Draft Environmental Scoping Report for the Proposed New Route P166-1/2 at Mbombela, Mpumalanga Province

A Report for: SANRAL

Authority No: NEAS Reference: DEA/EIA/0001338/2012

DEA Reference: 14/12/16/3/3/2/384

Date: February 2013

THE SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LTD

Reg. No.1998/009584/06

Royal HaskoningDHV

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DOCUMENT DESCRIPTION

Client:
SANRAL

Report Name:
Draft Environmental Scoping Report for the Proposed New Route P166-1/2 at Mbombela, Mpumalanga Province.

Royal HaskoningDHV Reference Number:
E02.JNB.001223

DEA Reference:
NEAS Reference: DEA/EIA/0001338/2012
DEA Reference:14/12/16/3/3/2/384

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Mbombela, Mpumalanga Province

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MAIN ACRONYMS

DEA	Department of Environmental Affairs
DMGDP	Draft Mpumalanga Growth and Development Plan
MDEDET	Mpumalanga Department of Economic Development, Environmental and Tourism
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMF	Environmental Management Framework
ESS	Environmental Scoping Study
ESR	Environmental Scoping Report
GN	Government Notice
HGM	Hydro-geomorphology
IDP	Integrated Development Plan
SANBI	South African National Biodiversity Institute
SANRAL	South African National Roads Agency Limited
EMPr	Environmental Management Programme
I&AP	Interested and Affected Party
NEMA	National Environmental Management Act
SADC	Southern Africa Development Community
SDF	Spatial Development Framework

1 INTRODUCTION

Endecon Ubuntu Pty Ltd has appointed Royal HaskoningDHV (RHDHV) (formally known as SSI Engineers and Environmental Consultants) on behalf of the South African National Roads Agency Limited (SANRAL) to undertake the Environmental Impact Assessment (EIA) process for the proposed new route P166-1/2 in Mbombela, (Nelspruit), Mpumalanga Province. The environmental studies to be undertaken for the project will be divided into two phases namely:

- Environmental Scoping Study (ESS) which is presented in this report; and
- Environmental Impact Assessment Study (EIA) which will include an Environmental Impact Assessment Report (EIAR) as well as an Environmental Management Programme (EMPr).

The EMPr will be compiled based on the findings of the Environmental Impact Assessment Report, providing mitigation and management measures for the planning phase of the proposed project.

1.1 Project Background and Description

The P166-1/2 is a proposed new road which will run roughly in parallel to the existing R40 road that passes through the town of Mbombela (Nelspruit) and which runs to White River. The section of the P166-1/2 under review starts at Maggiesdal, south of Mbombela, where an interim connection to the R40-2 (the portion of the R40 running south from Mbombela towards Barberton) needs to be defined, ending north of White River where it meets the R40-4 (the portion of the R40 running north from White River towards Hazyview, as indicated in Figure 1 below. This proposed route is approximately 32 kilometres long and follows an alignment in close proximity to newly established townships/ planned areas of development and plantations.

The preliminary design for the road was completed more than twenty years ago and sections of this road were proclaimed though an environmental study was never undertaken. This was done, however, before the promulgation of the National Environmental Management Act (NEMA) (No 107 of 1998, as amended) and the EIA Regulations (1997, 2006 & 2010) and therefore no RoD/Environmental Authorisation in terms of these Regulations was obtained. A short section of the route was constructed in 2010 for convenient access from the new N4 Nelspruit bypass to the Mbombela Stadium for the 2010 Soccer World Cup, which obtained a separate authorisation from the Department of Environmental Affairs in 2008. Some township development and planning has also taken place in close proximity to the route.

Endecon Ubuntu, a civil engineering firm from Mbombela, has been appointed by SANRAL to review the existing preliminary design for the designated section of the P166-1/2. The purpose of the review is to test the previously defined road reserve for a cost-effective, affordable and environmentally responsible design and to make adjustments if and where necessary. Environmental Authorisation is required for route determination as defined in the 2010 EIA Regulations. Environmental Authorisation will ensure the authorised corridor obtain legal status in the planning statues of the area such as Spatial Development Framework (SDF) and Environmental Management Framework (EMF) (if any).

1.1.1 *Investigation Analysis*

The section of the P166 under investigation (which includes portions of both P166-1 and P166-2) is not completely covered by Provincial Declarations. Basic Design Plans were used to create the alignment of the road to fill the gaps between declarations. The road is intersected by three National Roads, namely the N4/7 into Nelspruit, N4/7X bypass and R40/4. The road reserve varies, but is predominantly 80m wide. It is proposed that the road reserve width of the undeclared portions as mentioned above not be reduced but left as is, in order to accommodate a 6 lane dual carriageway road.

The following SANRAL typical cross sections have been used for the purposes of this project:

- TD-R-XS-001-V1: Typical cross sections for single lane ramps (refer figure 1 below);
- TD-R-XS-002-V1: Typical cross sections for dual carriageway, 6 lanes divided (refer figure 2 further below).

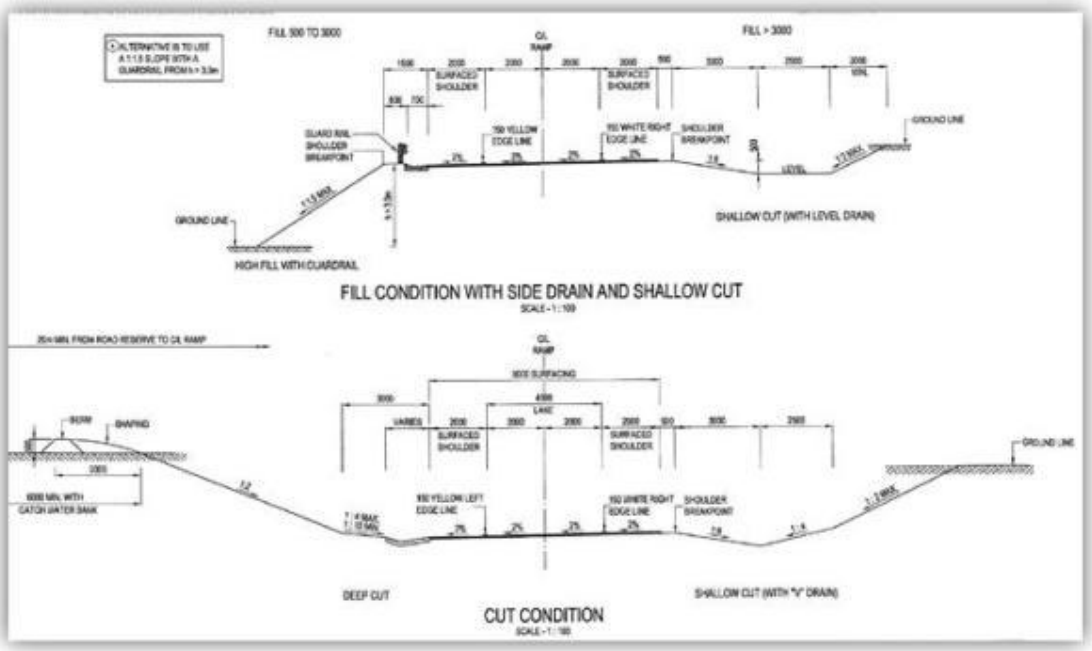

FIGURE 1: TYPICAL CROSS SECTION: SINGLE LANE RAMPS

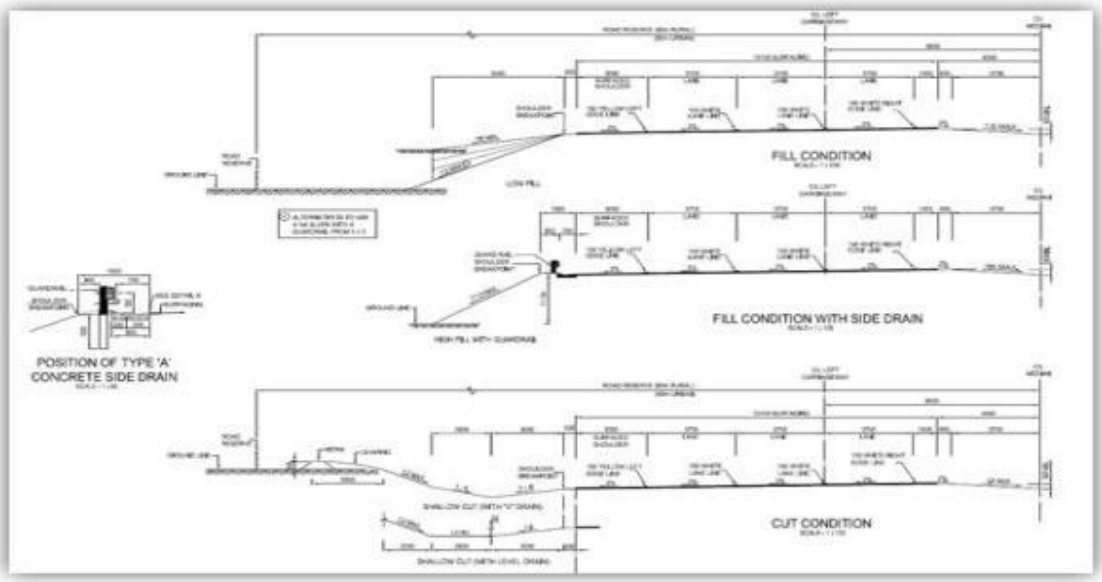

FIGURE 2: TYPICAL CROSS SECTION DUAL CARRIAGEWAY 6 LANE DIVIDED

1.2 Project Need and Desirability

SANRAL is continuously monitoring the traffic growth patterns on the National Road 4 (N4) route and other national roads such as R40. It appears that, as a result of strong growth in traffic volumes on the route and the exceptional economic growth of the Mbombela Region, the N4 and R40 routes through Mbombela will become oversaturated i the long term. Such over-saturation will have an international impact (internationally, the N4 is the main link between South Africa and Mozambique) and local impact. I. In addition the R40 link to the other National Road 2 (N2) route is important as it is the main corridor from the Richards Bay and Durban harbours. South African exports through the Maputo harbour are steadily increasing and may even grow stronger with future planned improvements of the Maputo harbour. It is essential for the Southern African Development Community (SADC) to enhance opportunities for sustained economic growth in the region. It is also important that the N4 and R40 links are not future stumbling blocks as a result of capacity constraints. It is therefore essential that an alternative route such as the P166-1/2 within the region be investigated to relieve future N4 and R40 traffic congestion. In this context there is a need for such a project to increase traffic flow capacity in the Mbombela / White River area.

In the context of desirability, such a new road route would be desirable if it were to alleviate future congestion and to facilitate economic development and linkages between the different parts of eastern Mpumalanga by providing a bypass for people travelling between Barberton and White River, thus facilitating access and cutting down travel time. However the desirability of the proposed project also needs to be examined in the context of current land use and development patterns in the affected area, in terms of how such a major road would impact existing land uses and other aspects of the affected environment. The rapid economic development of the wider Mbombela area has been alluded to above. This has meant that much of the area in the vicinity of the old servitude has undergone development since the servitude was originally proclaimed, resulting in many residential

and other land uses existing in close proximity, or even within the servitude. This has implications in terms of how the development of a road may affect areas immediately adjacent to, or in proximity of the servitude in terms of a number of social environmental parameters such as noise, visual impact, and social impact. People in the vicinity of the road who stand to be affected in this way by the proposed road may thus not view the road as being desirable, and as such this Environmental Scoping Report aims to identify all possible issues and impacts relating to the proposed development. The proposed development may also be viewed as being undesirable if it were to cause certain types of impact on the biophysical environment, such as impacts on remnant natural areas in a context of increasing fragmentation of the natural environment or surface water-related impacts.

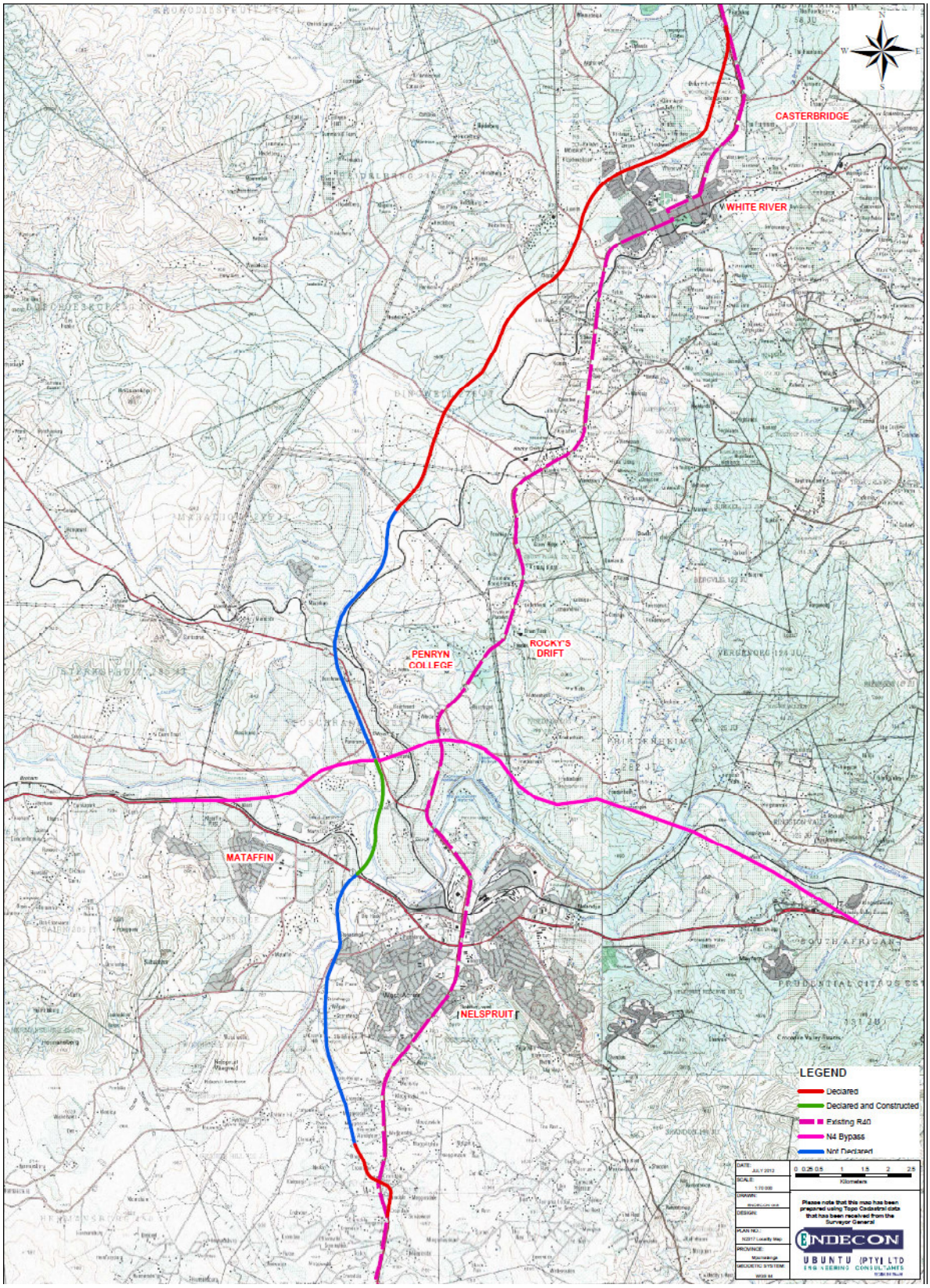

FIGURE 3: P166 SERVITUDE MAP WITHOUT PROPOSED ALTERNATIVE ALIGNMENTS

1.3 Environmental Study Requirements

The route determination of a new road and design of associated physical infrastructure is an activity which may result in detrimental environmental impacts according to Government Notice R545 of June 2010 promulgated under the National Environmental Management Act (Act 107 of 1998, as amended). SANRAL thus requires an Environmental Authorisation (EA) from the (National) Department of Environmental Affairs (DEA) to undertake the proposed project. DEA will be the lead authority subject to comments from the local authority namely the Mbombela Local Municipality and *inter alia* the following Departments:

- Mpumalanga Department of Economic Development, Environment and Tourism (MDEDET);
- Mpumalanga Department of Public Works, Roads and Transport;
- Mpumalanga Department of Land Affairs; and
- Department of Water Affairs (Mpumalanga Regional Office)

SANRAL acknowledges the need for undertaking comprehensive environmental studies in order to identify and evaluate all potential environmental impacts (social and biophysical) associated with the proposed project which is also a legislative requirement. Accordingly RHDHV have been appointed as an Independent Assessment Practitioner (EAP) to undertake the environmental studies.

When interpreting Government Notices R544, R545 and R546 it is observed that the following activity is triggered by the proposed project:

TABLE 1: LISTED ACTIVITY

Indicate the number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice) :	Describe each listed activity as per project description
R545, 18 June 2010 (List 2)	18-	The proposed project is for the determination of a new route which will be environmentally and technically feasible for the construction phase of the P166, 1-2.

NB: It must be noted that the proposed project is for the determination of a new route which will be environmentally and technically feasible for the construction phase of the P166, thus the activities which will be triggered and other components related to the construction of the project will be covered by separate Environmental Studies which will be conducted at a later stage.

1.4 Details of the Environmental Assessment Practitioner

As alluded above Royal HaskoningDHV has been appointed as the independent Environmental Assessment Practitioner (EAP) by Endecon Ubuntu, to undertake the appropriate environmental studies for this proposed project. The professional team of RHDHV have considerable experience in the environmental management and EIA fields. RHDHV has been involved in and/or managed several of the largest Environmental Impact Assessments undertaken in South Africa to date. A specialist area of focus is on the assessment of multi-faceted projects, including the establishment of linear

developments (national and provincial roads, and power lines), bulk infrastructure and supply (e.g. wastewater treatment works, pipelines, landfills), electricity generation and transmission, the mining industry, urban, rural and township developments, environmental aspects of Local Integrated Development Plans (LIDPs), as well as general environmental planning, development and management.

TABLE 2: PARTICULARS OF THE EAP

Details	
Consultant:	Royal HaskoningDHV (formerly SSI Engineers and Environmental Consultants (Pty) Ltd)
Contact Persons:	Ntseketsi Lerotholi and Malcolm Roods
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Expertise:	Malcolm Roods is a Principal with RHDHV specializing in Environmental Impact Assessments (EIA) for electricity supply (generation, transmission and distribution), road infrastructure, residential developments as well as water management projects. This builds on a broad government background, which has made him particularly flexible. His past experiences include 6 years public service which included policy development, environmental law reform and EIA reviews. His experience also includes 5 years of environmental consulting in the field of Impact Assessment and Authorisation Applications, with a focus on legislative requirements and sector area management. He is also a certified Environmental Assessment Practitioner with the Interim Certification Board (ICB) for EAP of South Africa.
	Ntseketsi Lerotholi is Senior Environmental Scientist (*Pr Sci Nat* 400165/12) with a MSc in Environmental Biotechnology. Her expertise includes Environmental Impact Assessment Studies, Public Participation Process, Strategic Environmental Assessments Studies, Environmental Management Plans, Mining Right and Permits applications, Environmental Monitoring and Audits, Environmental Training and Integrated Environmental Management. She has undertaken various EIA projects for linear infrastructure (such as roads, power lines etc).

1.5 Environmental Scoping Report Structure

The report structure is summarised in Table 3

TABLE 3: REPORT STRUCTURE

Sections	Content
Section 1	Introduction and background to the project and Environmental Study requirements.
Section 2	Legal requirements, brief Scoping of National legislation and guidelines.
Section 3	Technical description of the project
Section 4	Project alternatives, consideration of sites, route alignments and no go option for the project
Section 5	Scope of Environmental Investigations, approach to undertake the Scoping Study.
Section 7	Description of potential Environmental Impacts - Biophysical
Section 7	Description of potential Environmental Impacts - Social
Section 8	Overview of the Public Participation undertaken for the Project.
Section 9	Conclusion and recommendations of the Environmental Scoping Study
Section 10	Plan of Study for EIA, overview of specialist's studies required for the EIA Phase of the project and timeline for the completion of the EIA Process.

2 PROJECT ALTERNATIVES

2.1 Alignment Alternatives

In terms of the Environmental Impact Assessment (EIA) Regulations as well as the National Environmental Management Act (as amended), feasible and reasonable alternatives are required to be identified and evaluated within the Environmental Impact Assessment process. The identified feasible alternatives need to be evaluated in terms of social, biophysical, economic and technical factors.

The proposed project is of linear in nature, thus four alternative alignment routes (in certain sections of the route where environmental sensitivities have been identified) have been created and will be evaluated for the project. The identification of alternatives took into consideration the terrain and the built up areas (businesses and residential) that are located adjacent to the study area. The four alternative (to the existing servitude) alignment routes are described below:

2.1.1 *Maggiesdal Alternative*

The Maggiesdal alternative indicated in **Purple** on Figure 4 below starts at the south of farm Maggiesdal JT and runs west of and roughly parallel to the existing P166 servitude indicated in **Orange** on Figure 4 towards the north passing through the Stone Henge Township and West Acres suburbs situated in the east until to the N4 where it joins the existing P166 servitude. The Maggiesdal alternative to the part of the existing servitude in the Maggiesdal / Stone Ridge / Stonehenge area was created in order to address mainly social issues related to the existing servitude, whereby development of new estates and housing has occurred in immediate proximity to the existing servitude. The Maggiesdal alternative has been created to potentially avoid the resultant social impacts, although biodiversity issues and surface water issues and potential impacts are associated with the Maggiesdal alternative as it traverses a number of surface water crossings and an area of largely undisturbed bushveld habitat.

2.1.2 *Phumlani Alternatives*

The Phumlani Alternatives were created in order to address primarily social issues relating to the Msholozi / Phumlani Informal settlement. The Msholozi settlement has been established over a long stretch of the existing servitude (approximately 1.65km) and thus a number of households would need to be relocated if the proposed road route was to be finalised along the existing servitude. Along with the social issues associated with relocation of households, a number of social issues are associated with the presence of a main arterial road running through a densely populated informal settlement. Accordingly a number of alternatives were identified in the vicinity of the informal settlement (in the area to the south of White River) that avoid the informal settlement. As described below, alternatives were identified to the east and west of the informal settlement. The alternatives are associated with a number of potential environmental issues, including impacts on existing agricultural activities in the Heidelberg area and in the area immediately south of White River and the R357 (along the Phumlani 1 and Phumlani 3 alternatives respectively), as well as social issues (impacts on smallholdings) along Phumlani Alternative 3, and both biodiversity and surface water crossing issues, in particular in the area west of Rocky Drift and south of the Heidelberg Road.

2.1.2.1 Phumlani Alternative 1

The Phumlani alternative 1 indicated in **Pink** on Figure 4 below and is the western-most aligned of the three Phumlani alternatives. It starts at the south of the farm Dingwell 276 and runs roughly parallel to the proposed P166 servitude passing close to Phumlani Township. It ends at White River where it joins /connects to the existing P166 servitude.

2.1.2.2 Phumlani Alternative 2

The Phumlani alternative 2 indicated in **Green** on Figure 4 below starts at the middle of the farm Dingwell 276 JT and runs west of and roughly parallel to the existing P166 servitude and east of the Phumlani alternative 1towards White River where it connects with the existing P166 servitude.

2.1.2.3 Phumlani Alternative 3

The Phumlani alternative 3 indicated in **Yellow** on Figure 4 below starts in the middle of the farm Dingwell 276 JT and runs east of and roughly parallel with the existing P166 servitude in an easterly and northerly direction moving towards White River where it connects with the existing P166 servitude.

