ENVIRONMENTAL IMPACT ASSESSMENT

FOR THE CONSTRUCTION OF ROAD K148 BETWEEN ROADS K146 AND K133 (INCLUDING N3/K148 INTERCHANGE).

Reference: Gaut 002/15-16/E0259

DRAFT ENVIRONMENTAL IMPACT REPORT

Public Review Period: 29 July 2016 – 30 August 2016

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PROJECT DETAILS

DEA Reference No.	**:**	Gaut 002/15-16/E0259
Title	:	Environmental Impact Assessment ProcessThe Construction of road K148 between roads K146 and K133 (Including N3/K148 Interchange).
Report compiled by	:	Company Name: Envirolution Consulting Contact person: Ms Sheila Muniongo Postal Address: P.O.Box 1898, Sunninghill, 2157 Telephone Number: 0861 44 44 99 Fax Number: 0861 62 62 22 Email: sheila@envirolution.co.za
Client	:	Gauteng Department of Roads and Transport (GDoRT).
Report Status	:	Draft Environmental Impact Assessment Report for public review
Review period		**The 30-day period for review is from** **29 July 2016 – 30 August 2016**

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EXECUTIVE SUMMARY

Envirolution Consulting (Pty) Ltd was appointed by Ndodana Engineers to conduct the Environmental Impact Assessment (EIA) Process on behalf of the Gauteng Department of Roads and Transport (GPDoRT), and undertake a Scoping & Environmental Impact Assessment (EIA) process for the proposed construction of Road N3/K148 (phase 1) between k146 and K133 (including the interchange).

This project is located in the Gauteng Province of South Africa on provincial Route K148. The project route commences at the intersection between Routes K148 and K154, km 0,000 on the K148 and continues in a north-easterly direction where it terminates at the intersection between Routes K148 and K133 at approximately 6 km.

This is a Greenfields project (K148) linking in with existing roads (K154 and K133). The project includes:

- Verification of K148, K154, K146 and K133 alignments with a 62 meter road reserve.
- Detail design of the horizontal and vertical geometric alignment of the K148 route.
- Detail design of the K133/K148 and K146/K148 intersections.
- Detail design of the N3-11/K148 diamond interchange and bridge.
- Detail design of the general drainage of the road reserve and river / stream crossings at km 3.740 and km 7.980.
- Preliminary allowances for the investigation of three borrow pits and one hard rock quarry.
- Construct a pavement structure capable of accommodating current and future traffic loading.

In terms of the NEMA EIA Regulations (2014), published in Government Notice R. 982 in Government Gazette No. 38282 of 4 December 2014, under Section 24(5) of the National Environmental Management Act, 1998 (Act No.107 of 1998), a Scoping & Environmental Impact Assessment are required for the development due to the following listed activities:

Table 1: Project Detailed description of listed activities associated with the project

Listed activity as described in GN R 983, 984 and 985	Description of project activity that triggers listed activity
GR 984 Listing Notice 2 ***(27)*:** The development of **(ii)** a road administered by a provincial authority **(iii)** a road with a reserve wider than 30m **(iv)** a road catering for more than one lane of traffic in both directions	A new road with a **servitude of 62m** is proposed by a Provincial Government department between roads K146 and K133, inclusive of the N3/K148 interchange.
GN R 985: Listing 3 **(12)** The clearance of an area of 300 sqm or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a	Before construction of the road, the servitude area needs to be cleared of vegetation. The properties are currently mostly used for farming activities. The area falls in the Grassland Biome and Dry or

Listed activity as described in GN R 983, 984 and 985	Description of project activity that triggers listed activity
maintenance management plan. **a)** In Gauteng **(ii)** within critical biodiversity areas identified in bioregional plans **(iv**) on land where at the time of coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.	Mesic Highveld Grassland, more specifically as a western wedge of dry Carleton Dolomite Grassland vegetation unit (Gh 15, as defined by Mucina and Rutherford 2006) that on site extends south to about the R550 road and the northern border of the Suikerbosrand Nature Reserve. The Carletonville Grassland is classified as Vulnerable, with only small patches conserved and about 25% transformed by cultivation, urban sprawl and mining, while the Soweto Grassland is Endangered, with about 50% transformed and few conserved patches, the largest and most notable being the Suikerbosrand Nature Reserve just south of the site.
GN R 985: Listing 3 (**19).** The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from- **(i)** a watercourse;	The road project will require depositing of material in areas where the design requires it. At the wetland crossings, the material require collectively for infilling may exceed 5 cubic meters and may be required in the vicinity of the watercourse in the area. The proposed road will cross wetlands and seasonal watercourses and will require a Water Use License. A WUL Application will be submitted to DWS as part of this project. The EIA will inform the DWS about the impacts on the environment.

I. PROJECT DESCRIPTION

Going at right-angles from the northwest-southeast R103 road between Johannesburg and Heidelberg, the proposed N3/K148road will pass west-southwest between the two Engen service stations that are located on a new bridge on both sides of the N3 Johannesburg-Durban motorway. It will then head through farmland, onto a higher area where it will bend more south, and then it will descend to its current western extent just before reaching the edge of the residential areas of Magagula Heights. At this point it will have an approximately1-km long right-angled connection at the K146, back to the narrow unnamed tar road, which is located northwest of the site. At the eastern end, to comply with regulations, the R103 will have to be re-constructed as a curve slightly northeast of its current position, so that the R103-N3/K148junction lies at the correct distance from a motorway. Besides the new bridge to be constructed over the N3, another bridge is planned near the western end of the development, where it is proposed that the K145/K146 cross a small river. The total area assessed for the first phase of the proposed N3/K148and K146 is at least 5.28 km2 (8.9-3.3 x 0.8 + 1 km = 52800 ha). A later western phase is planned to link the remaining 3.3 km of the N3/K148road to the R550 between Nigel and Meyerton.

The project is located in the jurisdiction of the following authorities:

Provincial Authority: Gauteng Department of Agriculture and Rural Development

Contact person:	Mr Tendani Rambuda (Environmental Officer)
Postal address:	Po Box 8769 Johannesburg 2000
Telephone:	011 240 3386
E-mail:	Tendani.Rambuda@gauteng.gov.za

Local municipality	City of Joburg
Contact person:	Lebo Molefi Assistant Director: Environmental Impact Management
Postal address:	PO Box 1049, Johannesburg, 2000
Telephone:	011 587 4200 Fax: 086 627 7516
E-mail:	lebomol@joburg.org.za

Local municipality:	City of Ekurhuleni
Contact person:	H Nkosi HOD Environmental Resource
Postal address:	Private Bag x1069 Germiston (47 Van Buuren Road Germiston) 1400
Telephone:	011 999 9412 Fax: 086 627 7516
E-mail:	H.Nkosi@ekurhuleni.gov.za

II. NEED FOR THE PROJECT

The objective of the proposed N3/K148 is to link existing roads to improve circulation and access of the area and to make provision for future developments. The project is in line with the Gauteng 25-Year Integrated Transport Master Plan (November 2013), stating that the use of existing infrastructure must be maximised.

K148/N3 Intersection as the “Tambo Springs Freight Hub Intersection”. The interchange should provide for the increase in traffic that forms part of the freight hub between KZN and Gauteng. The K148 (which is also known as the Heidelberg Road) crosses the N3 and forms part of the road network supporting the Tambo Springs Freight Hub. The N3 is part of the national road network under the jurisdiction of SANRAL, and SANRAL supports the upgrading of the interchange. The need for the project exits, as it will contribute towards the freight transportation on the East Rand and inland distribution on the road network of goods between air, land and sea

III. IDENTIFICATION OF POTENTIAL IMPACTS AND CONCLUSSION OF SPECIALIST STUDIES

In summary, the following conclusions have been drawn from the specialist studies undertaken and is concluded as follows:

Impacts on Vegetation

The proposed K148 will impact largely on transformed and secondary vegetation that were found to be of low conservation value (sensitivity). However, primary rocky grassland and near-natural (grazed) rocky grassland portions, as well as moist grasslands were also recorded along the route and were classified as medium to high sensitivity to the proposed road. In addition, a Near Threatened succulent occurs within the grazed rocky grassland and unless otherwise specified by the Gauteng Department of Agriculture and Rural Development, a 300m buffer around this species should be respected.

This assessment noted that the proposed development mainly makes use of areas where historical impacts took place. The moist grassland and rocky grassland along the K148 route comprise approximately 1.3km of the ±5.8km of the K148. Along the R103 deviation, the moist grassland and rocky grassland comprise about 0.3km of the ± 4.2km deviation. *Due to the transformed state of the remainder of the vegetation along the proposed route, the impacts on these areas are envisaged to be minimal.*

Impact on Fauna

Overall, the remaining natural terrestrial habitats are considered as of only Medium-Low sensitivity, except for the western riverine system which is considered of Medium-High sensitivity. The development is expected to displace individual animals rather than populations, hence it is concluded that irreplaceable loss of species will not occur within the general area nor will any Red Data vertebrate species be significantly affected. From a vertebrate perspective, **no objection can be raised** should development of the K148 and K146 proceed.

Impacts on Wetlands

Six wetland areas were found to cross the proposed road and interchange as shown in Figure 7.3. Other wetlands within the vicinity but outside of 500 m of the proposed development have been omitted from this wetland report. The majority of the wetland areas are located in the eastern section of the proposed road with only the floodplain located in the western section of the proposed development. The five wetlands located in the eastern section of the proposed development are largely impacted by current and historical farming as well as other anthropogenic activities such as developments and road construction. The two main wetlands are the Channelled Valley Bottom wetland, to which all three the unchannelled valley bottom wetlands are connected, and the Floodplain wetland, also the largest of the wetland systems and less impacted than the other smaller wetlands.
The current assessment finds that a minimum buffer of 30 m from the edge of the wetland boundaries should be respected. It is important that appropriate mitigation measures are put into place and carefully monitored to ensure minimal impact to regional hydrology.

Impacts on Heritage Resources

The study area was assessed in terms of the archaeological component of Section 35 of the NHRA and although the area to the south of the study area is known for Rock Art, Stone Age and Late Iron Age stone walling the extensive agricultural activities in the study area would have obliterated any possible surface indications of in-situ archaeological sites. This was confirmed during the survey and no surface indicators of archaeological (Stone or Iron Age) material was identified in the study area.

In terms of the built environment of the area (Section 34), the demolished stone and mud foundations of various ruins occur in the southern portion of the study area.

Two cemeteries were recorded, Cemetery 1 is located 4 meters from the road reserve and approximately 11 meters from the actual road (section 7.3.1 of Appendix 9). Cemetery 2 is a much smaller cemetery located 117 meters to the north of the proposed road corridor.

No significant cultural landscapes or viewscapes were noted during the fieldwork as the southern portion of study area is bordered by a large informal settlement. The high density agricultural activities

impeded on the archaeological visibility in the study area it is recommended that a chance find procedure is incorporated into the EMP for this project.

Based on the results of the field survey of the proposed K148 there are **no significant archaeological risks** associated with the development and from an archaeological point of view there is no reason why the development should not proceed if the recommendations as made in the report area adhered by and based on approval from SAHRA.

Impacts on Soil, Agriculture and Land use

The large amount of disturbance created during construction would leave the site vulnerable to soil erosion. It is, therefore, important that there should be strict adherence to the Environmental Management Programme and good soil management measures regarding the management of stormwater runoff and water erosion control should be implemented, with the implementation of good soil management measures the impact of the road on soils can be managed to an acceptable level, without significant erosion issues. Loss of agricultural land impacts are regarded as medium because most of the proposed route traverses highly modified area. Although there is some high value agricultural land in the vicinity, the small holdings in the area are not commercially viable as agricultural units.

Visual Impacts

Due to the flat topography and terrain of the area, there is little in the surrounding landscape (such as trees and buildings) that can shield the development from view. The landscape character of the site, and surrounds, is open grassland with few homesteads. The visual exposure of the facility is therefore rated high for the immediate vicinity of the site. Other infrastructure such as the existing Eskom power line, railway line in close proximity to the site presents an existing change in the visual environment. The study concluded that the significance of the overall visual impact of the proposed development would be moderate, due to its extent, long term duration and medium magnitude. Mitigation measures are proposed which could moderate that visual impact. It is important that mitigation measures are complied with and it is advised that the environmental management programme set out principles for the implementation of these measures.

Social and Economic Impacts

The development will create employment and business opportunities for locals during both the construction and operational phase of the project. The enhancement measures listed in the report should be implemented in order to maximise the potential benefits. In addition, the proposed establishment of a number of renewable energy facilities in the area will create socio-economic opportunities, which, in turn, will result in a positive social benefit. The significance of this impact is rated as low positive based on the magnitude and duration of the project.

Cumulative Impacts

The cumulative impacts for the proposed K148 road have been assessed to be of low to moderate significance. The interchange should provide for the increase in traffic that forms part of the freight hub between KZN and Gauteng. The K148 (which is also known as the Heidelberg Road) crosses the N3 and forms part of the road network supporting the Tambo Springs Freight Hub. This implies that projects of the same nature will be consolidated in one area creating a node, and ultimately aiming to

reduce the potential for cumulative impacts associated with such developments when spatially fragmented.

IV. PUBLIC PARTICIPATION PROCESS

Interested and Affected Parties, including surrounding and affected landowners, Provincial, National and Local Governments Departments were involved during the Public Participation Process (PPP).

The Draft EIA Report will be available to the stakeholders, the public and all registered I&APs for a review period of 30 days. Dates and venues of the availability of the report were communicated to registered IAPs.

V. ALTERNATIVES/DEVIATIONS CONSIDERED

Specialist studies and the interaction with land owners during the Public Participation Process (PPP) have guided the design of alternatives/deviations. The proposed alternatives will be assessed by the Scoping and Environmental Impact Assessment Reports and recommendations from the investigations are likely to inform a decision on the preferred access alternative. When the project was initiated, an alignment (blue on the map **Figure 1** below) was proposed but it was found that the western section of the alignment would have impacted negatively on the Suikerbosrand Nature Reserve. To avoid the impact, two other alternatives (indicated in red and yellow on **Figure 2**) were designed which will now be investigated as part of this EIA. Future development of the road will be undertaken outside of the scope of this application, and will be done in a manner sensitive to the receiving environment.

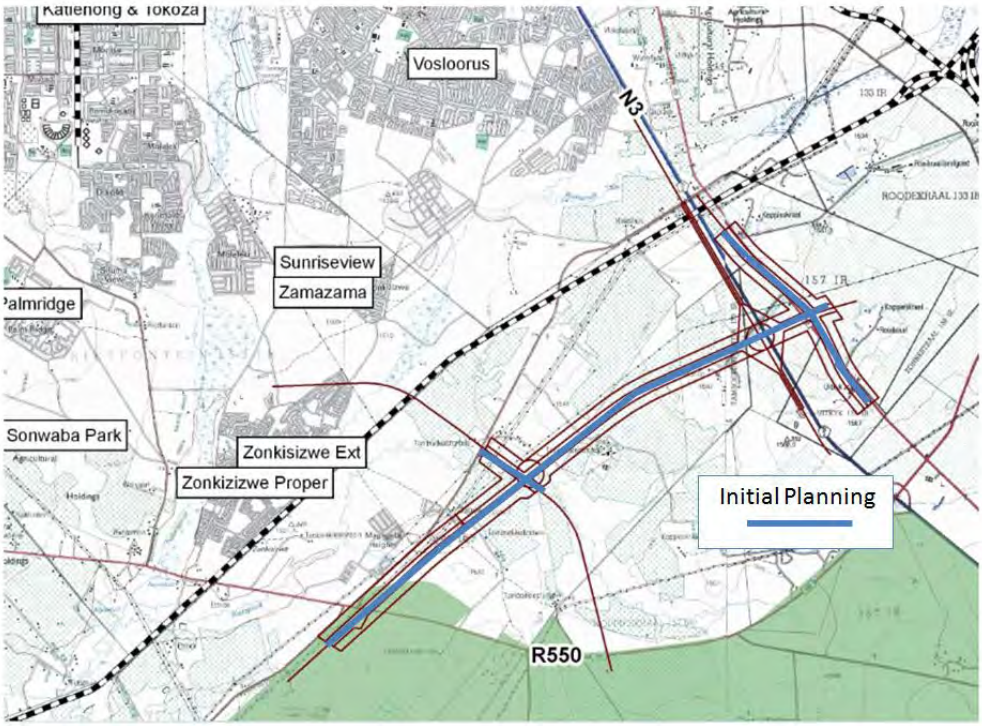


Figure 1a: Features of Initial Planning (road extends into Suikerbosrand Reserve)

Alternative 1 (Red), the preferred option is proposed as indicated in the Figure below. The road will form a link between the N3/K148 and K146. The road is a deviation from Alternative 2 (yellow line) that was initially proposed as the preferred alignment. The Alternative 1 (red line) was proposed to the south of the initial alignment to avoid land use features that would be impacted upon negatively.

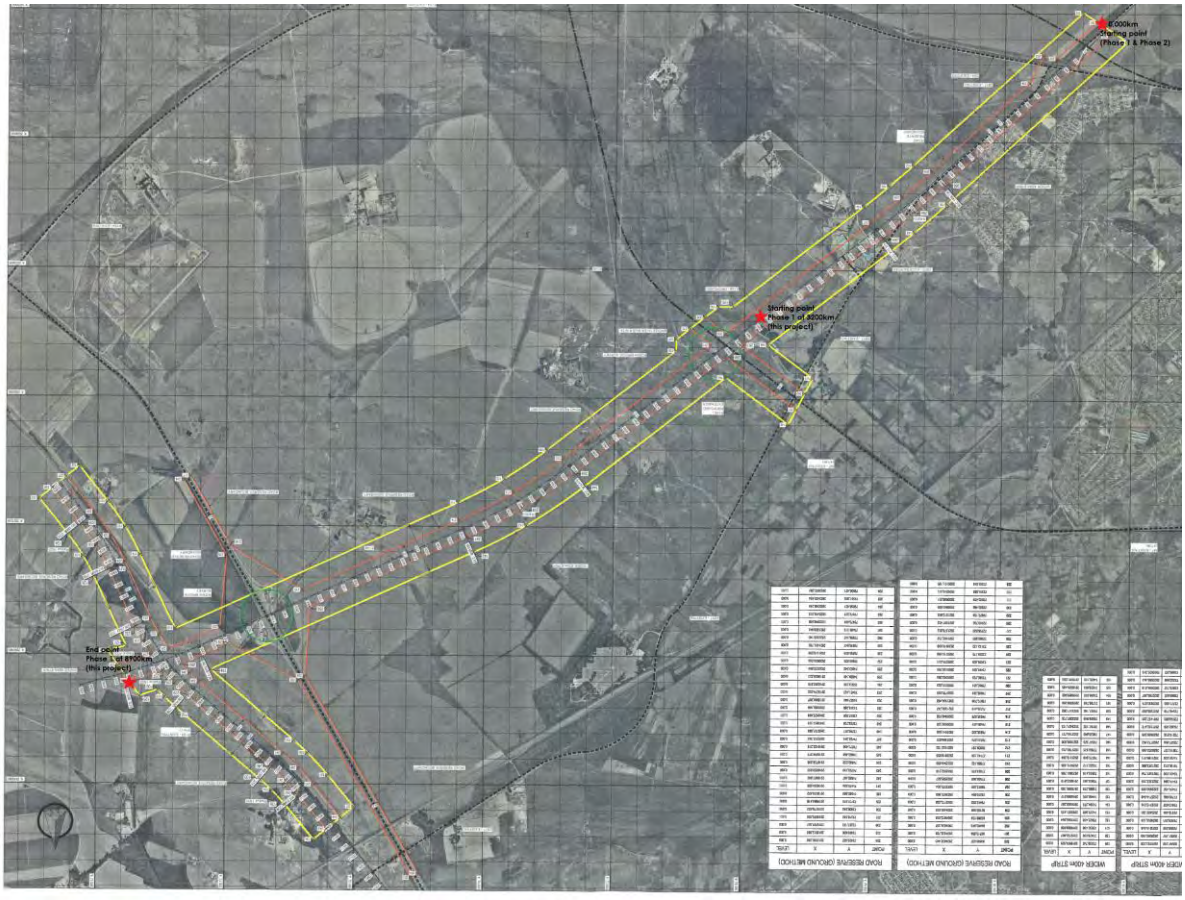


Figure 1b: Features of Initial Planning (full length 8,900km, this project 5,700km)

Alternative 2 (Yellow) follows nearly the same alignment of Alternative 1 and Alternative 2 was initially proposed as the preferred alignment. However, during specialist investigations, it was found that this alignment would impact negatively upon an existing cemetery and other land uses (a dairy facility and buildings). The Alternative 1 (red line) was then proposed to the south of the initial alignment to avoid these features.

The No Go Option: A No Go Option implies the consequences of not construction of the road and the subsequent implications on sustainable development. No footprint would result from this option and the status quo of the area will be retained. While this cancels out negative impacts that would have occurred should the project proceed, it also means that the positive impacts of the new infrastructure would not realise.

VI. OVERALL CONCLUSION (IMPACT STATEMENT)

Alternative 1 avoids some of the high sensitivities identified on the site, and is nominated as the preferred alternatives following the full assessment through this EIA process for the following reasons:

» In terms of impacts arising from destruction/alteration of Heritage artefacts or features a result of construction activities, the impacts would be the similar for Alternative 1 and Alternative 2 for most of the alignment, apart from the fact that Alternative 2 would impact on the graves.
» From a social perspective, there is no significant difference in the potential impacts of the two alternative road alignments. A potential conflict of land use has, however been raised, Alternative 2 would impact on the graves which hold sentimental value for the community nearby. This land use conflict results in the Alternative 2 being less desirable from a social perspective.

However, it must be noted that they are certain sensitivities on site that are unavoidable by either of the alternatives. In order to protect biodiversity and conserve sensitive environments during development, steps that should be followed are to firstly avoid, then minimize, then repair or restore, and finally compensate for, or offset the negative effects of any development on biodiversity (Macfarlane *et al*, 2014). Thus where the impact is unavoidable, the impacts must be minimised and the unavoidable and unforeseen impacts restored or rehabilitated. The section below summarises how this mitigation hierarchy has been applied to mitigate impacts that are likely to occur on site.

» **Impacts on moist grassland**: Vegetation associated with the moist grassland was classified as being of high sensitivity, it is recommended that the road alignment through the moist grassland in the southern extent of the K148 be re-routed to avoid this area or to minimise the area traversed. Due to the nature of the development, neither of the proposed alterative can avoid this area, though the use of a wetland rehabilitation and monitoring plan (Appendix 6) as well certain road crossing design as suggested by the in the Hydrological Assessment (Appendix 8), this impact can be minimised and managed.
» **Impacts on rocky grassland**: Along the R103 deviation from the existing R103, primary rocky grassland was recorded. Although the three portions were isolated and surrounded by maize and pasture, the species diversity was high with Declining and provincially protected plant species occurring. Where the route cannot deviate to accommodate Declining plant species, these will have to be relocated as per instructions from the GDARD.
» **Impact on wetlands**: Both alternative cross some wetland areas located in the eastern and western section of the proposed road. It is recommended that a minimum buffer of 30 m from the edge of the wetland boundaries should be respected. However, technically based on the nature of the development, this impact cannot be totally avoided totally, but though the use of wetland rehabilitation and monitoring plan (Appendix 6). The wetland rehabilitation and monitoring plan is specific to the construction of the proposed road and interchange within the delineated wetlands or within the protective buffer thereof, including construction upslope that could impact on the wetlands down the slope. In addition, the rehabilitation plan also applies to disturbances in wetlands where absolutely necessary in order to construct the road. The overall objective of this plan is to return the environment in and around footprint of the road to a state as close to the state prior to construction and to limit or negate any construction and operational associated impacts.