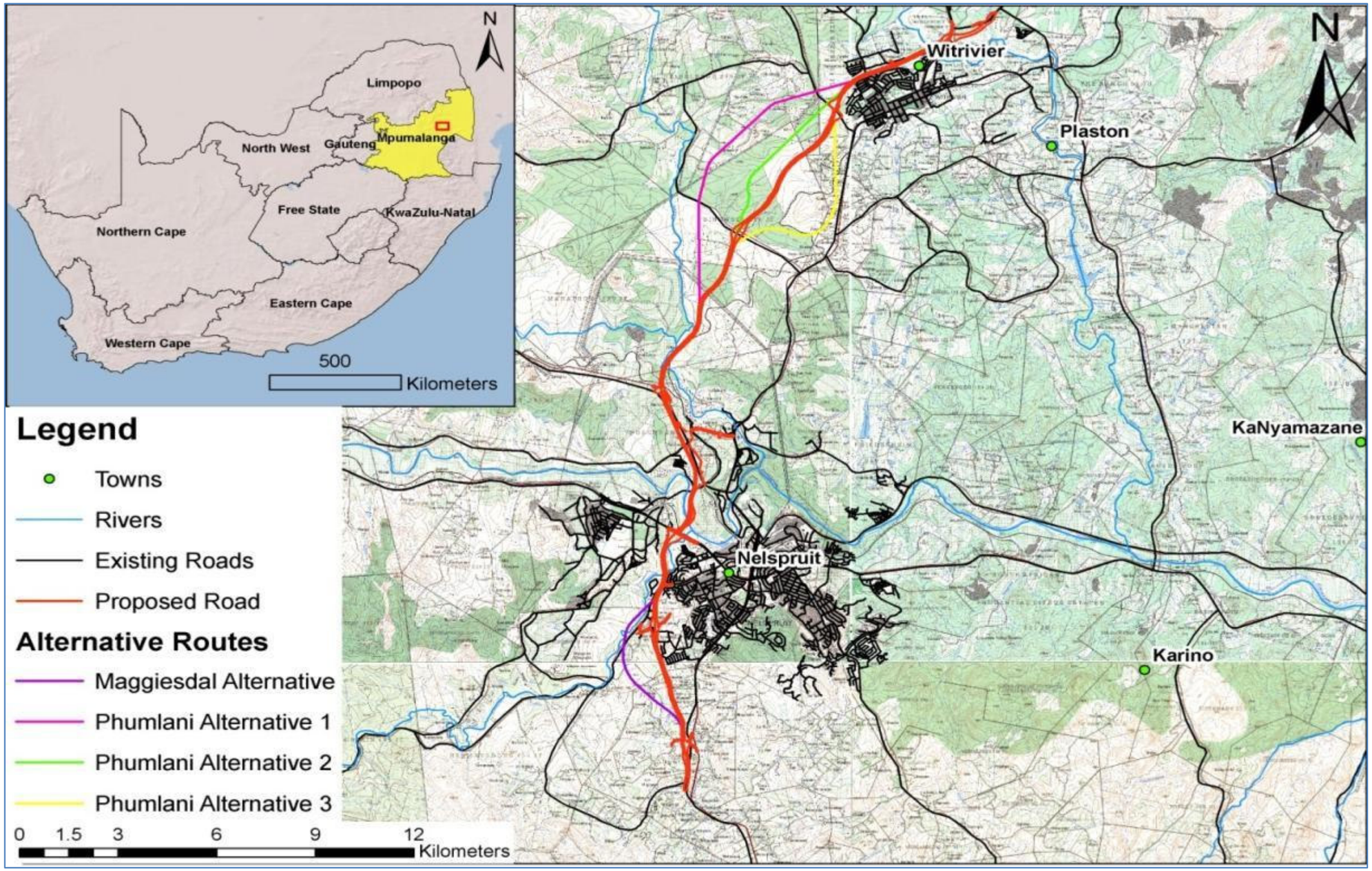


FIGURE 4: LOCALITY MAP WITH PROPOSED ALTERNATIVES

2.1.3 *No go Alternative*

If the proposed project does not proceed as planned the status quo will remain the same; i.e. the existing R40 road that passes through the centre of Mbombela and along its current alignment towards White River will provide the route for travel between Mbombela and White River. The benefits provided by a new bypass of ease of access and reduction of travel time as well as the creation of a road to handle the anticipated increase in traffic along the N4 and R40 corridors will not materialise. In the context of this anticipated increase in traffic this would entail that the concomitant increase in congestion on the existing roads would not be mitigated unless another solution to alleviate congestion was found. Not finding a solution to alleviate increasing congestion may have an impact on travel time and 'lifestyle quality' thus potentially having knock on effects in terms of economic development..

Conversely none of the negative impacts that have been identified as potentially occurring due to the proposed road are likely to materialise should the project go ahead. Most importantly the following impacts would be unlikely to occur:

- Impacts on biodiversity (e.g. fragmentation)
- Impacts on surface water bodies (especially in terms of altered aquatic ecology and hydrology)
- Impacts on the social environment (especially relating to potential relocation and potential loss of property value)

3 LEGAL REQUIREMENTS

A preliminary review of the relevant legislation was undertaken in order to identify any legal issues related to the proposed project. Below is the applicable environmental and transportation legislation, which must be considered by SANRAL during the implementation of the proposed project.

TABLE 4: LEGAL REQUIREMENTS

Legislation	Sections	Relates To
The Constitution Republic of South Africa (1996)	Chapter 2	Bill of Rights.
	Section 24	Environmental Right
National Environmental Management Act (No 107 of 1998)(as amended)	Chapter 2	Defines the strategic environmental management goals and objectives of the government. Applies throughout the Republic and to the actions of all organs of state that may significantly affect the environment.
	Chapter 5	Integrated Environmental Management
	Section 24(a) &(d) &24(5)	Listed activities and Regulations
	Chapter 7	Compliance Enforcement and Protection

Legislation	Sections	Relates To
	Section 28	The developer has a general duty to care for the environment and to institute such measures as may be needed to demonstrate such care.
National Heritage Resources Act (No 25 of 1999) and regulations	Section 34	No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority.
	Section 35	No person may, without a permit issued by the responsible heritage resources authority destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or paleontological site.
	Section 36	No person may, without a permit issued by the South African Heritage Resource Agency (SAHRA) or a provincial heritage resources authority destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority. "Grave" is widely defined in the Act to include the contents, headstone or other marker of such a place, and any other structure on or associated with such place.
	Section 38	This section provides for Heritage Impact Assessments (HIAs), which are not already covered under the ECA. Where they are covered under the ECA the provincial heritage resources authorities must be notified of a proposed project and must be consulted during the HIA process. The Heritage Impact Assessment (HIA) will be approved by the authorising body of the provincial directorate of environmental affairs, which is required to take the provincial heritage resources authorities' comments into account prior to making a decision on the HIA.
National Environmental Management: Air Quality Act (No 39 of 2004)	Sections 26-27	Control of fuels.
	Section 32	Control of dust.
	Section 34	Control of noise.
	Section 35	Control of odours
National Water Act (36 of 1998)	Section 4	Provides Principles that govern the distribution, use and management of water resources in the Republic South Africa.
	Section 19	Prevention and remedying the effects of pollution
	Section 20	Control of emergency incidents
	Section 21	Control of Water Use
	Section 22	Permissible Water Use

Legislation	Sections	Relates To
National Environmental Management: Biodiversity Act (10 of 2004)		Provides management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act107 of 1998; the protection of species and ecosystems that warrant national protection and the sustainable use of indigenous biological resources.
National Forest Act (Act No 84 of 1998)		This Act provides for the protection, management and utilisation of forests; the protection of certain plant and animal life; the regulation of trade in forest produce; the prevention and combating of veld, forest and mountain fires. The Act also enforces the necessity for a permit to be obtained prior to any clearing of indigenous vegetation.
National Road Traffic Act (No 93 of 1996)		Road safety
Minerals and Petroleum Development Act (No 28 of 2002)	Section 39	Environmental Management Plan for establishing borrows pits.
	Section 41	Finalise provision for construction.
The South African National Road Agency Limited & National Roads Act No 7 of 1998	Chapter 1	The section of the Act makes provision for the establishment of the South African National Roads Agency.
	Chapter 3	Powers Function and Responsibilities of the Agency are outlined.
	Section 25(1)	The Agency is given responsibility to perform all strategically planning with regards to national roads system planning, design, construction, operation, management, control, maintenance and rehabilitation of national roads for the Republic, and is responsible for the financing of all those functions in accordance with its business and financial plan, so as to ensure that government's goals and policy objectives concerning national roads are achieved.
Mpumalanga Biodiversity Conservation Plan (2007)		
Road Transportation Act (No 74 of 1977)		
Mpumalanga Roads Act (No 1 of 2008)		
Mbombela Local Municipality Standard traffic by-laws		
Mbombela Local Municipality Spatial Development Framework 2007 and Draft (2011-2030)		
Mbombela Local Municipality Integrated Development Plan 2012 to 2017		
Other Local Municipality Bylaws		

4 SCOPE OF ENVIRONMENTAL INVESTIGATIONS

4.1 Approach in Undertaking the Study

An issues based Environmental Scoping Study (ESS) for the proposed new route P166-1/2 at Mbombela in the Mbombela Local Municipality has been undertaken in accordance with the Environmental Impact Assessment (EIA) Regulations published in Government Notice R543(18 June 2010) in terms of the National Environmental Management Act (NEMA; No 107 of 1998)(as amended).

4.2 Authority Consultation

The relevant authorities, that are required to provide input to the proposed project, were consulted from the outset of this study, and will be engaged throughout the project process. The required application for environmental authorisation form was submitted to the Department of Environmental Affairs (DEA) on the **05th of July 2012** and was acknowledged on **23rd July 2012.** The Department of Environmental Affairs is the Competent Authority mandated to process and approve all applications belonging to the State Owned Companies (SOC) and the South African National Roads Agency Limited (SANRAL), a state owned company, is the applicant for this project. DEA is required to provide a decision regarding the proposed project pending comments from provincial Departments which *inter alia* includes the Mpumalanga Department of Economic Development, Environment and Tourism (MDEDET).

4.3 Environmental Scoping Study

The Environmental Scoping Study is aimed to address the following:

- Identification of potential positive and negative environmental impacts (biophysical and social);
- Identification of environmental "hotspots" which should be avoided where possible due to potentially significant impacts or sensitive environments;
- Description of project alternatives that was identified;
- Evaluation of the identified feasible route alternatives;
- Optimisation of positive impacts to the benefit of the local environment and community;
- To enable I&APs to verify that their contributions have been captured, understood and interpreted; and
- To afford I&APs and stakeholders an opportunity to raise more issues if there are any.

Impacts on, *inter alia,* climate, topography, biodiversity, sites of archaeological, cultural and historical interest, as well as the social environment were identified by means of a site inspection which was undertaken on **31 July 2012**, a desk-top review of available information and relevant literature for the study area, consultation with specialists and key stakeholders is provided in Chapter 5 below.

5 DESRIPTION OF THE RECEIVING BIOPHYSICAL ENVIRONMENT

5.1 Terrain

The terrain of the area is moderately undulating, with slopes of around 2-5% occurring in certain areas, with terrain which becomes steeper (10-30%) in certain parts, especially in the north and closer to White River. The altitude varies from around 700 m above sea level at the river to over 900 m above sea level at the highest points. As most of the study area is underlain by granite geology, prominent granite exfoliation domes occur across much of the study area. The terrain generally rises in elevation as the route moves from the town centre of Mbombela into the hilly terrain to the south of the city along the Barberton Road, and as one moves north towards White River.

5.2 Climate

This section describes the general prevailing climatic conditions within the study area during the four seasons of the years which are Autumn, Winter, Summer and Spring.

5.2.1 *Temperature*

The mean daily maximum temperature for the study area is approximately 21°C - 28°C in January and with the coldest 6°C - 15.0°C in July.

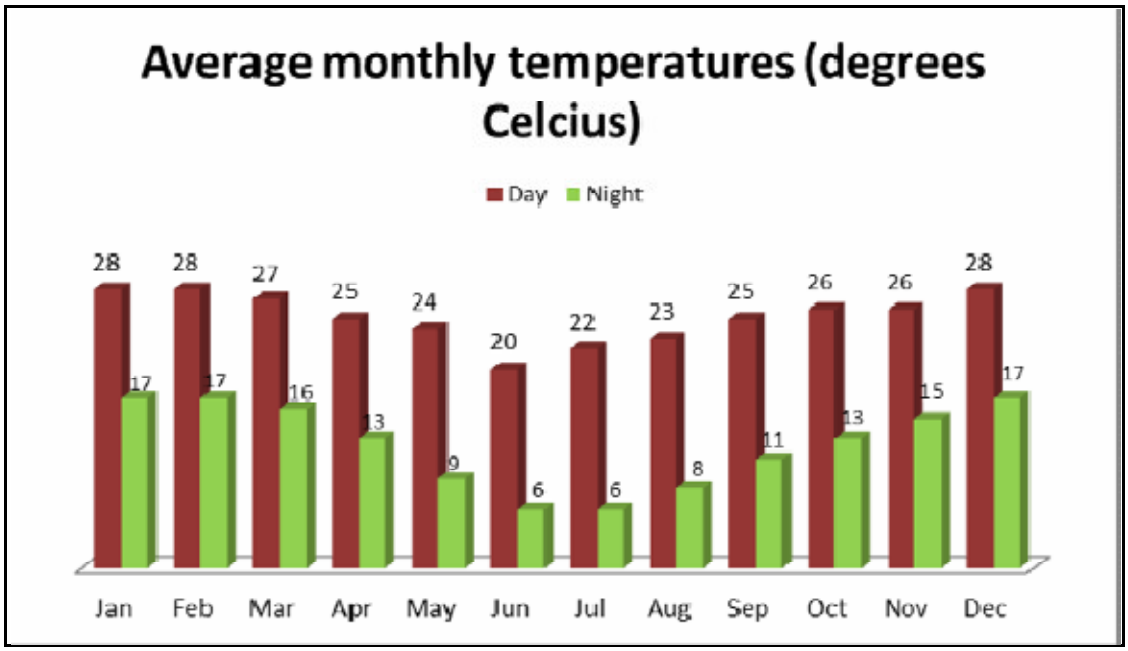


FIGURE 5: AVERAGE MONTHLY TEMPERATURES

5.2.2 *Rainfall*

The study area experiences summer rainfall with dry winters with mean annual precipitation of approximately 667 mm of rain. The highest monthly rainfall in summer is 120 mm in December and the lowest rainfall during June (2 mm). Rainstorms are often violent with severe lightning and strong westerly or easterly winds and sometimes accompanied by hail. The winter months of June, July and August are dry and their combined rainfall comprises approximately 3.8% of the total annual precipitation.

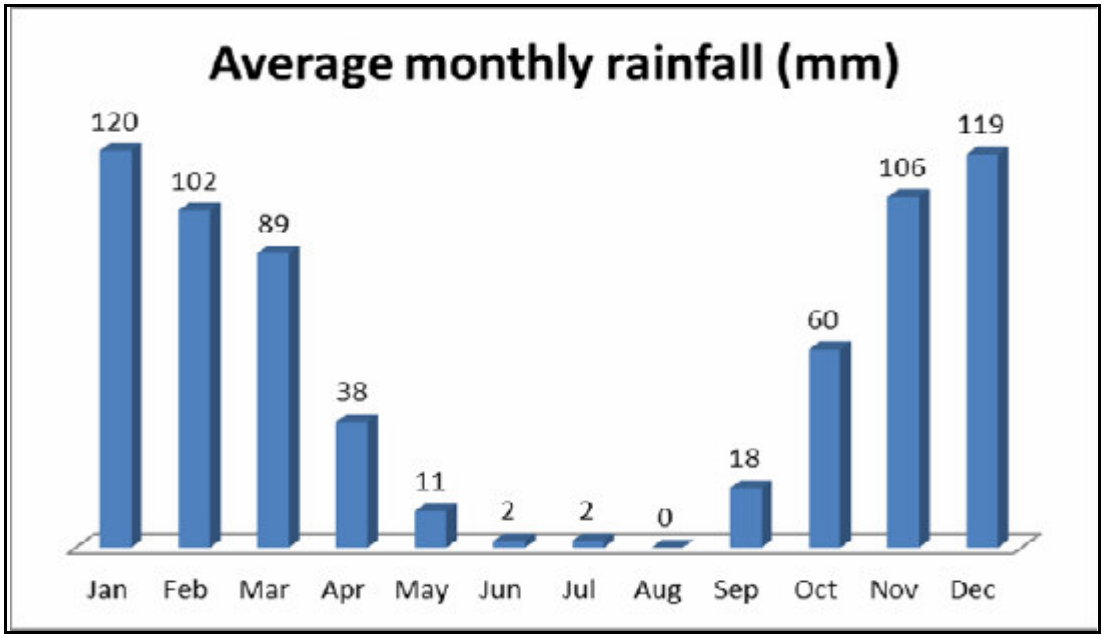


FIGURE 6: AVERAGE MONTHLY RAINFALL

5.2.3 *Wind*

The wind direction in the area frequently moves towards the north-east at an average speed of 4.65 m/s. No extreme wind speed cases have been recorded in the area.

5.3 Agriculture, Geology and Soils

The Agriculture, Soils and Geology study was conducted by Gary Paterson from ARC through a desktop study. This section describes the soils of the study area and its characteristics.

5.3.1 *Geology and Soils*

The geology underlying the study area is gneiss and migmatite of the Nelspruit Granite Suite (Geological Survey, 1986). The study area is characterised by three land types, namely Ab42, Ab43 (Red, structureless, highly weathered soils) and Ba67 (Red, structureless, highly weathered soils, some with underlying plinthite). The distribution of these land types is shown in Figure 7 below. The soils were classified according to MacVicar *et al*, 1977), with the dominant agricultural potential class within each land type indicated in **bold type**. The main characteristics of each of the land types are given in Table 5 below. The various proposed alternatives for the P166 route do not involve significantly different soils or terrain than the main proposed route. Table 5 indicates that within land types Ab42 and Ab43, most of the soils occurring can be regarded as high potential agricultural soils. Phumlani Alternative 1 was identified as traversing areas under cultivation (citrus fruits) from the desktop study; however this will be verified during the site survey.

TABLE 5: SOIL PROPERTIES PER LAND TYPE

Land type	Dominant soils	Sub-dominant soils	Slopes	Agricultural Potential (%)
Ab42	Hu16/17; 600-1200 mm; SaCl-Cl 53%	Hu18; 900-1200 mm; Cl 12% Rock & shallow soils 10%	10-30%	H: 75.7 M: 11.2 L: 13.1
Ab43	Hu16/17; 900-1200 mm; SaCl-Cl 54%	Hu18; 900-1200 mm; Cl 31%	8-20%	H: 92.0 M: 1.5 L: 6.5
Ba67	Rock & shallow soils 31%	Hu25/26/35/36; 900-1200 mm; SaLm-SaClLm 27%	2-5%	H: 42.0 M: 24.0 L: 34.0

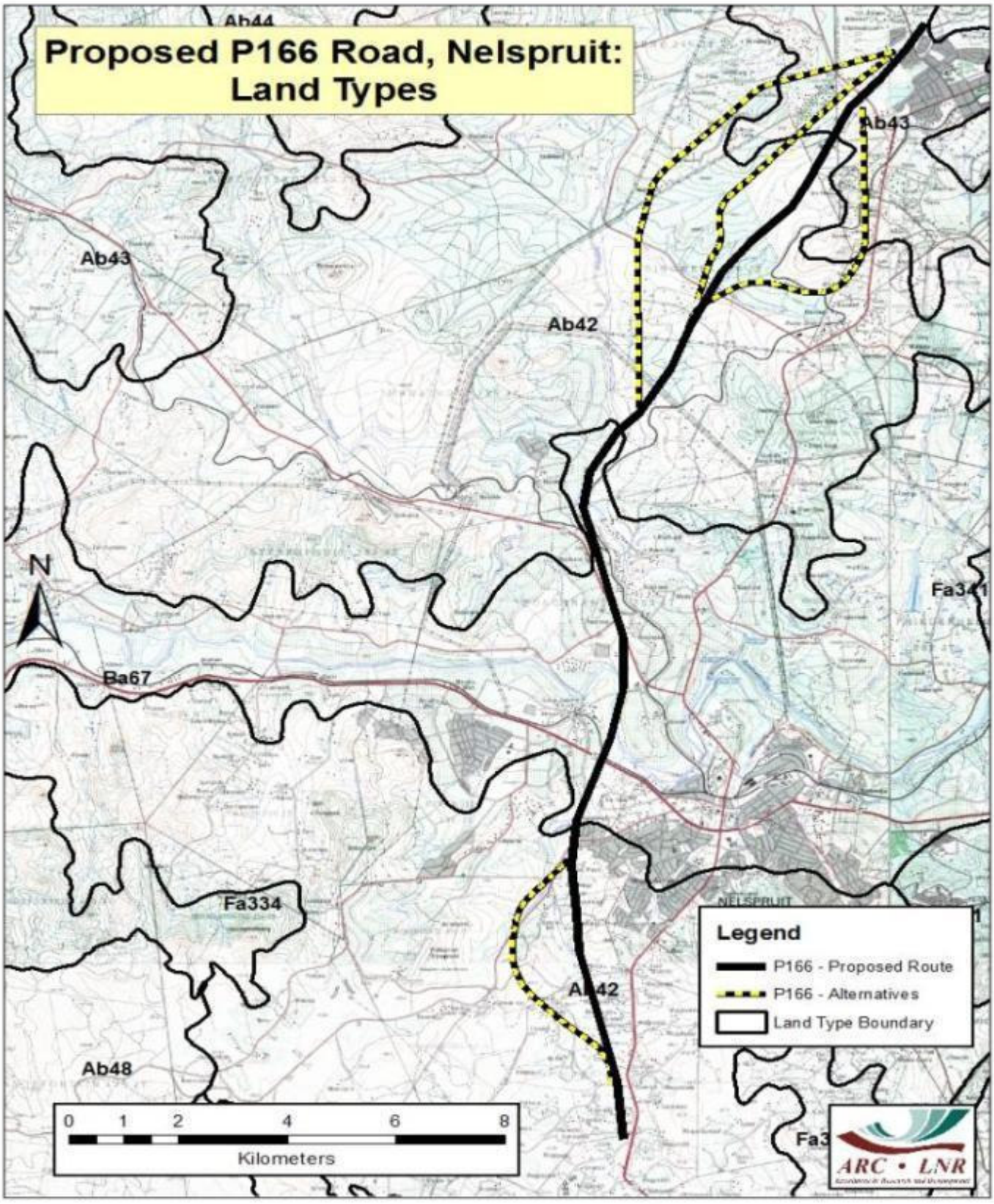


FIGURE 7: LANDTYPES OF THE STUDY AREA

5.3.2 *Agriculture Potential and Erodibility*

The proposed P166 and its associated alternatives will traverse through land types Ab42, Ba67 in the vicinity of the Crocodile River. The soils of the two land types are similar, with Ba67 containing a higher percentage of shallow soils, but both land types are dominated by red, moderately deep to deep, medium- to heavy-textured soils of the Hutton form, which are generally very favourable for cultivation, despite the high clay content (35-55%) in places within Ab42. The main limiting factor is terrain. Land type Ba67 occurs in the footslopes and river plain area of the Crocodile River, where cultivation is relatively easy on the flatter slopes. This is evidenced by the extensive citrus, sugar cane and other cultivation along the river. Land type Ab42, on the other hand, especially closer to the Marathon substation, has significantly steeper slopes, up to 30% in places, so that cultivation is difficult, if not impossible. Large parts of the eastern Mpumalanga escarpment have similar soils and terrain, and the only possible land use is forestry. The soils in the study area, due largely to their kaolinitic mineralogy, are inherently stable soils not prone to erosion. However erosion can occur on disturbed steep slopes when they are not rehabilitated.

5.4 Hydrology (Wetlands)

The Hydrology study was conducted by Paul da Cruz from Royal HaskoningDHV through a desktop and preliminary site inspection. This section describes the general water resources occurring in the study area, their characteristics and potential impacts in relation to the proposed P166.

5.4.1 *Surface Water and Wetlands Hydro-geomorphic Forms*

The study area is characterised by a number of surface water features; the main rivers draining through the study area are the Crocodile River which runs from an east to westerly direction and the Nels River that drains in a southerly direction, with a number of other smaller perennial (such as the Sandspruit and Gladdespruit) and non-perennial streams bisecting the proposed route and its alternatives.

There are a number of different types of surface water features in the study area, including a number of different wetland hydro-geomorphic forms. It is important to note that not all surface water features found in the study area can be classified as wetlands. There are likely to be certain drainage lines / rivers that occur along the proposed road in which no hydric soils are likely to occur, due mainly to the presence of outcropping / very shallow bedrock at the surface which precludes the occurrence of soils, or where recent alluvial deposits have not developed signs of hydromorphism. Although these areas are not strictly wetlands if hydric soils are not found within them, they are protected under the National Water Act in the same way as wetlands are protected.