  In addition, a hydrological study (Appendix 8) has been undertaken in the EIA investigations as part of the formulation of mitigation for the impact of bridge structures on the receiving environment i.e. the floodplain and streams. These recommendations are aimed to reduce the

impact the road construction will have on water resources within the study area. The hydrologist has recommended that the design of the roadway and bridge be modelled on Scenario 2 (with the bridge height being at least 4.63 m), Scenario 3 (with the bridge height being at least 4.07 m, if 0.7 m freeboard is a strict requirement) or Scenario 4 through a widened bridge with roadway raised and additional culverts added in order to minimise impact on wetlands and stream. Scenario 3 and 4 were further assessed for implementation and are discussed in the following section:

Option 1 (based on scenario 3 discussed above) is the **preferred option** where a filling across the wetland with a small bridge (25m span) at the permanent stream is constructed (Refer Appendix 1.4 - Wetland Crossing Option 1). Mitigation measure include inter alia:

- fill height of approximately 4m;
- 1:2 maximum embankment slopes;
- dump rock foundation to allow for movement of ground water underneath the fill;
- culverts at regular intervals (spaced at 150m) to assist in the drainage of the wetland and to allow crossing point for small animals;
- river training at the bridge structure; and
- erosion protection at the culvert outlet structures.

Option 2 (based on scenario 4 as discussed above) is the **not preferred option** where a bridge spanning the entire wetland is proposed. This option is not feasible from an economic perspective. Environmentally the wetlands will be impacted for either of the options.

» **Impact on heritage:** Cemetery 1 is located 4 meters from the road reserve and approximately 11 meters from the actual road (refer to section 7.3.1 of Appendix 9). Due to design constraints it is not possible to adhere to the 30 meter buffer zone preferred by SAHRA. It is recommended that a reduction of this buffer zone is negotiated with SAHRA based on a CMP (Cultural Management Plan) for the cemetery. The boundary of the cemetery must be pegged out on site with a surveyor and will need to be fenced with an access gate for family members. The social team should consult with the local community to determine the extent of the cemetery prior to being pegged out by the surveyor.

The findings of the specialist studies undertaken within this EIA to assess both the benefits and potential negative impacts anticipated as a result of the proposed project conclude that there are no insurmountable environmental or social constraints that prevent the proposed project from proceeding, provided that the recommended mitigation and management measures are implemented. The project has considered constraints, and is considered to meet the requirements of sustainable development. Environmental specifications for the management of potential impacts are detailed within the draft Environmental Management Programme (EMPr) for the K148 road and is included within **Appendix 10.** With reference to the information available at this planning approval stage in the project cycle, the confidence in the environmental assessment undertaken is regarded as acceptable provided all measures are taken to protect and preserve surrounding environment.

VII. COMPLIANCE CHECKLIST

The National Environmental Management Act, 1998 (Act No. 107 of 1998), makes provision for regulations to carry out the purposes of the Act**. The following checklist was based on the 2014 Regulations** (Appendix 3), and will guide the reader to the relevant pages of the report.

Table 2: Legal requirements of Section 31 of the EIA Regulations

EIA REGULATIONS 2014 GNR 982: Appendix 3: CONTENT OF ENVIRONMENTAL IMPACT ASSESSMENT REPORTS.	**Cross-reference in this EIA report**
1. Environmental impact assessment process (1) The environmental impact assessment process must be undertaken in line with th approved plan of study for environmental impact assessment. (2) The environmental impacts, mitigation and closure outcomes as well as the residua risks of the proposed activity must be set out in the environmental impac assessment report.	(1) The EIA process has been undertaken according to the approved plan of study (2) Chapter 6
2. The objective of the environmental impact assessment process is to, through a consultative process— (a) determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context; (b) describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location; (c) identify the location of the development footprint within the preferred site based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment; (d) determine the—- (i) nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and (ii) degree to which these impacts— (aa) can be reversed; (bb) may cause irreplaceable loss of resources, and (cc) can be avoided, managed or mitigated; (e) identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment; (f) identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity; (g) identify suitable measures to avoid, manage or mitigate identified impacts; and (h) identify residual risks that need to be managed and monitored.	(a) Chapter 3 (b) Section 2.2 (c) Chapter 6 & 7 (d) Chapter 6 (e) Chapter 6 & 7 (f) Chapter 6 (g) Chapter 6 (h) Chapter 6
3. An environmental impact assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include—	
(a)details of— i. the EAP who prepared the report; and ii. the expertise of the EAP, including a curriculum vitae;	Appendix 11

(b)the location of the activity, including: i. the 21 digit Surveyor General code of each cadastral land parcel; iii. where available, the physical address and farm name; iv. where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	Appendix 1
(c) a plan which locates the proposed activity or activities applied for as well as associated structures and infrastructure at an appropriate scale; or, if it is— i. a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or ii. ii. on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	Appendix 1
(d) a description of the scope of the proposed activity, including— i. all listed and specified activities triggered and being applied for; and ii. a description of the activities to be undertaken including associated structures an infrastructure ;	Chapter 1, section 1.2
(e) a description of the policy and legislative context within which the development is proposed including— i. an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and ii. how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments;	Chapter 3
(f) a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;	Section 2.2
(g) a motivation for the preferred site, activity and technology alternative;	Section 2.2
(h) a full description of the process followed to reach the proposed preferred alternative within the site, including: i. details of all the alternatives considered; ii. details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; iii. a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them; iv. the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; v. the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts—	(i) Section 2.3 (ii) Chapter 4 (iii) Chapter 6 (iv) Chapter 5 (v) Chapter 6 (vi) Section 6.1 (vii) Chapter 6 (viii) Chapter 6 (ix) Chapter 6

(aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated; vi. the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives; vii. positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; viii. the possible mitigation measures that could be applied and level of residual risk; ix. if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and x. a concluding statement indicating the preferred alternatives, including preferred location of the activity;	(x) Chapter 6 (xi) Chapter 7
(i) a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including— (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;	Chapter 6
(j) an assessment of each identified potentially significant impact and risk, including— (i) cumulative impacts; (ii) the nature, significance and consequences of the impact and risk; (iii) the extent and duration of the impact and risk; (iv) the probability of the impact and risk occurring; (v) the degree to which the impact and risk can be reversed; (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and (vii) the degree to which the impact and risk can be avoided, managed or mitigated;	Chapter 6
(k) where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report;	Section 7.1
(l) an environmental impact statement which contains— (i) a summary of the key findings of the environmental	i. Section 7.1 ii. Section 7.1 (Figure 7.2 and 7.3) and

impact assessment; (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	Appendix 1 iii. Section 7.2
(m) based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr;	Appendix 10
(n) the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;	Section 7.4
(o) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	Section 7.4
(p) a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed;	Section 6.1
(q) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	Section 7.3
(r) where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required, the date on which the activity will be concluded, and the post construction monitoring requirements finalised;	N/A
(s) an undertaking under oath or affirmation by the EAP in relation to: (i) the correctness of the information provided in the reports; (ii) the inclusion of comments and inputs from stakeholders and I&APs; (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties; and	i. Appendix 11 ii. Appendix 3 iii. Appendix 3 iv. Appendix 3
(t) where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	N/A
(u) an indication of any deviation from the approved scoping report, including the plan	N/A

of study, including— any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and a motivation for the deviation;	
(v) any specific information[1] that may be required by the competent authority; and any other matters required in terms of section 24(4)(a) and (b) of the Act.	N/A
(w) any other matters required in terms of section 24(4)(a) and (b) of the	N/A

Table 3 outlines the GDARD requirements as outlined in the acceptance of the scoping report dated 24 May 2016, and where in the EIA reports the requirements have been addressed within this report for ease of reference.

Table 3: GDARD requirements as outlined in the acceptance of the scoping report

NO.	INFORMATION REQUIREMENTS	CROSS REFERENCE IN THIS EIA REPORT
1.	The EIAR must comply with Regulation 23 of the EIA Regulations, 2014	*Within **106 days** of the acceptance of the scoping report*, It is the EAP intention to submit to the competent authority-an EIA report inclusive of any specialist reports, and an EMPr, which must have been subjected to a public participation process of at least 30 days and which reflects the incorporation of comments received, including any comments of the competent authority
2.	Comments or inputs from the South African National Roads Agency Limited and the owners of the two Filling Stations along the N3 must be sourced and attached to the Draft EIAR.	Comments to be acquired during the public review of the Draft EIA Report
3.	Comments from Ekurhuleni Roads and Storm Water division and the Environmental Management section must form part of the Draft EIAR.	Comments to be acquired during the public review of the Draft EIA Report
4.	Impacts of the road construction on the heritage resources might be highly significant as indicated by the Archaeological Impact Assessment Specialist, that there is a need to determine the age and history of the ruins in the area, as they are not indicated in the 1943 or 1975 1:50 000 maps and the assumption that they are not older than 60 years might be incorrect. It might happen that they were not mapped during that time; therefore it is recommended that there must be further investigation be instituted on site. It also recommended that at least a 20 meter buffer be kept	It is recommended that a buffer zone of at least 20 meters should be kept from the ruins as these sites might contain unmarked graves. If this is not possible it is recommended that through the social team a community representative is taken to these areas to show and / or confirm the presence of graves prior to construction. An archival study must be conducted prior to construction to determine the age and history of the ruins if the ruins will be impacted on, it is recommended that the above form part of the EA conditions for better management of these heritage resources.

NO.	INFORMATION REQUIREMENTS	CROSS REFERENCE IN THIS EIA REPORT
	from the ruins as these sites might contain unmarked graves that haven't been discovered. A social team must survey the site to show or confirm if there are any signs of other unmarked graves on site.	
5.	It is also recommended from the report that Cemetery 1 must be avoided with a 30 meter buffer zone and this must be shown in the alignment of the road.	As per the revised Heritage report – Appendix 9, Cemetery 1 is located 4 meters from the road reserve and approximately 11 meters from the actual road. Due to design constraints it is not possible to adhere to the 30 meter buffer zone preferred by SAHRA. It is recommended that a reduction of this buffer zone is negotiated with SAHRA based on a CMP (Cultural Management Plan) for the cemetery. The boundary of the cemetery must be pegged out on site with a surveyor and will need to be fenced with an access gate for family members. The social team should consult with the local community to determine the extent of the cemetery prior to being pegged out by the surveyor.
6.	The road alignment goes through a number of sensitivities including the primary rocky grassland, a Near Threatened succulent plant (in which a 300 m buffer zone must be respected according to the specialist) and several wetland areas. Therefore methods of crossing these wetland areas must be explained to avoid destructions of wetlands including the clear illustration of buffers, which is not clearly indicated in the report.	The EAP recommended that a 300m buffer around the Near Threatened species within the grazed rocky grassland forms part of the EA conditions. Option 1 (based on scenario 3 as recommended by the hydrologist) is the preferred option for the bridge where a filling across the wetland with a small bridge (25m span) at the permanent stream is constructed An illustration of the above option with clear illustration of the wetland buffers, is included in Appendix 1.4.
7.	A well designed bridge which spans the entire area of the stream crossing **maybe** considered, as this will not impede the movement of biodiversity faunal species within the stream. There must be a balance between environmental, social and economic needs to achieve the objectives of sustainable development.	Option 2 (based on scenario 4 as recommended by the hydrologist i.e. “bridge to spans the entire area of the stream crossing“) was considered as a method of crossing the wetland, however this option this option is not preferred because it is not a feasible from an economic perspective. Environmentally the wetlands will be impacted for either of the options.
8.	Given that some of the activities will take within the stream, the Department of Water and Sanitation (DWAS) must be contacted with regard to the approval of relevant permits, and this must form part of the Draft EIAR or an indication that an application has been sent to DWAS for approval or comments.	A WULA application will be submitted together with this DEIR to Department of Water affairs and Sanitation for comment. A pre-consultation meeting has been held with the Department concerned to this regard. Proof of submission to GDAR will form part of the FEIR.

1. INTRODUCTION

Envirolution Consulting (Pty) Ltd was appointed by Ndodana Engineers to conduct the Environmental Impact Assessment (EIA) Process on behalf of the Gauteng Department of Roads and Transport (GPDoRT), and undertake a Scoping & Environmental Impact Assessment (EIA) process for the proposed construction of Road N3/K148 (phase 1) between k146 and K133 (including the interchange).

This project is located in the Gauteng Province of South Africa on provincial Route K148. The project route commences at the intersection between Routes K148 and K154, km 0,000 on the K148 and continues in a north-easterly direction where it terminates at the intersection between Routes K148 and K133 at approximately 6 km.

The nature and extent of this proposed road, as well as potential environmental impacts associated with the construction, operation and decommissioning phases are explored in more detail in this EIA Report.

1.1 Project Background

This is a Greenfields project (Provincial road K148) linking in with existing roads (K154 and K133). It entails the construction of road K148 between roads K146 and K133 (including N3/K148 interchange), consisting of the following activities:

- Verification of K148, K154, K146 and K133 alignments with a **62 meter road reserve**.
- Detail design of the horizontal and vertical geometric alignment of the K148 route.
- Detail design of the K133/K148 and K146/K148 intersections.
- Detail design of the N3-11/K148 diamond interchange and bridge.
- Detail design of the general drainage of the road reserve and river / stream crossings at km 3.740 and km 7.980.
- Preliminary allowances for the investigation of three borrow pits and one hard rock quarry.
- Construct a pavement structure capable of accommodating current and future traffic loading.

1.2 Requirement for an Environmental Impact Assessment Process

In terms of the NEMA EIA Regulations (2014), published in Government Notice R. 982 in Government Gazette No. 38282 of 4 December 2014, under Section 24(5) of the National Environmental Management Act, 1998 (Act No.107 of 1998), a Scoping & Environmental Impact Assessments are required for the development due to the following listed activities:

Listed activity as described in GN R 983, 984 and 985	Description of project activity that triggers listed activity
GR 984 Listing Notice 2 ***(27)*:** The development of **(ii)** a road administered by a provincial authority	A new road with a **servitude of 62m** is proposed by a Provincial Government department between roads K146 and K133, inclusive of the N3/K148

Listed activity as described in GN R 983, 984 and 985	Description of project activity that triggers listed activity
(iii) a road with a reserve wider than 30m **(iv)** a road catering for more than one lane of traffic in both directions	interchange.
GN R 985: Listing 3 **(12)** The clearance of an area of 300 sqm or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. **b)** In Gauteng **(ii)** within critical biodiversity areas identified in bioregional plans **(iv**) on land where at the time of coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.	Before construction of the road, the servitude area needs to be cleared of vegetation. The properties are currently mostly used for farming activities. The area falls in the Grassland Biome and Dry or Mesic Highveld Grassland, more specifically as a western wedge of dry Carleton Dolomite Grassland vegetation unit (Gh 15, as defined by Mucina and Rutherford 2006) that on site extends south to about the R550 road and the northern border of the Suikerbosrand Nature Reserve. The Carletonville Grassland is classified as Vulnerable, with only small patches conserved and about 25% transformed by cultivation, urban sprawl and mining, while the Soweto Grassland is Endangered, with about 50% transformed and few conserved patches, the largest and most notable being the Suikerbosrand Nature Reserve just south of the site.
GN R 985: Listing 3 (**19).** The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from- **(i)** a watercourse;	The road project will require depositing of material in areas where the design requires it. At the wetland crossings, the material require collectively for infilling may exceed 5 cubic meters and may be required in the vicinity of the watercourse in the area. The proposed road will cross wetlands and seasonal watercourses and will require a Water Use License. A WUL Application will be submitted to DWS as part of this project. The EIA will inform the DWS about the impacts on the environment.

The Gauteng Department of Agriculture and Rural Development (GDARD) will be the relevant decision-making authority and the applicant is the Gauteng Province Department of Roads and Transport (GP DoRT), which is a parastatal. The EIA authorisations need to be granted by the GDARD for approval and setting of conditions prior to commencement of any construction activities.

The development also triggers activities that require a Water Use License because it crosses several water courses. Therefore, before construction activities may take place, the activity will require a Water Use License as per requirement in the National Water Act (Act No.36 of 1998) (NWA) under Section 21(c) and (i) Water Uses. In terms of the NWA, this development requires a Water Use License as per the following regulations:

- Section 21(c) impeding or diverting the flow of water in a watercourse and;
- Section 21 (i) altering the bed, banks, course or characteristics of a watercourse.

The proposed project is subject to the requirements of the Environmental Impact Assessment Regulations published in terms of Section 24(5) of the National Environmental Management Act (NEMA, Act 107 of 1998, as amended). The Act makes provision for the identification and assessment of activities that are potentially detrimental to the environment and which require authorisation from the competent authority (in this case, GDARD) based on the findings of an EIA. An application for authorisation for the project has been accepted by the GDARD (under Application Reference number: **Gaut 002/15-16/E0259**).

The need to comply with the requirements of the EIA Regulations ensures that decision-makers are provided the opportunity to consider the potential environmental impacts of a project early in the project development process, and assess if environmental impacts can be avoided, minimised or mitigated to acceptable levels. Comprehensive, independent environmental studies are required to be undertaken in accordance with the EIA Regulations to provide the competent authority with sufficient information in order for an informed decision to be taken regarding the project. Gautrans has appointed Envirolution as the independent Environmental Assessment Practitioner (EAP) to undertake the environmental impact assessment and prepare the EIA Report for the construction of the proposed road
The EIA will be undertaken using the following phased approach:

- **Phase 1**: Project Initiation: authority consultation, site visits, the initiation of the environmental process and public participation;
- **Phase 2**: Compilation of the Scoping Report, identification of the specialist studies, and compilation of Plan of Study of Environmental Impact Report (EIR);
- **Phase 3**: The compilation of the EIR and the draft Environmental Management Programme (EMPr); and
- **Phase 4**: The compilation of the site specific EMPr.

1.3 Regulations (2014) guiding the Environmental Scoping Process

The 2014 EIA Regulations stipulate time frames for the submission and consideration of an EIA Report, which applies as follows to this project:

23. (1) *Within **106 days** of the acceptance of the scoping report*, Envirolution must submit to the competent authority-

(a) an EIA report inclusive of any specialist reports, and an EMPr, which must have been subjected to a public participation process of at least 30 days and which reflects the incorporation of comments received, including any comments of the competent authority; or

(b) a notification in writing that the environmental impact report inclusive of any specialist reports, and an EMPr, will be submitted within 156 days of acceptance of the scoping report by GDARD, as significant changes have been made or significant new information has been

added to the environmental impact report or EMPr, which changes or information was not contained in the reports consulted on during the initial public participation process contemplated in subregulation (1)(a), and that the revised environmental impact report or EMPr will be subjected to another public participation process of at least 30 days).

1.4 Objectives of the EIA Phase

The EIA Phase aimed to address those identified potential environmental impacts and benefits (direct, indirect and cumulative impacts) associated with the project including design, construction, operation, and decommissioning, and recommend appropriate mitigation measures for potentially significant environmental impacts. The purpose of this EIA report is to consider the impacts associated with the currently proposed road. This EIA report aims to provide the environmental authorities with sufficient information to make an informed decision regarding the proposed project.

The release of a draft EIA Report for a 30 day period will provide stakeholders with an opportunity to verify that issues that they raised through the EIA Process have been captured and adequately considered. The final EIA Report for submission to the GDARD will incorporate all issues and responses raised during the public review period of the draft report.

1.5 Project Team

1.5.1 The Applicant

Applicant name: Gauteng Department of Roads and Transport
Responsible person: Ernest Bongani Mashaba (Director: Design)
Physical address: Corner Pritchard & Simmonds Street Johannesburg CBD
Sage Life Building 41
Postal address: Private Bag X83, Marshalltown, 2107
Cell: 060 546 7449
Telephone: (011) 355-7241/7000
Fax: (011) 355 7305
E-mail: Ernest.Mashab@gauteng.gov.za

1.5.2 The Engineers

Ndodana Consulting Engineers
Henk Diedericks, Gert Broekman
Office: (012) 667 5820
Fax: (012) 667 4682
Mobile: 082 704 6553
Email: henkd@global.co.za, gertnce@global.co.za

1.5.3 Environmental Assessment Practitioner

Company Name: Envirolution Consulting (Pty) Ltd
Name: Sheila Muniongo
Physical Address: Vista Place Suite 1a & 2, No 52 Cnr Vorster Avenue & Glen Avenue

Glenanda
Postal Address: PO Box 1898, Sunninghill, 2157
Telephone Number: (0861) 44 44 99
Fax Number: (0861) 62 62 22
E-mail: sheila@envirolution.co.za

1.5.4 Expertise of the EAP to carry out the EIA Phase

- Sheila Muniongo, the principle author of this EIA report holds an Honours Bachelor degree in Environmental Management and 5 years of experience in the consulting field. Her key focus areas are on strategic environmental assessment and advice on environmental impact assessments; public participation; environmental management programmes, and mapping through ArcGIS for variety of environmental projects. She is currently involved in several diverse projects across the country.
- Ms Marinda le Roux heads the project team and acts as the Project Manager for all phases of the project. Marinda is a certified Environmental Assessment Practitioner with 20 years' experience of Environmental Management and impact assessment, plus 4 years in the Town and Regional Planning field. She was previously employed at a leading consulting engineering firm Aecom (then BKS) and prior to that, at the Free State Provincial Department of Land Use.
- Gesan Govender, the project manager and Environmental Assessment Practitioner (EAP) responsible for this project, is a registered Professional Natural Scientist and holds an Honours degree in Botany. He has over 15 years of experience within the field of environmental management. His key focus is on strategic environmental assessment and advice; management and co-ordination of environmental projects, which includes integration of environmental studies and environmental processes into larger engineering-based projects and ensuring compliance to legislation and guidelines; compliance reporting; the identification of environmental management solutions and mitigation/risk minimising measures; and strategy and guideline development. He is currently responsible for the project management of EIA's for several diverse projects across the country.

1.5.5 Specialists

The specialists have been appointed for the relevant specialist studies are presented below.

Table 4: Project Specialists

Discipline	Specialist
Public Participation & Facilitation	**Chris le Roux** Midturion Information Consultants chrisleroux60@gmail.com 084 609 2881 Po Box 12158 Clubview 0014
& Wetlands Assessment	**Antoinette Bootsma** Limosella Consulting Cell: 0834545454 **antoinette@limosella.co.za**
Vegetation study	**Antoinette Eyssel-Knox** 083 6426295 **antoinette@dimela-eco.co.za**
Vertebrate Study	**Naas Rautenbach** **naasrauten@mweb.co.za**

Hydrological Assessment	**Marco van Dijk** Water Engineering Department of Civil Engineering University of Pretoria Tel: +27 12 420 3176 Cell: +27 83 394 8627 E-mail: marco.vandijk@up.ac.za
Heritage Impact Assessment	**Jaco van der Walt** Archaeologist Heritage Contracts and Archaeological Consulting CC (HCAC) Mobile: 082 373 8491 Fax: 086 691 6461 jaco.heritage@gmail.com
Water Use License Application (to follow)	**Willem de Frey** EkoInfo CC Tel: 012-365-2546 Extension 1 Fax (24/7): 012-365-3217 Cell: 082 579 5049 Email: wdefrey@ekoinfo.co.za
Traffic Study (2013)	**IQ Tech Consulting Engineers** Herman. Joubert (HJ). Tech IQ. Work: 012 346 5336. Cell: 082 651 9550 hsj@tiq.co.za

Specialist reports are attached to this Draft EIA Report and findings have been discussed in the body of the report.

Due to the location away from built up areas, and the nature of the road project, it was decided that a Visual Impact Assessment and a Social Impact Assessment would not be required. A Hydrological Assessment was commissioned to address issues around the placement of the crossing at the southernmost end of the Phase 1 design for the K148 road. A Traffic Impact Assessment was done in 2013 (See Appendix 11).

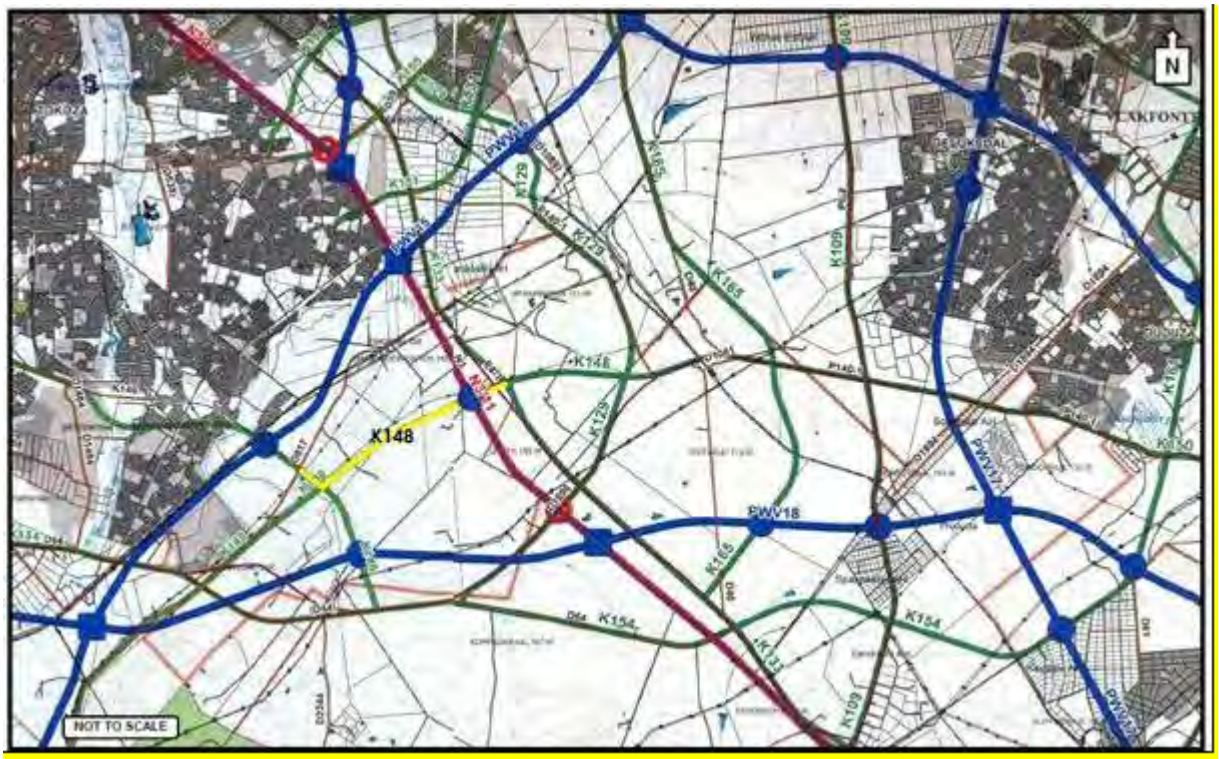


Figure 2: The K148 shown (this project shown in yellow) in relation to the planned and existing roads of the region

1.5.6 Authority

Gauteng Department of Agriculture & Rural Development

Physical address:	11 Diagonal Street, Diamond Building, Newtown, JOHANNESBURG, 2000
Assessing officer:	Tendani Rambuda
	Environmental Officer
	Gauteng Department of Agriculture & Rural Development
Tel:	011 240 3386
Email:	Tendani.Rambuda@gauteng.gov.za

2. PROJECT DESCRIPTION

2.1 Project locality

The study site is located south of the Rietspruit River, with the townships of Vosloorus, Katlehong and Zonkizizwe north of the river and a railway line and small tarred road roughly parallel to the site south of the river. Going at right-angles from the northwest-southeast R103 road between Johannesburg and Heidelberg, the proposed N3/K148 road will pass west-southwest between the two Engen service stations on either side of the N3 Johannesburg-Durban motorway on a new bridge. It will then head through farmland, onto a higher area where it will bend more south, and then it will descend to its current western extent just before reaching the edge of the residential areas of Magagula Heights. At this point it will have a right-angled connection, the K146, back to the small unnamed tar road, which is here just northwest of the site.

At the eastern end, to comply with regulations, the R103 will have to be re-constructed as a curve slightly northeast of its current position, so that the junction lies at the correct distance from a motorway.

Besides the new bridge to be constructed over the N3, another bridge is planned near the western end of the development, where it is proposed that the K145/K146 cross a small river. The total area assessed for the first phase of the proposed N3/K148 and K146 is at least 5.28 km² (8.9-3.3 x 0.8 + 1 km = 52800 ha). A later western phase is planned to link the remaining 3.3 km of the N3/K148 road to the R550 between Nigel and Meyerton.

2.2 Need and Desirability of the proposed project (Project Motivation)

The road network in Gauteng is under increasing pressure due to a number of factors, including economic growth of the province, increased car ownership and increased urbanization. Amongst others this has resulted in increased demand for road capacity in general in Gauteng. The current system shows a lack of capacity, with great congestion, frequent. The overall objective of the Gauteng Province DoRTis to improve the road network through the provision of mobility and access in the Gauteng province. The N3/K148 plays an important role in achieving these objectives. In a regional context, N3/K148 provides better mobility and circulation around the Vosloorus area. It will provide important linkages to existing and planned new roads.

Planning documents refer to the K148/N3 Intersection as the “Tambo Springs Freight Hub Intersection”. The interchange should provide for the increase in traffic that forms part of the freight hub between KZN and Gauteng. The K148 (which is also known as the Heidelberg Road) crosses the N3 and forms part of the road network supporting the Tambo Springs Freight Hub. The N3 is part of the national road network under the jurisdiction of SANRAL, and SANRAL supports the upgrading of the interchange. The need for the project exits, as it will contribute towards the freight transportation on the East Rand and inland distribution on the road network of goods between air, land and sea.[2]

[2] *http://www.roadsandtransport.gpg.gov.za/publications/Publication%20Library/First%20Quarter%20Report%20(2014-15).pdf*

The table below includes answers relevant to the proposed project's Need and Desirability.

Table 5. Need and Desirability

NEED ('Timing'):
Question 1: Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing approved Spatial Development Framework (SDF) agreed to by the relevant environmental authority? (i.e. is the proposed development in line with the projects and programmes identified as priorities within the credible IDP). **Answer: Yes** The Planning documents of the EMM and Gauteng Province consider the N3/K148 as imperative. For sustainable development (in line with the SDF), access from the N3, and a distribution road will support new developments in the area of Magagula Heights, Zonkizizwe, Vosloorus and the Tamboekiesfontein rural area. These frameworks include EMM Spatial Development Frameworks, and Integrated Development Plans (IDPs). The K148 (which is also known as the Heidelberg Road) crosses the N3 and forms part of the road network supporting the Tambo Springs Freight Hub. The N3 is part of the national road network under the jurisdiction of SANRAL, and SANRAL supports the upgrading of the interchange. The need for the project exits, as it will contribute towards the freight transportation on the East Rand and inland distribution on the road network of goods between air, land and sea.
Question 2: Should development, or if applicable, expansion of the town/area concerned in terms of this land use (associated with the activity being applied for) occurs here at this point in time? **Answer : No.** The town/area will not expand immediately, but Yes the activity may result in further expansion of the area due to improved access**.**
Question 3: Does the community/area need the activity and the associated land use concerned (is it a societal priority)? This refers to the strategic as well as local level (e.g. development is a national priority, but within a specific local context it could be inappropriate) **Answer: Yes** The region requires access from the N3 and K133, and a distribution road to accommodate new developments in the area of Magagula Heights, Zonkizizwe and the Tamboekiesfontein rural area.
Question 4: Are the necessary services with adequate capacity currently available (at the time of application), or must additional capacity be created to cater for the development? **Answer: Yes** The existing infrastructure will be used by motorists that currently make use of other routes in the area. The other routes may not be the shortest or most conveniently located to some users. This Scoping & EIR will determine if additional infrastructure will be required for the development.
Question 5: Is this development provided for in the infrastructure planning of the municipality, and if not what will the implication be on the infrastructure planning of the municipality (priority and placement of services and opportunity costs)? **Answer: Yes** The road is being funded by the Province (Department of Roads and Transport). The municipality will

be able to approve development applications based on the improved access that will result from the proposed road.

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

Answer: Yes

The National Spatial Development Perspective was initiated with the aim of not only providing a strategic assessment of the spatial distribution and socio-economic characteristics of the South African population, but also gaining an understanding of the distribution of economic activity and potential across the South African landscape. In order to overcome the spatial distortions of apartheid, infrastructure investment and development spending should primarily support localities that are growth nodes in South Africa and thus create regional gateways to the global economy.

DESIRABILITY ('placing'):

Question 7: Is the development the best practicable environmental option for this land/site?

Answer: Yes

The specialist studies to be conducted during the EIR phase of the project will give a clear indication of environmental options.

Question 8: Would the approval of this application compromise the integrity of the existing approved and credible municipal IDP and SDF as agreed to by the relevant authorities.

Answer: No

Question 9: Would the approval of this application compromise the integrity of the existing environmental management priorities for the area (e.g. as defined in EMFs), and if so, can it be justified in terms of sustainability considerations?

Answer: No

Question 10: Do location factors favour this land use (associated with the activity applied for) at this place? (this relates to the contextualisation of the proposed land use on this site within its broader context).

Answer: Yes

An off ramp from the N3 was planned in previous projects, and provision of the K148 will link the K133 and the Road 550 to the south effectively.

Question 11: How will the activities or the land use associated with the activity applied for, impact on sensitive natural and cultural areas (built and rural/natural environment)?

Answer: The impacts can be mitigated. This EIR process will determine the potential impact on the environment and if negative impacts are identified, mitigation measures will be proposed. To date, the specialist studies have shown that if these cannot be avoided, wetland crossings may be an issue that would require well-planned mitigation and rehabilitation after construction.

Question 12: How will the development impact on people's health and wellbeing (e.g. in terms of noise, odours, visual character and sense of place, etc)?

Answer: No negative impacts are anticipated regarding visual, noise or odours during the operational phase of the project. Exhaust fumes may be distributed into the area where at present

these vehicles make use of other roads that are further away from the study area.
Question 13: Will the proposed activity or the land use associated with the activity applied for, result in unacceptable opportunity costs? **Answer:** Social issues need to be assessed during the EIA phase.
Question 14: Will the proposed land use result in unacceptable cumulative impacts? **Answer:** **No** the project is not expected to have an unacceptable cumulative impact. The project will result in positive impacts in terms of road network, circulation and infrastructure improvement. However, the EIAR will determine the full extent of impacts and propose mitigation measures if required.

2.3 Description of Alternatives

When the project was initiated, an alignment (blue on the map Figure 4 and 5) was proposed but it was found that the western section of the alignment would have impacted negatively on the Suikerbosrand Nature Reserve. To avoid the impact, two other alternatives (indicated in red and yellow on Figure 6) were designed which will now be investigated as part of this Basic Assessment.

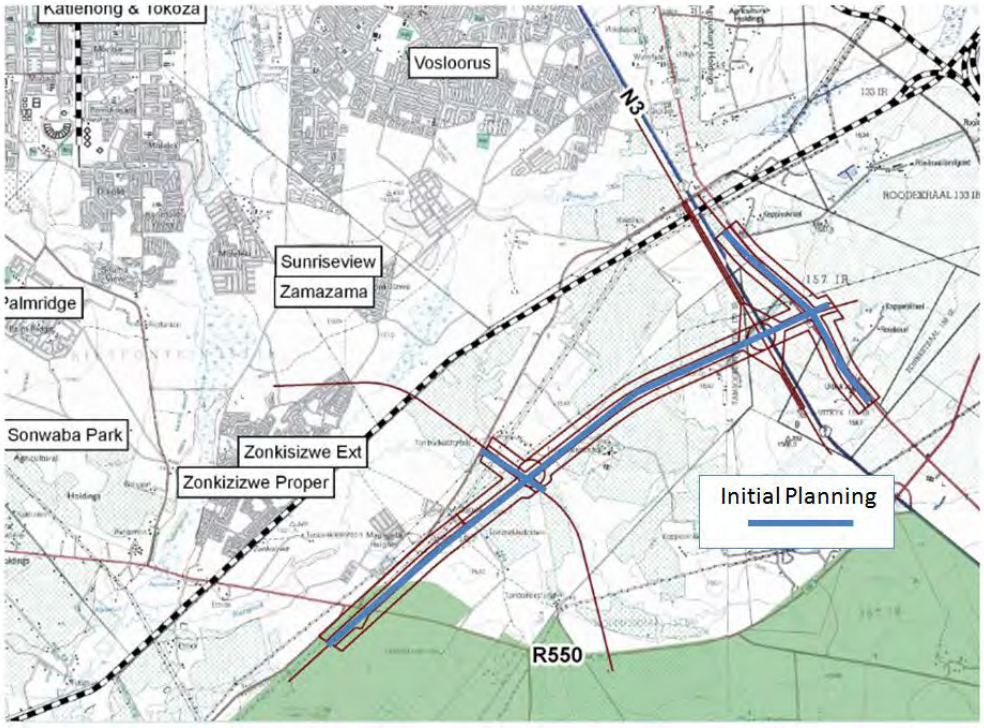


Figure 3: Features of Alternative 2

There are no existing plans for K148 continuing further west than the K150. There is sufficient space from where this proposed project ends for adjustment and continuation of this section's alignment to be considered during future planning. Prospective development of the road will be governed by town planning and development plans and is not foreseen in the near future. As an example, the farming infrastructure could be replaced by other developments such as housing for residential use. Doing a major realignment of a K route is a lengthy process and is not the preferred option.

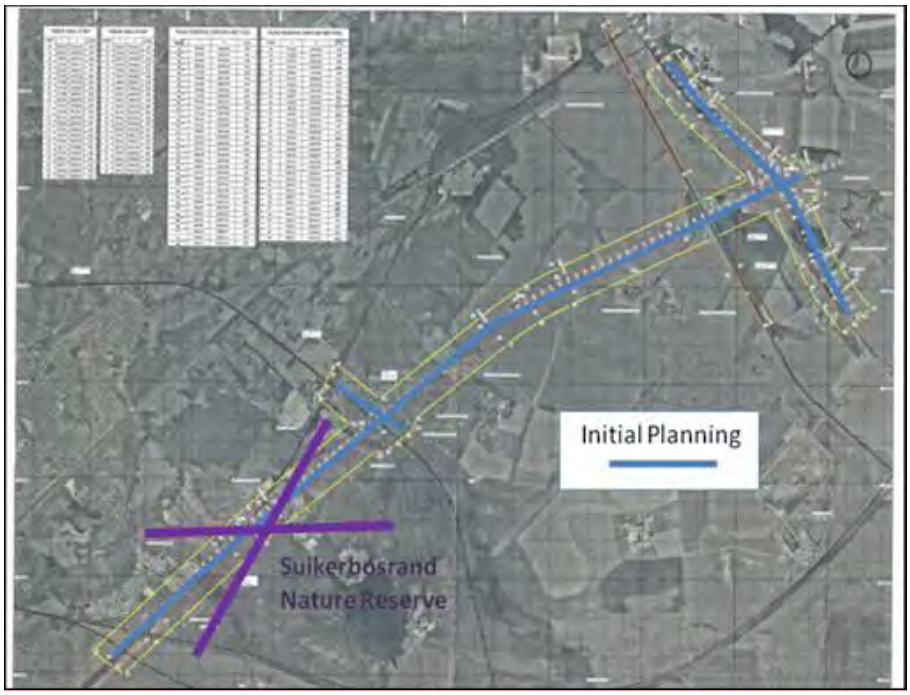


Figure 42: Suikerbosrand Nature Reserve in relation to Alternative 2

Alternative 1 (Red), the preferred option is proposed as indicated in the Figure 6 below. The road will form a link between the N3/K148 and K146. The road is a deviation from Alternative 2 (yellow line) that was initially proposed as the preferred alignment. The Alternative 1 (red line) was proposed to the south of the initial alignment to avoid land use features that would be impacted upon negatively.

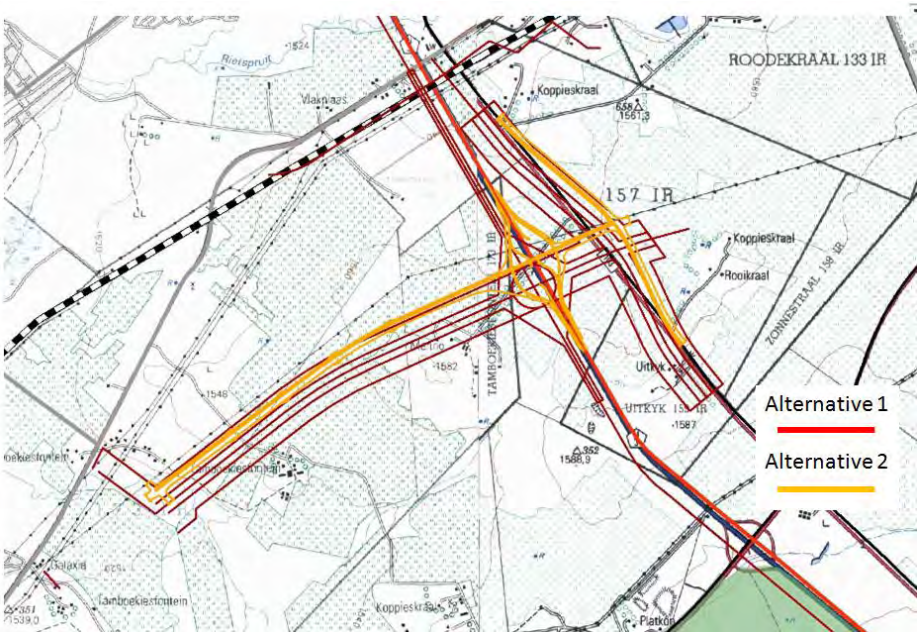


Figure 53: Alternative 1 and Alternative 2

Alternative 2 (Yellow) follows nearly the same alignment of Alternative 1 and Alternative 2 was initially proposed as the preferred alignment. However, during specialist investigations, it was found that this

alignment would impact negatively upon an existing cemetery and other land uses (a dairy facility and buildings). The Alternative 1 (red line) was then proposed to the south of the initial alignment to avoid these features.

The No Go Option The 'do-nothing' alternative is the option of not constructing the this road. Should this alternative be selected, there would be no environmental impacts on the site due to the construction and operation activities of this road. While the no-go alternative will have limited socio-economic benefits at a local and regional scale, the extent of the physical impact in the area would be minimised by the number of projects developed in in this area. No footprint would result from this option and the status quo of the area will be retained. While this cancels out negative impacts that would have occurred should the project proceed, it also means that the positive impacts of the new infrastructure would not realise

2.4 Required Services

A servitude of 62m will be required.

2.1.1 Construction Site Camps

The road construction contractor would need to set up at least one site camp but this does not necessarily need to be near the route. The contractor may however prefer to use a fully serviced site at another location. The contractor will be encouraged to utilised already disturbed areas for construction camp purposes, in order to minimise cumulative impacts. It is likely that a number of construction camps would need to be established for the construction period.

2.1.2 Sewage

A negligible sewage flow is anticipated for the duration of the construction period. Chemical toilets will be utilised during construction, and the contactor will ensure regular treatment of these facilities. The toilets will be serviced regularly, as specified by the final site specific EMPr.

2.1.3 Solid Waste Disposal

All solid waste will be collected at a central location at each construction site and will be stored temporarily until removal to an appropriately permitted landfill site in the vicinity of the construction site.

2.1.4 Electricity

The project itself will not require electricity. Construction team might have temporary connection and supply of electricity from the existing network. Diesel generators will be utilised as an option for the provision of electricity.

3. LEGISLATION AND GUIDELINES CONSIDERED

The overarching environmental legislation for the management of the environment in South Africa is the National Environmental Management Act, 1998 (Act 107 of 1998 "NEMA"). Its preamble states that sustainable development requires the integration of social, economic and environmental factors in the planning, implementation and evaluation of environmental decisions to ensure that development serves present and future generations.

Chapter 5 of NEMA makes provisions for regulations to be formulated and published. The purpose of the EIA Regulations is "to regulate the procedures and criteria as contemplated in Chapter 5 of the National Environmental Management Act relating to the submission, processing and consideration of, and decision on applications for environmental authorisation for the commencement of activities in order to avoid detrimental impacts on the environment, or where it cannot be avoided, ensure mitigation and management of impacts to acceptable levels, and to optimise positive environmental impacts, and for matters pertaining thereto". In terms of the NEMA EIA Regulations (2014), published in Government Notice R. 982 in Government Gazette No. 38282 of 4 December 2014, under Section 24(5) of the National Environmental Management Act, 1998 (Act No.107 of 1998), a Scoping & Environmental Impact Assessment are required for the development due to the following listed activities:

Listed activity as described in GN R 983, 984 and 985	Description of project activity that triggers a listed activity
Government Notice R. 984 (2014 Regulations) ***Listing Notice 2:*** *27 The development of* *(ii)* ***a road administered by a provincial authority*** *(iii) a road with a* ***reserve wider than 30m*** *(iv) a road catering for more than one lane of traffic in both directions*	A new road with a servitude of **62m** is proposed by a Provincial Government department, the Gauteng Department of Roads and Transport
GN R 985: ***Listing 3 (12)*** *The* ***clearance of an area of 300 sqm or more of indigenous vegetation*** *except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.(a)* *(ii) within critical biodiversity areas identified in bioregional plans* *(iv) on land where at the time of coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.*	Before construction of the road, the 61m servitude area needs to be cleared of vegetation. The properties are currently mostly used for farming activities. The area falls in the Grassland Biome and Dry or Mesic Highveld Grassland, more specifically as a western wedge of dry Carleton Dolomite Grassland vegetation unit (Gh 15, as defined by Mucina and Rutherford 2006) that on site extends south to about the R550 road and the northern border of the Suikerbosrand Nature Reserve. The Carletonville Grassland is classified as Vulnerable, with only small patches conserved and about 25% transformed by cultivation, urban sprawl and mining, while the Soweto Grassland is Endangered, with

	about 50% transformed and few conserved patches, the largest and most notable being the Suikerbosrand Nature Reserve just south of the site.
GN R 985: Listing 3 (19). *The infilling or depositing of any material of more than 5 cubic metres into, or the dredging,* *excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from-* ***(i) a watercourse;***	The road project will require depositing of material in areas where the design requires it. At the wetland crossings, the material require collectively for infilling may exceed 5 cubic meters and may be required in the vicinity of the watercourse in the area. The proposed road will cross wetlands and seasonal watercourses and will require a Water Use License. A WUL Application will be submitted to DWS as part of this project. The EIA will inform the DWS about the impacts on the environment.