Many of the surface water features encountered in the study area contain a distinct riparian zone. Under the National Water Act (No 36 of 1998) a riparian zone is defined as the physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterised by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas. The natural vegetation in the study area consists of savannah-type vegetation – i.e. very open woodland with a grassy understorey. Conversely

dense thickets and large trees occur along drainage lines, wetlands and rivers in the study area, with a typical tree and shrub species composition of species that tolerate or thrive in moist or even inundated conditions. Thus many riparian zones are wooded. In certain situations, the riparian zone is synonymous with hydric soils. Riparian zones are ecologically very important as they contain high species diversity and provide important food and refuge areas for biota, often forming linear natural habitats in an otherwise transformed context.

The wetland hydro-geomorphic (HGM) approach to wetland classification which uses hydrological and geomorphological characteristics to distinguish primary wetland units has been used to classify wetland types in South Africa (Kotze et al, 2005; SANBI, 2009). This approach has been used, and the classification system has been recently updated as part of the National Wetland Classification System for South Africa (SANBI, 2009). Under this classification system there are a number of different types of terrestrial (as opposed to marine) wetlands, certain of which are likely to occur in the study area:

- Channel
- Channelled Valley-Bottom Wetland
- Un-channelled Valley-Bottom Wetland
- Valley head Seep
- Hillslope Seep

A few HGM forms do not occur within the study area; including pans / depressions, true floodplains, and flats. The primary type of surface water feature occurring across the study area is the valley bottom wetland. Due to the undulating nature of the terrain, most wetlands occur within valley bottoms, and drain into the three major rivers (the Sand, Nels and Crocodile) that drain across the study area. Although valley bottoms are typically not very incised, the valley bottom wetlands are often relatively narrow, and no wide floodplain systems where depositional processes would predominate occur within the study area. The primary reason for the predominance of narrow valley bottom wetlands in the study area is due to the outcropping of granite bedrock in many parts of the study area that precludes the formation of wider depression systems. In the southern parts of the study area, the Crocodile River has cut a relatively deep, steep-sided valley into the underlying granitic bedrock.

FIGURE 8: NARROW VALLEY BOTTOM WETLAND TO THE SOUTH OF WHITE RIVER IN THE PHUMLANI INFORMAL SETTLEMENT

Where they occur, hillslope seepage and wetlands are hydrologically connected to the drainage network, and typically become valley bottom wetlands in their lower reaches. Hillslope seepage wetlands are found where groundwater discharges to the surface; groundwater outflow is the primary hydrological input to these wetlands. Where hillslope seepage wetlands were encountered in the study area, these were more often than not associated with bedrock outcropping of granite, especially in the form of lower outcrops at surface level. Groundwater in granite bedrock settings typically occurs within fractures within the bedrock. A study for a another project by the author in the same area (da Cruz, 2009) found that in a number of cases hillslope seepage wetlands were located immediately adjacent to, or downslope of these outcrops, suggesting that the granite outcrops are significant determinants of groundwater flow within the granite bedrock matrix, with groundwater discharge to the surface typically occurring at the boundary of these outcrops.

5.4.2 *Wetland Vegetative Characteristics*

Most wetlands in the study area are valley bottom systems, many of which are narrow features. The most commonly occurring vegetative form in these wetlands is *Phragmites mautitianus* reedbeds. The reeds occur across the channel or bed of the wetland, often with a very narrow vegetative transitional area to the surrounding non-wetland area. As described above, many of the wetlands display a wooded riparian component to their

vegetative structure, with a dense cover of trees and shrubs occurring on the channel banks, or even in the wetland itself. In some wetlands, particularly those in the higher-lying northern parts of the study area near White River, wetland vegetation was noted to consist of grasses rather than reedbeds.

FIGURE 9: *PHRAGMITES MAURITIANUS* REEDBEDS OCCURING IN WETLANDS

FIGURE 10: A VALLEY BOTTOM WETLAND ON THE PERIPHERY OF WHITE RIVER

5.4.3 *Water Features Crossed by the Proposed P166 and its Alternatives*

The Figures 11 to 13 below depicts all of the potential crossing points along the alternatives and the *main* alignment (including the proposed road reserve area) of the P166 road. The figures show the wetland or river type (in the context of wetlands the hydro-geomorphic wetland type is listed), as well as the name of the river, where applicable. The crossing name has been based on the quaternary catchment in which the crossing point is located. As can be seen, the vast majority of crossing points are valley bottom wetlands that are channelled. In addition to a number of larger perennial rivers crossed, the other wetland type crossed is the un-channelled valley bottom wetland. These wetlands are characterised by diffuse flow within the wetland area, which is important in the context of potential impacts on the hydrology of the wetland, as explored below.

At the present time 30 crossing points have been identified along the length of the proposed road (and within its reserve). The implications of the respective number and nature of crossings along the respective alternatives are discussed in the impacts section below.

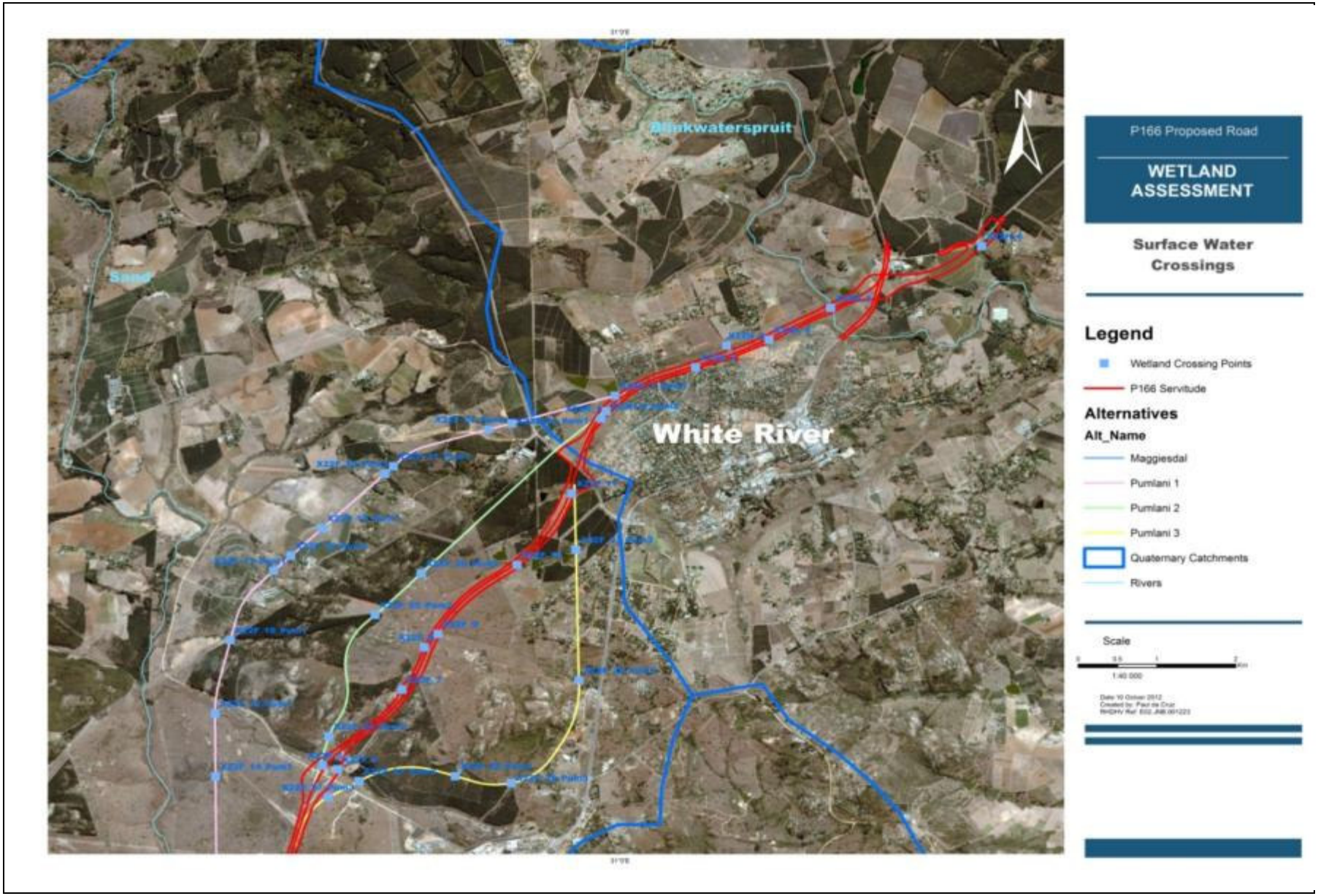


FIGURE 11: SURFACE WATER CROSSING POINTS IN THE WHITE RIVER AREA

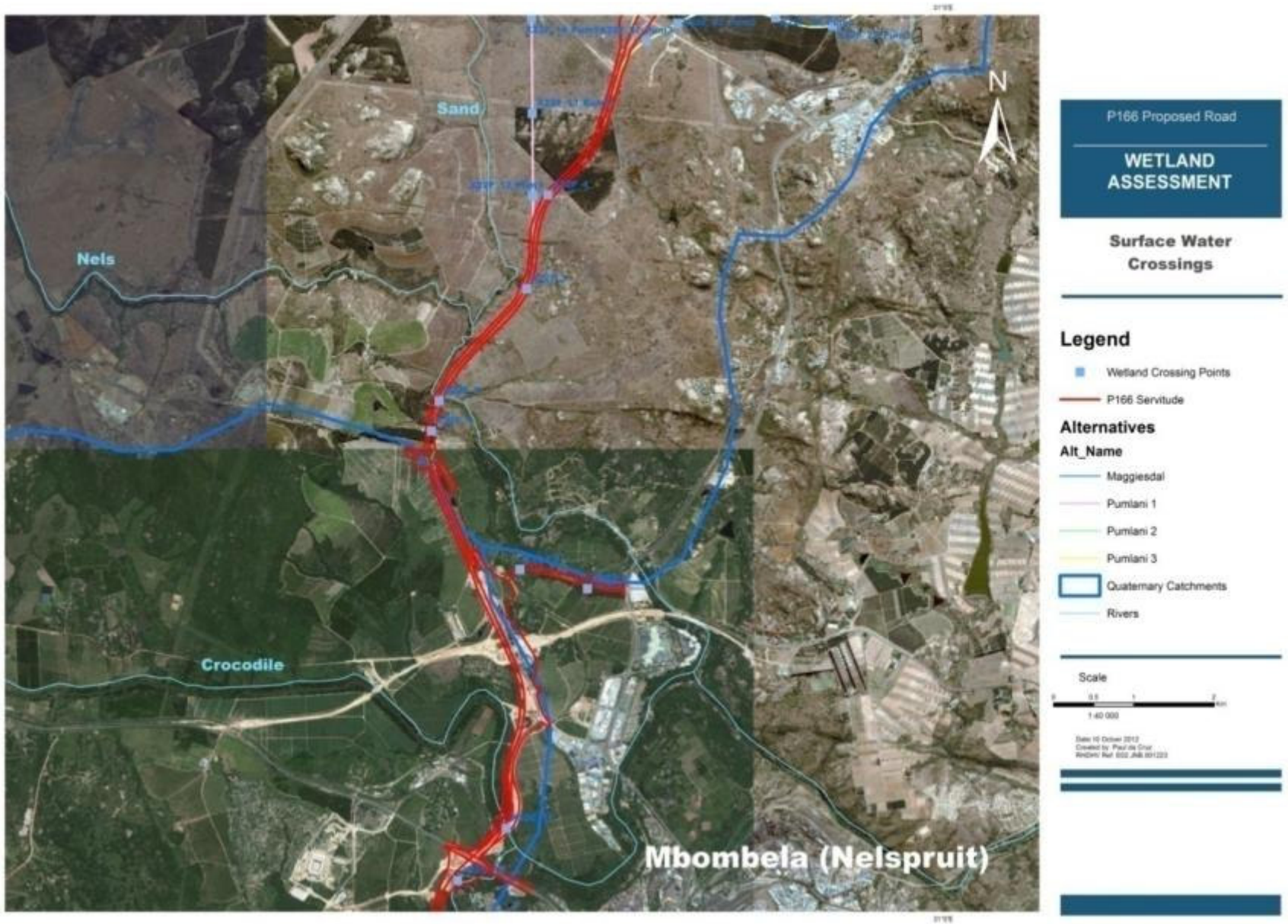


FIGURE 12: SURFACE WATER CROSSING POINTS IN NORTH OF MBOMBELA

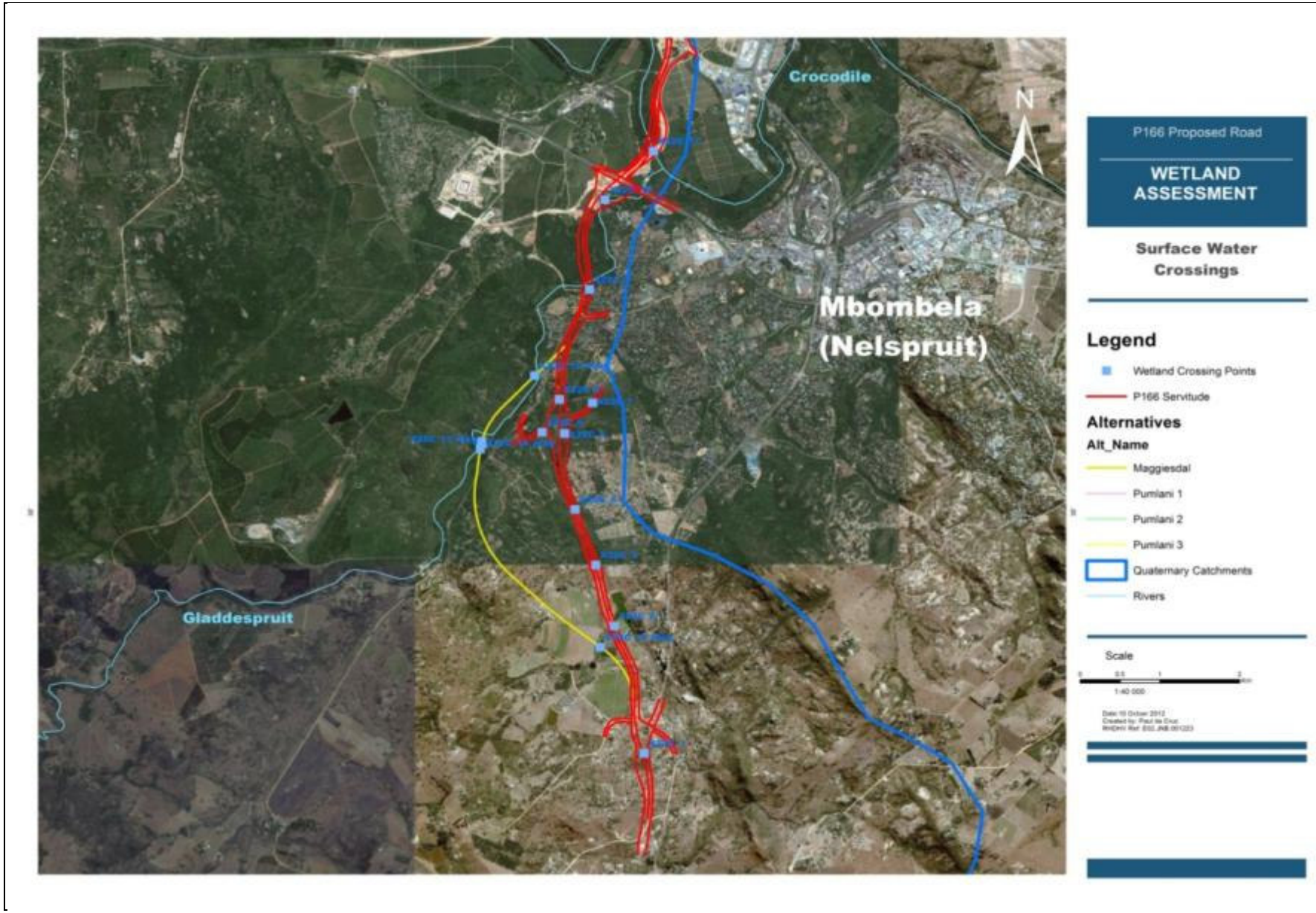


FIGURE 13: SURFACE WATER CROSSING POINTS IN SOUTH OF MBOMBELA

5.5 Biodiversity

The Biodiversity study was conducted by Clayton Cook an Independent specialist through a desktop study. This section describes the flora and fauna occurring in the study area.

5.5.1 *Vegetation*

The study area falls within the savannah biome of South Africa and specifically in the Central Bushveld Bioregion (SVcb) (Mucina & Rutherford, 2006). This bioregion has the highest number of vegetation types of the savannah bioregions. On a smaller scale the study area is located within Legogote Sour Bushveld (SVI 9) with a small section of the Pretoriuskop Sour Bushveld (SVI 10) (Mucina & Rutherford, 2006) also present.

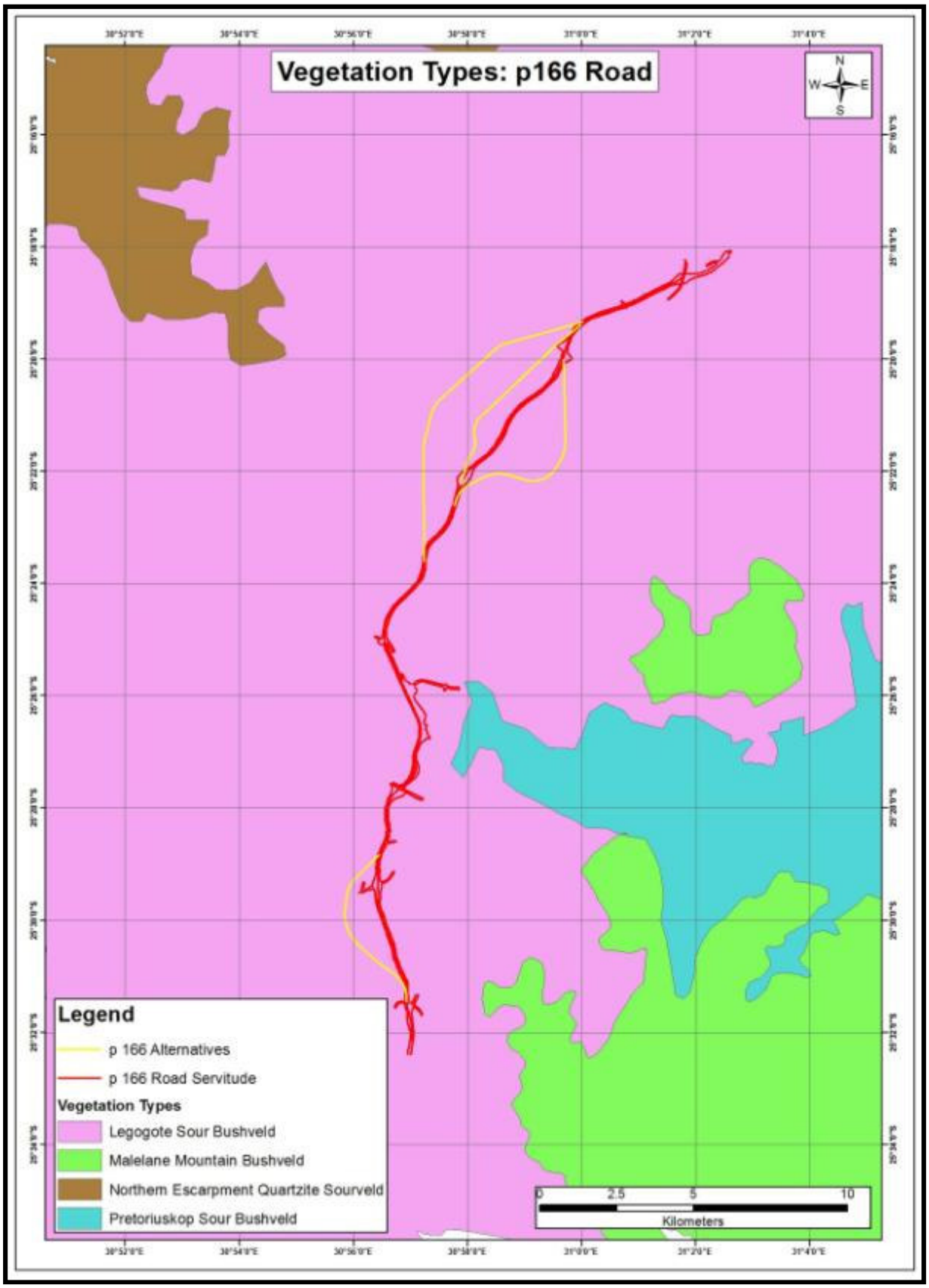


FIGURE 14: VEGETATION TYPE OF THE STUDY AREA

5.5.2 *Landscape Features*

The landscape along the route consists of gently to moderately sloping upper pediment slopes with dense woodlands including many medium to large shrubs often dominated by *Parinari curatelifolia* and *Bauhinia galpinii* with the grasses *Hyperthelia dissoluta* and *Panicum maximum* in the undergrowth. Short thicket dominated by *Acacia ataxacantha* occurs on rocky sites. Exposed granite outcrops have low vegetation cover, typically with *Englerophytum magaliesmontanum, Aloe perticola* and *Myrothamnus falbellifolia* (Mucina & Rutherford, 2006).

The vegetation is characterised by the presence of medium to large shrubs that form dense woodland areas on the slopes, while various acacia species are present in the lower-lying areas with *Dichrostachys cinerea* prominent in some localities. The large granite outcrops do not have much vegetation cover though smaller forb species do grow in the crevices where soil and litter have collected. Large areas have been transformed due to mainly forest plantations, with some areas transformed due to cultivation of crops. The soil ranges from deep Hutton to shallow but well-drained Mispah.

FIGURE 15: LEGOGOTE SOUR BUSHVELD (SVI 9) IN DENSE WOODLANDS

TABLE 6: SPECIES WITHIN THE LEGOGOTE SOUR BUSHVELD

Dominant taxa in this vegetation type	**Woody species**	*Pterocarpus angolensis, Sclerocarrya birrea, Acacia sieberiana, Acacia caffra, Ximenia caffra, Ficus thonningii, Combretum zeyheri, Schotia brachypetala, Diospyros lycioides, Gymnosporia buxifolia, Terminalia sericea, Englerophytum magalismontanum*
	Grasses	*Cymbopogon excavatus, Hyparrhenia hirta, Setaria sphacelata, Hypethelia dissoluta, Andropogon shirensis, Scizachyrium sanguineum, Heteropogon contortus*
	Forbes	*Gerbera viridifolia, Waltheria indica, Hypoxis rigidula, Xerophyta retinervis*
Endemic Species to Legogote		*Aloe simii*
Alien species to Legogote		*Lantana camara, Solanum mauritianum, Melia azedarach, Psidium guajava*
Conservation Status		Endangered with target of 19%. Only about 2% statutorily conserved in the Bosbokrand and Barbeton Nature Reserves, and a further 2% in private reserves including the Mbessan and Kaapsehoop Reserves and the Mondi Cycad Reserve. It has been greatly transformed (50%), mainly by plantations and also by cultivated areas and urban developments.

FIGURE 16: PRETORIUSKOP SOUR BUSHVELD (SVI 10)

The vegetation type is similar to the Legogote Sour Bushveld (SVI 9) but is drier and occurs mostly as open tree savannah that is characterised by the prominence of *Dichrostachys cinerea* and *Terminalia sericea* (Mucina &

Rutherford, 2006). The area is classified as open savannah with various *Acacia* species present and occurs on the upland areas. The geology is mainly granite from the Nelspruit Suite and the soil is shallow to medium deep. Large areas have been transformed due to cultivation and the development of settlements (Mucina & Rutherford, 2006).