The description of the Scoping &EIR process to be followed EIA Process is summarised in the flow diagram below

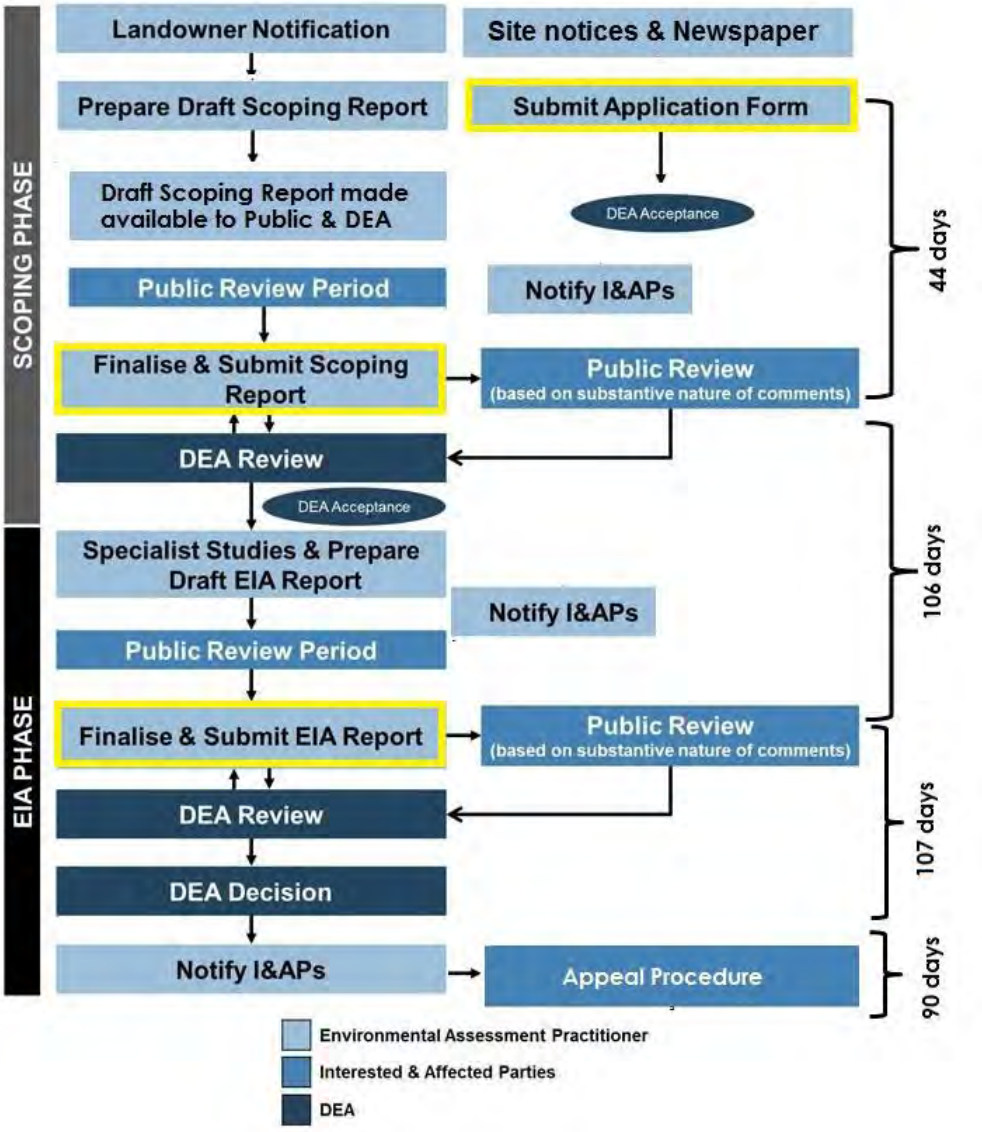


Figure 6: Overview of EIA Process

Appendix 2 of the 2014 Environmental Impact Assessment Regulations states that one of the purposes of the scoping report is to identify the relevant policies and legislation relevant to the activity. The EIA report must include a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process. It has been determined that a Scoping & Environmental Impact Assessment Report (S&EIR) process must be completed in respect of activities listed in a notice issued by the Minister in terms of section 24D of the NEMA. Accordingly, the Gauteng Department of Roads and Transport has applied for Authorisation of the listed activities relevant to this project. The scope and content of this Draft EIA Report has been guided by the following additional legislation and guidelines.

3.1 Constitution of the Republic of South Africa, 1996

The Constitution of the Republic of South Africa, 1996 has major implications for environmental management. The main effects are the protection of environmental and property rights, the drastic change brought about by the sections dealing with administrative law such as access to information, just administrative action and broadening of the *locus standi* of litigants. These aspects provide general and overarching support and are of major significance in the effective implementation of the environmental management principles and structures of the Environment Conservation Act and NEMA. Section 24 in the Bill of Rights of the Constitution specifically states:

"Everyone has the right –

- *To an environment that is not harmful to their health or well-being; and*
- *To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that -*
  - *Prevent pollution and ecological degradation;*
  - *Promote conservation; and*
  - *Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development."*

Section 24 of the Constitution therefore places a duty on all spheres of government to take reasonable steps, including making laws, preventing pollution, promoting conservation and ensuring sustainable development.

The Gauteng Department of Roads and Transport will be required to protect Constitutional Rights when undertaking this project for the construction of the K148.

3.2 The National Environmental Management: Air Quality Act 39 of 2004

The National Environmental Management: Air Quality Act 39 of 2004 provides for the setting of national norms and standards for regulating air quality monitoring, management and control and describes specific air quality measures so as to protect the environment and human health or well-being by: preventing pollution and ecological degradation; and promoting sustainable development through reasonable resource use. It also includes reference to the control of offensive odours whereby reasonable steps to prevent the emission of any offensive odours caused by activities on a premises are required.

The Gauteng Department of Roads and Transport is committed to control emissions during construction of the K148.

3.3 The Conservation of Agricultural Resources Act 43 of 1983

The Act provides for control over the utilization of the natural agricultural resources of the Republic in order to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invader plants; and for matters connected therewith.

Since the proposed K148 will cross streams and will be located in the vicinity of water courses and agricultural holdings, impacts such as soil erosion, alien plants, flooding and pollution must be avoided by all means.

3.4 National Water Act 36 of 1998

The National Water Act aims to manage the national water resources to achieve sustainable use of water for the benefit of all water users. The purpose of the Act is to ensure that the nation's water resources are protected, used, developed, conserved, and managed in ways, which take into account:

- Meeting the basic human needs of present and future generations;
- Promoting equitable access to water;
- Redressing the results of past racial discrimination;
- Promoting the efficient, sustainable and beneficial use of water in the public interest;
- Facilitating social and economic development;
- Providing for the growing demand for water use;
- Protecting aquatic and associated ecosystems and their biological diversity;
- Reducing and preventing pollution and degradation of water resources;
- Meeting international obligations;
- Promoting dam safety; and
- Managing floods and droughts.

Section 19 of the National Water Act addresses water pollution during construction:

(1) An owner of land, a person in control of land or a person who occupies or uses the land on which -

(a) any activity or process is or was performed or undertaken; or

(b) any other situation exists, which causes, has caused or is likely to cause pollution of a water resource, must take all reasonable measures to prevent any such pollution from occurring, continuing or recurring.

(2) The measures referred to in subsection (1) may include measures to -

(a) cease, modify or control any act or process causing the pollution;

(b) comply with any prescribed waste standard or management practice;

(c) contain or prevent the movement of pollutants;

(d) eliminate any source of the pollution;

(e) remedy the effects of the pollution; and

(f) remedy the effects of any disturbance to the bed and banks of a watercourse.

(3) A catchment management agency may direct any person who fails to take the measures required under subsection (1) to -

(a) commence taking specific measures before a given date;

(b) diligently continue with those measures; and

(c) complete them before a given date.

(4) Should a person fail to comply, or comply inadequately with a directive given under subsection (3), the catchment management agency may take the measures it considers necessary to remedy the situation.

(5) Subject to subsection (6), a catchment management agency may recover all costs incurred as a result of it acting under subsection (4) jointly and severally from the following persons:

(a) Any person who is or was responsible for, or who directly or indirectly contributed to, the pollution or the potential pollution;

(b) the owner of the land at the time when the pollution or the potential for pollution occurred, or that owner's successor-in-title;

(c) the person in control of the land or any person who has a right to use the land at the time when -

(i) the activity or the process is or was performed or undertaken; or

(ii) the situation came about; or

(d) any person who negligently failed to prevent -

(i) the activity or the process being performed or undertaken; or

(ii) the situation from coming about.

(6) The catchment management agency may in respect of the recovery of costs under subsection (5), claim from any other person who, in the opinion of the catchment management agency, benefitted from the measures undertaken under subsection (4), to the extent of such benefit.

(7) The costs claimed under subsection (5) must be reasonable and may include, without being limited to, labour, administrative and overhead costs.

(8) If more than one person is liable in terms of subsection (5), the catchment management agency must, at the request of any of those persons, and after giving the others an opportunity to be heard, apportion the liability, but such apportionment does not relieve any of them of their joint and several liability for the full amount of the costs.

Section 20 of the National Water Act addresses the reporting of incidents

20. (1) In this section ``incident'' includes any incident or accident in which a substance -

(a) pollutes or has the potential to pollute a water resource; or

(b) has, or is likely to have, a detrimental effect on a water resource.

(2) In this section, ``responsible person'' includes any person who -

(a) is responsible for the incident;

(b) owns the substance involved in the incident; or

(c) was in control of the substance involved in the incident at the time of the incident.

(3) The responsible person, any other person involved in the incident or any other person with knowledge of the incident must, as soon as reasonably practicable after obtaining knowledge of the incident, report to -

(a) the Department;

(b) the South African Police Service or the relevant fire department; or

(c) the relevant catchment management agency.

(4) A responsible person must -

(a) take all reasonable measures to contain and minimise the effects of the incident;

(b) undertake clean-up procedures;

(c) remedy the effects of the incident; and

(d) take such measures as the catchment management agency may either verbally or in writing direct within the time specified by such institution.

(5) A verbal directive must be confirmed in writing within 14 days, failing which it will be deemed to have been withdrawn.

(6) Should -

(a) the responsible person fail to comply, or inadequately comply with a directive; or

(b) it not be possible to give the directive to the responsible person timeously,the catchment management agency may take the measures it considers necessary to -

(i) contain and minimise the effects of the incident;
(ii) undertake clean-up procedures; and
(iii) remedy the effects of the incident.

(7) The catchment management agency may recover all reasonable costs incurred by it from every responsible person jointly and severally.
(8) The costs claimed under subsection (7) may include, without being limited to, labour, administration and overhead costs.
(9) If more than one person is liable in terms of subsection (7), the catchment management agency must, at the request of any of those persons, and after giving the others an opportunity to be heard, apportion the liability, but such apportionment does not relieve any of them of their joint and several liability for the full amount of the costs.

Section 21 of the National Water Act describes water uses as follows:
(a) taking water from a water resource,
(b) storing water,
(c) impeding or diverting the flow of water in a watercourse,
(d) engaging in a stream flow reduction activity contemplated in section 36,
(e) engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1),
(f) discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit,
(g) disposing of waste in a manner which may detrimentally impact on a water resource,
(h) disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process,
(i) altering the bed, banks, course or characteristics of a watercourse,
(j) removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people, and
(k) using water for recreational purposes.

Section 22 of the National Water Act prescribes permissible water uses.. Section 22 (2) further states that a person who uses water as contemplated in subsection (1):

(a) must use the water subject to any condition of the relevant authorisation for that use,
(b) is subject to any limitation, restriction or prohibition in terms of this Act or any other applicable law,
(c) in the case of the discharge or disposal of waste or water containing waste contemplated in section21(f), (g), (h) or (j), must comply with any applicable waste standards or management practices prescribed under section 26(1)(h) and (i), unless the conditions of the relevant authorisation provide otherwise,
(d) may not waste that water, and
(e) must return any seepage, run-off or water containing waste which emanates from that use, to the water resource from which the water was taken, unless the responsible authority directs otherwise or the relevant authorisation provides otherwise.

Section 41 of the National Water Act provides details on the procedure to follow for licence applications. Section 27 (1) prescribes the factors that should be considered by the Department of Water Affairs and Sanitation in the consideration of a licence application.

Since the proposed road K248 will cross streams and will be located in the vicinity of water courses, impacts such as soil erosion, alien plants, flooding and pollution must be avoided by all means.

3.5 National Heritage Resources Act 25 of 1999

The National Heritage Resources Act 25 of 1999 was introduced to ensure protection of South Africa's important heritage features. Section 38 of the Act requires that:

*any person who intends to undertake a development categorised as: **The construction of a road,** wall, road, pipeline, canal or other similar form of linear development or barrier **exceeding 300m in length;** must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.*

The Heritage Specialists on the project team will ensure compliance with the NHRA requirements.

3.6 Waste Management Act 59 of 2008

Waste management is regulated by the National Environmental Management: Waste Act 59 of 2008 ("the Waste Act") with effect from 1 July 2009. The Waste Act defines waste as:

(a any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes as defined in Schedule 3 to this Act; or

(b) any other substance, material or object that is not included in Schedule 3 that may be defined as a waste by the Minister by notice in the Gazette, but any waste or portion of waste, referred to in paragraphs (a) and (b), ceases to be a waste-

(i) once an application for its re-use, recycling or recovery has been approved or, after such approval, once it is, or has been re-used, recycled or recovered;

(ii) where approval is not required, once a waste is, or has been re-used, recycled or recovered;

(iii) where the Minister has, in terms of section 74, exempted any waste or a portion of waste generated by a particular process from the definition of waste; or

(iv) where the Minister has, in the prescribed manner, excluded any waste stream or a portion of a waste stream from the definition of waste.

Section 16 of the Waste Act states that the holder of waste must, within the holder's power, take all reasonable measures to:

(a) avoid the generation of waste and where such generation cannot be avoided to minimise the toxicity and amounts of waste that are generated;
(b) reduce, re-use, recycle and recover waste;
(c) where waste must be disposed of, ensure that the waste is treated and disposed of in an environmentally sound manner;

(d) manage the waste in such a manner that it does not endanger health or the environment or cause a nuisance through noise, odour or visual impacts;

(e) prevent any employee or any person under his or her supervision from contravening this Act; and

(f) prevent the waste from being used for an unauthorised purpose.

The Gauteng Department of Roads and Transport will be required to abide by the requirements of the Waste Management Act when approaching this project for the construction of the K148.

3.7 Land Use Planning Legislation

Legislation that regulates Land Use Planning has lead to "spatial planning tools" that are contained in Municipal and District Strategic Management Frameworks (SMFs), Strategic Development Initiatives (SDIs) and Municipal By-laws.

The Development Facilitation Act contains development facilitation regulations under the Regulations under Development facilitation Act 3. The Act is directed at provincial and local spheres of government; and serves to re-address the imbalances of the past and to ensure that there is equity in the application of spatial development planning and land use management systems.

The By-Laws adopted since 6 December 2000 by the Ekurhuleni Metropolitan Municipality (EMM) as well as the By-Laws of the disestablished municipalities in place prior to 6 December 2000 and that are still in force, are listed in the Municipal Code. The jurisdiction of each By-Law is indicated next to its listing in the Municipal Code. The By-Laws of the disestablished municipalities will eventually be repealed or replaced by uniform Ekurhuleni Metropolitan Municipality By-Laws.

The Integrated Development Plan (IDP) of 2013/2014 is a product of the IDP process. The Ekurhuleni Metropolitan Municipality (EMM) IDP is the principal strategic planning instrument which guides and informs all planning, budgeting, management and decision making processes in the municipality[3] According to the IDP, EMM is suffering from "skewed urban form" which is inherent in South African urban development processes, where the majority of the poor's settlements are far away from the places of economic opportunities. This type of urban form promotes the use of motorized and private transportation than a sustainable integrated public transport solution. Furthermore, the current land use management approaches are prone to reproduce and strengthen the existing densities. The highest priorities that were identified by wards of EMM, are:

- Construction and tarring of roads and storm water;
- Housing and or /construction of RDP houses;
- Construction and upgrading of sport facilities;
- New and upgrading of clinics;
- Installation of high mast and street lights;
- Construction of multipurpose centres;
- Provision of libraries;
- Construction and upgrading of community halls;
- Provision of taxi ranks; and
- Development of parks.

[3] *Ekurhuleni Metropolitan Municipality IDP & SDBIP 2 0 1 3 / 1 4*

With the construction of the road K148, the Gauteng Department of Roads and Transport will support the development planning suggestions that are contained in the IDP, in particular by improving road circulation and subsequent access to job opportunities.

3.8 The National Environmental Management Biodiversity Act (NEMBA)

NEMBA (Act 10 of 2004); Chapter 4 and 5 are important to this project, in terms of the following Regulations:

- National List Of Ecosystems that are threatened and in need of protection (Published under Government Notice 1002 in Government Gazette 34809 of 9 December 2012)
- Publication Of Lists Of Critically Endangered, Endangered, Vulnerable And Protected Species (Published under Government Notice R151 in Government Gazette 29657 of 23 February 2007)
- Threatened Or Protected Species Regulations (Published under Government Notice R152 in Government Gazette 29657 of 23 February 2007)
- Alien And Invasive Species Regulations (Published under Government Notice R598 in Government Gazette 37885 of 1 August 2014).
- Publication Of National List Of Invasive Species (Published under Government Notice R507 in Government Gazette 36683 of 19 July 20130.

This Environmental Impact Assessment will assist the Gauteng Department of Roads and Transport to take cognisance of the regulations of NEMBA when approaching this project for the construction of the K148.

3.9 National Development Plan 2030

The National Development Plan (NDP) offers a long-term perspective for development in the country. The NDP aims to eliminate poverty and reduce inequality by 2030. According to the plan, South Africa can realise these goals by drawing on the energies of its people, growing an inclusive economy, building capabilities, enhancing the capacity of the state, and promoting leadership and partnerships throughout society.

- The planning is that the NDP and its proposals are to be implemented in the right order over the next 17 years. Three phases have been identified.
- Government has already started a process to align the long term plans of departments with the NDP and to identify areas where policy change is required to ensure consistency and coherence.
- The NDP is a plan for the whole country. Government will engage with all sectors to understand how they are contributing to implementation, and particularly to identify any obstacles to them fulfilling their role effectively.
- The Plan will shape budget allocation over the next 17 years.
- The Plan identifies the task of improving the quality of public services as critical to achieving transformation. This will require provinces to focus on identifying and overcoming the obstacles to achieving improved outcomes, including the need to strengthen the ability of local government to fulfil its developmental role.

Improved road infrastructure and strengthening of links to nodes and job opportunities (such as the K148 project) are in support of the NDP.

3.10 Additional notable legislation

Other applicable legislation includes:

- National Road Traffic Act (Act No. 93 of 1996); and
- Subdivision of Agricultural Land Act (Act 70 of 1970)

3.11 Policy Guidelines

The following Guideline documents have been considered in the preparation of this report:

- Department of Environmental Affairs (DEA) Integrated Environmental Management Guideline Series 7, Public Participation in the EIA Process as published in Government Gazette No. 33308, 18 June 2010;
- Implementation Guidelines (published for comment) in Government Notice 603 of 2010
- Integrated Environmental Management Information Series (Booklets 0 to 23) (DEAT, 2002 – 2005);
- DEAT (2004) Cumulative Effects Assessment, Integrated Environmental Management, Information Series 7.

4. PUBLIC PARTICIPATION

The project and EIA process was made known as per the requirements of Regulation 41(2)(b), that state that written notice should be given in any of the manners provided for in section 47D of the Act, to Interested and Affected Parties, including surrounding and affected landowners. Provincial, National and Local Governments Departments were involved during the Public Participation Process (PPP).

4.1 Scoping Phase

A draft Scoping Report was released for public review in March/April 2016 for a 30-day comment period. Following the review of the draft scoping, a final scoping report was submitted to GDARD in April 2016, this together with the Plan of Study for the EIA was accepted by the GDARD, as the competent authority, in May 2016. In terms of this acceptance, an EIA was required to be undertaken for the proposed project. The public participation undertaken for the Scoping phase is summarised in Appendix C of the PP report.

4.2 Environmental Impact Assessment Phase

The EIA Phase for the proposed project has been undertaken in accordance with the EIA Regulations published in GN 38282 in December 2014, in terms of NEMA. Key tasks undertaken within the EIA phase included:

- Consultation with relevant decision-making and regulating authorities (at National, Provincial and Local levels).
- Undertaking a public participation process throughout the EIA process in accordance with Chapter 6 of Government Notice R982 of 2014 in order to identify any additional issues and concerns associated with the proposed project.
- Preparation of a Comments and Response Report detailing key issues raised by I&APs as part of the EIA Process
- Undertaking of independent specialist studies in accordance with Appendix 6 of Government Notice R982 of 2014
- Preparation of a Draft EIA Report in accordance with Appendix 3 of Government Notice R982 of 2014.

These tasks are discussed in detail in the following sections

4.2.1 Authority Consultation

The GDARD is the competent authority for this application. A record of all authority consultation undertaken is included within this EIA report. Consultation with GDARD has continued throughout the EIA process. On-going consultation included the following:

» The Final Scoping Report for the proposed project was submitted in April 2016. The Scoping Report was accepted by GDARD in May 2016.

The following will also be undertaken as part of this EIA process:

» Submission of a final EIA Report to GDARD following the 30-day public review period for the draft EIA.
» If required, an opportunity for GDARD representatives to visit and inspect the proposed project site.
» Notification and Consultation with Organs of State that may have jurisdiction over the project, including:
  * Provincial departments
  * Parastatals and Non-Governmental Organisations
  * Local Municipality and District Municipality

A record of the authority consultation in the EIA process is included within Appendix 3.

4.2.2 Public Involvement and Consultation

The following paragraphs describe the process that was undertaken to facilitate the public participation for the proposed project, and has **commenced on Friday 20 February 2015**. The public participation undertaken for the throughout this project is summarised in Appendix 3 of this report.

4.2.2.1 Submission of Notice of Intent

Midturion Information Consultants (MIC) was commissioned by Envirolution Consulting to undertake a Public Participation Process for the proposed Greenfields Project K148 linking in with the K154 and K133 and associated infrastructure.

4.2.2.2 Announcement of the Opportunity to Become Involved

The opportunity to participate in the EIA was announced in February 2015 in the following ways:

- Distribution of flyers inviting I&AP's to become involved, accompanied by a Background Information Document, including maps of the project location and a Registration Form, as well as a notification letter inviting I&APs to participate (Appendix 3.1);
- Newspaper Advertisement placed in The Star newspaper on Friday 27 February 2015 inviting I&AP's to register with, and submit their comments to MIC (Appendix 3.2);
- Site Notices informing the surrounding communities and immediately adjacent landowners of the proposed development. MIC placed site notices within the boundaries of the study area on Friday 20 and Saturday 21 February 2015. Please refer to the Appendix 3.3 for an example of the Site Notice that was placed.

Specialists were issued with letters to explain the purpose of their field studies to the directly affected landowners so that they would allow the required specialist studies on their properties.

4.2.2.3 I&AP's Database and Notification of the Identified I&AP's

An I&AP's database was developed, see Appendix 3.4.This database includes identified stakeholders and I&AP's registered for the Scoping Process. The database will be expanded through networking as new I&AP's respond to the advertisement placed in the newspaper for the proposed project. At the time of submitting the report the database had 85 stakeholders. Identified I&AP's representing the various sectors was informed of the proposed development via e-mail from February 2015. The organizations and stakeholders in the Public Participation Process are:

- National, Provincial and Local Government;
- Landowners;
- Non-Governmental Organizations;
- Business, Industry & Tourism;
- Traditional Leaders;
- Community Members;
- I&AP's.

A Background Information Document (BID) and Registration Form were compiled and forwarded to the I&AP's registered on the database. These were also distributed at the venues identified by the public participation team. The BID provides a brief background and description of the project and the Environmental Impact Assessment process to be followed. The Registration Form (Comments and Response Register – Appendix 3.5) granted the public an opportunity to register as I&AP and raise any concerns and comments regarding the project.

Stakeholders that were identified, including the following categories:

Stakeholder Category	**Number**
Government Departments	5
Local Government	1
Landowners	11
Mines	N/A
NGO's/CBO's	3
Parastatals	5
Traditional Authorities	N/A

4.2.2.4 Site Visit

Members of the Public Participation Team carried out a **site visit on 20 February 2015** to the study area. The objectives of the site visit were to:

- Gather information that could be used in the Consultation Process;
- Develop a preliminary understanding of the social context (representative structures, language, communication media, etc);
- Identify areas where information could be made accessible to the local communities and venues for public meetings;

- Determine those parties or structures that may be interested in and/or affected by the proposed developments (farming communities, municipalities, tribal lands and villages etc).

4.2.2.5 Information Sharing Meetings

Focus Group Meetings will be held to discuss the proposed project with the local councillors and the Ekurhuleni Metropolitan Mayoral Committee, who will then pass the information about the project on to the community. The Public Participation Team does not see the necessity to hold a Public Meeting at this stage of this project and focus group meetings will be held with the different groups during the review of the Draft EIA Report

4.2.2.6 Comment and Response Report

Issues and comments raised by I&APs over the duration of the EIA process have been synthesised into a Comments and Response Reports. The Comments and Response Report includes responses from members of the EIA project team and/or the project proponent. This is included in Appendix 3.5.