5.5.3 *Vegetation Classification*

A classification of vegetation data was done to identify, describe and map vegetation types. The descriptions of the plant communities include the tree, shrub and herbaceous layers. The conservation priority of each vegetation unit was assessed by evaluating the plant species composition in terms of the present knowledge of the vegetation of the Savanna Biome of South Africa. Seven distinct vegetation units could be identified namely wetland, sour bushveld, riverine areas, bushveld and afforested plantations **(Figure 17-.21).**

- **Wetland Unit**

This vegetation unit is located on northern part of the study area in the town of White River. The soil is dark grey clay. Few woody species occur covering less than 1% of the area. The herbaceous component is dominant with the forbs covering between 35 and 60% of the area with the grasses between 25-35%. Except for single large rocks in the stream no other rocks were observed. The vegetation is characterised by typical wetland species such as the grasses *Phragmites mauritianus, Imperata cylindrica, Agrostis lachnantha,* and the forbs *Typha capensis, Kyllinga alba, Monopsis decipens* and various *Cyperus* spp. The declining red data plant *Gunnera perpensa* is also present. The grass and forb layers are dominant and cover up to 80% of the area. Single individual trees such as the exotic *Eucalyptus camaldulensis* are present in this unit. The vegetation is typical wetland with the permanently wet and seasonal zones present with development on the temporary wet zone in the form of housing developments. The development within the wetland zone due to houses has also resulted in local people planting small crops and other plants directly in the seasonal wet zone of the wetland. It is also in these areas where the natural vegetation has been cleared and the soil worked and the water channelled. Various pioneer plant species such as Tagetes minuta and Bidens pilosa are present in these areas. Two declining red data species Gunnera perpensa and Eucomis autumnalis was found to be present in the wetland. The habitat is also suitable for various orchid species that were not flowering during the time of the survey.

- **Sour Bushveld**

This woodland is occurs on rocky terrain that varies from level to mildly steep rocky outcrops. The soil is shallow on the higher-lying rocky areas and varies from shallow to medium deep in the lower-lying more level areas. Soil texture is sandy to loam with some clay present. The woody layer covers between 10 and 50% of the area. The grasses cover between 55 and 65% and the forbs up to 12% of the area. The vegetation consists of open to closed woodland with smaller open grassland patches in-between. The trees *Acacia sieberiana* and *Pterocarpus angolensis* dominate the vegetation. Various grass and forb species are present and include *Tristachya rehmannii*, *Brachiaria serrata, Eragrostis superba, Fuirena pubescens, Monopsis decipiens, Hypoxis iridifolia, H. rigudula* and *Gerbera jamesonii*. Two declining species *Crinum macowanii* and *Eucomis atumnnalis* was found to be present in this unit. Suitable habitat exists for other red data species also.

- **Riverine**

Various riverine areas are present within the proposed route. These areas vary from slightly degraded to heavily degraded due to natural and human impacts. The more natural rivers along the route are characterised by the prominence of various hydrophilic plant species such as *Phragmites, Schoenoplectus corymbosus, Paspalum dilatatum, Cyperus textilis,* while the woody species include *Acacia sieberiana,* and *Acacia ataxacantha*. Unfortunately the category 1 declared alien invader shrub *Lantana camara* has infested large areas thereby displacing large amounts of the indigenous vegetation and together with it animal life. The riverine systems mostly support a diversity of plant and animal life and are important in the transport and channelling of water. They also provide water to underground systems on which many plant communities depend for their survival especially during the dry months of the year. From a vegetation point of view large areas are degraded while others have a more natural species composition. No red data species were found within this unit.

- **Bushveld**

This woodland is occurs on undulating rocky hills and slopes. The soil is shallow and leached though patches that are slightly deeper with loamy soil are present. The woody layer covers between 5 and 35% of the area, the grasses between 55 and 65%, and the forbs up to 12% of the area. The vegetation consists of open woodland with smaller dense patches on the rocky crests. Large open grassland areas occur between the sparsely spread trees. The tree *Acacia sieberiana* is dominant on the slopes and lower-lying areas while *Englerophtytum magalismontanum* is prominent in the crests. Other species present and include *Eragrostis curvula, Urochloa panicoides, Cephalaria zeyheriana, Eulophia petersii, Selaginella dregei and Vernonia natalensis*. No red data species were found within this unit.

- **Afforested Plantation**

This vegetation unit occurs on loamy soil with low rock cover all along the proposed P-166 route. The largest areas have been planted with various Eucalyptus spp and Pinus spp. for commercial properties or have been developed due to human settlements. The vegetation is completely transformed due to more than 80% thereof being developed with roads, houses, and plantations. Very little of the natural vegetation of the area has remained. In the areas along the roads of the various human settlements the vegetation is transformed with the grass *Eragrostis curvula* and the anthropogenic grass *Hyparrhenia hirta* present in many areas. No red data species were found within this unit.

FIGURE 17: VEGETATION UNITS OF STUDY AREA (A)

WETLAND UNIT = BLUE; SOUR BUSHVELD UNIT = GREEN; PLANTATION UNIT = YELLOW

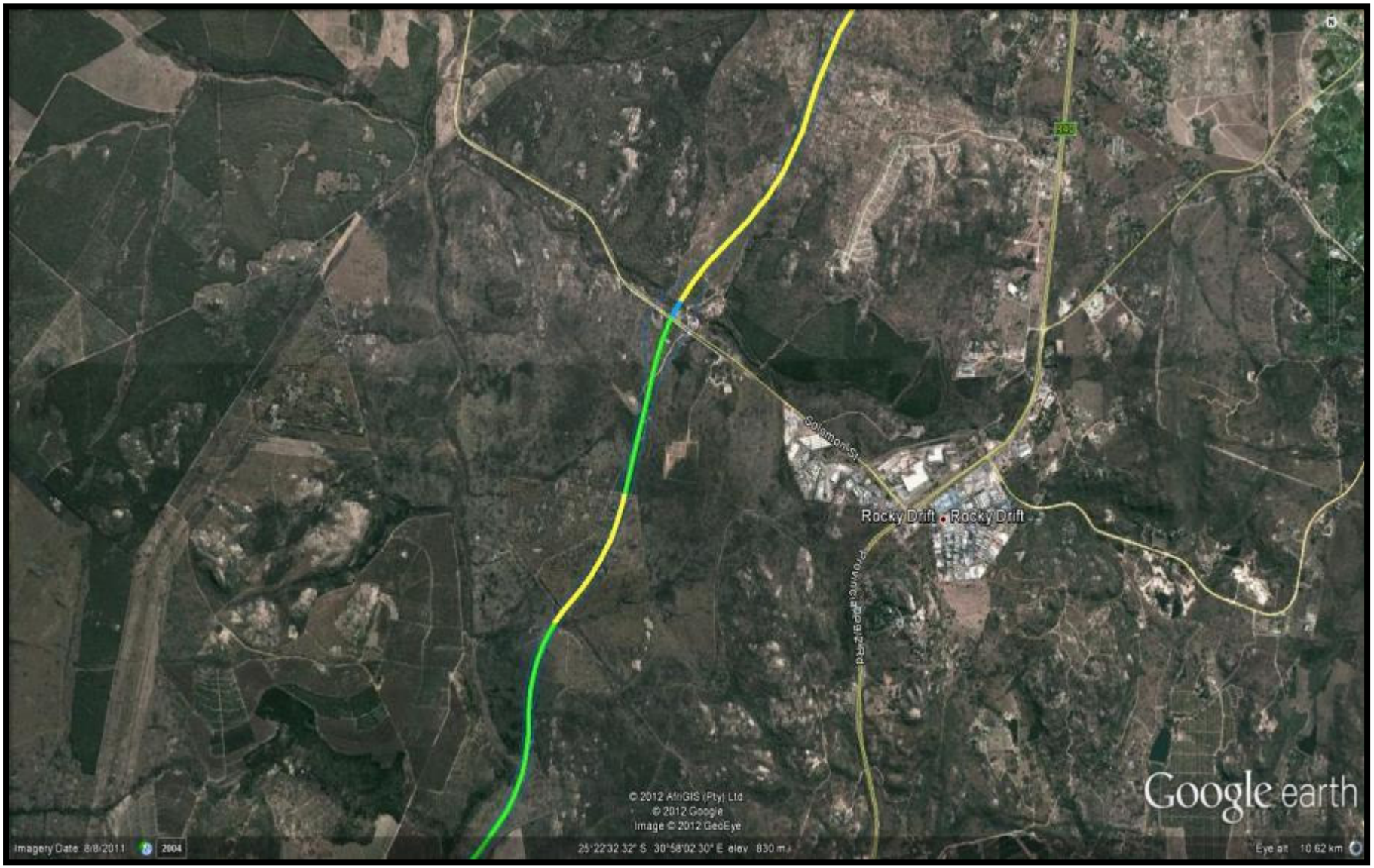


FIGURE 18: VEGETATION UNITS OF STUDY AREA (B)

WETLAND UNIT = BLUE; SOUR BUSHVELD UNIT = GREEN; PLANTATION UNIT = YELLOW

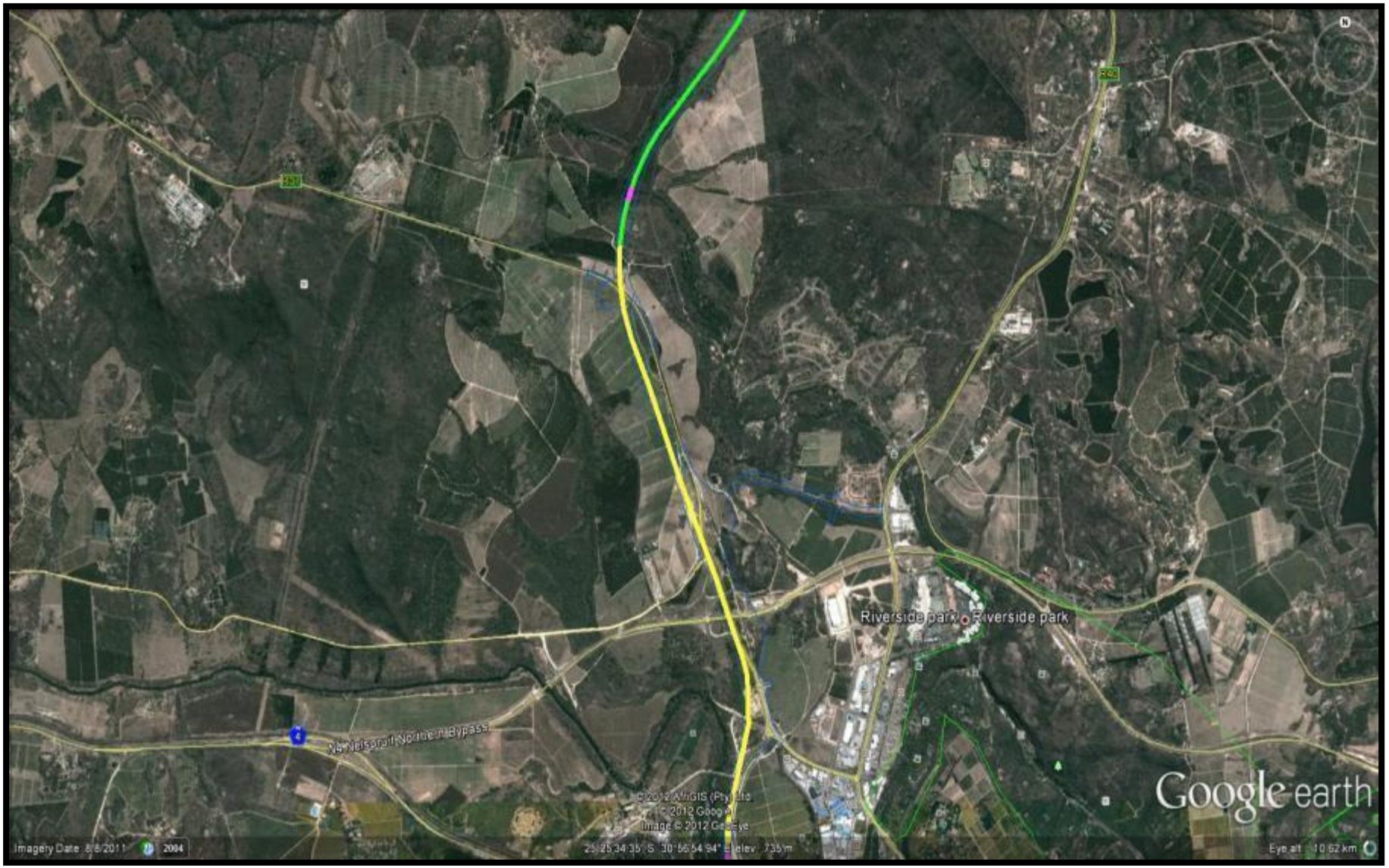


FIGURE 19: VEGETATION UNITS OF STUDY AREA (C)

WETLAND UNIT = BLUE; SOUR BUSHVELD UNIT = GREEN; PLANTATION UNIT = YELLOW, RIVERINE UNIT = PINK

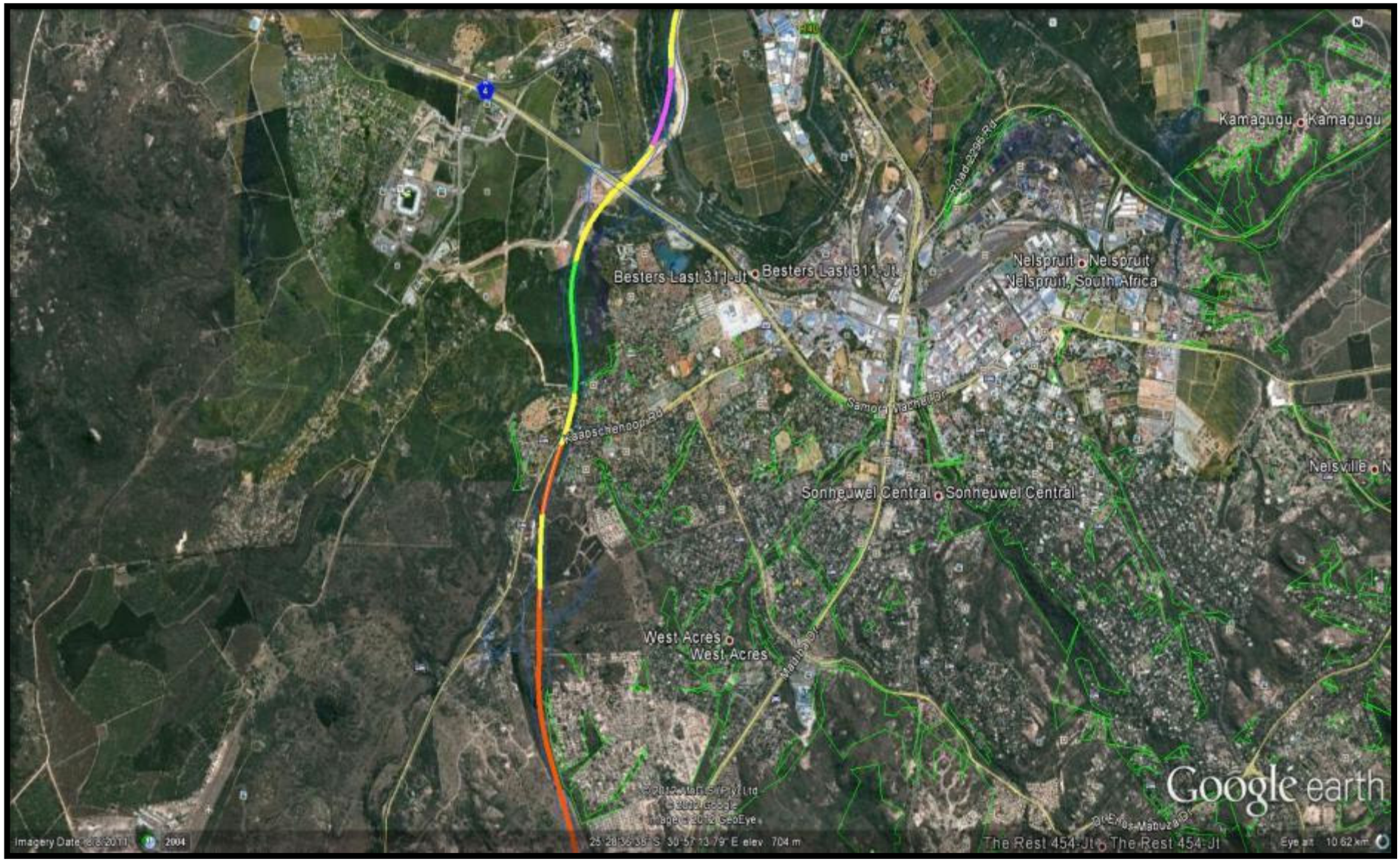


FIGURE 20: VEGETATION UNITS OF STUDY AREA (D)

WETLAND UNIT = BLUE; SOUR BUSHVELD UNIT = GREEN; PLANTATION UNIT = YELLOW, RIVERINE UNIT = PINK, BUSHVELD UNIT=ORANGE

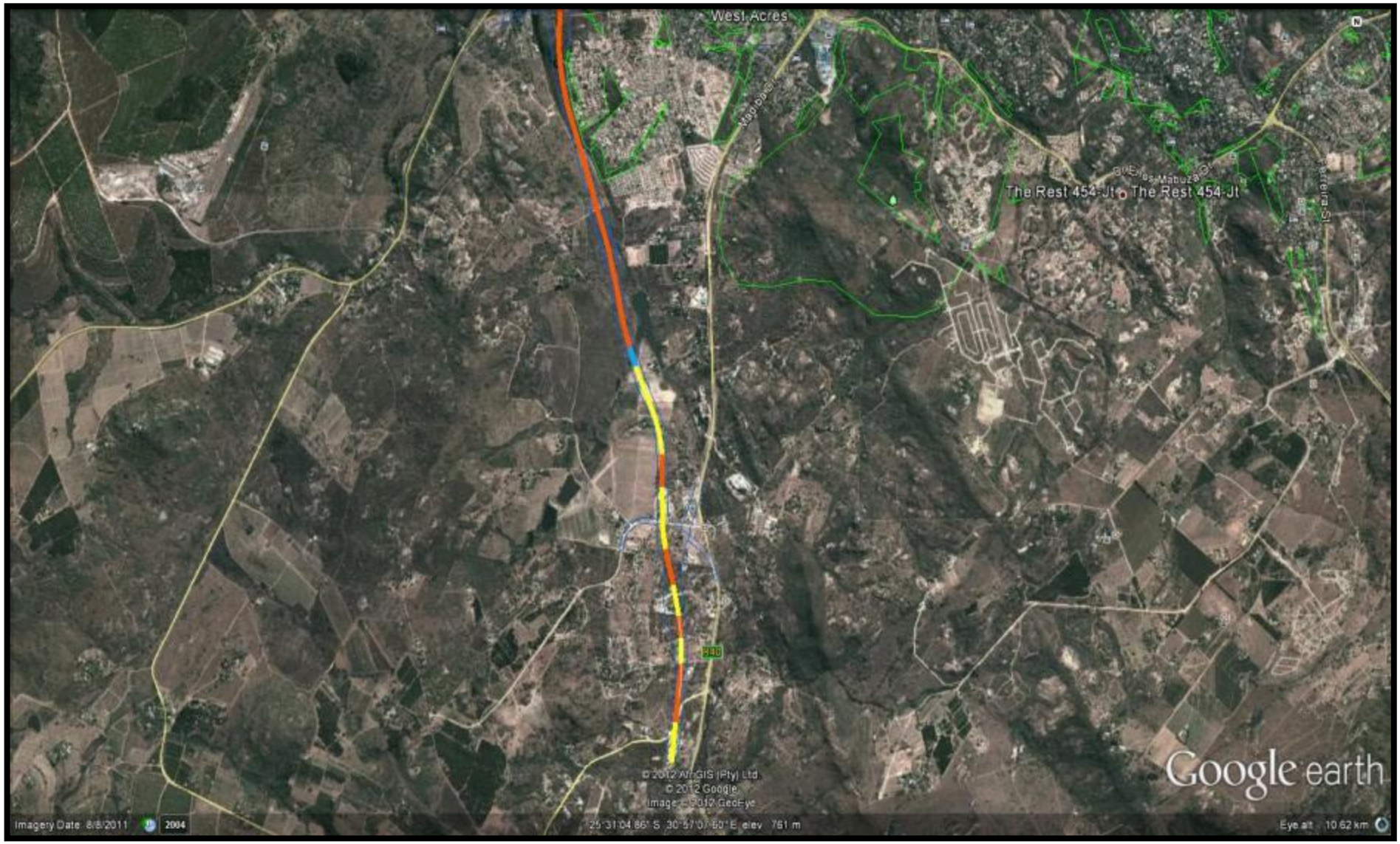


FIGURE 21: VEGETATION UNITS OF STUDY AREA (E)

WETLAND UNIT = BLUE; SOUR BUSHVELD UNIT = GREEN; PLANTATION UNIT = YELLOW, RIVERINE UNIT = PINK, BUSHVELD UNIT=ORANGE

5.5.4 *Mammals*

Mpumalanga is faunally diverse with approximately 163 mammal species consisting of 98 smaller and 64 larger species. It is the objective of Mpumalanga Parks Board (MPB) to conserve all of these species in situ. High mammalian species richness occurs in savannahs, which could be as a result of the wide variety of habitats available. In the Mpumalanga Province, savanna areas with the availability of sufficient cover, karst areas, wetlands, pans and a well-managed mosaic of short and tall grassland, are habitats that significantly contribute towards the ecological requirements of certain mammal species. Certain species in Mpumalanga, towards which conservation efforts for habitat protection should be directed, have been identified. Priority species can be used to emphasise key habitats, which are of conservation concern. These species thus contribute towards identifying priority areas of conservation importance and in determining the conservation value of land. Anthropogenic land conversion and habitat degradation and fragmentation are major threats to the continued existence of endemic and threatened fauna in the province (Cohen & Gomacho 2002). The settlements surrounding the P-166 road alignment and associated illegal hunting and poaching limits the suitability of these areas for larger mammal species. The collection or harvesting of wood (stumps) and rock material as well as the frequent burning of the vegetation reduces available refuge habitat an exposes remaining smaller terrestrial mammals to increased predation levels.

The use of wire snares for high intensity poaching activities will significantly affect remaining smaller mammal species such as rabbits and mongooses. Secondary access roads and vehicles (motor cars, motor cycles, quad bikes) increase access to the open areas as well as potential road fatalities. Major road networks with high vehicular traffic increase the risk of road fatalities (hedgehogs, hares) of mammals. Smaller mammal species are extremely vulnerable to feral cats and dogs.

Agricultural lands are in nature inhospitable environments, and only burrowing small mammals can co-exist in such situations. Rodents such as the Bushveld and Highveld gerbils can at times become pests in agricultural lands when they excavate planted seeds. The Yellow and Slender mongooses can subsist by preying on the few vertebrates managing a precarious existence due to surrounding road networks as well as hunting with dogs and wire snares.

- **Threatened Species**

According to the “South African Red Data Book of Terrestrial Mammals” (Smithers, 1986) and Skinner and Smithers (1990) updated by the IUCN Council in December 1995, the study area falls within the distribution ranges of 5 species which are placed into one of known threatened species (Endangered, Vulnerable and Rare). On the basis of the habitat descriptions provided for the above-mentioned threatened species by Skinner and Chimimba (2005), and the high level of human activity (hunting, poaching) within the study area, it is deemed highly unlikely that the study area provides critical habitat for the Endangered Wild Dog (*Lycaon pictus*) as well as the Vulnerable Lion (*Panthera leo*).

5.5.5 *Avifauna*

More than 567 bird species have been recorded in Mpumalanga. Approximately 71 Red Data species, of which 35 are threatened, occur within the area. There are no species endemic to Mpumalanga, and the province is

represented by the Grassland, Forest and Savanna biomes. Some of South Africa's endemic and most threatened terrestrial and wetland-associated bird species are significantly dependent on the wetlands, short dense and tall grasslands and woodland regions of the Mpumalanga province. A total of 12 Important Birding Areas (IBAs) occur within the province and most are of critical ornithological importance. The Masibekela wetland, near the Lebombo Mountains in the Lowveld region, holds species that are uncommon in Mpumalanga and support relative large numbers and varieties of birds.

Species richness in the Lowveld is high, due to a diversity of habitats. The presence or absence of bird species with specific habitat requirements can be indicative of the state of the environment. Bird species that can act as important savanna, grassland and wetland indicators, have been selected, in order to identify priority areas of conservation importance for birds, and to determine the conservation value of land within Mpumalanga Province. Habitat loss and degradation are the primary threats that impact severely on viable populations of these sensitive species (Cohen & Gomacho 2002).

- **Sensitive or Endangered Species**

Red Data List bird species previously recorded from the 2530CD and 2531BA grid squares within which the study area is situated and that occur or could possibly within or in the vicinity of the study area according to Harrison et al. (1997) based on habitat and food availability on site is listed in the ecology specialist study which is attached.