All directly affected stakeholders are in favour of the project thus far.

4.2.2.7 Public Review

The Draft EIA Report will be made available to the public and all registered I&AP's for a period of 30 days review period from 29 July 2016 – 30 August 2016. Reports will be sent to I&APs electronically (e-mailed, placed on the website, but also on CDs upon request) as well as a hard copy placed at a church for the potentially affected community. Dates of the availability of the report will be communicated to the registered I&AP's accordingly. I&AP's will be advised to submit their comments directly to the consultants (and not to GDARD). The comments and issues received during the commenting period will be added to the Final EIA Report that will be submitted to the relevant authority.

4.2.2.8 Final EIA Report

The final stage of the EIA phase includes collating responses from stakeholders and I&APs on the EIA Report in order to refine the final EIA Report. The Comments and Response Report includes all comments received during the Scoping phase of the process, and comments received during the EIA phase of the process, including those which will be received during the public review period of the EIA Report. It is this final report upon which the environmental authorities will make their decision to provide the environmental authorisation.

4.2.2.9 Summary

In order to facilitate an open and transparent process, I&AP's were identified and notified of this proposed project in accordance with legislation. The consultation process for the proposed projects in the vicinity of Vosloorus showed that most of the community is in favour of the project as it will help

with access to and from Vosloorus via the N3 and K148. Based on the input received during the Public Participation Process (PPP) conducted so far, the following conclusions can be made:

- Communication with I&AP's, especially the communities surrounding the proposed route, should continue to ensure informed decision-making and a transparent process throughout EIA Phase;
- Ongoing communication with all I&AP's (landowners and local community) in the study area will be improved to ensure effective public participation. Although land owners are satisfied with the proposed Alignment 1, the I&AP's should be encouraged to participate;
- The aim of this PPP was to identify issues and concerns in order to pass these on to the technical and planning processes with a view to developing measures for successful mitigation/avoidance of negative impacts;
- A number of issues and concerns have been identified by the EAP and PP facilitator during the EIA phase and these are addressed in the Comments and Response Report.

5. DESCRIPTION OF THE AFFECTED ENVIRONMENT

This section provides a description of the environment that may be affected by the proposed N3/K148 project. It is intended to provide an overview of the affected environment and is not a detailed environmental study. Detailed environmental specialist studies, which focus on significant environmental issues of the project, will be provided during the impact assessment phase.

5.1 Climate

The mean annual rainfall for the site is expected to be about 660 mm/annum, with most rain in the austral summer. The warm austral summers alternate with cold dry winters, and with frequent winter frost at the site altitude of about 1512-1587 meters above sea level (m a.s.l; as measured on Google Earth).

5.2 Topography

The topography of the area is rolling grasslands with wide shallow valleys, set between the more distant hills of the Witwatersrand to the north and the Suikerbosrand to the south. Old mine dumps to the northeast add to the raised topography of the area. It might be noted that the small river crossing the western end of the site, and its upstream tributary, both rise in the Suikerbosrand and so emerge near-pristine at the R505 before entering the communal grazing lands or the Magagula Heights developments south of the site.

5.3 Soils and Geology

The geology of the site emerges as dolomites on the low rocky ridges and stony plains across the site, especially in the west, while a few low ridges of dolerite emerge just east of the R103 road where the extended curve is to be developed. The soils are shallow and generally stony on both formations, but with deeper red soils in some areas, best indicated by current and fallow croplands and pastures, or as dark clay soils in the wide shallow valleys. The image below shows a view of the excavations on the project area.

Figure 7: View east across fallow lands with the remains of a large excavation

Table 6: Soil types associated with the study area

Soil Type (ARC, 2013)	Description	Relevance to wetlands (Fey, 2005)
dBo31	SOIL SERIES CLASS Deep (1200+mm), very dark greyish brown moderate blocky clay loam/clay on yellow-brown moderate blocky clay loam/clay, non-calcareous	None
dRg20	SOIL SERIES CLASS Deep (1200+mm), black swelling hydromorphic clay, calcareous	Associated with the majority of the wetlands on site.
Hu3/R	SOIL ROCK COMPLEX Red apedal sandy loam/sandy clay loam, mesotrophic with rock outcrops	None
mAv27	SOIL SERIES CLASS Moderately deep (600-1200mm), yellow-brown apedal sandy clay/clay loam/clay, mesotrophic on soft plinthite	This soil form is described as a potential seasonal to temporary wetland soil. Avalon soils are associated with hard or soft plinthic horizons which dam water within the lower part of the section. The strongest expression occurs in middle to lower slope positions in the landscape. Manganese is associated with iron in some plinthic materials in this soil form.
Sd2/R	SOIL ROCK COMPLEX Red structured sandy loam/sandy clay loam, mesotrophic on rock/saprolite with outcrops	None
SdA	SOIL ASSOCIATION Deep (1200+mm), red moderate blocky clay	None
	loam/clay, mesotrophic on gravel/saprolite; in association with yellow-brown apedal sandy clay/clay loam/clay with moderate blocky structure on saprolite	
xHu26	SOIL SERIES CLASS Red apedal sandy loam/sandy clay loam of variable depth (300-1200mm), mesotrophic	None

5.3.1 Agricultural Potential

Most of the proposed route traverses highly modified area. Although there is some high value agricultural land in the vicinity, the small holdings in the area are not commercially viable as agricultural units. Rocky outcrops that are found on site further limit the potential for crop farming and establishment of good grazing.

Figure 82: Rocky outcrops close to where the K148 will turn right into the K146.

5.4 Land Use and Heritage

The land use in a large part of the area is natural veld. Field investigation by the EAP indicated that the natural areas are largely modified and invested with aliens in certain areas.

The majority of the proposed road is located on current and historical farming lands. There are two garages near the proposed road as well as a graveyard area near a small informal settlement. A solitary grave was also found in close proximity to the proposed road. The graveyard is located at approximately 26°24'34.87"S and 28°13'18.49"E and the solitary grave is located at approximately 26°22'52.75"S and 28°15'18.10"E.

Figure 9: single grave (left) and graveyard (right) in study area

The image below shows the location of the proposed housing developments for Tamboekiesfontein and Janus Park in relation to the K133 (103). These townships will benefit from improved access via the proposed K148. Access from the proposed K148/133 to the proposed developments east of the N3 must be ensured, and has been discussed with the GP DoRT. The information was provided by Mr Jan Schoeman from Izzwelisha Town Planners.

The main activities immediately on and around the site are commercial and communal farming, mainly grazing livestock (beef and dairy cattle, and sheep) on natural and planted pastures, with crops, mainly maize, on the areas of deeper soils. North of the Rietspruit, most of the area is under dense

residential developments, while south of the R550 and a west of the N3 is the conserved disturbed and natural habitats of the Suikerbosrand Nature Reserve

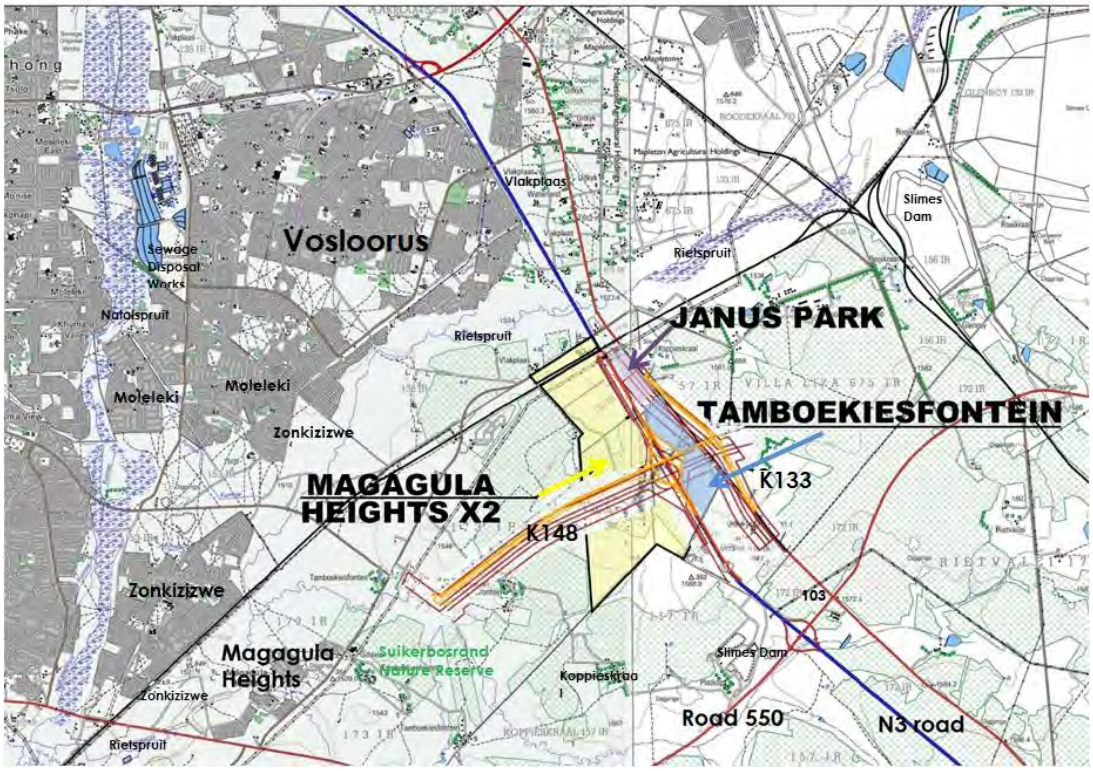


Figure 104: Township developments in relation to the K148

The image below provides a close-up view of the layout at the crossing, as from the Master plan for the area.

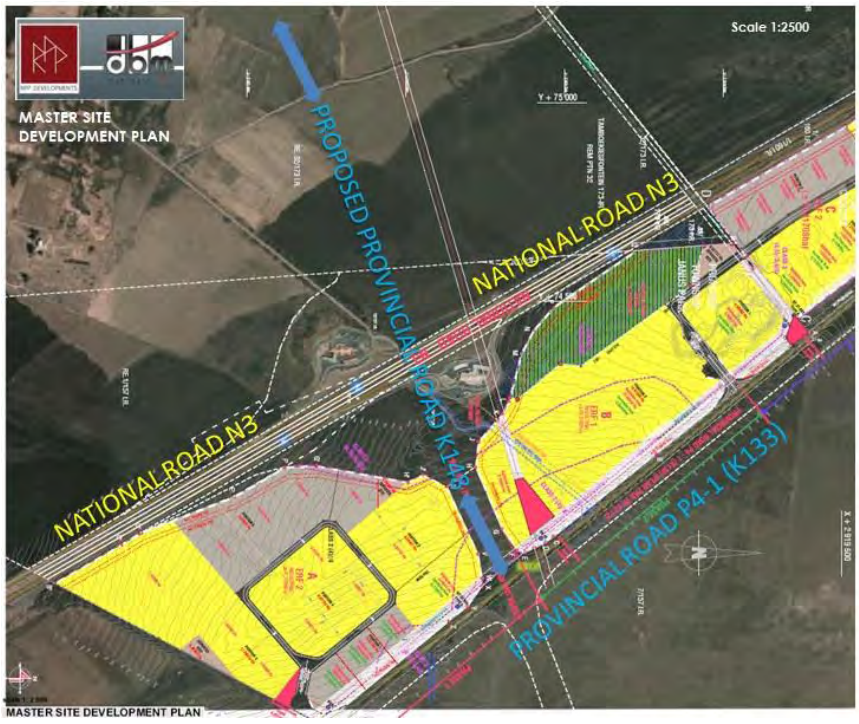


Figure 115: Placement of the K148 ito Master Plan

5.5 Flora and vegetation ecology

5.5.1 Vegetation overview

The proposed road is situated in the Grassland Biome. The Grassland Biome experience summer rainfall and dry winters with frost (and fire), which are unfavourable to tree growth. Therefore, grasslands comprise mainly of grasses and plants with perennial underground storage organs, for example bulbs and tubers and suffrutex species. In some grassland areas, the surface topography (e.g. rocky hills and protected valleys) creates habitats that are favourable to shrublands and trees (Mucina & Rutherford, 2006). Generally, the higher the surface rock cover, the higher the occurrence of woody vegetation such as trees and shrubs, relative to herbaceous vegetation (Mucina & Rutherford, 2006). The Grassland Biome comprises a number of vegetation types of which three types are traversed by the proposed K148 route (Mucina & Rutherford, 2006)

The north-eastern portion of the route assessed is situated in the Tsakane Clay Grassland, while the most of the south-western extent is situated in the Carletonville Dolomite Grassland (Mucina & Rutherford, 2006). Tsakane Clay Grassland grows on flat to slightly undulating plains. This short, dense, grassland comprises a mixture of common Highveld grasses (*Themeda triandra, Heteropogon contortus, Elionorus muticus* and *Eragrostis* spp.) and forbs from the *Asteraceae, Rubiacea*, *Malvaceae, Laminaceae* and *Fabaceae* families. Disturbance in this vegetation type leads to an increase in the grass *Hyparrhenia hirta* and *Eragrostis chloromelas.* Carletonville Dolomite Grassland occurs on undulating plains bisected by rocky ridges. This species-rich grassland forms a complex mosaic pattern dominated by many species. Only a small portion of the extent of Tsakane Clay Grassland and Carletonville Dolomite Grassland are protected in statutory reserves, while close to a quarter is already transformed by human activities. The Tsakane Clay Grassland is nationally classified as Endangered, while the Carletonville Dolomite Grassland is classified as Vulnerable (Mucina & Rutherford, 2006). The third vegetation type that will be traversed by the southernmost extent of the proposed K148 is the Eastern Temperate Freshwater Wetland vegetation, which occurs in flat landscapes or shallow depressions filled with water. The water bodies contain aquatic zones and outer parts with hygrophilous vegetation of temporary flooded grasslands. This vegetation unit is also nationally classified as Endangered (Mucina & Rutherford, 2006).

5.5.2 Vegetation groups

The proposed K148 traversed natural to semi-natural grassland vegetation, as well as large portions of transformed land that included pastures and fallow lands. The connection of the K148 with the R103 traversed mainly transformed land that included cultivated maize fields and pasture, however, natural rocky grassland was also recorded, these are described below with reference to their biodiversity attributes and proximity to the proposed development area (also refer to Figure 12).

1. **Moist grassland**: Moist grassland vegetation helps maintain the hydrology of the area and slows the flow of water, both by physically blocking the passage of water, and by absorbing the water into its root systems. This moderates the impacts of flooding on downstream and surrounding areas. Moist grasslands (wetland areas) are protected by national legislation and are essential to maintain ecological corridors for the movement and survival of species within a landscape fragmented by cultivation and urbanisation. In addition, the hydrological processes associated with the wetlands and are closely associated with the intactness of the vegetation within and

surrounding these moist grasslands. The moist grassland is situated within an Important area of the Gauteng C-plan.

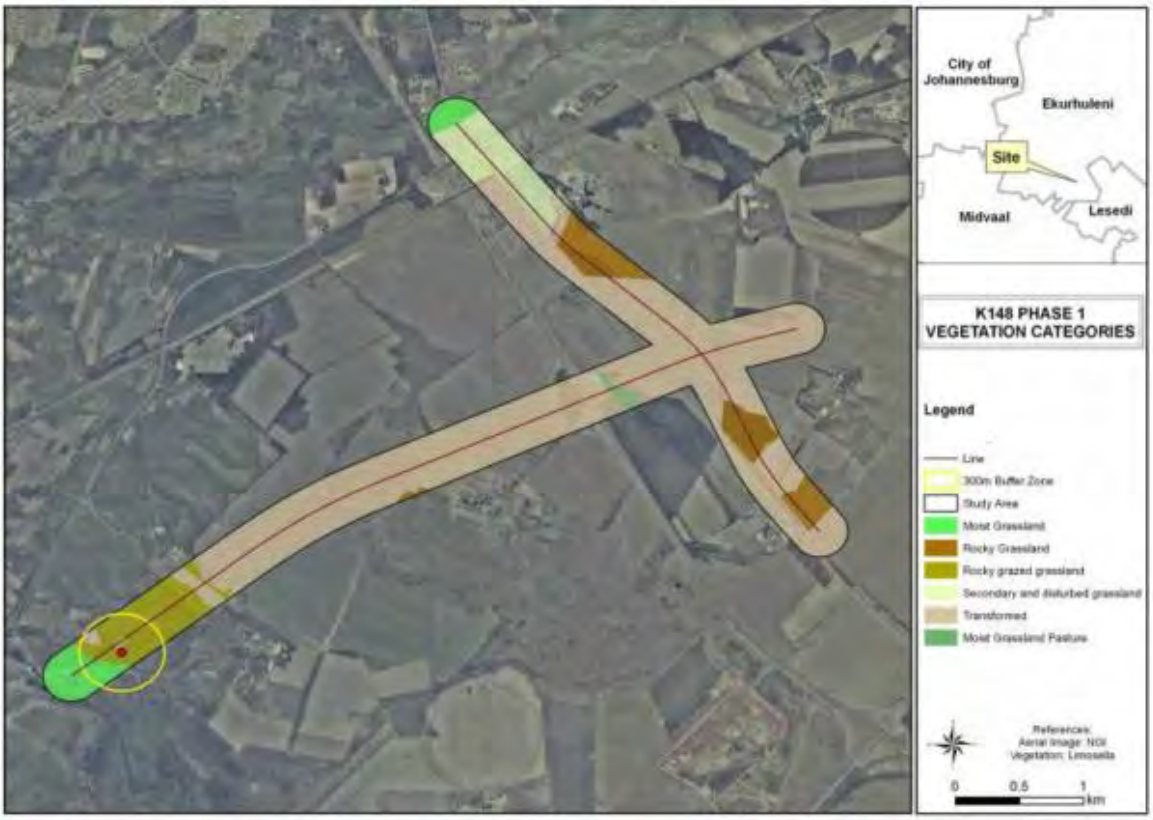


Figure 126: Vegetation groups delineated along the proposed K148 and R103 deviation (200m on either side of the route was mapped**)**

2. **Moist grassland-pasture**: the rocky grassland is situated within the Tsakane Clay Grassland that is nationally regarded as Endangered, therefore all good condition veld of this vegetation community should be classified as sensitive. A portion of this rocky grassland is situated within an Important area of the Gauteng C-plan. The rocky grassland also included the highest species diversity recorded along the proposed development and provided habitat to Declining and provincially protected plant species. It must be noted that the rocky grassland portion that will be impacted on are relatively small and surrounded by cultivated land and pasture with little to no connectivity to other natural vegetation. This reduces its ecological function and conservation importance.

3. **Rocky, grazed grassland (along the K148**): The grazed rocky grasslands showed signs of impacts from intense grazing, as well as impacts from the proximate settlements. Although grazed short and trampled, the vegetation composition was representative of near-natural Carletonville Dolomite Grassland (a Vulnerable vegetation type). One individual of a near threatened plant species was recorded in this vegetation group and as per the Red Listed species guidelines of GDARD, a 300 m no-go buffer should be respected around populations of this species.

4. **Primary rocky grassland (along the R103):** the rocky grassland is situated within the Tsakane Clay Grassland that is nationally regarded as Endangered, therefore all good condition veld of this

vegetation community should be classified as sensitive. A portion of this rocky grassland is situated within an Important area of the Gauteng C-plan. The rocky grassland also included the highest species diversity recorded along the proposed development and provided habitat to Declining and provincially protected plant species. It must be noted that the rocky grassland portion that will be impacted on are relatively small and surrounded by cultivated land and pasture with little to no connectivity to other natural vegetation. This reduces its ecological function and conservation importance.

5. **Secondary and disturbed grassland** vegetation were recorded in the northern extent of the R103 route. This vegetation grouping comprised mainly of land that was historically cultivated or disturbed and typically included a higher frequency of pioneer species, a low diversity of indigenous species and a low basel cover.

6. **The transformed areas** had limited to no natural habitat remaining. Transformed areas include pasture, maize fields and land where not natural species composition remained.

The different habitats and features observed at the site are illustrated below:

The image in top left is a photograph taken from on the rocky rim of the valley with the small river below and showing the intensity of grazing pressure, scattered larger alien trees around residence and, in the distance, the Suikerbosrand where the river rises.

A view south near the western end of the K148

View east across an extensive field of planted pasture

View northwest across the R103 road from the rocky outcrop

Figure 137: The different habitats and features observed at the site

Top right is an imagine of a photograph taken while looking along the route of the K148 and showing the gap between the service stations (red roofs) where the proposed road will pass, and the difference in elevation between the higher (south, right) and lower (north, left) stations. Vehicles can be seen on the N3 motorway that passes perpendicularly between the stations, and the underpass bridge that links the stations and their drainage systems. The image in the bottom left shows a patch of pristine natural grassland at the south end of the proposed new road (R103), showing maize and pasture lands, scattered alien trees and, at the distant tree clumps west (right of the utility pole), the position of the two service stations..

5.5.3 Gauteng Conservation Plan (C-plan)

The Gauteng Conservation Plan (Version 3.3) (GDARD, 2011) classified areas within the province on the basis of its contribution to reach the conservation targets within the province. Critical Biodiversity Areas (CBAs) contain irreplaceable, important and protected areas (terms used in C-Plan 2) and are areas needed to reach the conservation targets of the Province. In addition 'Ecological Support Areas' (ESAs), mainly around riparian areas and other movement corridors were also classified to ensure sustainability in the long term. Landscape features associated with ESAs is essential for the maintenance and generation of biodiversity in sensitive areas and requires sensitive management where incorporated into C-Plan 3.

Figure 148: C-Plan map in relation to the project

The majority of the proposed road is located on both important areas and ecological support areas which also include the wetland areas which are classified as important areas. The western section of the proposed road also enters the protected Suikerbosrand Provincial Nature Reserve as indicated in

the figure (Figure 5.8) above. The Carletonville Grassland is classified as Vulnerable, with only small patches conserved and about 25% transformed by cultivation, urban sprawl and mining, while the Soweto Grassland is Endangered, with about 50% transformed and few conserved patches, the largest and most notable being the Suikerbosrand Nature Reserve just south of the site.

5.5.4 Plants of Conservation Importance

A list of fifteen (15) plants of conservation concern that were previously recorded in the quarter degree square that the site is situated in, or may potentially occur as well as their likelihood of occurrence are given in Appendix C of the vegetation assessment report,

Of the species listed in Appendix C, one Near Threatened succulent species was confirmed to occur in the grazed rocky grassland (southern extent of the K148), as well as three Declining plant species within the rocky grassland (along the R103 deviation). As per the Red List Plant Species Guidelines of the GDARD (GDARD, 2012b), populations of Threatened and Near Threatened species must be conserved in situ while a protective buffer area around the population be respected as a no-go area. As per the guidelines, the buffer area for the Neat Threatened succulent should be 300m. Although not recorded at the time of the site visit, the possibility of *Kniphofia typhoides* occurring in moist grasslands and *Argyrolobium campicola* occurring in the rocky grasslands, could not be ruled out. Distribution data indicated that these two species were previously recorded in close proximity to the site (within 5km) (GDARD, 2015).

5.5.5 Provincially protected plants

A number of provincially protected plants are listed in the Transvaal Nature Conservation Ordinance Act No. 12 of 1983. These plants are not to be removed, damaged, or destroyed without permit authorisation from Gauteng Department of Agriculture and Rural Development (GDARD). In this study area, this includes:

- All species of *Haemanthus* -Paint brush
- All species of *Gladiolu*s-Gladioli
- *Lithops lesliei* -Stone plant
- All species of *Eucomis* - Pineapple plant

5.5.6 Alien Invasive Plant Species

Six (6) category 1b species were recorded and must therefore be removed by implementing an alien invasive plant management programme in compliance of section 75 of the Act[4] as stated above. The species were *Ailanthus altissima, Cirsium vulgare, Eucalyptus camaldulensis, Gleditsia triacanthos, Pennisetum clandestinum* and *Xanthium strumariums.*

5.6 Fauna and Avifauna

The proposed K148 road, with its connections to the N3 motorway and R103 road will form a 8km long, relatively narrow and linear development across a variety of habitats. The inevitable consequences of a road are to divide and therefore fragment the habitats on either side, so that the

[4] National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA)

principle environmental impacts to be mitigated and/or avoided are those that affect habitat quality, water flow and/or connectivity of terrestrial animal populations on either side.
A site visit by a botanist, mammalogist and ornithologist was conducted on 14 April 2015 from 10:00-14:30 hours. Findings of the site visit are discussed below.

5.6.1 Mammals

Mammals: During the visit the site was surveyed and assessed for the potential occurrence of Red Data and/or wetland-associated species such as Juliana's golden mole (*Neamblosomus juliana*), Highveld golden mole (*Amblysomus septentrionalis*), Rough-haired golden mole (*Chrysospalax villosus*), African marsh rat (*Dasymys incomtus*), Angoni vlei rat (*Otomys angoniensis*), Vlei rat (*Otomys irroratus*), White-tailed rat (*Mystromys albicaudatus*), a member of shrews such as the Forest shrew (*Myosorex varius*), Southern African hedgehog *(Atelerix frontalis), a number of bats such as the* Short-eared trident bat (*Cloeotis percivali*), African clawless otter (*Aonyx capensis*), Spotted-necked otter (*Lutra maculicollis*), Marsh mongoose (*Atilax paludinosus*), Brown hyena (*Parahyaena brunnea*), etc.

Table 7: Mammal diversity. The species observed or deduced to occupy the site[5].

Note	SCIENTIFIC NAME	ENGLISH NAME
√	*Lepus saxatilis*	Scrub hare
√	*Cryptomys hottentotus*	African mole rat
?	*Hystrix africaeaustralis*	Cape porcupine
?	*Thryonomys swinderianus*	Greater cane rat
?	*Pedetes capensis*	Springhare
*	*Rhabdomys pumilio*	Four-striped grass mouse
*	*Mus indutus*	Desert pygmy mouse
*	*Mus minutoides*	Pygmy mouse
√	*Mastomys natalensis*	Natal multimammate mouse
√	*Mastomys coucha*	Southern multimammate mouse
?	*Otomys angoniensis*	Angoni vlei rat
?	*Otomys irroratus*	Vlei rat
√	*Gerbilliscus brantsii*	Highveld gerbil
?	*Dendromus melanotis*	Grey pygmy climbing mouse
?	*Dendromus mesomelas*	Brants' climbing mouse
?	*Dendromus mystacalis*	Chestnut climbing mouse
DD?	*Suncus lixus*	Greater dwarf shrew
DD?	*Suncus infinitesimus*	Least dwarf shrew
DD*	*Crocidura cyanea*	Reddish-grey musk shrew
DD*	*Crocidura hirta*	Lesser red musk shrew
NT?	*Atelerix frontalis*	Southern African hedgehog
*	*Tadarida aegyptiaca*	Egyptian free-tailed bat
√	*Neoromicia capensis*	Cape serotine bat
√	*Scotophilus dinganii*	African yellow house bat

[5] *(Systematics and taxonomy as proposed by Bronner et.al [2003] and Skinner and Chimimba [2005]).*

Note	SCIENTIFIC NAME	ENGLISH NAME
√	*Scotophilus viridis*	Greenish yellow house bat
NT?	*Parahyaena brunnea*	Brown hyena
*	*Felis silvestris*	African wild cat
*	*Genetta*	Small-spotted genet
*	*Genetta tigrina*	SA large-spotted genet
√	*Cynictis penicillata*	Yellow mongoose
√	*Galerella sanguinea*	Slender mongoose
*	*Canis mesomelas*	Black-backed jackal
*	*Sylvicapra grimmia*	Common duiker
√	*Raphicerus campestris*	Steenbok

√ Definitely there or have a *high* probability to occur;

* *Medium* probability to occur based on ecological and distributional parameters;

? *Low* probability to occur based on ecological and distributional parameters.

Red Data species rankings as defined in Friedmann and Daly's S.A. Red Data Book / IUCN (World Conservation Union) (2004) are indicated in the first column: CR= Critically Endangered, En = Endangered, Vu = Vulnerable, LR/cd = Lower risk conservation dependent, LR/nt = Lower Risk near threatened, DD = Data Deficient. All other species are deemed of Least Concern.

Table 8: Mammal species positively confirmed from the study site, observed indicators and habitat.

SCIENTIFIC NAME	ENGLISH NAME	OBSERVATION INDICATOR
L. saxatilis	Scrub hare	Faecal pellets
C. hottentotus	African mole rat	Tunnel system

Scrub hares and rodent moles are common and widespread. But in both instances hare droppings and mole tunnel systems were few and far in-between.

African Mole Rat (C. Hottentotus)

Scrub Hare (L. Saxatilis)

Figure 159: Scrub hares and rodent moles

5.6.2 Avifauna

The footprint area of the study site is surrounded by areas that still feature of natural vegetation that fall within the Suikerbosrand Nature Reserve and which are excluded from any development. The proposed development will not impact on the Suikerbosrand Nature Reserve but disturbance will occur at the natural veld areas around the construction activities. When operational, noise and fumes from the vehicles using the K148 may disrupt birds and cause them to move away for breeding purposes in particular. The proposed development will not have a negative effect on any Red Data avifaunal species previously recorded for this area (none of which were found during the site visit). Although relatively limited, the proposed development will result in some habitat loss.

The footprint area of the study site is small and disturbed by past human activities and does not offer suitable habitat for the Red Data avifaunal species recorded for the area. These Red Data avifaunal species are habitat specific and unable to adapt to areas changed by man. Only the more common avifaunal species that are able to adapt to areas changed by man will make use of the disturbed state of the study site.

The development must be restricted to the proposed footprint area at all times. The natural grassland area should be regarded as medium sensitive in terms of avifaunal biodiversity and kept as natural as possible at all times.

NO Red Data avifaunal species were confirmed from the study site for which suitable foraging, breeding and roosting habitat was found:

5.6.3 Herpetofauna

During the visit, the site was surveyed and assessed for the potential occurrence of South African Red Data species in Mpumalanga[6] (such as: Giant Bullfrogs (*Pyxicephalus adspersus*); Spotted Shovel-nosed Frog (*Hemisus guttatus*); Whistling Rain Frog (*Breviceps sopranus*); Plain Stream Frog (*Strongylopus wageri*); Sungazer (*Cordylus giganteus*); Breyer's Long-tailed Seps (*Tetradactylus breyeri*); Natal Hinged Tortoise (*Kinixys natalensis*); Striped Harlequin Snake (*Homoroselaps dorsalis*); Swazi Rock Snake (*Lamprophis swazicus*); and Southern African Python (*Python natalensis*).

Two reptile species were confirmed during site visits and **one amphibian** species was confirmed during site visits. It should be noted that potential occurrence is interpreted as being possible over a period of time, as a result of expansions and contractions of population densities and ranges which stimulate migration.

Table 9: Reptile and Amphibian species positively confirmed on the study site, observed indicators and habitat.

Scientific Name	English Name	Observation Indicator	Habitat
Trachylepis punctatissima	Speckled Rock Skink	Sight record	Individuals on man-made rupiculous habitat.
Lygodactylus	Common Dwarf	Sight record	A few individuals on

[6] *Alexander and Marais, 2007; Minter, et al, 2004 and Du Preez & Carruthers, 2009),*

Scientific Name	English Name	Observation Indicator	Habitat
capensis	Gecko		man-made rupiculous habitat.
Strongylopus fasciatusi	Striped Stream Frog	Vocalisation	Permanent water bodies

Figure 16: Speckled Rock Skink (*Trachylepis punctatissima)*

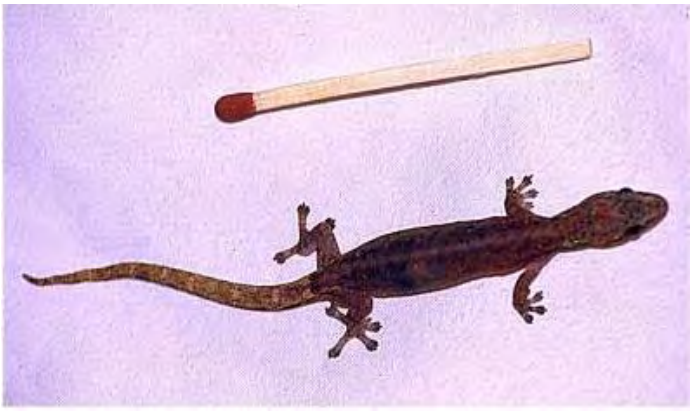


Figure 171: Common Dwarf Gecko (Lygodactylus capensis capensis)

Figure 18: Striped Stream Frog[7] (*Strongylopus fasciatusi)*

Within the context of the K148, N3 connecting ramps and K146 and R103 linkages, the main environmental concern is with the crossing of the small river at the western end whose tributaries arise within the Suikerbosrand to the south. Disturbance of this superficially insignificant riverine and wetland system is expected to have significant impacts on faunal connectivity between the near-pristine upstream origins in the Suikerbosrand and important downstream connections to the Riet- and Natalspruits, although it will require effective conservation on both sides of the proposed road development to preserve such links. More minor concerns are for division of and effects on the degraded but natural grasslands along the western third of the K148, and loss of the Endangered Soweto Highveld Grassland patches east of the current R103 road.

Overall, the remaining natural terrestrial habitats are considered as of only Medium-Low sensitivity, except for the western riverine system which is considered of Medium-High sensitivity. The development is expected to displace individual animals rather than populations, hence it is concluded that irreplaceable loss of species will not occur within the general area nor will any Red Data vertebrate species be significantly affected.

From a vertebrate perspective, no objection can be raised should development of the K148 and K146 proceed.

5.7 Wetlands and Surface Water Bodies

A specialist study was done to assess the potential impact of the project on wetlands and surface water bodies. During the site visits, six wetland areas were found to cross the proposed road and interchange. Of these six wetland areas one large floodplain wetland is located in the nationally protected Suikerbosrand Nature reserve.

[7] *www.sareptiles.co.za/gallery*

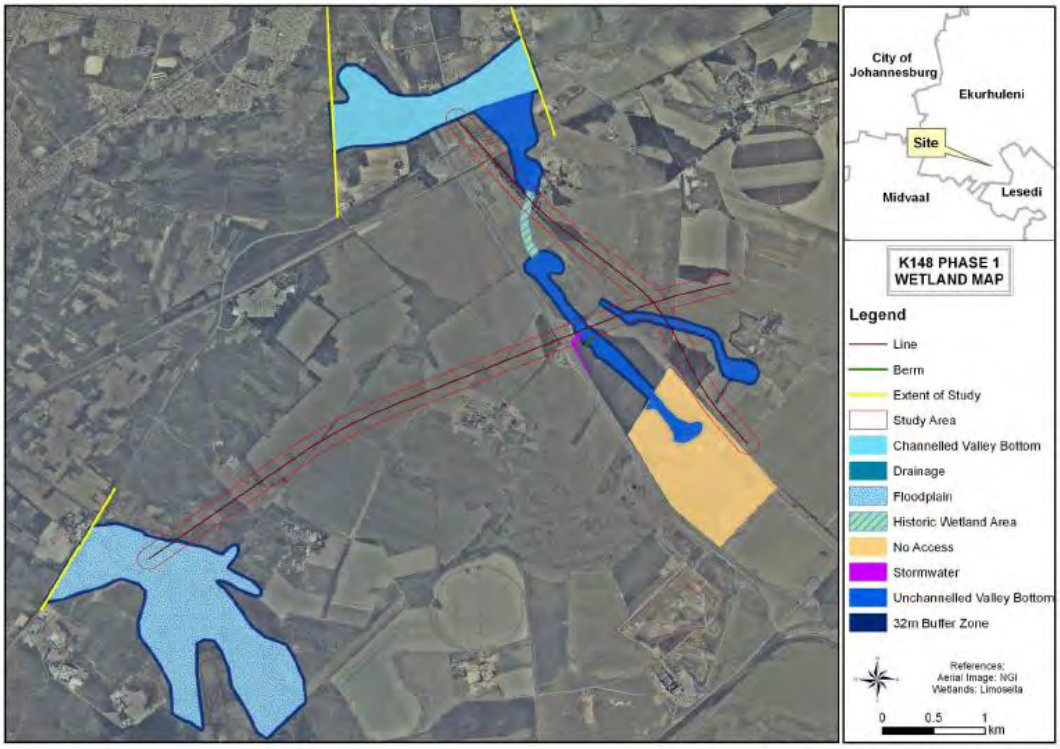


Figure 19: Wetland map

The wetlands found throughout the proposed road and interchange are:

1. Unchannelled Valley Bottom 1
2. Unchannelled Valley Bottom 2
3. Unchannelled Valley Bottom 3
4. Channelled Valley Bottom
5. Floodplain
6. Historical Wetland

Other wetlands within the vicinity, but outside of 500 m of the proposed development have been omitted from this assessment. The majority of the wetland areas are located in the eastern section of the proposed road with only the floodplain located in the western section of the proposed development. The five wetlands located in the eastern section of the proposed development are largely impacted by current and historical farming as well as other anthropogenic activities such as developments and road construction. The two main wetland areas are the Channelled Valley Bottom wetland, to which all three the unchannelled valley bottom wetlands are connected, and the Floodplain wetland is also the largest of the wetland system and is less impacted than the other smaller wetlands.

The study took place during the end of the growth season and some wetland areas especially seepage wetlands could have been overlooked especially with regards to farm lands since many infloresences were no longer identifiable. It is thus suggested that the area should be groundtruthed before construction commences. Presence of wetlands according to existing spatial layers of the Gauteng Province indicates that a river and wetland area in both the northern section of the proposed road and the western section of the proposed road. Furthermore numerous pans like wetlands are shown throughout the proposed road area, as illustrated on the Figure 21 above.

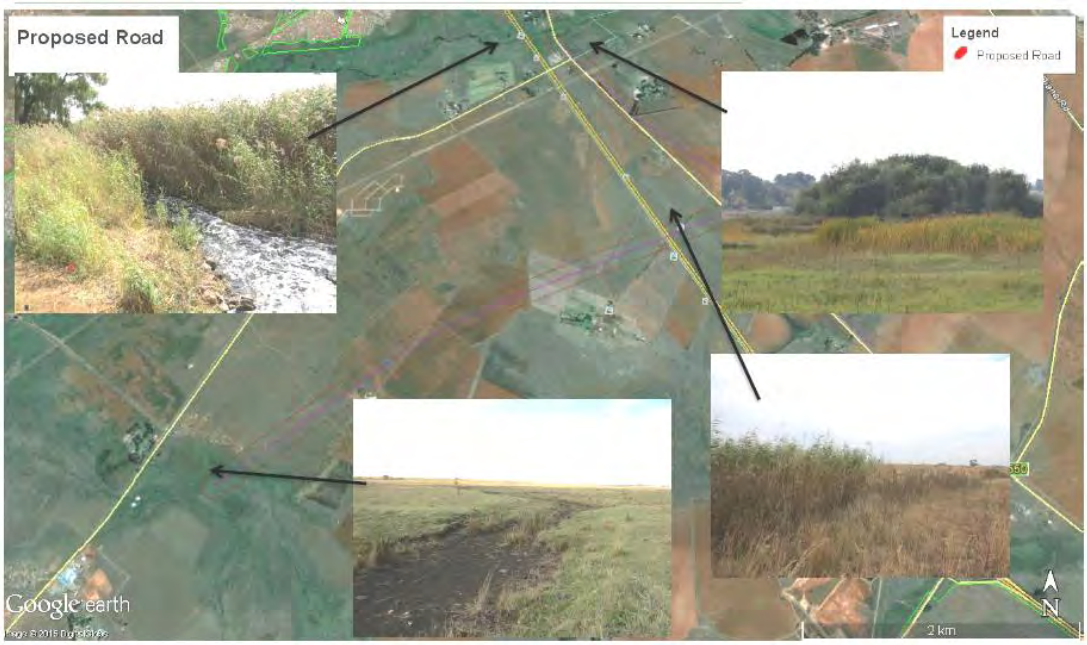


Figure 20: Vegetation indicating wetlands in the study area

In summary the PES scores for the unchannelled valley bottom wetlands is an **E – Low.** The change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural habitat features are still recognizable (Macfarlane et al, 2007) and is likely to remain stable over the next 5 years. The channelled valley bottom, and the floodplain wetland scored a C - Moderately modified. A moderate change in ecosystem processes and loss of natural habitats has taken place but the natural habitat remains predominantly intact.

The EIS scores for the unchannelled valley bottom is **1.0 and falls into the Low to Marginal class** and is characterised by wetlands that are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these wetlands is not usually sensitive to flow and habitat modifications. They play a small role in moderating the quantity and quality of water in major rivers[8] while the Floodplain wetland and the channelled valley bottom scored 2.7 and 2.2 respectively and fall into the High class which is characterised by Wetlands that are considered to be ecologically important and sensitive. The biodiversity of these wetlands may be sensitive to flow and habitat modifications. They play a role in moderating the quantity and quality of water of major rivers.

Wetlands situated within 500 m of proposed activities should be regarded as sensitive features potentially affected by the proposed development (Regulation 1199 of 2009 in terms of the National Water Act, 1998). Development activities close to wetlands are excluded from General Authorisation (GA) for Section 21 (c) and (i) water uses (published in Government Gazette No. 389). In this instance the Department of Water Affairs should be contacted regarding the application for a Water Use License.

[8] *DWAF (DWS), 1999*

Table 10: Combined EIA scores for the wetlands in the study area

WETLAND IMPORTANCE AND SENSITIVITY		Importance	Confidence
Channelled Valley Bottom	Ecological importance & sensitivity	2.4	3.0
	Hydro-functional importance	2.0	3.0
	Direct human benefits	2.3	3.0
	Overall EIS score	**2.2**	
Unchannelled Valley Bottom	Ecological importance & sensitivity	1.7	3.0
	Hydro-functional importance	0.9	3.0
	Direct human benefits	0.3	3.0
	Overall EIS score	**1.0**	
Floodplain Wetland	Ecological importance & sensitivity	3.3	3.0
	Hydro-functional importance	2.3	3.0
	Direct human benefits	2.3	3.0
	Overall EIS score	**2.7**	

5.8 Hydrology

The purpose of the Hydrological Specialist Study (Appendix 8) was to examine the influence of the proposed K148 roadway on the flood level and maximum flow velocities on the existing floodplain. The proposed roadway and bridge were therefore inserted into the model. This specialist study was included in the EIA investigations as part of the formulation of mitigation for the impact of bridge structures on the receiving environment i.e. the floodplain. The concern was raised by the DWS after a site visit.

The proposed roadway surface will have a 25 x 4 m bridge opening, and the information was inserted into the HEC-RAS model to gauge the influence of the proposed bridge. Different scenarios were investigated in terms of the impact of the road structures on hydrology The following paragraphs will discuss the influence of the proposed roadway and 4 scenarios on the floodplain.

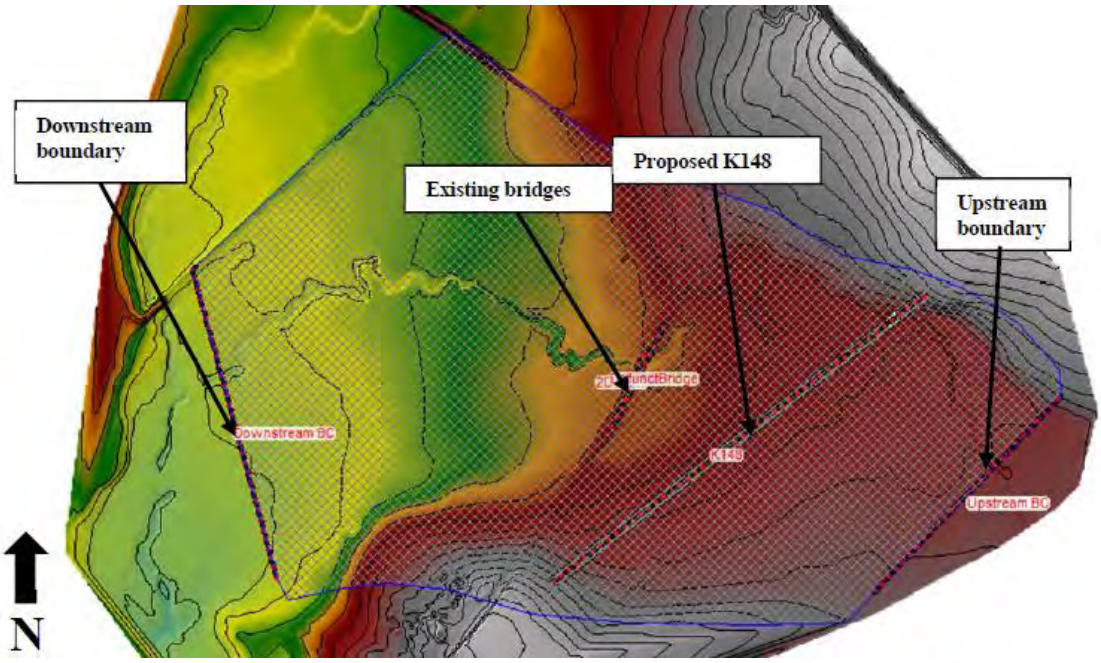


Figure 21: Hydrological HEC-RAS model with proposed K148 Road and bridge.

Scenario 1 would prevent flooding of the bridge deck for both the 1:50 and 1:100 floods, but the roadway will be inundated for both the 1:50 year (1518.80) and the 1:100 year (1518.93 m) recurrence interval flood peaks. The roadway would therefore have to be elevated in the floodplain.

Scenario 2 proposed a bridge with the roadway raised above the floodplain. Although the bridge would not be inundated if constructed as in Scenario 1, the roadway to the left of the bridge would be inundated for both analysed floods. Therefore, various scenarios were run to determine what the level of the roadway should be to prevent inundation. The bridge opening was kept at 25 x 4 m and the road was elevated to 1521.5 m. Although this scenario would prevent flooding of the roadway, the freeboard requirements of the bridge would not be met. The bridge *soffit* level for Scenario 2 is at 1520.5 and the maximum water level for the 1:50 flood peak is 1520.43, which only provides 0.07 m freeboard. As 0.7 m freeboard is required, the bridge *soffit* should be increased to at least 1521.13, making the bridge opening 4.63 m high. However, the water on the floodplain would take long to drain, as the entire floodplain would have to drain to the bridge situated at the extreme right of the floodplain. The next scenario was run to improve this situation. The road level could be lowered to 1521.3 m and without causing inundation of the shoulder breakpoint during the 1:100 year flood (the maximum water level for this scenario is 1521.24).

Scenario 3 proposes a bridge with the roadway raised and additional culverts added as further mitigation to the impact on the floodplain. Due to the slow drainage of the floodplain, an alternative to a larger bridge opening would be to add culverts along the floodplain. Scenario 3 was used to analyse this option. A cross section of the elevated roadway in this scenario is shown in Figure 8-38. The bridge opening was kept at 25 x 4 m, the road was elevated to 1521.3 m and eight 2 x 1.5 m culverts were included in the floodplain. The 1:50 year and 1:100 year floodlines and figures have shown that significant damming would occur upstream of the roadway for both analysed floods. A comparison of figures shows that the damming will be more than for Scenario 1. This is to be expected, as the water

is no longer allowed to flow over the roadway. However, damming at Scenario 3 will be less than for Scenario 2.