5.5.6 *Amphibians*

The majority of frog species in Mpumalanga Province are classified as explosive breeders completing their short duration reproductive cycle in the early summer months between (November-January). These frog species only emerge after the first heavy summer rainfalls and are dormant during the cold winter months. Explosive breeding frogs utilise ephemeral pans or inundated grasslands for their short duration reproductive cycles. Amphibian surveys by Jacobsen (1989), as well as recent and current surveys suggest that 51 species of amphibians currently occur in the Province of Mpumalanga. The present study concentrated mainly on Red Data species and species that are threatened or have relatively restricted distributions. Eight species are considered as important for setting conservation priorities in Mpumalanga namely Karroo toad (*Vandijkophrynus* (*Bufo*) *gariepensis nubicolus)*, Cascade Frog (*Hadromophryne* (*Heleophryne*) *natalensisis),* Spotted shovel-nosed Frog (*Hemisus guttatus*), Yellow-striped Reed Frog (*Hyperolius semidiscus),* Plain Stream Frog (*Strongylopus wageri)*, Giant Bullfrog (*Pycicephalus adspersus)*, Greater Leaf-folding Frog (*Afrixalis fornasinii*) and Whistling Rain Frog (*Breviceps sopranus*) (Theron 2002).

- **Habitat Available for Sensitive or Endangered Species**

No threatened frog species have been recorded within the2530CD and 2531BA Quarter Degree Grid Cell (QDGC) in which the proposed P166 road link is situated (Minter et al. 2004).

5.5.7 *Reptiles*

Most current knowledge of the reptiles of Mpumalanga is based on a survey done by N.H.G. Jacobsen (1989) providing a detailed account of all reptiles in the then Transvaal province. This survey resulted in descriptions of

life histories, habitat requirements and conservation status and maps of the known distributions. Jacobsen's (1989) survey revealed that 154 reptiles occur in the Mpumalanga Province and of these, 86 species are threatened. However, many of these threatened reptiles have relatively wide distributions and thus this study was restricted to Red Data species and species that are largely restricted to Mpumalanga. Reptile lists require intensive surveys conducted for several years. Reptiles are extremely secretive and difficult to observe during field surveys. The majority reptile species are sensitive to severe habitat alteration and fragmentation. Due to the high levels of habitat destruction and degradation in the area due to agricultural and livestock grazing activities coupled with increased levels of disturbances around the villages are all causal factors in the alteration of reptile species occurring on the site and surrounding areas. The rocky crests and summits and wooded hill slopes provide favourable refuges for certain snake and lizard species (rupicolous and arboreal species). The indiscriminate killing of all snake species around the villages reduces populations drastically. The frequent burning of the limited overgrazed grassland vegetation has a high impact on remaining reptiles. Fires during the winter months will severely impact on the hibernating species, which are extremely sluggish. Fires during the early summer months destroy the emerging reptiles as well as refuge areas increasing predation risks.

- **Habitat Available for Sensitive or Endangered Species**

Of the 15 reptile species considered for this study, 4 have been recorded exclusively from Mpumalanga. These are Haacke's flat gecko (*Afroedura haackei*), Mariepskop flat gecko (*Afroedura sp. nov.),* Rondavel flat gecko (*Afroedura sp. nov.)* and Wilhelm's flat lizard (Platysaurus wilhelmi). Other species considered in this study were: Abel Erasmus Pass flat gecko (*Afroedura sp. nov.*), Forest/Natal purpleglossed snake (*Amblyodipsas concolor*), Lowveld shieldnosed snake (*Aspidelaps scutatus intermedius*), Transvaal dwarf chameleon (*Bradypodion transvaalense complex*), Sungazer/ Giant girdled lizard (*Cordylus giganteus*), Barberton girdled lizard (Cordylus warreni barbertonensis), Lebombo girdled lizard (*Cordylus warren warreni*), Swazi rock snake (*Lamprophis swazicus*), Transvaal flat lizard (*Platysaurus orientalis orientalis*), Montane burrowing skink (*Scelotes mirus*), Breyer's longtailed seps/ Breyer's plated lizard (*Tetradactylus breyeri*). These species are also found in other provinces of South Africa. Of these, only four are listed in the Red Data Book (Branch 1988). The Swazi rock snake and Breyer's longtailed seps are listed as Rare, the Sungazer lizard is listed as Vulnerable and Haacke's flat gecko as Restricted

Detailed biodiversity study will be conducted during the EIA phase to verify the occurrence of endemic and threatened species occurring in the study area.

6 DESRIPTION OF THE RECEIVING SOCIAL ENVIRONMENT

6.1 Heritage

The Heritage study was conducted by Dr Johnny Schalkwyk an Independent specialist through a Desktop study and preliminary site investigation. This section describes the potential different types of archaeological features and sites which are occurring in the study area.

- **Stone Age**

Human occupation of the region started at least during the Middle Stone Age and continued through to the Later Stone Age. Because of the high impact of agricultural development, as well as the dense vegetation cover in the undeveloped area, very few indications of Stone Age occupation were identified during the survey. What was found was a number of stone tools, flakes and cores, dating to the Middle and Later Stone Age, as surface finds. As these objects are surface finds, they are out of context and are viewed to have a very low significance.

A number of rock shelters containing San rock art are known to exist in the region. These usually occur in shelters located on the granite outcrops. It is our understanding that most of the area has been extensively surveyed (e.g. Van Schalkwyk, et al 1996), although it is always possible that new sites might be identified. However, none of the known sites occur close to the new road alignment.

- **Iron Age**

Iron Age people moved into southern Africa by c. AD 200, entering the area either by moving down the coastal plains, or by using a more central route. It seems more likely that the first option was what brought people into the study area. From the coast they followed the various rivers inland. One of the earliest dated sites are located near Tzaneen (Silver Leaves). Some sites dating to this and a slightly later period, were identified at Plaston (Evers 1977) and at Vergenoeg and The Curlews (Van Schalkwyk & Teichert 2007)
Being cultivators, they preferred the rich alluvial soils close to rivers to settle on. Consequently, as the study area is in close proximity to the Crocodile River, one would expect settlement sites dating to the Early Iron Age to occur here. Unfortunately, large sections of this area has been subjected to agricultural activities, being ploughed over annually, or are used for orchards. These activities would have had a negative impact on any heritage sites that might have occurred here. Furthermore, the areas not is use for agricultural activities, are densely vegetated, which also makes the detection of sites very difficult. A few pieces of pottery were noticed in ploughed areas during the field survey. Unfortunately, all of it was non-diagnostic (i.e. it did not have any decorations), with the result that it could not be identified or dated.

- **Historic Age**

The historic period started in the 1840s. Due to the presence of malaria, few people settled here and most, being traders, hunter and miners, only passed through the area. Nelspruit as town was proclaimed only in 1905. As time went by, the area was divided into farms and more and more people settled on a permanent basis. The Pretoria – Lorenço-Marques (Maputo) railway line, also known as the NZASM line, was built through the region during the

1880s. A number of features, e.g. bridges, culverts, stations, houses, good sheds, etc. still exist and forms part of this feature. During the 1920s the old national road (now the N4) was built. Later, it was realigned in some places and upgraded. As a result some of the bridges and culverts that formed part of this road still exist, although it is not used any more.

6.1.1 *Identified Sites*

- **Stone Age**

No sites, features or objects of cultural significance dating to the Stone Age were identified in the study area.

- **Iron Age**

No sites, features or objects of cultural significance dating to the Iron Age were identified in the study area.

- **Historic period**

No sites, features or objects of cultural significance dating to the historic period were identified in the study area.

6.2 Social

The Social desktop study was conducted by Kementhree Moonsamy from Royal Haskoning DHV. This Section addresses the presentation and analysis of social and economic data for provincial, municipal and key areas in close proximity to the proposed development area.

6.2.1 *The Mpumalanga Province*

Mpumalanga lies in eastern South Africa, north of KwaZulu-Natal and bordering Swaziland and Mozambique. It constitutes 6.5% of South Africa's land area. In the north it borders on Limpopo, to the west Gauteng, to the southwest the Free State and to the south KwaZulu-Natal. The capital is Nelspruit (recently renamed to Mbombela). Mpumalanga province is divided into three municipal districts, which are further subdivided into 17 local municipalities.

- **Mpumalanga's Social and Economic Challenges**

According to the statistics provided in the Draft Mpumalanga Growth Development Plan (DMGDP 2011), the unemployment rate in Mpumalanga is standing at approximately 28%. The aim is to reduce the unemployment rate to 15% by 2020. Accordingly, the province aims to create approximately 719 000 jobs over a period of ten years, moving from 890 000 currently employed individuals to 1 609 656 employed individuals within the next ten years (DMGDP, 2011). The province further aims to increase the income level of 620 000 individuals above the

poverty line by 2020 and to increase the Human Development Index[1] (HDI) from the current level of 0.50 to a higher level over the next ten years. This will be achieved by increasing the literacy level from the current 40 000 individuals per annum to 63 000 individuals per annum and increasing the percentage of life expectancy from 51 years to 62 years. In addition to this, the Province intends to reduce the Gini coefficient[2], from 0.65 to 0.55 by 2020. These broad objectives may be achieved if the provincial economy growth rate is around five and seven percent per annum, which is the target set (DMGDP, 2011).

Mpumalanga, like the rest of South Africa, continues to face the challenge of overcoming the inequalities and discrepancies created by the Apartheid regime. These challenges include the lack of basic services, continued, widespread poverty, lack of education, increased mortality rates and HIV/AIDS, rapid urbanisation, high unemployment rates and low economic indicators. According to Statistics South Africa, the unemployment rate for the province at the end of the third quarter of 2012 was 25.3 % (Nkangala IDP, 2011-2016).

In addition to these challenges, there are noticeable variations in the distribution of the population in Mpumalanga which creates numerous challenges. The province is characterised by geographical disparities and dispersed settlement patterns which present challenges for timely and efficient service delivery. The dispersed nature of settlements further raises the costs of delivery and infrastructure provision (Nkangala IDP, 2011-2016).

- **The Provincial Economy**

  - **Mining**

    Extensive mining is done and the minerals found include: gold, platinum group metals, silica, chromite, vanadiferous magnetite, argentiferous zinc, antimony, cobalt, copper, iron, manganese, tin, coal, andalusite, chrysotile asbestos, kieselguhr, limestone, magnesite, talc and shale. Gold was first discovered in Mpumalanga province in 1883 by Auguste Roberts in the mountains surrounding what is now Barberton. Gold is still mined in the Barberton area today.

    Mpumalanga accounts for 83% of South Africa's coal production. 90% of South Africa's coal consumption is used for electricity generation and the synthetic fuel industry. Coal power stations are in proximity to the coal deposits. A coal liquefaction plant in Secunda (Secunda Coal to Liquid) is one of the country's two petroleum-from-coal extraction plants, which is operated by the synthetic fuel company, Sasol.

  - **Agriculture**

    The climatic contrasts between the drier Highveld region, with its cold winters, and the hot, humid lowveld allow for a variety of agricultural activities. More than 68% of Mpumalanga is utilised by agriculture. Crops include maize, wheat, sorghum, barley, sunflower seed, soybeans, groundnuts, sugar cane, vegetables,

[1] The Human Development Index (HDI) is a comparative measure of life expectancy, literacy, education and standards of living for countries worldwide. It is a standard means of measuring well-being, especially child welfare. It is used to distinguish whether the country is a developed, a developing or an under-developed country, and also to measure the impact of economic policies on quality of life (http://en.wikipedia.org/wiki/Human_Development_Index)

[2] The Gini coefficient is perhaps the best known inequality measure and can be derived from the Lorenz curve. Mathematically the Gini coefficient varies between zero and one, although in reality, values usually range between 0.20 and 0.30 for countries with a low degree of inequality and between 0.50 and 0.70 for countries with highly unequal income distributions

coffee, tea, cotton, tobacco, citrus, subtropical and deciduous fruit. Forestry is extensive around Sabie in the far north of the province. Located near the forests, Ngodwana is the site of one of South Africa's largest paper mills (Sappi). Natural grazing covers approximately 14% of Mpumalanga. The main products are beef, mutton, wool, poultry and dairy.

- **Tourism**

Mpumalanga is also a popular tourism destination. Kruger National Park, established in 1898 for the protection of lowveld wildlife, covering 20,000 square kilometres (7,700sqmi), is a popular destination. The other major tourist attractions include the Sudwala caves and the Blyde river canyon.

The various towns in the region have much to offer, with emphasis on both historical sites and adventure vacations. Mountain and quad biking, horse trails, river rafting and big game viewing are endemic to the region. Mpumalanga is also noted as "Big Five territory," that is, where the famed five mammals have been given prominence (lion, african elephant, cape buffalo, leopard, and rhinoceros)[3]. The towns in the Lowveld, comprise of Barberton, Mbombela, White River, Sabie, Graskop. Hazyview, Malelane, Pilgrim's Rest, Mashishing (Lydenburg) and Nkomazi. In 2008 Haute Cuisine route was formed, trickling from Mbombela down to Hazyview.

6.2.2 *The District Municipality*

Ehlanzeni District Municipality is the most eastern district of the province of Mpumalanga. It is bordered by Swaziland and Mozambique in the east, Limpopo Province in the north, Gert Sibande District in the south and Nkangala District in the west. It consists of five local municipalities: Mbombela, Thaba Chweu, Nkomazi, Umjindi and Bushbuckridge, which became part of the district after the government decision to phase out cross-boundary municipalities in 2006.

The majority of the population lives in formal urban areas, or in villages in the tribal areas. Ehlanzeni District has the highest population density in Mpumalanga. The estimated population density varies substantially between the five municipalities with Mbombela and Bushbuckridge having the highest densities and Umjindi and Thaba Chweu the lowest.

According to the Provincial Integrated Spatial Framework, Ehlanzeni area has the largest population with an urbanisation level of 17%. Mbombela, Hazyview, Barberton, White River and Malelane are the biggest urbanised areas in Ehlanzeni district. The administrative capital of the province is Mbombela, which is found in this area. Service centres in this area are Barberton, Hazyview and White River, with a diverse economic base and a strong focus on the agricultural sector. Other service centres in the Ehlanzeni area are Nkomazi, Mapulaneng and Lydenburg. The tourism and forestry centres include Sabie, Graskop, and Pilgrim's Rest (Ehlanzeni IDP 2010-2011).

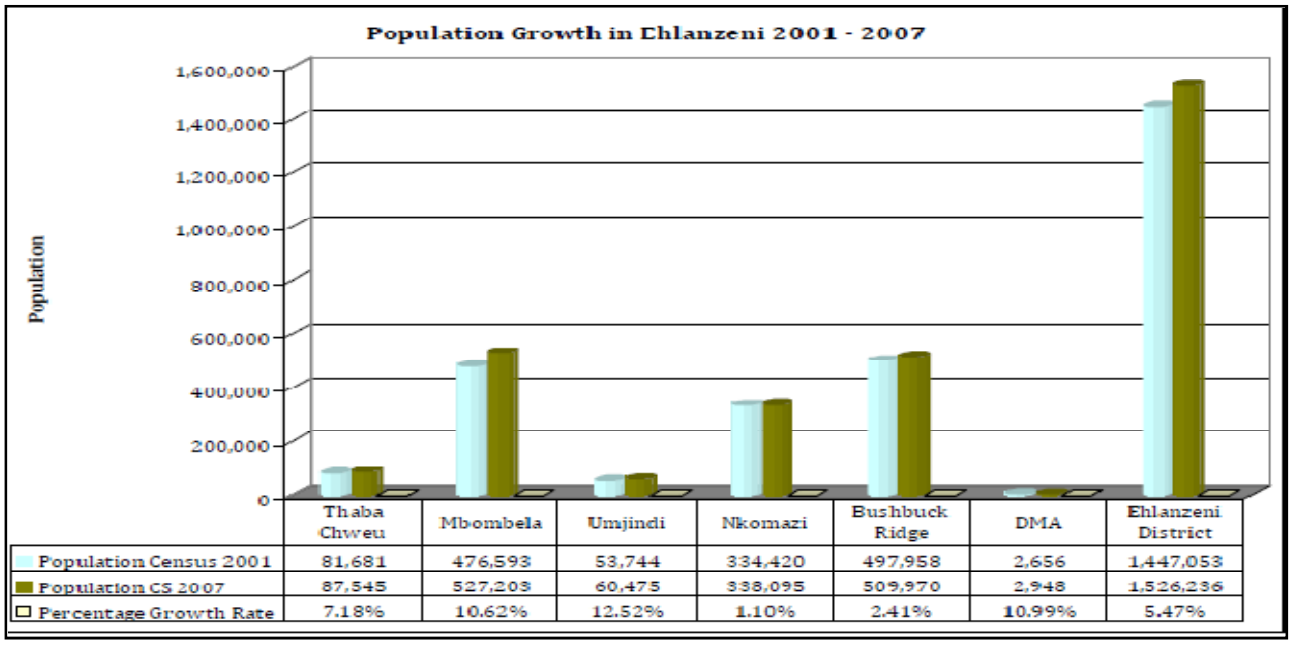
[3] The members of the Big Five were chosen for the difficulty in hunting them and the degree of danger involved, rather than their size (http://en.wikipedia.org/wiki/Big_Five_game)

The municipality consists of 9 Traditional Authorities situated in the eastern Nsikazi area. (Mbombela SDF 2009-2030). However none of these areas are within the project development area. They are:

- Gutshwa Traditional Authority
- Lomshiyo Traditional Authority
- Masoyi Traditional Authority
- Mbuyane Traditional Authority
- Mdluli Traditional Authority
- Mpakeni Traditional Authority
- Msogwaba Traditional Authority
- Nkambeni Traditional Authority
- Kgarudi Traditional Authority

- **Social and Economic Characteristics**

According to the 2007 Community Survey there are 1 526 236 people and 387 317 households in the District. 86.5 Of these households are in formal dwellings while 4.2% constitute informal housing structures (2007 Community Survey). Almost 70% (69%) of households were owned and fully paid off (2007 Community Survey). Ehlanzeni has 53% or 805,752 of its population within the female category while there is a recorded 47% (or 720,484) males in the District. The male/female ratio is 89 males for every 100 females. According to the Ehlanzeni IDP 2010-2011, the population of Ehlanzeni increased by 5.47% between 2001 and 2007, that is the population grew from 1 447 053 to 1 526 236 people.

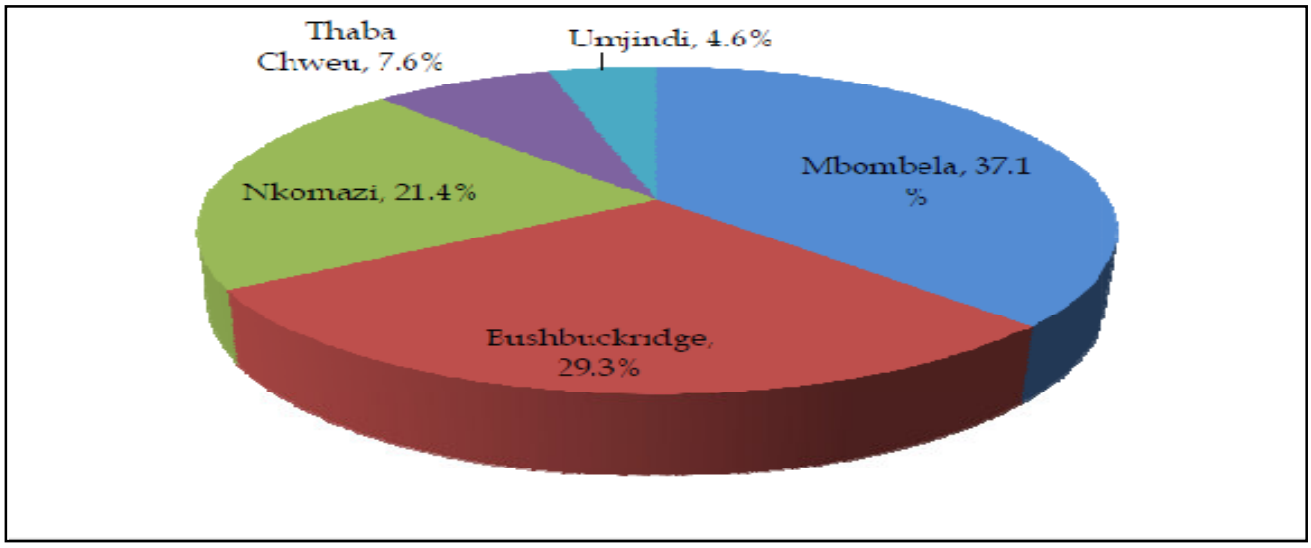


	Thaba Chweu	Mbombela	Umjindi	Nkomazi	Bushbuck Ridge	DMA	Ehlanzeni District
Population Census 2001	81,681	476,593	53,744	334,420	497,958	2,656	1,447,053
Population CS 2007	87,545	527,203	60,475	338,095	509,970	2,948	1,526,236
Percentage Growth Rate	7.18%	10.62%	12.52%	1.10%	2.41%	10.99%	5.47%

(Source: Mbombela IDP 2012)

FIGURE 22: EHLANZENI DISTRICT POPULATION GROWTH

HIV/AIDS infection rates recorded in 2008 is presented in the pie graph below. Mbombela is in a very vulnerable position due to its high infection rate, that is, 37.1% of the total Ehlanzeni District population.



(Source: Global Insight 2009)

FIGURE 23: EHLANZENI 2008 HIV/AIDS INFECTION RATES

With respect to schooling in the District, 6.7% of the population has a higher education and 29.5% has secondary schooling. The Ehlanzeni IDP states that there is a need more tertiary institutions in the District in the attempt that this would improve access to tertiary education and will draw scarce skills into the province through research and other development initiatives. (Ehlanzeni District IDP 2010-2011).

According to the 2007 Community Survey 49.2% of households did not record having an income, 23.9% earned incomes between R1 – R1400 and 10% earned between R801 to R1,600 per month. The Figure below shows that the District has within its jurisdiction 44.4% of 'not economically active' participants in the economy. Unemployment rates in the District have remained on par with the Province's rates. Both experienced a peak in unemployment in the 2002/ 2003 years. Unemployment rates in 2008 in the District remained at least 3.3% below the provincial rate (Ehlanzeni District IDP 2010-2011).

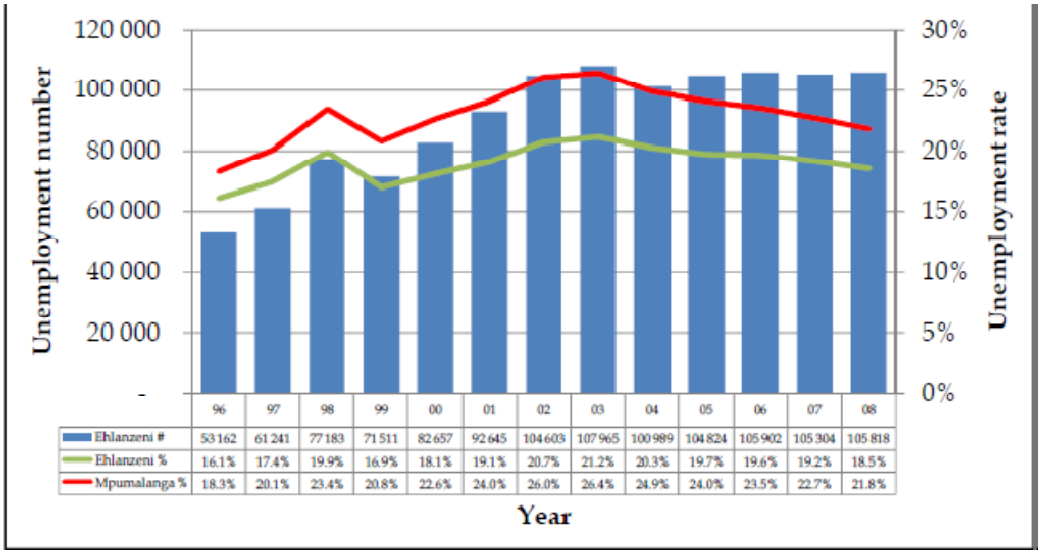


FIGURE 24: UNEMPLOYMENT IN EHLANZENI DISTRICT

The figure below presents the occupational categories prevalent in the Ehlanzeni District. Most employed individuals occupy elementary positions (19.0% of the employed population, or 65 969 individuals), while the two other largest occupations are 'unspecified[4]' (over 14% or 46 654 individuals) and craft and related trade work (over 13% or 44 948 individuals).

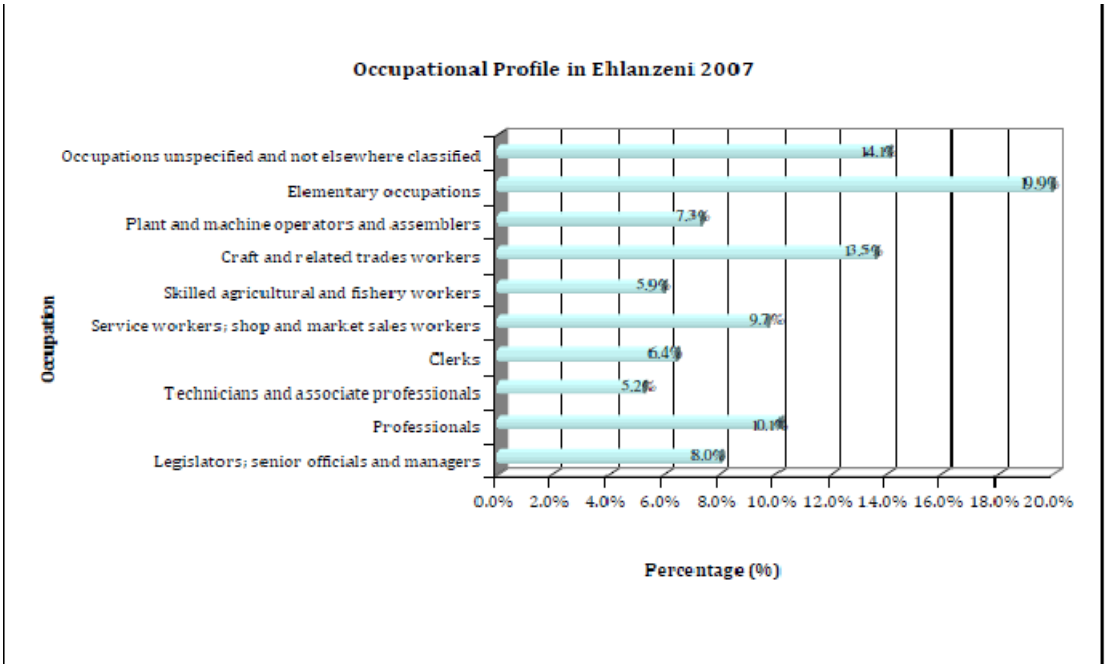


FIGURE 25: OCCUPATIONAL PROFILE OF EHLANZENI'S POPULATION

- **Key Strengths in the Ehlanzeni District**

Ehlanzeni District includes both Lowveld and escarpment country. Agriculturally, the area has much to offer. An abundance of citrus fruit and other subtropical fruits - mangoes, avocados, guavas, paw-paws, litchis, bananas and granadillas as well as sugar cane, pecan and macadamia nuts and many types of vegetables are cultivated. Mbombela, the Provincial capital, is the second largest citrus-producing area of South Africa and is responsible for a third of the country's export of oranges (South African LED Network).

The Ehlanzeni SMME Development and Support Plan 2009- 2014 shows the number of SMME's within Ehlanzeni District along with the sectors they are found in, this is found in the Table 7 below.

TABLE 7: PERCENTAGE SMME SECTORAL REPRESENTATION

SMME Scope	Total No of SMMEs within the Sector	Sectoral Representation
Agriculture	88	4.24%
Mining	4	0.19%
Manufacturing	105	5.06%

[4] Unspecified may refer to informal work

SMME Scope	Total No of SMMEs within the Sector	Sectoral Representation
Construction	156	7.52%
Trade	1236	59.60%
Transport	55	2.65%
Electricity	23	1.11%
Finance Services	102	4.90%
Community Services	305	14.71%
Total	**2078**	**100%**

6.2.3 *The Mbombela Local Municipality*

Mbombela is one of 5 local municipalities situated within the Ehlanzeni District Municipality, which also includes part of the Kruger National Park. The municipality is divided into 5 zones namely, Nelspruit A, Nelspruit B, Nelspruit C, Hazyview and Nsikazi. These municipal zones are based on the latest ward delineation which came into effect on 18 May 2011. The municipal wards increased from 36 to 39 and part of Kruger National Park fall within the municipal area as Ward 39 (Mbombela SDF 2012). The project study areas (extent of the proposed road) fall within Ward 14 and Ward 30 of the Mbombela LM.

The Mbombela LM records a 2007 population of 137 353 out of a total District population of 387 317 (2007 Community Survey). MLM has the largest population size within the Ehlanzeni District. It constitutes 35% of the total District's population, with the rest of the municipalities constituting 65%.

Mbombela Local Municipality is generally not affected by the illegal occupation of land near towns and therefore there are no slums in the main towns. In 2005 there was an attempt by communities living in the periphery to invade a privately owned piece of land (Dingwell farm) situated close to White River. This may well be an indication that there is a need to embark on interventions that will integrate these communities with urban centers. The Mbombela Local Municipality is comprised of non-formalised settlements (Tribal land or R118 towns), townships (R293 towns), formalised towns around town centres and farm land (Manikela, Research Report 2008).

Social Characteristics

- **Demographics**

The population of the municipality is growing rapidly. The census count of 2001 revealed that the total population was 476,593 and has increased to 527,203 during the census count of 2007 (Stats SA, 2007). This implies that there was an increase of 10, 6 % from 2001 and 2007. According to the Stats SA, 2007, the household size has increased by 25,127, from 112,226 in 2006 to 137,353 household in 2007 respectively. The average household number in recorded as 3.84 members per household (Mbombela IDP 2012-2017).

- **Service Provision**

According to the household survey of 2007, 86.8% of households were recorded as formal households, with 4.3% falling into the 'informal' household category. 59.4% of houses are owned and fully paid off, with 13.2% rented, and 18.6% occupied rent free (2007 Community Survey). With regards to basic service provision; 53.3% of households utilise a pit latrine with 8.7% recorded as having no toilet and over 35% have flush toilets. Of the 91.5% of households that have some form of piped water, 40.9% have water piped into the dwelling, 29.2% utilise water from pipes within the property and 21.4% access water via pipes (standpipes) found outside the property 85,2% of households in the LM use electricity for lighting, as compared to a provincial average of 61.1%. 73, 6% of households utilise electricity for cooking with 61, 8% using electricity for heating purposes. Only 29.2% of households responded positively to having refuse removal services whether private or government provided (2007 Community Survey).

- **Education and Health Levels and Facilities**

According to Stats SA (2007), the level of education in the municipality is very low. Approximately 11.32% of the sampled population of 527 204 have no schooling, 27.67% completed primary education, 6.11% completed primary education (Grade 1-7), 13.22% completed secondary education and 8.71% completed higher education. The Mbombela IDP reports that it has within its LM the following educational facilities:

- 151 public primary schools
- 59 public secondary schools
- 25 independent (private) schools
- 5 tertiary institutions

TABLE 8: NUMBER AND TYPE OF MBOMBELA'S PUBLIC FACILITIES

Amenities	Total amenities	Hazyview	Nelspruit A	Nelspruit B	Nsikazi
Community Halls	24	2	5	8	9
Cultural centres	1	0	0	1	0
Theatres/ Amphitheatre	2	0	2	0	0
Libraries	10	2	3	2	3
Sports Fields	9	1	4	2	2
Swimming Pools	5	2	3	0	0
Multi-purpose sports courts	9	2	2	3	0
TOTAL		**9**	**19**	**16**	**14**

Mbombela has two district hospitals (Rob Ferreira and Themba), one TB hospital (Bongani) and three private hospitals. There is at least one government health care facility every 5- 10 kms. However the level of services provided is limited. Facilities are under-resourced, with insufficient health education programmes. The recording of vital information such as births and deaths is lacking, making it more difficult for basic services provision (Mbombela IDP 2012-2017).

HIV/AIDS still remains the biggest challenge. According to a Department of Health Survey (2009) in the Mbombela IDP 2012-2017, Mbombela has an HIV prevalence rate of 43%. It is the second highest in the Ehlanzeni District. There are 29 clinics providing health services, two being accredited. The municipality has a HIV/AIDS strategy in the review process. (Mbombela IDP 2012-2017).

- **Security and Safety**

The highest recorded crimes are property related, at 17.3% followed by social crimes at 7.4% (theft, muggings) and violent crimes at 2.3%. An average of 41 102 people are served by one police station in the District. There is an average of 6 581 accidents per annum and most of these accidents happen during peak hours and after hours. Feedback from Interested and Affected People (IAPs) into the IDP process showed that there is a need for visible traffic policing, and a need for pedestrian and overhead bridges to assist in the reduction of accidents within Mbombela. Poor road infrastructure and street lighting have been pinned as contributing factors to accidents. (Mbombela IDP 2012-2017).

- **Vulnerable populations**

A Department of Health Survey (2009) in the Mbombela IDP 2012-2017 accounts for 3000 orphans and 2000 vulnerable children in the municipality that need assistance. The IDP states that as a mitigation measure, the LM is involved in 32 home-based care projects, of which 16 are funded by the Department of Social Services, 15 funded by the Department of Health and 1 is funded by the Expanded Public Works Programme conditional grant (Mbombela IDP 2012-2017).

- **Economic Characteristics**

Mbombela Local Municipality (MLM) has a well-established economy consistently achieving growth rates higher than the South African and Mpumalanga economies in most sectors. Mbombela is the seat of the Mpumalanga provincial government and the foremost industrial, commercial, retail and services centre for the region, including Mozambique and Swaziland (South Africa LED Network, Mbombela LM).

MLM is endowed with areas like Mbombela which is the capital of the Mpumalanga province. Hazyview is an important banana producing and eco and adventure tourism area, White River, which is an important tourist and farming area. MLM is currently involved in the following big projects: the development of the Maputo Development Corridor project, the Mpumalanga Investment initiative, the Transfonteir Park, the Mpumalanga International Airport and hosted the 2010 FIFA World Cup. (South Africa LED Network, Mbombela LM).

Development in Mbombela is concentrated along three corridors. The western development axis, along the R40 road includes Mbombela, Rocky's Drift, White River and Hazyview. It has a well-developed municipal infrastructure, and provision of services is of high standard. There is steady growth of commercial and industrial activity, as well as in the provision of services to the high income residential areas (South Africa LED Network, Mbombela LM).

In the south the second axis, along the N4, runs east/west through the area. It gives access to Mbombela and Ngodwana Sappi, one of the largest pulp and paper manufacturing centers in the southern hemisphere, and in the east reaches the Mozambique border and provides access to Maputo. Together these axes account for more than 85% of all industrial, commercial and retail development, and there is good potential for further growth (South Africa LED Network, Mbombela LM).

To the east, a secondary development axis extends along the D363, D1411 and other roads. The area is characterised by mainly low income urban development and rural villages which are supported by subsistence crop production and livestock farming on communal land. These services infrastructure is poorly developed; accessibility is limited due to the poor condition of the roads; and there is little retail or industrial development (South Africa LED Network, Mbombela LM).

- **Employment**

The municipality's eligible employed work force is estimated to be 165,594 (50.19%). The number of unemployed residents is estimated to be 52,290 (15.85%). The highest unemployment rates are recorded in Nelspruit B, Hazyview and Nsikazi zones (Mbombela IDP 2012-2017). The figure below shows that the two occupational categories that employ the most labour is in elementary occupations (19.08%) and Craft and related trade works (13.51%) of the total 32.03% employed. The number of employed individuals with an income of less than R1 600 per month constitutes 41.3% and those without an income constitute 42.6 % of the total LM population.

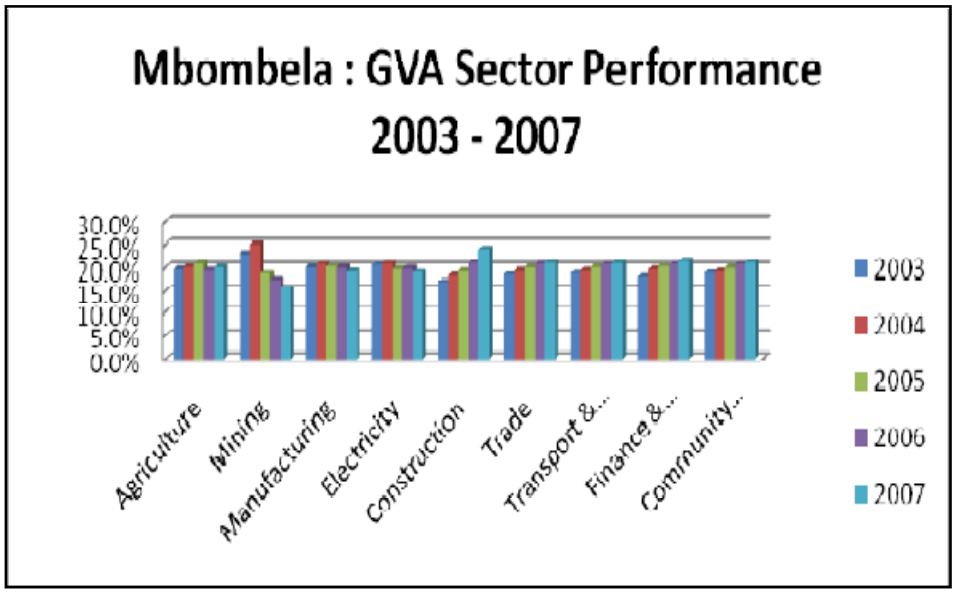
TABLE 9: PERCENTAGE OCCUPATION PER CATEGORY IN MBOMBELA

Category of Occupation	Number	Percentage
Legislation, senior officials and managers	15 234	9.02%
Professionals	16 037	9.50%
Technical and Associate Professionals	10,882	6.44%
Clerks	12,509	7.41%
Service workers, ship and market sales workers	16,424	9.73%
Skilled agricultural and fishery workers	9,437	5.59%
Craft and related trades workers	22,807	13.51%
Plant and machine operators and assemblers	11,816	7.00%
Elementary occupations	32,225	19.08%
Occupation unspecified and not elsewhere classified	21,496	12.73%
Total	168,867	32.03%

Source: Mbombela IDP 2012-2017 (2007 Community Survey)

Industry Performance

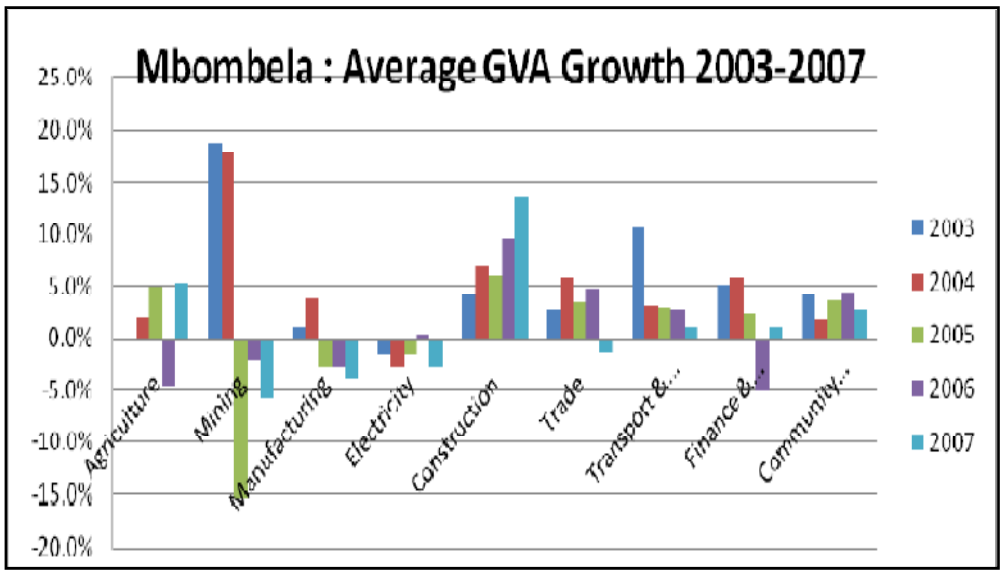
Data gleaned from Global Insight research (2007) shows that the agriculture, manufacturing, electricity, transport and communication sectors experienced fluctuations in performance over the 2003-2007 years. During the period 2005 to 2007, the mining sector declined from 25%to 15.7% (Ehlanzeni SMME Development and Support Plan 2009-2030).



Source: (Ehlanzeni SMME Development and Support Plan 2009-2030)

FIGURE 26: MBOMBELA'S GVA SECTOR PERFORMANCE (2003-2007)

Sectors like construction and community services experienced positive growth over the years. Mining, agriculture and manufacturing experienced a mixed growth over the years, along with finance and business services sectors (Ehlanzeni SMME Development and Support Plan 2009-2030).



Source: (Ehlanzeni SMME Development and Support Plan 2009-2030)

FIGURE 27: MBOMBELA'S AVERAGE GVA GROWTH (2003-2007)

- SMME Development Challenges and Opportunities

  - The SMME sector within EDM faces a number of challenges and opportunities. Key challenges are among others: Access to information on SMME development and support, as well as the uncoordinated

nature of the support; Access to funding, markets, as well as delayed payments, especially by Government departments;
- Lack of entrepreneurial, business management and technical skills required to ensure operational efficiency of the SMMEs; and
- Absence of body co-ordinating SMME activities within the district, thereby depriving SMME's of a platform to network and be exposed to economic opportunities.

However, opportunities that could be exploited include agriculture and agro-processing potential, tourism development, trade related opportunities, and opportunities in other related sectors (Ehlanzeni SMME Development and Support Plan 2009-2030).

- **Key Strengths in the Mbombela Local Municipality**

MLM's key strategic objectives are to provide water and sanitation and other basic services to its communities. The municipality's competitive advantage is its location which enables it to take advantage of the strong international, regional and national linkages to become an active regional economic player.

Between the eastern and western axes is an area of rich agricultural land along Crocodile and White Rivers. Fertile soils and the subtropical climate provide perfect conditions for the production of citrus and tropical fruits, such as mango, banana, avocado, macadamia and pecan nuts. Hazyview is an important banana-producing area. It is also the centre of the major agricultural area producing coffee, nuts, spices, and vegetables. It is the gateway to private reserves that form the western conservation extension to the Kruger National Park.

White River is an important farming and tourism centre. The chief agricultural products are tropical fruits, vegetables, flowers and timber. With three irrigations dams and a number of nearby forests, it is a popular holiday destination (Ehlanzeni SMME Development and Support Plan 2009-2030).

- **Key Weaknesses in the Mbombela Local Municipality**

The primary and secondary sector contribution to the GDP of Mbombela is dependent on investment in value adding processing of the raw agricultural and forestry products. There is therefore a need to invest in research and development to diversify the economy. This will entail expansion in the industries of food and beverage, wood and wood products, paper and paper products (Ehlanzeni SMME Development and Support Plan 2009-2030).

6.3 Noise

The Noise study was conducted by Barend van Der Merwe from DBAcoustics through a desktop study and preliminary site visit. This section describes, analyses the prevailing noise activities, the receiving environment and potential impacts within the study area.

6.3.1 *The Noise Receiving Environment*

The proposed P166 route and its alternatives will run in the vicinity of other main feeder roads and noise sensitive areas which include residential areas, businesses and informal settlements (Figure 28).

The prevailing ambient noise levels along this proposed road vary between built-up areas with high prevailing ambient noise levels to areas where there are low prevailing ambient noise levels because of the rural type district of the area. The prevailing ambient noise levels are made up out of traffic noise, domestic noise, built-up area noise, industrial type noises and residential type noises. This road will be a linear type noise source with high noise levels during peak periods and low noise levels during periods with less to little traffic. This is a phenomenon along all feeder roads.

The levels of noise emissions from road traffic as given in SANS 10210 for the prediction of road traffic noise are a function of:

- The number of vehicles passing in a time period (determined for each hour);
- The mean speed of the vehicles;
- The percentage heavy-duty vehicles;
- The road surface texture;
- The road gradient;
- The road worthiness of the vehicles;
- Distance between road and receiver;
- Intervening topography and structures that may shield the noise from the receiver; and
- Meteorological effects.

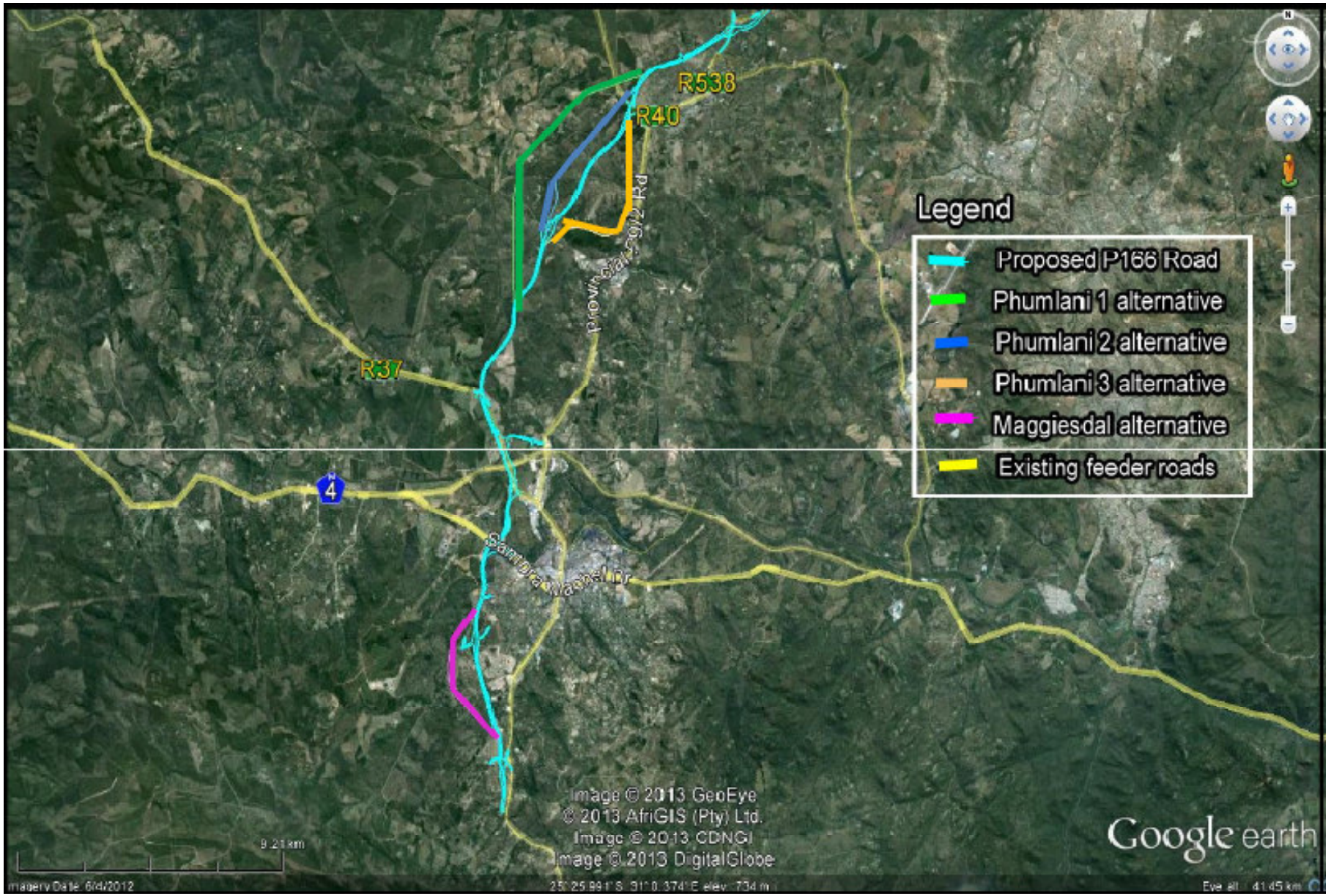


FIGURE 28: EXISTING FEEDER ROADS AND NOISE SENSITIVE AREAS

- **Current Noise Sources**

Traffic noise, wind noise, domestic type noise and farming activity noise are the main contributors to the prevailing ambient noise level of the different areas within the study area. The prevailing noise level is proportional to the distance from the main noise sources.

7 POTENTIAL ENVIRONMENTAL IMPACTS - BIOPHYSICAL

7.1 Wetlands

7.1.1 *Wetland Impacts from Roads*

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.