The flood levels and velocities for Scenario 3 are lower than those of Scenario 2, especially for the 1:100 year which has a significantly lower flood level. However for Scenario 3 the flow would be introduced downstream of all the small culverts. The bridge soffit for Scenario 3 is at 1520.5 m and the maximum water level for the 1:50 flood peak is 1519.87, providing approximately 0.63 m freeboard, which is less than the minimum requirement of 0.7 m. However, little debris is expected at the bridge due to the type of vegetation in the study area. It could therefore be argued that 0.63 m freeboard should be sufficient in this case.

Scenario 4 suggested a widened bridge with roadway raised and additional culverts added. Due to the freeboard problem in Scenario 3, a wider bridge was simulated in Scenario 4 (alternatively, a higher bridge could be constructed). The bridge opening was widened to 30 x 4 m, the road was elevated to 1521.3 m and eight 2 x 1.5 m culverts were included in the floodplain. It was found that damming would also occur upstream of the roadway but that the damming will be slightly less than for Scenario 3. This is to be expected, as the bridge opening is now wider. For this scenario, the roadway could actually be lower than 1521.3, at 1520.5 m, to maintain sufficient freeboard.

At the second site visit (pre application meeting for the WULA), DWS (Ms Kalembo Barbara , email: KalemboB@dws.gov.za) has requested that once the preferred alternative has been finalised, design drawings will have to be submitted for each wetland crossing that the WULA will apply to. The hydrologist has recommended that the design of the roadway and bridge be modelled on Scenario 2 (with the bridge height being at least 4.63 m), Scenario 3 (with the bridge height being at least 4.07 m, if 0.7 m freeboard is a strict requirement) or Scenario 4. The final decision would depend on the outcome of an economic analysis and feedback from the WULA processes.

Discussions with DWS is ongoing throughout the EIA phase, the situation is further discussed in the WULA application.

6. IMPACT ASSESSMENT

This chapter serves to assess the significance of the positive and negative environmental impacts (direct, indirect, and cumulative) expected to be associated with the development of the proposed road

6.1 Impact Evaluation methodology

Direct, indirect and cumulative impacts of the issues identified through the EIA study, as well as all other issues identified in the EIA phase must be assessed in terms of the following criteria:

- 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, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high):
- The **duration**, wherein it will be indicated whether:
  - very short duration (0–1 years) – assigned a score of 1;
  - short duration (2-5 years) - assigned a score of 2;
  - medium-term (5–15 years) – assigned a score of 3;
  - long term (> 15 years) - assigned a score of 4; or
  - permanent - assigned a score of 5
- The **consequences (magnitude)**, quantified on a scale from 0-10, where 0 is small and will have no effect on the environment, 2 is minor and will not result in an impact on processes, 4 is low and will cause a slight impact on processes, 6 is moderate and will result in processes continuing but in a modified way, 8 is high (processes are altered to the extent that they temporarily cease), and 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- The **probability** *of occurrence*, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale of 1–5, where:
  1 is very improbable (probably will not happen),
  2 is improbable (some possibility, but low likelihood),
  3 is probable (distinct possibility),
  4 is highly probable (most likely) and
  5 is definite (impact will occur regardless of any prevention measures)

The potential impacts have been assessed in terms of the following factors:

Probability	Duration
1. Very improbable 2. Improbable (low likelihood) 3. Probable (distinct possibility) 4. Highly probable (most likely 5. Definite (regardless of measures to prevent)	1. A of very short duration (0-1 year) 2. Short duration (2-5 years) 3. Medium term (5-15 years) 4. Long term (>15 years) 5. Permanent(or ongoing during lifetime)

Extent	Magnitude
1. Limited to the site 2. Limited to the local area 3. Limited to the region 4. National 5. International	0. Small or no effect 2. Minor or no impact on processes 4. Low, with slight impact on processes 6. Moderate (processes continue but modified) 8- high (processes altered and stop temporarily) 10. Very high and destructive of patterns with processes permanently stopping

Magnitude + Duration + Extent x Probability = Significance Score

- the **status**, which will be described as either positive, negative or neutral.
- the degree to which the impact can be **reversed** (low, moderate, high).
- Whether the impact may cause ***irreplaceable* loss of resources** (Yes/No).
- Whether the impact can be ***mitigated.***
- The **significance** shall be determined through a synthesis of the characteristics described and can be assessed as low, medium or high. The **significance** is calculated by combining the criteria in the following formula:

S = Significance weighting *M = Magnitude*
E = Extent *P = Probability*
D = Duration ***S=(E+D+M)P***

The **significance weightings** for each potential impact are as follows:
< 30 points: Low (i.e. where this impact would not have a direct influence on the decision to develop in the area),
30-60 points: Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated),
> 60 points: High (i.e. where the impact must have an influence on the decision process to develop in the area).

Assessment of impacts are summarised in the following table format. The rating values as per the above criteria are included. In some instances the impact was found to be similar for all alternatives, but a distinction was made between impacts that are pertinent for a particular Alternative. The No Go Option was included in the assessment.

Assumptions and Limitations

The following assumptions and limitations are applicable to the studies undertaken within this EIA Phase:

» All information provided by the developer and I&APs to the environmental team was correct and valid at the time it was provided.
» It is assumed that the development site identified by the developer represents a technically suitable site for the establishment of the proposed K148 road
» Studies assume that any potential impacts on the environment associated with the proposed development will be avoided, mitigated, or offset.
» This report and its investigations are project-specific, and consequently the environmental team did not evaluate any other site alternatives.

Refer to the specialist studies in **Appendices 4-9** for specialist study specific limitations.

6.2 Alternatives Assessment

The following alternatives have been considered and assessed through this EIA report. The environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects are considered. The details pertaining to each alternative considered, as well as the technical preference are provided below:

Alternative 1 (Red), the preferred option is proposed as indicated in the Figure 6.1 below. The road will form a link between the N3/K148 and K146. The road is a deviation from Alternative 2 (yellow line) that was initially proposed as the preferred alignment. The Alternative 1 (red line) was proposed to the south of the initial alignment to avoid land use features that would be impacted upon negatively.

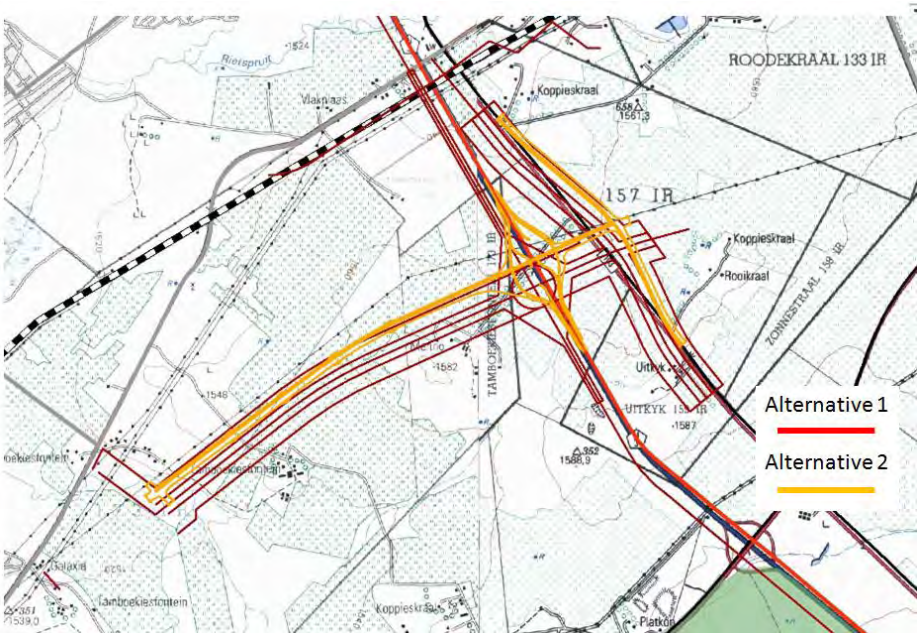


Figure 22: Road alignment Alternative 1 and Alternative 2

Alternative 2 (Yellow) follows nearly the same alignment of Alternative 1 and Alternative 2 was initially proposed as the preferred alignment. However, during specialist investigations, it was found that this alignment would impact negatively upon an existing cemetery and other land uses (a dairy facility and

buildings). The Alternative 1 (red line) was then proposed to the south of the initial alignment to avoid these features.

It was found that the preferred Alternative 1 as well as Alternative 2 would have an impact on the footprint of the project and surrounding areas. The magnitude of the impacts and the type of environment that will be influenced were comparatively evaluated in the EIA process in order to recommend an option and focus the specialist studies. The specialist studies were based on the full understanding of the nature of the impacts and include mitigation options for the recommended route (Alternative 1). A comparative table has been drawn up where the various environments as well as the impact of the activity on those environments where classified in a simplistic way in order to establish an option with:

a) the least possible impacts;
b) avoidance of impacts;
c) manageable impacts;
d) mitigation possibility

The Public Participation thus far has indicated that both routes present impacts but that **Alternative 1 will be acceptable to land owners and inhabitants of various properties.**

6.3 Description and assessment of issues and potential impacts

The sections which follow provide a summary of the findings of the assessment of potential impacts associated with the construction and operation of the proposed construction of Road N3/K148 (phase 1) between k146 and K133 (including the interchange).The assessment of potential issues presented in this chapter has involved key input from specialist consultants, the public and the project proponent. Issues were assessed in terms of the criteria detailed in section 6.1. The nature of the potential impact is discussed, and the significance is calculated with and without the implementation of mitigation measures. Recommendations are made regarding mitigation/enhancement and management measures for potentially significant impacts and the possibility of residual and cumulative impacts are noted.

6.3.1 Ecological Impact Assessment:

6.3.1.1 Description of Ecological Impacts

The Vertebrate and Vegetation Specialist Reports (attached) contain the findings related to the ecology

Impacts on Fauna: The main environmental concern regarding vertebrates is with the crossing of the small river at the western end whose tributaries arise within the Suikerbosrand to the south. Disturbance of this superficially insignificant riverine and wetland system is expected to have significant impacts on faunal connectivity between the near-pristine upstream origins in the Suikerbosrand and important downstream connections to the Riet- and Natalspruits, although it will require effective conservation on both sides of the proposed road development to preserve such links. More minor concerns are for division of and effects on the degraded but natural grasslands along the western third of the K148, and loss of the Endangered Soweto Highveld Grassland patches east of the current R103 road.

Impacts on Flora: The vegetation was classified into six broad groups and assigned a vegetation sensitivity as described below.

1. **Moist grassland**: Vegetation associated with the moist grassland was classified as being of **high sensitivity**, taking into account that the vegetation is important in maintaining the functionality thereof and that all watercourses are protected by national legislation. However, the vegetation was disturbed by intense grazing and historical impacts with a low likelihood of supporting plant of conservation concern. Nonetheless, it is recommended that the road alignment through the moist grassland in the southern extent of the K148 be re-routed to avoid this area or to minimise) the area traversed.
2. **Moist grassland-pasture**: A Pasture area north of the N3 and on either side of the Total petrol stops, showed some signs of elevated soil moisture and was classified as moist grassland-pasture. Although the vegetation (pasture) was not in a natural state and does not include plant species of concern, the precautionary principal applies in that the area should be regarded as being of **medium sensitivity** and be compared with the wetland assessment report and its recommendations. In the absence of wetland conditions, this area could be regarded as being of low sensitivity.
3. **Rocky, grazed grassland (along the K148**): In the southern extent of the K148, in proximity to a small informal residential settlement, rocky, grazed grassland was recorded. This area slopes south-wards towards the moist grassland. Although overgrazing was noted and the species diversity was lower than what can be expected in rocky grasslands, the vegetation is in a sub-climax condition and was habitat to one individual of a Near Threatened plant species, with the possibility of more individuals occurring. As per the Gauteng guidelines for biodiversity assessments, all grassland (even if slightly degraded) should be considered as sensitive. This area is also situated within a C-plan 'Important Area' and is classified as being of **medium sensitivity** due to the trampled state and apparent low species diversity. *Note that a 300m buffer around the Near Threatened species within this grazed grassland should be regarded as high sensitivity and should be avoided by the final route.*
4. **Primary rocky grassland (along the R103):** Along the R103 deviation from the existing R103, primary rocky grassland was recorded. Although the three portions were isolated and surrounded by maize and pasture, the species diversity was high with Declining and provincially protected plant species occurring. Some portions were also situated within a C-plan 'Important Area and the rocky grassland was classified as being of **high sensitivity**. Where the route cannot deviate to accommodate Declining plant species, these will have to be relocated as per instructions from the GDARD.
5. **Secondary and disturbed grassland** vegetation were recorded in the northern extent of the R103 route. This vegetation grouping comprised mainly of land that was historically cultivated or disturbed and typically included a higher frequency of pioneer species, a low diversity of indigenous species and a low basel cover. This vegetation grouping was classified as being of **low sensitivity** and is suitable for the proposed development.
6. **The transformed areas** had limited to no natural habitat remaining and were therefore classified as being of **low sensitivity** to the proposed K148 route. Transformed areas include pasture, maize fields and land where not natural species composition remained.

6.3.1.2 Summary of impacts associated with the proposed road during the construction and operational phase

The two alternatives road alignment discussed in section 6.2 do not differ in any significant way as far as the impacts on the ecology is concerned. Therefore, there is no significant difference in the potential impacts associated with these alternatives, and the impacts for the two alternatives are not comparatively assessed in the assessment tables below. *The impacts assessment tables below apply to alternative 1 and 2 road alignment.*

Destruction and deterioration of rocky grassland vegetation		
Nature: ***T***he sensitive vegetation (rocky grassland) along the K148 route comprised approximately 1.3km of the ±5.8km of the K148. Due to the transformed state of the remainder of the vegetation along the proposed route, the **impacts on these areas are envisaged to be minimal.**		
CONSTRUCTION PHASE		
Rating of Impacts	**Without mitigation**	**With mitigation**
Probability	Definite (5)	Highly probable (4)
Duration	Permanent (5)	Permanent (5)
Extent	Limited to site (1)	Limited to site (1)
Magnitude	High (8)	Moderate (6)
Significance	**70 (high)**	**48 (moderate)**
Status (positive or negative)	Negative	Negative
OPERATIONAL PHASE		
The sensitive vegetation (rocky grassland) along the K148 route comprised approximately 1.3km of the ±5.8km of the K148. Along the R103 deviation, the rocky grassland comprised only 0.3km of the ± 4.2km deviation. Due to the transformed state of the remainder of the vegetation along the proposed route, the **impacts on these areas are envisaged to be minimal.** Activities includes: • Maintenance vehicles /activities impacting outside of the road reserves; or • Failed rehabilitation and degradation of adjacent vegetation • Increased usage of areas surrounding the road e.g. car stops, vendors • Pollutants from roads reaching adjacent grassland and the watercourses • Increased flooding resulting in erosion		
Probability	Highly probable (4)	Probable (3)
Duration	Medium term (3)	Short term (2)
Extent	Limited to Local Area (2)	Limited to the Site (1)
Magnitude	High (8)	Low (4)
Significance	**52 (moderate)**	**21 (Low)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Moderate
Irreplaceable loss of resources?	Moderate	Low
Can impacts be mitigated?	Yes	
NO GO Option	A No Go Option will not change the status quo of the sensitive rocky grassland.	
Mitigation: • When finalising the route, endeavour to plan the route through as much low sensitivity vegetation groups as possible, and avoid protective buffer areas. • Plan for storm water management during construction and operation of the road. • An independent Ecological Control Officer (ECO) should be appointed to oversee construction. • The route alignment must be fixed through areas with the least vegetation sensitivity. • As the rocky grasslands is classified as sensitive, the work area (e.g. area disturbed) must be kept to a		

minimum in these areas and no construction camps or related activities may be places within these areas.

- A temporary fence or demarcation must be erected around the construction area (include the servitude, construction camps, areas where equipment is stored and the actual footprint of the development) to prevent access to adjacent sensitive grasslands. Prohibit vehicular or pedestrian access into natural areas beyond the demarcated boundary of the construction area.
- No open fires are permitted within naturally vegetated areas.
- Formalise access roads and make use of existing roads and tracks where feasible, rather than creating new routes through naturally vegetated areas.
- A vegetation rehabilitation plan should already be implemented during construction

Cumulative impacts: Expected to be moderate, should mitigation measures be implemented

- If mitigation measures are not strictly implemented the following could occur:
  - Considerable loss of biodiversity
  - Erosion of areas around the panels and continued erosion of the development area with associated siltation and/or erosion of lower-lying wetlands
  - Spread and establishment of invasive species
- Increased habitat fragmentation and displacement of terrestrial vertebrates in the region
- Increased transformed areas that will affect local fauna and flora population dynamics and runoff patterns that may affect downstream ecosystems

Residual impacts:

- Altered topsoil characteristics
- Loss of and alteration of microhabitats
- Altered vegetation composition, lower vegetative cover and loss of species diversity
- Increased habitat fragmentation and displacement of terrestrial vertebrates
- Higher risk of invasion by alien plant species

Destruction and deterioration of vegetation in and around moist grassland

Nature: The sensitive vegetation (moist grassland) along the K148 route comprised approximately 1.3km of the ±5.8km of the K148. Along the R103 deviation, the rocky grassland comprised only 0.3km of the ± 4.2km deviation. Due to the transformed state of the remainder of the vegetation along the proposed route, the **impacts on these areas are envisaged to be minimal.**

CONSTRUCTION PHASE		
Rating of Impacts	**Without mitigation**	**With mitigation**
Probability	Definite (5)	Highly probable (4)
Duration	Permanent (5)	Permanent (5)
Extent	Limited to site (1)	Limited to site (1)
Magnitude	High (8)	Moderate (6)
Significance	**70 (high)**	**48 (moderate)**
Status (positive or negative)	Negative	Negative
OPERATIONAL PHASE		

Activities includes:

- Maintenance vehicles /activities impacting outside of the road reserves; or
- Failed rehabilitation and degradation of adjacent vegetation
- Increased usage of areas surrounding the road e.g. car stops, vendors
- Pollutants from roads reaching adjacent grassland and the watercourses
- Increased flooding resulting in erosion

Probability	Highly probable (4)	Probable (3)

Duration	Medium term (3)	Short term (2)
Extent	Limited to Local Area (2)	Limited to the Site (1)
Magnitude	High (8)	Low (4)
Significance	**52 (moderate)**	**21 (Low)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Moderate
Irreplaceable loss of resources?	Moderate	Low
Can impacts be mitigated?	Yes	
NO GO Option	A No Go Option will not change the status quo of wetlands and rivers in the area.	

Mitigation:

- No activities may proceed within moist grassland without a Water Use License permitting the activity.
- The final route should avoid moist grasslands where possible, or endeavour to impact on as little portion thereof as possible while adhering to mitigation measures as set out in the wetland assessment (Limosella, 2015).
- The road design should endeavour to span the moist grassland / wetland area and associated buffer zone.
- The moist grassland (wetland as delineated by the wetland specialist) and associated buffer zones should be fenced during the construction phase to prevent any human activity from encroaching into these areas, other than that which is essential to the road construction. Monitoring of the fences is important to ensure no infringement of the fences occurs.
- Construction within moist grassland should preferably take place during the dry months.
- Input of sediment during construction activities should be prevented at all cost. Mitigation for this potential impact includes establishment of vegetation as soon as possible after construction.
- The bridge needs to designed as such to prevent flooding of the roadway, but also to prevent the impact on the floodplain (damming), as the floodplain would have to drain towards the bridge situated at the extreme right of the floodplain.
- The hydrologist has recommended that the design of the roadway and bridge be modelled to provide a bridge height being at least 4.63 m), or with the bridge height being at least 4.07 m, if 0.7 m freeboard is a strict requirement.

Cumulative impacts: Expected to be moderate, should mitigation measures not be implemented as changes made to the bed or banks of watercourse channels will cause unstable channel conditions causing erosion, meandering, increased potential for flooding and movement of bed material, which will result in property damage adjacent to and downstream of the site.

Residual Risks: Low risk (of damming and flooding at the bridge structure) anticipated provided that the mitigation measures are implemented correctly and rehabilitation of the site is undertaken.

Exposure of soils to erosion and subsequent loss of topsoil for re-vegetation and sedimentation of moist grasslands

Nature: The removal of surface vegetation will expose the soils, which in rainy events would result in a loss of topsoil and sedimentation of proximate moist grasslands. In addition, indigenous vegetation communities are unlikely to colonise eroded soils successfully and seeds from proximate alien invasive trees can spread easily into these eroded soil. The earthworks and digging will result in stockpiled and loose soils, which could also increase the likelihood of sedimentation in proximate watercourses. Activities includes:

- Removal of vegetation prior to heavy rainfall;
- Removal of vegetation in and in proximity to moist grasslands
- Removal of rocky grassland on slopes

- Failure to rehabilitate

NO GO Option	A No Go Option will not result in exposure of soils to erosion and subsequent loss of topsoil for re-vegetation and sedimentation of moist grasslands	
CONSTRUCTION PHASE		
Rating of Impacts	**Without mitigation**	**With mitigation**
Probability	Probable (3)	Improbable (2)
Duration	Short Duration (2)	Short Duration (2)
Extent	Limited to Local Area (1)	Limited to Local Area (1)
Magnitude	Moderate (6)	Low (4)
Significance	**27 (moderate)**	**14 (low)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	Yes	

OPERATIONAL PHASE

Operation of the road and intersections will not impact directly the exposure of soils to erosion as this impact will mainly take place in the construction phase of the project.

Mitigation:

- Do not allow erosion to develop on a large scale before taking action.
- No construction / activities should be undertaken within the moist soils until a Water Use License was granted by the Department of Water Affairs (DWA).
- Make use of existing roads and tracks where feasible, rather than creating new routes through grassland areas.
- Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction / earthworks in that area (DWAF, 2005).
- Runoff from roads must be managed to avoid erosion and pollution problems.
- Remove only the vegetation where essential for construction and do not allow any disturbance to the adjoining natural vegetation cover. The grassland can be removed as sods and re-established after construction is completed.
- Colonisation of the disturbed areas by plant species from the surrounding natural vegetation must be monitored to ensure that vegetation cover is sufficient within one growing season. If not, then the areas need to be rehabilitated with a grass seed mix containing species that naturally occur within the study area.
- Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and work areas.

Cumulative Impacts

Cumulative erosion impacts are likely to very low after mitigation

Residual Impacts

If erosion at the site is controlled during construction, then there will be very little residual impact.

Destruction of plants of conservation concern

Nature: The construction will result in the removal of plant species of conservation concern, impact on their habitat, pollinators and inevitably the persistence of these This could put further strain on the already declining populations. The main area of occurrence of Declining and provincially protected species is along the R103 deviation in its southern extent, while the grazed rocky grassland along the K148's southern extent is habitat to a Near Threatened species. Activities includes:

- Construction activity where these plants could occur or were confirmed to occur
- Construction in proximity to where these species occur

NO GO Option	A No Go Option will not result in the destruction of species of conservation within the study area.	
CONSTRUCTION PHASE		
Rating of Impacts	**Without mitigation**	**With mitigation**
Probability	Definite (5)	Definite (5)
Duration	Short Duration (2)	Short Duration (2)
Extent	Limited to Local Area (2)	Limited to Local Area (2)
Magnitude	High (8)	Moderate (6)
Significance	**60 (high)**	**50 (moderate)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	Yes	
OPERATIONAL PHASE		
Operation of the road and intersections will not impact directly the plants of conservation value		

Mitigation:

Planning Phase

- Undertake a scan of the suitable habitat of *L lesliei* during its flowering period (March-June). If more individuals are recorded, respect a 300m buffer around the population when planning the final route and implement and Ecological Management Plan for this species as per the GDARD Red Listed Species guideline (GDARD, 2012b).
- If no additional species are observed, apply to the GDARD to have the one confirmed individual relocated to a suitable, conserved habitat.
- Where possible the deviation of the R103 should avoid the Declining and provincially protected plant species where possible. Where removal of the plants is unavoidable, this should be stated in the application and no removal of the plants may occur without the permission of the GDARD.
- Implement a Plant Rescue and Rehabilitation Plan: Where the plants of conservation concern are deemed to be under threat from the construction activity, the plants should be removed by a suitably qualified specialist and replanted as part of vegetation rehabilitation after the construction (Note, these plants may only be removed with the permission of the provincial authority).
- If the provincially protected species are used as part of rehabilitation, their survival must be monitored for at least two growing seasons after rehabilitation was completed

Construction phase:

- Where possible, construction activities must be restricted to previously disturbed areas.
- Where the road construction will take place in proximity to these species, cordon off the sensitive vegetation that house the protected plant species and the plants of conservation concern and protect from construction activities and vehicles.
- Construction workers may not tamper or remove these plants and neither may anyone collect seed from the plants without permission from the local authority.