FIGURE 29: A WETLAND IMPACTED BY RECENT ROAD CONSTRUCTION ACTIVITIES ALONG THE PORTION OF THE EXISTING SERVITUDE THAT WOULD LINK THE P166 WITH THE R40 TO THE NORTH OF THE RIVERSIDE MALL AND N4 BYPASS IN MBOMBELA

The two most important types of impacts that would relate to new roads constructed into and across surface water features relates to the destruction of riparian / wetland habitat and vegetation and the alteration of the hydrological regime. Depending on the nature of the design roads constructed into a surface water feature could involve the placing of imported substrate into the bed of the watercourse or wetland. This would cause a certain area of vegetation on the banks and in the channel to be lost. The presence of the raised road and its substrate typically acts as hydrological barrier to flow in the system. This would typically alter the hydrology of the surface water feature by effectively 'damming' water on the upstream side of the road (making this wetter than the pre-construction situation) and by allowing water to bypass or underpass the road to the downstream section of the wetland more slowly or in lesser volumes. The impounding effect can also have an important effect on the morphology of the watercourse as sediment that is transported down the watercourse during flow periods would be trapped behind the structure. This can alter the natural sediment balance of the downstream watercourse, and by depriving the downstream stretches of sediment, can induce erosion in these stretches as the natural sediment balance is re-established.

Culverts are often constructed under road crossings of watercourses. The number and size of the culverts is an important factor in determining the degree and nature of the impact on the hydro-morphological regime of the feature; too few culverts can exacerbate the impounding function of the road, also concentrating flow downstream of the crossing which can result in channelisation of a wetland. This is very important in the context of wetlands,

where diffuse flow would naturally occur within the bed of the valley bottom; the reduction in diffuse flow and channelisation of the downstream part of the wetland can have an important impact on the resource quality in the wetland and could negatively affect its level of functionality. In this context the alteration of the hydrology of a surface water feature can alter the vegetative composition of a wetland, by allowing pioneer non-wetland plant species to establish themselves in an area where the wetland has been channelised and the water table has been lowered, thus desiccating the wetland.

7.1.2 *Ecological Impacts in the Context of Surface Water Features*

Surface water features are ecologically very important for a number of reasons due to presence of aquatic and riparian habitat and the associated biota that occur within these habitats. Surface water features are typically linear in nature, and in many cases provide a last remnant of natural habitat in an otherwise transformed landscape. For these two primary reasons, surface water features often act as important movement corridors and ecological linkages. The development of a road through a surface water feature such as a wetland can be associated with a number of impacts on the movement of biota through this feature. Road crossings typically create a 'hard barrier' across the surface water feature in the context of its bed and banks. The creation of this barrier is a very strong hindrance to both aquatic and terrestrial biota using the wetland or watercourse as a movement corridor. Animals moving across a road may be prone to greater mortalities and increased predation as they move across the cleared area of the road surface and reserve. Road crossing structures not designed to accommodate low water flows through the crossing may similarly be a significant hindrance to the movement of aquatic biota.

As most of the surface water features in the area are associated with a riparian zone, the road crossings of surface water features will have an impact on these riparian areas. Riparian vegetation will be cleared within the road and road reserve footprint, and thus will have an impact on the structural integrity of the riparian zone. Importantly it introduces the edge effect which can have an important effect on biota within the riparian zone, and create a very convenient 'entry point' into the riparian zone and wider riverine corridor for alien invasive vegetation. Certain of the tree / shrubs occurring within the riparian zones of rivers and watercourses in the study area are protected species, and these would be felled if they are located within the reserve. Although many of the larger trees are not subject to protection under the National Forestry Act, these larger trees are locally very important as they provide an important seasonal source of food for many animals, including many avian frugivores (fruit-eating bird species).

7.1.3 *Recommendations*

Further studies will be conducted during the EIA phase to verify and assess the significant impacts on water resources, recommend mitigation measures and to confirm the selection of preferred alternatives.

In the context of the P166 servitude and Maggiesdal alternative there are roughly the same number of surface water crossings between the Maggiesdal alternative and the section of the P166 main servitude, thus there is no preference from this perspective. If the nature of the surface water crossings along each route is examined in more detail, the P166 servitude crosses the Brinkspruit valley bottom wetland at an oblique angle (i.e. not

perpendicularly), thus potentially affecting a longer stretch of the wetland than what would ideal from a wetland impact perspective. Although the Maggiesdal Alternative crosses the Gladdespruit twice, the physical footprint of the alternative on this wetland could be reduced if the alternative alignment was shifted slightly to the west, to avoid the wetland. For this reason, the Maggiesdal Alternative is slightly preferred from a surface water perspective, although the main P166 servitude does not constitute a fatal flaw.

In the context of the Phumlani Alternatives Phumlani Alternative 1 would cross the highest number of wetlands, double the number crossed by the respective section of the main P166 servitude. In addition this alternative traverses an area that is highly natural and in which the wetlands are largely undisturbed. Due to this factor and the much higher number of crossings, Alternative 1 is least preferred from a surface water context.

In terms of the number of crossings, there is very little to separate the main P166 servitude and Phumlani Alternatives 2 and 3, as these largely traverse the same drainage systems. Alternative 3 runs partly through an area of natural character close to a granite inselberg, thus the wetlands crossed here would be more likely to be in a natural state. Conversely, the wetlands that would be crossed by the main P166 servitude in the area around the informal settlement are likely to be degraded, and thus arguably less sensitive from an ecological perspective. The same situation exists for Alternative 2 part of which is located on the boundary of the informal settlement. It is arguably better to consolidate impacts on wetlands in one place, thus it would be arguably preferable to consolidate existing impacts and impacts associated with the proposed road in one set of wetlands. In this context:

- The main P166 servitude and Alternative 2 are most preferred from a surface water perspective
- Alternative 3 is less preferred, but not a fatal flaw
- Alternative 1 is least preferred

7.2 Agriculture Geology and Soils

7.2.1 *Potential Impacts, Preliminary Assessment and Recommendations*

The main potential impact identified for the proposed P166 and its alternatives is the loss of agricultural soil in irrigated areas closer to the Crocodile River. Further assessment of impacts will be undertaken in the EIA phase and mitigation measures will be recommended. The P166 and its alternatives will traverse the similar terrain with high soil potential.

7.3 Biodiversity

7.3.1 *Potential Impacts and Preliminary Assessment*

The proposed P-166 road and alternatives are located within areas where various forms of land use occur and these include the Legogote Sour Bushveld (SVI 9) which is considered an endangered vegetation type, the Pretoriuskop Sour Bushveld (SVI 10) vegetation type is not threatened with large areas conserved in the Kruger

National Park and areas which are transformed due to commercial agricultural activities and urban sprawl. Soil erosion is regarded low to medium with veld degradation evident in grazed and cultivated areas. The alien plants degradation is evident with large patches on the ground. Four sensitivity categories of areas were identified and shown in figure 29 below:

- **High**: Areas with high species richness and habitat diversity comprising natural indigenous plant species. These areas are ecologically valuable and important for ecosystem functioning.
- **Medium**: An area with a relatively natural species composition; not a threatened or unique ecosystem; moderate species and habitat diversity. Development could be considered under exceptional conditions with limited impact on the vegetation / ecosystem.
- **Low-medium**: Areas with relatively natural vegetation, though a common vegetation type. Could be developed with mitigation and expected low impact on ecosystem.
- **Low**: A totally degraded and transformed area with a low habitat diversity and ecosystem functioning; no viable populations of natural plants. Development could be supported with little to no impact on the natural vegetation / ecosystem.

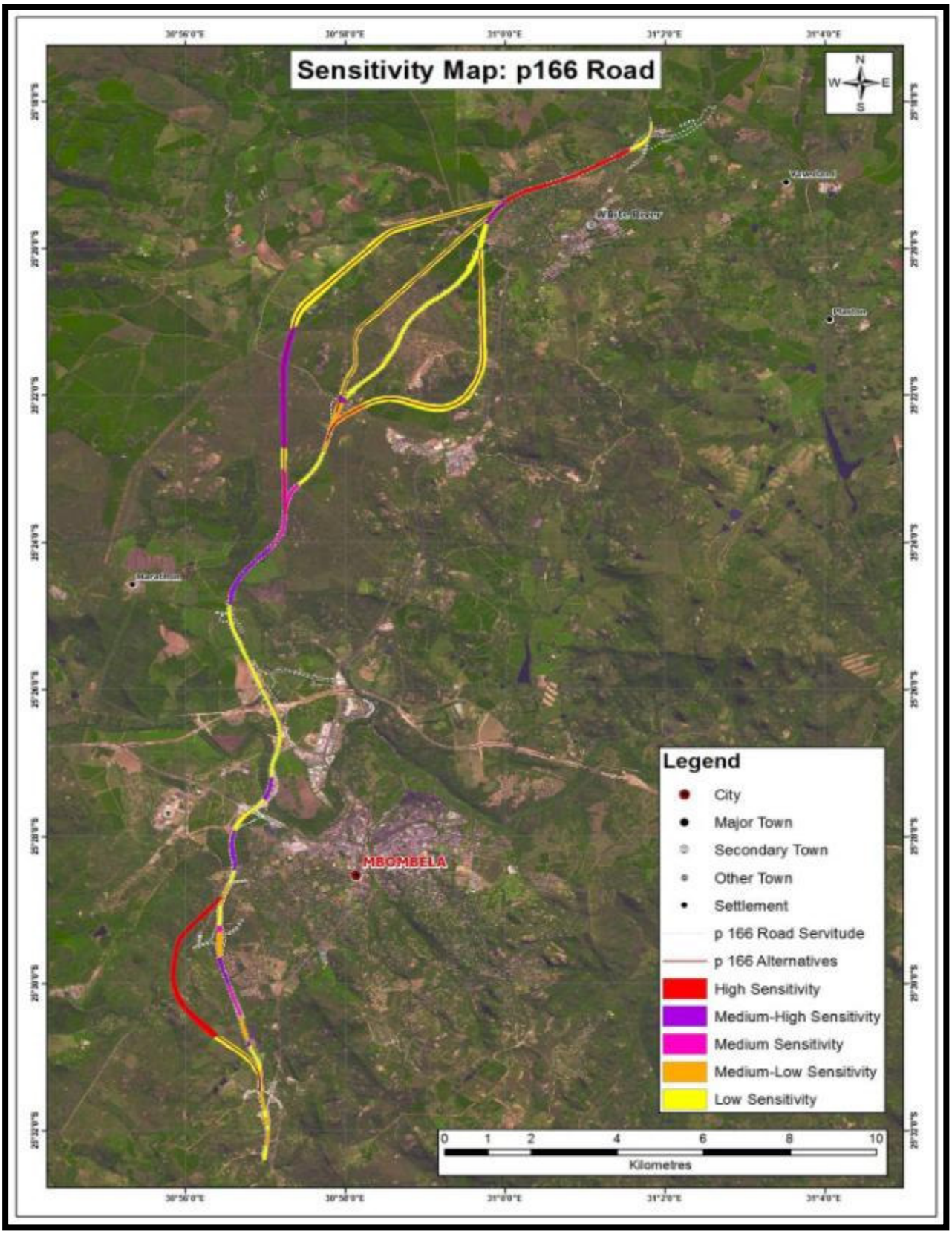


FIGURE 30: RELIMINARY SENSITIVITY MAP FOR THE PROPOSED P-166 ROAD

7.3.2 *Recommendations and implications for development of the alternatives*

From an ecological perspective the Phumlani alternative 3 is preferred as it bisects large transformed vegetation units with low conservation potential or likelihood for red listed plant or animal species. The Phumlani alternative 3 only bisects two wetland habitats.

The Phumlani alternative 1 bisects 9 wetland habitats as well as rocky slopes which could potential offer suitable habitat for several rupicolous Red Data reptile species namely Swazi rock snake (*Lamprophis swazicus*), Wilhelm's flat lizard (*Platysaurus wilhelmi*) and Haacke's flat gecko (*Afroedura haackei*). .

The Phumlani alternative 2 bisects a section of rocky hillslope as well as 4 wetland or river crossings which could potentially offer suitable habitat for the red listed *Gunnera perspensa* and *Eucomis autumnalis*.

The main P-166 alignment is preferred over the Maggiesdal Alternative 1 as this alternative bisects natural larger areas of natural Legogote Sour Bushveld as well as indigenous riparian vegetation along a perennial river (the Gladdespruit). The P-166 alignment runs parallel to a degraded non-perennial drainage line as well as transformed vegetation units. The P-166 alignment is also situated closer to existing high density residential areas which would have resulted in the alteration of the faunal composition due to the associated high levels of anthropogenic activities.

It is recommended that a final walk through of all sensitive habitats of the preferred alignments are undertaken by faunal and floral specialists once the route is adequately marked out by a qualified land surveyor in order to determine possible rare or threatened plant or animal species that would be significantly impacted and to recommend suitable mitigation measures for any on site specific problems.

8 POTENTIAL ENVIRONMENTAL IMPACTS – SOCIAL

8.1 Heritage

8.1.1 *Preliminary Assessment and Recommendations*

As mentioned above that there were no sites of archaeological importance which were identified through a desktop study that will be impacted by the proposed project. The road could potentially impact hitherto undiscovered heritage sites, transforming these sites or causing their destruction. Accordingly a detailed walkthrough of the P166 and its alternatives will be conducted during EIA phase to verify archaeological sites and features occurring within the proposed project and to confirm the findings of the desktop study.

8.2 Noise

8.2.1 *Potential Noise Impacts*

- Sound is a wave motion, which occurs when a sound source sets the nearest particles of air in motion. The movement gradually spreads to air particles further away from the source. Sound propagates in air with a speed of approximately 340 m/s;
- The sound pressure level in free field conditions is inversely proportional to the square of the distance from the sound source – inverse square law. Expressed logarithmically as decibels, this means the sound level decrease 6 dB with the doubling of distance. This applies to a point source only. If the sound is uniform and linear then the decrease is only 3 dB per doubling of distance;
- The decibel scale is logarithmic therefore decibel levels cannot be added together in the normal arithmetic way, for example, two sound sources of 50 dB each do not produce 100 dB but 53 dB, nor does 50 dB and 30 dB equal 80 dB, but remains 50 dB;
- Air absorption is important over large distances at high frequencies, depends on the humidity but is typically about 40 dB/km @ 4000 Hz. Road Traffic noise frequencies are mainly mid/low and will be unaffected below 200m;
- When measuring the intensity of a sound, an instrument, which duplicates the ear variable sensitivity to sound of different frequency, is usually used. This is achieved by building a filter into the instrument with a similar frequency response to that of the ear. This is called a weighting filter because it conforms to the internationally standardized A-weighting curves. Measurements of sound level made with this filter are called A-weighted sound level measurements, and the unit is dB;
- Sound propagation is affected by wind gradient rather than the wind itself. The profile of the ground causes such a gradient. Sound propagation upwind is refracted upwards creating a sound shadow and downwind refracted towards the ground producing a slight increase in sound level over calm isothermal conditions;
- The velocity of sound is inversely proportional to the temperature so a temperature gradient produces a velocity gradient and a refraction of the sound. Temperature decreases with height and the sound is refracted upwards;
- For a source and receiver close to the ground quite large attenuation can be obtained at certain frequencies over absorbing surfaces, noticeably grassland. This attenuation is caused by a change in phase when the reflected wave strikes the absorbing ground and the destructive interference of that wave with the direct wave. The reduction in sound tends to be concentrated between 250 Hz and 600 Hz;
- Noise screening can be effective when there is a barrier between the receiver and the source i.e. walls, earth mounds, cuttings and buildings. The performance of barriers is frequency dependent. To avoid sound transmission through a barrier the superficial mass should be greater than 10 Kg/m^2; and
- There is a complex relation between subjective loudness and the sound pressure level and again between annoyance due to noise and the sound pressure level. In general the ear is less sensitive at low frequencies and the ear will only detect a difference in the sound pressure level when the ambient noise level is exceeded by 3-5 dBA.

The recommended noise level for a residential area according to the General Environmental Health and Safety Guidelines is 55.0dBA during the day time period and 45.0dBA during the night time period. The South African National Standards have different recommended ambient noise levels and is illustrated in Table 10.

The reference time intervals can be specified to cover typical human activities and variations in the operation of noise sources and are for daytime between 6h00 to 22h00 and for night time between 22h00 and 6h00.

In terms of noise increases, persons exposed to an increase of 2 dBA or less would not notice the difference. Some people exposed to increases of 3-4 dBA will notice the increase in noise level, although the increase would not be considered serious. Noise increases of 5dBA and above are very noticeable, and, if these are frequent incidents, or continuous in nature, could represent a significant disturbance.

TABLE 10: RECOMMENDED NOISE LEVELS FOR DIFFERENT DISTRICTS

1	2	3	4	5	6	7
Type of district	**Equivalent continuous rating level $L_{Req.T}$ for ambient noise** dBA					
	Outdoors		**Indoors, with open windows**			
	Day-night L_{Rdn} [2]	**Daytime** L_{Rd} [1]	**Night-time** L_{Rn} [1]	***Day-night*** $LRdn$ [2]	**Day-time** L_{Rn} [1]	**Night-time** L_{Rn} [1]
a) Rural districts	45	45	35	35	35	25
b) Suburban districts with little road traffic	50	50	40	40	40	30
c) Urban districts	55	55	45	45	45	35
d) Urban districts with some workshops, with business premises and with main roads	60	60	50	50	50	40
e) Central business district	65	65	55	55	55	45
f) Industrial districts	70	70	60	60	60	50

People exposed to an increase in the prevailing ambient noise level will re-act differently to the noise levels and the response is given in Table 11 below.

TABLE 11: COMMUNITY RESPONSE TO EXEEDING AMBIENT NOISE LEVELS

1	2	3
Excess)$L_{Req,T}$[1)] dB	**Estimated community/group response**	
	Category	**Description**
0	None	No observed reaction
0-10	Little	Sporadic complaints
5-15	Medium	Widespread complaints
10-20	Strong	Threats of community/group action
>15	Very strong	Vigorous community/group action

1) Calculate)$L_{Req,T}$ from the appropriate of the following:

a))$L_{Req,T}$ = $L_{Req,T}$ of ambient noise under investigation MINUS $L_{Req,T}$ of the residual noise (determined in the absence of the specific noise under investigation).

b))$L_{Req,T}$ = $L_{req,T}$ of ambient noise under investigation MINUS the maximum rating level for the ambient noise.

c))$L_{Req,T}$ = $L_{Req,T}$ of ambient noise under investigation MINUS the typical rating level for the applicable district.

8.2.2 *Preliminary Assessment of Alternatives and Recommendations*

The preliminary noise sensitivity analysis of the study area was conducted on the proposed P166 main route and its alternatives. The results of the preliminary analysis are discussed below.

The P166 main route and Phumlani alternative 1 and 3 emerged as less (medium) sensitive when compared with other alternatives which were very sensitive. However it should be noted that this was a preliminary assessment further assessment will be conducted in the EIA phase.

8.3 Social

8.3.1 *Potential Impacts and Preliminary Assessment of Alternatives*

- **Sensitive Areas along the P166 Route and Alternatives**

The preliminary social sensitivity analysis of the study area was conducted on the proposed P166 main route and its alternatives. The results of the preliminary analysis are discussed below.

- **P 166 Road (North end, White River)**

The northern route of the proposed P 166 passes along the west side of White River, between the residential suburb of Colts Hill and the North West side of White River, also primarily being a residential area.

- **Phumlani Alternative 1, 2 and 3**

The proposed alternative routes traverse commercial agricultural farms, informal settlement, formal residential areas and small holdings. These establishments will be negatively impacted by the proposed project.

- **P166 Road (Middle End of Mbombela)**

The middle most portion of the P 166 passes commercial and business properties as well as residential small holdings. It runs parallel to the R40 at its end.

- **P166 Road Southern End and Maggiesdal Alternative**

The original proposed southern P 166 route skirts the large, formal residential community called 'Stonehenge' along the west side. The proposed alternative Maggiesdal straddles farm land, privately catered tourist accommodation and a private events venue.

8.3.2 *Implications of Sensitive Areas for development and further study*

The presence of the above sensitive areas has implication for the routing of the proposed road, and the selection of a final proposed alignment that is associated with the least amount of environmental impacts (i.e. that is most socially and environmentally sustainable). The Maggiesdal and Phumlani Alternatives have been created primarily to address social issues, however each of the alternatives is associated with a certain level of social impact, in spite of ameliorating social impacts associated with the proposed alignment. The alternatives will need to be comparatively assessed in the impact phase social study based on the more detailed assessment undertaken in that study, and recommendations in terms of proposed routes will be made in the study.

In terms of the sensitive areas identified above for which no routing alternatives have been identified, the impact phase social study will examine mitigation measures to potentially ameliorate or avoid the identified social impacts. It should be noted that this may involve the suggestion of further alternatives that would avoid these socially-sensitive areas, e.g. for the portion of the existing servitude that runs between White River and Colts Hill.

8.3.3 *Recommendations*

Phumlani alternative 1 and P166 in the southern end emerged as the preferred alternatives from the preliminary social assessment. Detailed studies will be undertaken to assess the impacts identified in the EIA phase and nominate the preferred alternative based on further study.

9 PUBLIC PARTICIPARTION PROCESS

The primary aims of the Public Participation Process during the Environmental Scoping Study were:

- To inform Interested and Affected Parties (I&APs) of the proposed project;
- To identify issues, comments and concerns as raised by I&APs;
- To promote transparency and an understanding of the project and its consequences;
- To serve as a structure for liaison and communication with I&APs; and
- To provide local knowledge and input in identifying potential environmental (biophysical and social) impacts associated with the proposed development.

9.1 Advertising

As required by the EIA Regulations (2010), the commencement of the EIA process for the project was advertised in a local newspaper and by using Site Notices that were placed in public venues and at the project site at the inception of the project. This advertisement and Site Notice informed I&APs about the proposed project and requested them to register and become involved in the project. A copy of the advertisement and Site Notice is attached in **Appendix E1.** The primary aim of this advert was to ensure that the widest possible group of I&APs were informed of the project and to obtain comments from the public regarding the proposed project.

9.2 Identification of Key Stakeholders

The first step in the public participation process was to identify key stakeholders, including:

- Provincial Government Representatives;
- Local Authorities (i.e. Mbombela Municipality);
- Affected and Surrounding Landowners.
- Chiefs and Headmen/headwoman
- Environmental NGOs; and
- Community Based Organisations.

All I&AP information (including contact details), together with dates and details of consultations and a record of all issues raised will be recorded within a comprehensive project database. This database will be updated on an on-going basis throughout the project, and will act as a record of the communication/public involvement process.

9.3 Background Information Document

Background Information Document (BID) for the project has been compiled and the aim of this document is to provide a brief outline of the proposed project, provide preliminary details regarding the EIA process, and explain how I&APs could become involved in the project. The BID, together with a comment sheet and relevant map,

were distributed to all identified stakeholders and I&APs inviting them to register for the proposed project and submit details of any issues and concerns that they may have, refer to **Appendix E2.**

9.4 Consultation and Public Involvement

Through consultations with I&APs and Stakeholders, issues for inclusion within the Environmental Scoping Report has been identified and recorded. Consultations took the form of telephonic interviews (note the telephonic conversation was captured in the issues report as part of the public participation record), letters and emails with key I&APs and stakeholders to inform them of the proposed project and to record their comments. In addition, a Local Authority Focus Group Meeting will be held during the public review period on the Draft Scoping Report.

A public meeting was be held during the review period of the draft Environmental Scoping Report. In accordance with the requirements of the EIA Regulations, this meeting will be advertised 10 days prior to the event.. Networking with I&APs, will continue throughout the duration of the project. The primary aim of these meetings will be to:

- Disseminate background information regarding the proposed project to I&APs,
- Supply more information regarding the EIA process and the findings of the specialist studies undertaken;
- Answer questions regarding the project and the EIA process;
- Obtain feedback from I&APs with respect to the proposed project; and
- Receive input regarding the public participation process.

9.5 Issues and Response Report

Issues and concerns raised during the public participation process will be compiled into an Issues and Response Report and this information will be available in the final scoping report.

9.6 Public Review of the Draft Environmental Scoping Report

The draft Environmental Scoping Report will be made available for review at the following public locations within the study area, which were identified as readily accessible to I&APs:

- Mbombela Public Library;
- White River Public Library
- Mbombela Municipality Offices; and
- Royal HaskoningDHV website.

The availability of this draft report will be advertised in the **Mpumalanga News paper.** A 40-day period will be allowed for this review process, from **22 February 2013-30 April 2013**. I&APs registered on the project database will be notified of the availability of this report.

9.7 Final Environmental Scoping Report

The compilation of the Final Environmental Scoping Assessment Report entails the consideration and inclusion of all relevant comments received from the public on the draft and final Environmental Scoping Report and Plan of Study for EIA. The public will be afforded an opportunity of 21 days to comment on the final report ascertain that all the issues raised during the review of the draft Scoping Report have been addressed adequately. After the 21 public commenting period, the final document will be submitted to DEA and MDEDET for authority review, comments and decision-making.

10 CONCLUSION AND RECOMMENDATIONS

The Environmental Scoping Study described the proposed project and identified the four alternatives in order to identify the potential environmental impacts (biophysical and social) associated with the proposed project. In line with Regulation 28 (Part 3) of the EIA Regulations, this issues-based ESS aimed to identify and provide:

- A description of the proposed activity;
- A description of the environment that may be affected by the activity and the manner in which the physical, biological, social, and economic aspects of the environment may be affected by the proposed activity;
- The identification of all legislation and guidelines applicable to the development;
- A description of environmental issues and potential impacts, including cumulative impacts, that have been identified;
- Details of the public participation process conducted to date; and

Based on the Environmental Scoping Study (ESS) undertaken, it can be concluded that there are no fatal flaws identified during the scoping phase. Those issues highlighted as potentially significant will be assessed during the EIA phase and appropriate mitigation measures will be provided. An Environmental Management Programme will be compiled for the project which will contain the practical project specific mitigation measures which will be implemented by SANRAL in order to minimise the identified environmental impacts and optimise the positive impacts. The methodology that will be used for assessment of potential significant impacts is contained in Plan of Study for EIA.

TABLE 12: SUMMARY OF POTENTIALLY SIGNIFICANT IMPACTS

Discipline	Potential Impacts	Recommendations	Preliminary (Scoping Phase[5]) preferred alternative
Wetlands	• Alteration of the hydrology and morphology of rivers and wetlands crossed • Alteration of the aquatic ecology and resource quality of rivers and wetlands crossed • Downstream impacts due to hydrological impact at the crossing point • Introduction of pollutants such as hydrocarbons into the drainage system from stormwater inlfows	Different alternative alignments have different implications in terms of intensity of impact on wetlands and rivers, as a different number of surface water crossings and different types of crossings will have varying levels and intensity of impacts. Through the further investigation, assessment and classification of wetlands along the respective alternatives and along the existing servitude, recommendations will be made in terms of a preferred set of alternatives. Where no alternatives exist and the main servitude is associated with significant impact on wetlands, suggestions in terms of consideration of new alternatives may be made.	The main P166 servitude and Alternative 2 are most preferred from a surface water perspective
Soils and Agricultural Potential	• Soils on steeper slopes may be prone to erosion. • Loss of productive agricultural land, especially in the Crocodile River Valley, leading to concomitant loss of income and knock-on social impacts such as job losses, etc	A detailed assessment of the study area will be undertaken within the EIA phase in order to adequately assess the potential impacts on soils and agricultural potential as a result of the proposed project and recommend appropriate mitigation measures, where required. All alternatives will be assessed in further detail and in the context of their respective impacts on agricultural potential and production.	The P166 and its alternatives will traverse the similar terrain with high soil potential; therefore preferred route will be determined during an EIA phase.
Ecology	The following impacts were identified that could affect the floristic and faunal	A detailed assessment of the study area will be undertaken within the EIA	Phumlani alternative 3 is preferred as it bisects large transformed

[5] It should be noted that although preferred alternative sections have been identified by each respective specialist scoping phase (desktop) study, these recommendations will be refined and altered if necessary based on further detailed assessment in the EIA phase specialist study

Discipline	Potential Impacts	Recommendations	Preliminary (Scoping Phase[5]) preferred alternative
	attributes of the study area adversely: • Potential impacts on the local and regional biodiversity; • Potential impacts on sensitive/pristine habitat types; • Potential impacts on threatened/protected species and habitat; • Potential impacts on surrounding habitat and species; and • Potential impacts on fauna species. Impacts of a cumulative nature include: • Potential increase in habitat transformation (e.g. loss of habitat); • Potential increase in habitat fragmentation (e.g. loss of migratory routes); and • Potential increase in environmental degradation (e.g. loss of habitat quality).	phase in order to adequately assess the potential impacts on biodiversity as a result of the proposed project and recommend appropriate mitigation measures, where required.	vegetation units with low conservation potential or likelihood for red listed plant or animal species and only bisects two wetland habitats.
Social	The proposed development is likely to have an impact on areas with high human movement along the proposed road. Social issues and potential social impacts associated with developing a road along the existing servitude were the main driver leading to the creation of alignment alternatives. Nonetheless each alternative is associated with certain social issues and social impacts. The following are the possible generic (i.e. not related to a specific alternative	A detailed assessment of the study area will be undertaken within the EIA phase in order to adequately assess the potential impacts on the social environment as a result of the proposed project and recommend appropriate mitigation measures, where required. The social impacts associated with each alternative (including the respective section of the existing servitude) will be further assessed in the impact phase study and will thus allow the comparative assessment of	Phumlani alternative 1 and P166 in the southern end emerged as the preferred alternatives from the preliminary social assessment.

Discipline	Potential Impacts	Recommendations	Preliminary (Scoping Phase[5]) preferred alternative
	alignment) impacts: • Labour and employment; • Extent of in-migration; • Potential loss of grazing land; • Potential physical displacement and relocation; • Potential loss of livelihoods; • Potential health and safety issues for nearby communities as a result of construction labour force; • Potential health and safety issues for nearby communities as a result of increased traffic; • Changes in criminal activity; and • Spin-offs from related local procurement.	each alternative.	
Heritage	Potential destruction of or damage to hitherto undiscovered heritage sites.	It is recommended that a full heritage impact assessment be carried out during the EIA phase, in order to further identify any areas / locations of heritage sensitivity that could affect the route determination of the final proposed alignment	No sites of archaeological importance which were identified through a desktop study therefore preferred route will be determined during an EIA phase.
Noise	**Noise is a social environmental issue, and the generation of noise by the proposed road was an important factor in the** creation of alternatives that would potentially ameliorate or alleviate noise-related issues. Different alternatives (including the respective section of the existing servitude) have differing implications in terms of noise	The field study noise data and available noise data on the study area will be evaluated and the noise impact assessment report will be compiled for the EIA process. The detailed assessment will be used to comparatively assess all alternatives and to recommend a preferred set of alternative alignments.	The P166 main route and Phumlani alternative 1 and 3 emerged as less (medium) sensitive when compared with other alternatives which were very sensitive. However it should be noted that this was a preliminary assessment further assessment will be conducted in the EIA phase.

Discipline	Potential Impacts	Recommendations	Preliminary (Scoping Phase[5]) preferred alternative
	creation for sensitive receptors. Generic Potential noise impacts are generated from the following activities: Construction phase: • Preparation of the foot print areas; • Civil construction; • Grading and building of new roads; • Asphalt laying; • Marking of roads. Operational phase: • Traffic volumes. Maintenance Phase • Maintenance of the road surface		

11 : PLAN OF STUDY FOR THE EIA PHASE

11.1 Process Phases

11.1.1 *Scoping Phase*

A desk-top and field survey issues-based Environmental Scoping Study has been undertaken for the proposed project. Existing information and input from specialists, the Authorities and Interested and Affected Parties (I&APs) were used to identify potential environmental impacts (both social and biophysical) associated with the proposed project. No environmental fatal flaws associated with the proposed project were identified through the Environmental Scoping Study, although a number of potentially significant environmental impacts have been identified as requiring further in-depth study.

11.1.2 *Environmental Impact Assessment*

An EIA is required to be undertaken in order to provide a comprehensive assessment of the potential impacts which have been identified in the Scoping Phase and recommend appropriate mitigation measures where required. The EIA will also be utilised as an instrument for the evaluation of the identified alternatives. The EIA will aim to adequately investigate and address all environmental issues in order to provide DEA with sufficient information to make an informed decision regarding the proposed project.

11.2 Particulars of the Applicant and EAP

Applicant: South African National Roads Agency Limited
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Environmental Assessment Practitioner: Royal HaskoningDHV
Contact Person: Malcolm Roods
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11.3 Specialist Team

The following specialist studies and specialists are proposed to be undertaken in the EIA Phase Table 13.

TABLE 13: SPECIALIST STUDIES TO BE UNDERTAKEN IN THE EIA PHASE

Specialist Field	Specialist Name
Noise	Barend van der Merwe
Wetlands	Paul da Cruz
Soils and Agricultural Potential	Garry Paterson
Ecology	Clayton Cook
Social Study	Kementhree Moonsamy
Heritage	Johnny van Schalkwyk

The Terms of Reference for each of the specialist studies for the EIA phase is provided on Table 17 below. As a critical step in the EIA process, it is important that the public has the opportunity to comment on, and the authorities approve of, the proposed approach to the EIA Phase.

Commenting on the PoS for EIA by the public ensures that the proposed approach, including the scope of work for the specialists, is informed by public and the authority feedback in order to ensure that the work produced addresses the issues of concern at the requisite level of confidence. A robust basis for informed debate and decision making is thus provided.

Key outcomes of the specialist studies would be information which will allow I&APs to engage in informed debate on the implications of the proposed project and will allow SANRAL to make an informed decision on the best alternatives. SANRAL will also gain an understanding of the range and benefits of implementing possible mitigation measures.

TABLE 14: SPECIALISTS TERMS OF REFERENCE FOR EIA STUDY

Study	Terms of Reference
Wetlands	The EIR-phase surface water study will assess in more detail the nature of the surface water features crossed by the proposed P166 road. All surface water features will be visited in the field to validate the findings of the scoping phase study in terms of their (hydro-geomorphic) classification. Where wetlands (i.e. containing hydric soils) are found to occur, the nature of the wetland being assessed will be further investigated utilising the Department of Water Affairs' guideline for the delineation of wetland areas (DWAF, 2005). This guideline will also form the basis for the delineation of the edge of the riparian zone of the surface water features where a riparian zone is present. A wetland and riparian zone shapefile will be created. The field visit will also be used to identify all other surface water features not identified during the desktop assessment, or where uncertainty existed as to whether the area constituted a wetland or other surface water feature. The impacts of the proposed road and river crossing structures will be assessed in detail in the EIR-phase surface water study. This will include the assessment of the likely impacts associated with the relevant design of the crossing structure (if available) at the level of each crossing point. A high level assessment of the Present Ecological Status of each crossing will be undertaken in order to inform the assessment of impacts. Based on the identification of impacts, a list of mitigation or remediation measures will be specified. Lastly the impacts of the proposed project on surface water features will be rated in terms of the EIA rating matrix.
Soils and Agricultural Potential	▪ Undertake an assessment of impacts identified in the scoping report and their significance due to the proposed development on soils and agricultural potential. ▪ Propose mitigation measures to reduce or eliminate the identified impacts ▪ Sensitivity maps will be compiled to show the soil profile and agricultural potential of the sites selected. In addition, a report will be compiled to reflect the findings of the study.
Ecology	The following aspects will be included as part of the EIA investigation. ▪ **Floristic investigation** - Map the location and extent of all plant communities, indicating size and ecological sensitivity, areas of disturbance, surrounding land use, etc; - Compile a list of potential Threatened Plant Species that occur in the area; - Identify plant species that may be of conservation importance down to species level; - Provide locality, date surveyed, GPS location, spatial resolution and distribution, including actual numbers, of plant species that may be of conservation importance; - Provide a list of alien plant species occurring on the property, considering eradication programmes of alien vegetation; and

Study	Terms of Reference
	- Provide relocation plans for plants of conservation importance. These species may include: * Species endemic to the province; * Red Data listed plants; * Medicinal plants; and * Protected plants. • **Faunal investigation** The faunal species which were identified during the scoping report will further be assessed in terms their occurrence, habitats and sensitivities. Impacts will be assessed and rated using an EIA rating system and mitigation measures will be recommended on significant impacts identified.
Social	The following social issues will be further assessed in the EIA phase: • **Population and Politics**: this includes changes and impacts related to population structure, migration, welfare balances, and power and authority; • **Economy and Work**: this context includes changes and impacts related to national and regional economic networks, entrepreneurial opportunities, tax income, employment levels and patterns, commercial and labour organization, access to jobs and employment equity, labour exploitation and household and community livelihoods; • **Land and Resources**: this includes baseline changes and impacts related to the use of and access to natural resources such as land and water, and to location and settlements based on access to such resources; • **Infrastructure and Social Services**: the social services context includes changes and impacts related to services infrastructure (water, energy, education, roads, and communication) and demand for these services. Health is considered under this heading, particularly in relation to demand for and access to health services; • **Organisation and Community**: changes and impacts related to local government, crime, community organization, development planning, access to decision making, voluntary organizations (CBOs and NGOs), support networks, community stability, response to change, trust in political and social institutions, barriers to access (skills, literacy), household budgeting and use of income, and cultural resources and practices; and • **Social Divisions**: this context focuses on changes and impacts around equity (for example the distribution and circulation of compensation), non-participation, unmet expectations, prevailing social tensions and divisions, the influx of newcomers, and the status of vulnerable groups such as the elderly, women, children and the disabled.
Heritage	Archaeological survey of the study area in accordance with the requirements of Section 38(3) of the National Heritage Resources Act (Act 25 of 1999) will be conducted in the EIA phase. Site-specific, detailed management and mitigation measures will furthermore be compiled for inclusion in the Environmental Management Programme (EMPr). The study should provide a map of the identified archaeological artefacts as well as a report detailing the finding of the study, and mitigation of any impacts.
Noise	A standardised impact assessment methodology will be used to evaluate the impact during the construction, operational and

Study	Terms of Reference
	maintenance phases of the project on each and every noise sensitive area. The prevailing ambient noise levels of during each of these phases will differ due to the location of these areas to other point and/or linear noise sources. Assessment of route alignments and nomination of the preferred. Provision of mitigation measures for significant impacts.

11.4 Approach to the Undertaking of the EIA Phase

Potential environmental impacts (biophysical and social) associated with the proposed road determination project have been identified in the Environmental Scoping Study (ESS). No environmental fatal flaws associated with the proposed project were identified through the Environmental Scoping Study, but a number of potentially significant environmental impacts have been identified as requiring further in-depth study within the Environmental Impact Assessment (EIA) phase of the project. Mitigation measures will be contained in the Environmental Management Programme (EMPr) to be compiled during the EIA phase. Mitigation measures recommended in the ESS will also be included in the EMPr.

As part of the identification of mitigation measures, if necessary further routing / alignment alternatives in areas of specific environmental sensitivity may need to be considered. The process of identifying any further required alternative sections will be undertaken at the end of the scoping phase and at the onset of the EIA phase, based on specialist input as well as public comment and feedback relating to areas of environmental sensitivity. This will determine the routes and alternatives taken forward for further assessment in the EIA phase of the project.

The EIA phase will aim to adequately assess and address all potentially significant environmental issues in order to provide the Department of Environmental Affairs (DEA) and Mpumalanga Department of Economic Development Environment and Tourism (MDEDET) with sufficient information to make an informed decision regarding the proposed project.

The following points below outline the proposed approach to undertaking the EIA phase of the project. It is believed that the proposed approach will adequately fulfil the competent authority's (DEA's) requirements, the requirements of the EIA Regulations (2010) and the objectives of environmental best practice, so as to ensure transparency and to allow an informed decision regarding the project to be made.

11.4.1 *Authority Consultation*

Consultation with all relevant authorities initiated during the Scoping Phase will continue throughout the duration of the project. The representatives from the relevant Departments will be requested to formally provide input into the EIA process. The authorities to be consulted include:

- National Department of Environmental Affairs;
- Mpumalanga Department of Economic Development, Environment and Tourism;
- Department of Land Affairs;
- Department of Water Affairs;
- Department of Minerals and Resources and
- Department of Transport etc.

11.4.2 *Public Participation Process for the EIA Phase*

- **On-going Consultation with all I&APs**

On-going consultation with key stakeholders (e.g. local authorities, relevant government departments, local business), and other identified I&APs will ensure that I&APs are kept informed regarding the EIA findings and proposed mitigation measures. Networking with I&APs will effectively continue throughout the duration of the project until the closure of the EIA phase. The database and issues and response report will be continually updated throughout the process.

- **Public Involvement**

Public meetings will be held to provide the general public with feedback regarding the findings of the EIA, and to provide detail regarding mitigation measures proposed. In accordance with the requirements of the EIA Regulations, the public meetings will be advertised 10 days prior to the event. I&APs registered on the project database will be notified of this public meeting by letters, emails and newspaper advertisement. In addition, local authorities will be invited to attend focus group meetings, in order to encourage continued participation in the process. Formal minutes of the public meeting and focus group meetings will be compiled and distributed to the attendees for comments. These proceedings will also be included in the final EIA report.

- **Issues and Response Report**

Issues and concerns raised during the public participation process of the EIA phase will be compiled into an Issues and Response Report. Issues will be captured according to the nature thereof, for example technical, property/servitude comments, general, technical, health, social, etc Proceedings of meetings and comments received will also form part of the document. This record of issues will provide a consolidated list in order to ensure that all issues and concerns raised by I&APs are considered within the EIA process.

11.4.3 *Environmental Impact Assessment*

The Environmental Impact Assessment (EIA) will aim to achieve the following:

- To provide an overall assessment of the social and biophysical environments affected by the proposed project;
- To assess the study area in terms of environmental criteria;
- To identify and recommend appropriate mitigation measures for potentially significant environmental impacts within an Environmental Management Programme (EMPr); and
- To undertake a fully inclusive public participation process to ensure that I&AP issues and concerns are recorded.

11.4.4 *Environmental Impact Assessment Report*

The EIA Report will include and address the following:

- A project description (including a description of the proposed activity, plans illustrating the study area and proposed site, and detailed technical details regarding the proposed project);
- A description of the pre-construction environment;
- A description of the public participation process, including the identification of I&APs, a record of the procedures followed, and the perceptions and views of the I&APs regarding the project;

- A description of environmental (biophysical and social) issues identified and potential impacts of the proposed project on these aspects (i.e. how the environment may be affected as a result of the proposed activity)
- Assessment of impacts identified in the Scoping Study which were determined to be significant. These impacts will be assessed in terms of the nature, extent, duration, intensity, severity and probability and accumulation of the impact occurring;
- Conclusions and recommendations regarding the presence of any environmental fatal flaws and recommendations regarding the proposed project.
- The integration of the specialist studies into a consolidated report will allow for easy assessment of the potential environmental aspects. In order to evaluate the significance of the identified impacts, the following characteristics of each potential impact will be identified:
  - The nature, which shall include a description of what causes the effect, what will be affected and how it will be affected;
  - The extent, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional;
  - The duration, wherein it will be indicated whether the lifetime of the impact will be of a short duration (0–5 years), medium-term (5–15 years), long term (> 15 years) or permanent;
  - The probability, which shall describe the likelihood of the impact actually occurring, indicated as improbable (low likelihood), probable (distinct possibility), highly probable (most likely), or definite (impact will occur regardless of any preventative measures);
  - The significance, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high; and
  - The status, which will be described as positive, negative or neutral.
  - Cumulative.
- South African National Roads Agency Limited has the responsibility to avoid or minimise impacts as described in section 28 of the National Environmental Management Act (No107 of 1998).

11.4.5 *Review of Environmental Impact Assessment Report*

- **Public Review of the draft Environmental Impact Assessment Report**

The draft Environmental Impact Assessment Report and EMPr will be made available at public places for public review and comment, in accordance with the EIA Regulations 2010. A 40-day period will be allowed for this review process. An advert indicating the availability of this report and the information regarding the public meeting will be placed in the local newspaper. In addition, all I&APs registered on the project database will be notified of the public meeting, the availability of this report and the review period by letter. All I&AP comments received during the 40-day public review period will be incorporated into a final Environmental Impact Assessment Report and this will then be made available to the public for a 21 day period. This final report will be submitted to the Authorities for their review and decision making.

- **Authority Review of the Environmental Impact Assessment Report, including EMPr**

The public will be afforded an opportunity of 21 days to comment on the final report ascertain that all the issues raised during the review of the draft Environmental Impact Report and Environmental Management Programme have been addressed adequately. After the 21 public commenting periods, the final documents will be submitted to DEA and MDEDET for authority review, comments and decision-making.

11.4.6 *Environmental Authorisation*

On receipt of the Environmental Authorisation for the project, the I&APs registered on the project database will be informed of this Environmental Authorisation and its associated terms and conditions in writing via letters, email and advertisement in the local newspaper.

11.4.7 *Work Programme*

The environmental programme for the Environmental Impact Study and the key dates relevant to the project are outlined in the table below:

TABLE 15: EIA SCHEDULE

ACTIVITY	START	FINISH
Submit final Scoping report to Decision-making Authority	2013/04/29	2013/04/29
Authority review of FSR (Best Case = 30 calendar days)	2013/04/30	2013/05/30
Receipt of Approval to commence EIA phase	2013/05/30	2013/05/30
ENVIRONMENTAL IMPACT PHASE		
Detailed specialist studies	2013/02/04	2013/06/17
Undertake biophysical studies in growing season	2013/02/04	2013/03/01
undertake non-biophysical specialist studies	2013/05/03	2013/05/30
Compilation of Draft Environmental Impact Report (DEIR)	2013/04/30	2013/06/17
Compile DEIR	2013/04/30	2013/05/20
Incorporate Specilaist Studies into DEIR	2013/05/31	2013/06/04
Submit draft DEIR to Client for review	2013/06/04	2013/06/04
Client review period of DEIR	2013/06/05	2013/06/13
Finalise DEIR with client comments (for public review period)	2013/06/14	2013/06/17
PUBLIC REVIEW OF THE DRAFT ENVIRONMENTAL IMPACT REPORT (DEIR)		
Make DEIR Report available for public review	2013/06/18	2013/06/18
Public Review of DEIR (40 calendar days)	2013/06/19	2013/07/29
Advertising of DEIR availability	2013/06/05	2013/06/19
Prepare advert	2013/06/05	2013/06/05
Submit to Client for approval	2013/06/05	2013/06/05
Client review period	2013/06/06	2013/06/07
Advertisement for DEIR Comment Period appears in newspaper	2013/06/19	2013/06/19
CONSULTATION WITH I&APs & Meetings	2013/06/19	2013/09/04
Key Stakeholder Meetings	2013/08/19	2013/08/21
Public Meetings / Focus Group Meetings	2013/08/19	2013/08/21
Distribute Minutes of Meetings	2013/09/04	2013/09/04
Update I&AP database from response to adverts and discussions	2013/06/19	2013/07/29
Incorporate comments into the Issues Trail	2013/07/30	2013/07/31
PUBLIC REVIEW OF DRAFT FINAL ENVIRONMENTAL IMPACT REPORT (DFEIR)		
Finalise DFEIR with comments from public on DEIR	2013/07/30	2013/08/01
Submit DFEIR report to Client for reivew	2013/08/01	2013/08/01
Client review period of DFEIR	2013/08/02	2013/08/06
Make changes to DFEIR with Client comments	2013/08/07	2013/08/08
Public Review of DFEIR (21 Calendar days)	2013/08/09	2013/08/29
AUTHORITY REVIEW OF FINAL ENVIRONMENTAL IMPACT REPORT - FEIR (Best Case = 105 days)		
Incorporate Comments from public on DFEIR into FEIR	2013/08/30	2013/09/03
Submit final FEIR report to Decision-making Authority	2013/09/03	2013/09/03
Authority review of EIA report (60 calendar days)	2013/09/04	2013/11/04
Decision Period (45 calendar days)	2013/11/05	2014/01/08
Record of Environmental Authorization	2014/01/09	2014/01/09
Notify I&APs of EA (12 calender days)	2014/01/10	2014/01/22

REFERENCES

1. National Environmental Management Act (No 107 of 2006)
2. National Environmental Management Act (No 107 of 2006) Government Notice 543,544, 545 and 546
3. Cook. C., (2012): Preliminary Ecological and Habitat Assessment for the Proposed P166-1/2
4. Da Cruz, P., (2012): Surface Water Assessment for the Proposed P166-1/2
5. Paterson, G., (2012): Soil and Agricultural Potential for the Proposed P166-1/2
6. Moonsamy, K., (2012): Baseline Social Assessment for the Proposed P166-1/2
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8. Van Schalkwyk, J., (2012): Heritage Assessment for the Proposed P166-1/2
9. Van der Merwe, B., (2012): Noise Assessment for the Proposed P166-1/2