Cumulative impacts:

- Possible erosion of cleared areas and associated accelerated erosion from surrounding areas
- Possible loss of ecosystem functioning due to increase in invasive species
- Increased habitat fragmentation and displacement of terrestrial vertebrates in the region

Residual impacts:

- Altered vegetation composition
- Compacted topsoils
- Possibility for erosion and invasion by alien invasive

Spread of alien invasive vegetation

Nature: Alien invasive species will quickly encroach into disturbed areas, particularly adjacent to drainage areas through contaminated construction vehicles and tools; and alien invasive species spread from current infestation into disturbed soils.

Alternatives 1 & 2 will have similar potential to disturb areas that could result in the spread of alien invasive species.

CONSTRUCTION PHASE		
Rating of Impacts	**Without mitigation**	**With mitigation**
Probability	Highly probable (4)	Probable (3)
Duration	Medium term (3)	Short term (2)
Extent	Limited to Local Area (2)	Limited to the Site (1)
Magnitude	High (8)	Low (4)
Significance	**52 (moderate)**	**21 (Low)**
Status (positive or negative)	Negative	Negative
OPERATIONAL PHASE		

Activities includes:

- Degradation of natural grassland vegetation alongside the road reserve; and
- Failed rehabilitation, erosion and subsequent colonisation by alien invasive plant species

Probability	Probable (3)	Improbable (2)
Duration	Medium term (3)	Short term (2)
Extent	Limited to Local Area (2)	Limited to the Site (1)
Magnitude	High (8)	Low (4)
Significance	**39 (moderate)**	**14 (Low)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Moderate
Irreplaceable loss of resources?	Moderate	Low
Can impacts be mitigated?	Yes	
NO GO Option	A No Go Option will not lead to the accelerated encroachment of alien invasive species since no additional areas will be disturbed for the project.	

Mitigation:

- Alien invasive species (particularly category 1b species) that were identified within the study area and in specific along the final route alignment should be removed prior to construction-related soil disturbances. By removing these species, the spread of seeds will be prevented into disturbed soils which could thus have a positive impact on the surrounding natural vegetation.
- All alien seedlings and saplings must be removed as they become evident for the duration of construction.
- Manual / mechanical removal is preferred to chemical control.

- All construction vehicles and equipment, as well as construction material should be free of plant material. Therefore, all equipment and vehicles should be thoroughly cleaned prior to access on to the construction areas. This should be verified by the ECO.

Cumulative impacts: Expected to be moderate, should mitigation measure not be implemented. Alien invader plant species pose an ecological threat as they alter habitat structure, lower biodiversity (both number and "quality" of species), change nutrient cycling and productivity, and modify food webs.

Residual Risks: None anticipated provided that the mitigation measures are implemented correctly and rehabilitation of the site is undertaken.

Loss of faunal habitat and ecological structure

Nature: The construction phase and operational phase of the road development will result in the loss of faunal habitats within the area. This impact relates to the complete removal or partial destruction/disturbance of existing vegetation by machinery and workers, impacting directly on the ecological condition of natural vegetation and habitat availability. These activities will have an impact on foraging and breeding ecology of faunal species. Loss of vegetation generally affects nutrient cycles, removes the organic litter layer and results in habitat fragmentation and destruction of wildlife corridors.

Impacts related to the loss or disturbance of natural vegetation would be similar for Alternative 1 and 2.

NO GO Option	A No Go Option will not result in the loss of faunal habitats or ecology in the area.	
CONSTRUCTION PHASE		
Rating of Impacts	**Without mitigation**	**With mitigation**
Probability	Definite (5)	Definite (5)
Duration	Short Duration (2)	Short Duration (2)
Extent	Limited to Local Area (2)	Limited to Local Area (2)
Magnitude	High (8)	Moderate (6)
Significance	**60 (high)**	**50 (moderate)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	Yes	

OPERATIONAL PHASE

Nature: Operation of the road and intersections will not impact directly on vegetation and habitat of the area. Any future extensions of the road (next phases) should be carefully planned as to avoid the Suikerbosrand Nature Reserve and wetlands.

Mitigation:

- All construction and maintenance activities must be carried out according to the generally accepted environmental best practice and the temporal and spatial footprint of the development must be kept to a minimum.
- The boundaries of the development footprint areas are to be clearly demarcated and it must be ensured that all activities remain within the demarcated footprint area.
- Edge effects of all construction and operational activities, such as erosion and alien plant species proliferation, which will affect faunal habitats adjacent to the development area, need to be strictly managed.

- Any natural areas beyond the development footprint, which have been affected by the construction activities, must be rehabilitated using indigenous plant species.
- Education and awareness campaigns on faunal species and their habitat are recommended to help increase awareness, respect and responsibility towards the environment for all staff and contractors.

Cumulative impacts: Expected to be minimal. It is not envisaged that any Red Data species will be displaced by the habitat transformation that will take place as a result of the construction and operation of the proposed development. The impact on smaller, non-Red Data species that are potentially breeding in the area will be local in extent, in that it will not have a significant effect on regional or national populations.

Residual Risks: None anticipated provided that the mitigation measures are implemented correctly and rehabilitation of the site is undertaken.

Direct impact on faunal communities

Nature: Activities involving the clearing/harvesting of natural vegetation will result in the loss of faunal species. Faunal diversity within the study area has already been negatively impacted as a result of historic and on-going disturbances associated with agriculture and housing developments.

The expected impact is similar for both alternatives.

NO GO Option	A No Go Option will not change the status quo of faunal communities within the area.	
CONSTRUCTION PHASE		
Rating of Impacts	**Without mitigation**	**With mitigation**
Probability	Definite (5)	Definite (5)
Duration	Short Duration (2)	Short Duration (2)
Extent	Limited to the Local Area (2)	Limited to the Local Area (2)
Magnitude	High (8)	Moderate (6)
Significance	**60 (high)**	**50 (moderate)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Moderate
Irreplaceable loss of resources?	Moderate	Low
Can impacts be mitigated?	Yes	
OPERATIONAL PHASE		
Operation of the road and intersections will not impact directly on fauna of the area.		

Mitigation:

- It is recommended that a speed limit of 30km/h is implemented on all roads running through the study area during all phases in order to minimise risk to fauna from vehicles.
- No trapping or hunting of fauna is to take place. Access control must be implemented to ensure that no illegal trapping or poaching takes place.
- Should any Red Data faunal species be noted within the development footprint areas, these species must be relocated to similar habitat within the vacant land to the west of the development area with the assistance of a suitably qualified ecologist.
- Any fauna directly threatened by the construction activities must be removed to a safe location by the ECO or qualified Ecologist.
- All staff and contractors must undergo an environmental induction course held by the ECO as well as faunal education and awareness programmes.

Cumulative impacts: Expected to be moderate to minimal, should the recommended mitigation measures not be adequately implemented. The habitat is however already largely transformed and fragmented due to the farming and housing development activities and the site is not a unique habitat within the landscape. It is not envisaged that any Red data species will be present on the site and thus directly impacted as a result of the development.

Residual Risks: None anticipated provided that the mitigation measures are implemented correctly and rehabilitation of the site is undertaken.

Impact of disturbance and noise pollution on fauna

Nature: Species residing within this landscape often experience varying degrees of disturbance. As a result, disturbance of fauna by the proposed road and interchange is anticipated to be of low significance as most fauna will move away from the area temporarily. Disturbance is created by noise-pollution associated with workers and construction activities can affect local wildlife utilising adjacent habitats, particularly mammalian species. This is likely to be short-lived during the construction phase but will continue to have an impact during the operational life span of the development when noise and emissions from vehicles occur on the road.

The level of disturbance of fauna would be similar for both alternatives. The disturbance and noise impact is similar for both alternatives, but due to the additional length of Alternative 2, the impact may be more than for Alternative 1.

CONSTRUCTION PHASE		
Rating of Impacts	**Without mitigation**	**With mitigation**
Probability	Definite (5)	Highly Probable (4)
Duration	Permanent (5)	Permanent 5)
Extent	Limited to Site (1)	Limited to Site (1)
Magnitude	Moderate (6)	Low (4)
Significance	**60 (high)**	**40 (moderate)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Moderate
Irreplaceable loss of resources?	Moderate	Low
Can impacts be mitigated?	Yes	
NO GO Option	A No Go Option will not result in additional noise and disturbance in the area.	
OPERATIONAL PHASE		
No significant noise related impacts or disturbances are expected on fauna during operation of the road.		
Probability	Probable (3)	Improbable (2)
Duration	Permanent (5)	Permanent (5)
Extent	Limited to Site (1)	Limited to Site (1)
Magnitude	Moderate (6)	Low (4)
Significance	**36 (moderate)**	**20 (low)**

Mitigation:

- Strict control must be maintained over all activities during construction, in line with an approved Construction EMPr.
- Any Red Data species identified in this report observed to be roosting and/or breeding in the vicinity, the ECO must be notified.

Cumulative impacts: Species at the Suikerbosrand Nature Reserve to the south of the road development route may experience high levels of disturbance. Species are particularly sensitive to disturbance during the breeding season and this must be borne in mind during both the construction and operational phases.

Residual Risks: None anticipated provided that the mitigation measures are implemented correctly and rehabilitation of the site is undertaken.

Poaching of wildlife in the vicinity		
Nature: The site is vulnerable to hunting/trapping by construction workers. Harassing and hunting by construction workers could be expected.		
CONSTRUCTION PHASE		
Rating of Impacts	**Without mitigation**	**With mitigation**
Probability	Probable (3)	Improbable (2)
Duration	Short (2)	Very short (1)
Extent	Limited to Site (2)	Limited to Site (1)
Magnitude	Moderate (6)	Low (4)
Significance	**30 (moderate)**	**12 (low)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Moderate
Irreplaceable loss of resources?	Moderate	Low
Can impacts be mitigated?	Yes	
NO GO Option	A No Go Option will not result in the possible poaching of cattle in the area.	
OPERATIONAL PHASE		
No poaching is anticipated in the operational phase		
Mitigation: • Education of the construction staff about the value of wildlife and environmental sensitivity. • Restrict access to the suitable and sensitive habitats of faunal species. • The contractor/contractors must ensure that no animals are disturbed, trapped, hunted or killed during the construction phase. Conservation-orientated clauses should be built into contracts for construction personnel, complete with penalty clauses for non-compliance.		
Cumulative impacts: Species at the Suikerbosrand Nature Reserve to the south of the road development route may experience high levels of disturbance. Species are particularly sensitive to disturbance during the breeding season and this must be borne in mind during both the construction and operational phases.		
Residual Risks: None anticipated provided that the mitigation measures are implemented correctly and rehabilitation of the site is undertaken.		

Reduction of natural migratory and faunal dispersal routes.		
***Nature: The* reduction of natural migratory and faunal dispersal routes.**		
CONSTRUCTION PHASE		
No impact related impacts to the reduction of natural migratory and faunal dispersal route is anticipated during construction of the road.		
OPERATIONAL PHASE		
The development will modify the natural habitat of various faunal species. These species may no longer be able to find suitable habitat on the site, although most forms should be available on any undeveloped surrounding land. The road itself could possibly lead to a modest decline in population numbers, but not to local extinction.		
Probability	Definite (5)	Highly Probable (4)
Duration	Permanent (5)	Permanent 5)
Extent	Limited to Site (1)	Limited to Site (1)
Magnitude	Moderate (6)	Low (4)
Significance	**60 (high)**	**40 (moderate)**
Status (positive or negative)	Negative	Negative

Reversibility	Low	Moderate
Irreplaceable loss of resources?	Moderate	Low
Can impacts be mitigated?	Yes	
NO GO Option	A No Go Option will not change the status quo of the sensitive rocky grassland.	
Mitigation: • Ensure maintenance of drainage line with 32-m buffer as primary dispersal corridor. • Ensure any crossing opportunities (culverts, pipes, bridges) are designed to also facilitate small animal movements.		
Cumulative impacts: Expected to be low, should the above mitigation measures be implemented but the nature of the increased transformed areas may affect local fauna		
Residual impacts: Modest decline in population numbers, but not to local extinction.		

6.3.1.3 Comparative Assessment of alternative roads

In terms of the ecological impacts arising from construction activities, there is **no significance difference** in the potential impacts associated with the two alternatives. Therefore, there is **no preference** between the alternative alignments.

6.3.2 Impact on Wetlands and River courses:

6.3.2.1 Description of Impacts on Wetlands and River courses:

Construction may lead to some direct or indirect loss of or damage to seasonal wetlands or drainage lines. This will lead to localised loss of wetland habitat and may lead to downstream impacts that affect a greater extent of wetlands or impact on wetland function. Where these habitats are already stressed due to degradation and transformation, the loss may lead to increased vulnerability (susceptibility to future damage) of the habitat. Physical alteration to wetlands can have an impact on the functioning of those wetlands. The project would entail a bridge with the roadway raised above the floodplain where the road must cross. The bridge needs to designed as such to prevent flooding of the roadway, but also to prevent the impact on the floodplain (damming), as the floodplain would have to drain towards the bridge situated at the extreme right of the floodplain.

Broad potential impacts that may be associated with the proposed development include:

- Changing the quantity and fluctuation properties of the watercourse by changing runoff characteristics of the area surrounding the wetland/riparian area (by for example compacting soils)
- Changing the amount of sediment entering water resource and associated change in turbidity (increasing or decreasing the amount)
- Alteration of water quality – increasing the amounts of nutrients (phosphate, nitrite, nitrate)
- Alteration of water quality – toxic contaminants (including toxic metal ions (e.g. copper, lead, zinc) and hydrocarbons
- Changing the physical structure within a water resource (habitat) including its associated buffer zone

Cumulative Impacts -Cumulative impacts are anticipated (mostly at the wetland floodplain) and are discussed in the impact table 6.3.2.2.

6.3.2.2 Summary of impacts associated with the proposed road during the construction and operational phase

The two alternatives road alignment discussed in section 6.2 do not differ in any significant way as far as the impacts on the wetland is concerned. Therefore, there is no significant difference in the potential impacts associated with these alternatives, and the impacts for the two alternatives are not comparatively assessed in the assessment tables below. *The impacts assessment tables below apply to alternative 1 and 2 road alignment.*

Degradation of wetlands areas & drainage systems		
Nature: six wetland areas were found to cross the proposed road and interchange. Of these six wetland areas one large floodplain wetland is located in the nationally protected Suikerbosrand Nature reserve (this falls outside of the study area, as refined for the preferred alternative) Construction may lead to some direct or indirect loss of or damage to seasonal wetlands or drainage lines. This will lead to localised loss of wetland habitat and may lead to downstream impacts that affect a greater extent of wetlands or impact on wetland function. Where these habitats are already stressed due to degradation and transformation, the loss may lead to increased vulnerability (susceptibility to future damage) of the habitat. Physical alteration to wetlands can have an impact on the functioning of those wetlands. **The project would entail a bridge with the roadway raised above the floodplain where the road must cross. A hydrological study was done to determine the optimal design of the bridge. Recommendations from this report will guide the final design of the structure.**		
CONSTRUCTION PHASE		
Rating of Impacts	**Without mitigation**	**With mitigation**
Probability	Definite (5)	Highly probable (4)
Duration	Medium-term (3)	Medium-term (3)
Extent	Limited to Local Area (2)	Limited to Local Area (2)
Magnitude	High (8)	Moderate (6)
Significance	**65 (high)**	**44 (moderate)**
Status (positive or negative)	Negative	Negative
OPERATIONAL PHASE		
Wetland impacts are expected during operation of the road, when the bridge could lead to some extent of damming. This can be mitigated by proper design of the bridge structures. Any future extensions of the road should be carefully planned as to avoid the Suikerbosrand Nature Reserve and wetlands		
Probability	Highly probable (4)	Probable (30)
Duration	Permanent (5)	Permanent (5)
Extent	Limited to Local Area (2)	Limited to the Site (1)
Magnitude	High (8)	Low (4)
Significance	**60 (high)**	**30 (moderate)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Moderate
Irreplaceable loss of resources?	Moderate	Low
Can impacts be mitigated?	Yes	

NO GO Option	A No Go Option will not change the status quo of wetlands and rivers in the area.
Mitigation: The bridge needs to design as such to prevent flooding of the roadway, but also to prevent the impact on the floodplain (damming), as the floodplain would have to drain towards the bridge situated at the extreme right of the floodplain. The hydrologist has recommended that the design of the roadway and bridge be modelled to provide a bridge height being at least 4.63 m), or with the bridge height being at least 4.07 m, if 0.7 m freeboard is a strict requirement.	
Cumulative impacts: Expected to be moderate, should mitigation measures not be implemented as changes made to the bed or banks of watercourse channels will cause unstable channel conditions causing erosion, meandering, increased potential for flooding and movement of bed material, which will result in property damage adjacent to and downstream of the site. **The impacts would be the similar for Alternative 1 and Alternative 2, as both cross the same water courses and wetlands.**	
Residual Risks: Low risk (of damming and flooding at the bridge structure) anticipated provided that the mitigation measures are implemented correctly and rehabilitation of the site is undertaken.	

Pollution of water courses and soil		
Nature: Accidental pollution or illegal disposal and dumping of construction material such as cement or oil, as well as disposal or discharge of human (including partially treated and untreated sewage) into water resources will influence the water quality of watercourses, thereby influencing its functionality and the persistence of vegetation. Furthermore, the surrounding areas are already exposed to pollution which during high rainfall events could be washed into the wetlands – especially if vegetation cover is not sufficient to slow down water and filter pollutants. **Impacts would be the similar for Alternative 1 and Alternative 2, as both cross the same water courses & wetlands.**		
CONSTRUCTION PHASE		
Rating of Impacts	**Without mitigation**	**With mitigation**
Probability	Definite (5)	Highly probable (4)
Duration	Medium-term (3)	Medium-term (3)
Extent	Limited to Local Area (2)	Limited to Local Area (2)
Magnitude	High (8)	Moderate (6)
Significance	**65 (high)**	**44 (moderate)**
Status (positive or negative)	Negative	Negative
NO GO Option	A No Go Option will not add to pollution of water courses and soil within the area.	
OPERATIONAL PHASE		
No significant pollution related impacts are expected during operation of the road unless maintenance is done without proper implementation of the EMP, and contractor's specifications.		
Probability	Improbable (2)	Highly improbable (1)
Duration	Short Duration (2)	Short Duration (2)
Extent	Limited to the region (3)	Limited to the Local Area (2)
Magnitude	Minor (2)	Minor (1)
Significance	**14 (low)**	**5 (low)**
Status (positive or negative)	Negative	Neutral
Reversibility	Low	Moderate
Irreplaceable loss of	Moderate	Low

resources?		
Can impacts be mitigated?	Yes	
Mitigation: • All waste generated during construction is to be disposed of as per the Environmental Management Programme and no washing of paint brushes, containers, wheelbarrows, spades, picks or any other equipment adjacent or in drainage channel is permitted. • Proper management and disposal of construction waste must occur during the lifespan of the project, including during maintenance of the roads and interchanges. • No release of any substance i.e. cement, oil, that could be toxic to fauna or faunal habitats within the watercourses. • Portable toilets must be placed 30m away from the edge of the channels.		
• Do not locate the construction camp or any depot for any substance which causes or is likely to cause pollution within a distance of 50m from a channel. • Spillages of fuels, oils and other potentially harmful chemicals must be cleaned up immediately and contaminants properly drained and disposed of using proper solid/hazardous waste facilities (not to be disposed of within the natural environment). Any contaminated soil must be removed and the affected area rehabilitated immediately – consult with a wetland/aquatic specialist if spills occur.		
Cumulative impacts: Expected to be moderate, should mitigation measures not be implemented. The impacts would be the similar for Alternative 1 and Alternative 2.		
Residual Risks: A low risk (of damming of water at the bridges that will affect the flood plain and flooding) is anticipated. The optimal design of bridges should be done to accommodate water and limit obstruction of water courses.		

6.3.2.3 Comparative Assessment of alternative roads

In terms of the impacts arising from the degradation and pollution of wetlands as a result of the construction activities, there is **no significance difference** in the potential impacts associated with the **two alternatives**. Therefore, there is **no preference** between the alternative alignments.

6.3.3 Heritage Impacts

6.3.3.1 Description of Heritage Impacts

During specialist investigations, it was found that the initial alignment would impact negatively upon an existing cemetery and a single grave with a headstone. The graveyard is located at approximately 26°24'34.87"S and 28°13'18.49"E and the solitary grave is located at approximately 26°22'52.75"S and 28°15'18.10"E.

Figure 232: single grave and graveyard

As mitigation of this impact, the Alternative 1 (red line) as shown in Figure 24 was proposed to the south of the initial alignment to avoid these features. No other heritage features were identified in the project area, but should any artefacts be discovered during site clearing, the prescribed procedures should be followed to avoid damage or disturbance thereof.

6.3.3.2 Summary of impacts associated with the proposed road during the construction and operational phase

Destruction/Alteration of Heritage artefacts or features - Alternative 1		
Nature: *Destruction of or damage to heritage features must be avoided.* A grave was found in close proximity to the proposed road. A graveyard is located at approximately 26°24'34.87"S and 28°13'18.49"E. As these features are visible**, it would be easy to avoid them** in the unlikely change that some would occur on the proposed alignment and interchange location. See HIA in Appendix 9 of this EIA Report.		
CONSTRUCTION PHASE		
Rating of Impacts	**Without mitigation**	**With mitigation**
Probability	Improbable (2)	Highly improbable (1)
Duration	Short Duration (2)	Short Duration (2)
Extent	Limited to the region (3)	Limited to the Local Area (2)
Magnitude	Minor (2)	Minor (1)
Significance	**14 (low)**	**5 (low)**
Status (positive or negative)	Negative	Neutral
Reversibility	Moderate	High
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	Yes	
NO GO Option	A No Go Option will not add to the destruction of any heritage resources within the area.	
OPERATIONAL PHASE		
No further impact is expected during operation of the road and intersections.		
Mitigation: The cemetery and grave must be demarcated and **avoided,** and should any archaeological sites or graves be exposed during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.		
Cumulative impacts: None anticipated. There are no anticipated fatal flaws with regard the construction of the road preferred **Alternative1 as this alternative was designed to avoid the cemetery and grave**		
Residual Risks: None anticipated provided that the mitigation measures are implemented.		

Destruction/Alteration of Heritage artefacts or features - Alternative 2		
Nature: *Destruction of or damage to heritage features must be avoided.* A grave was found in close proximity to the proposed road. A graveyard is located at approximately 26°24'34.87"S and 28°13'18.49"E. This location falls within this road alternative.		
CONSTRUCTION PHASE		
Rating of Impacts	**Without mitigation**	**With mitigation**
Probability	Definite (5)	Highly probable (4)

Duration	Medium-term (3)	Medium-term (3)
Extent	Limited to Local Area (2)	Limited to Local Area (2)
Magnitude	High (8)	Moderate (6)
Significance	**65 (high)**	**44 (moderate)**
Status (positive or negative)	Negative	Neutral
Reversibility	Moderate	High
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	Yes	
NO GO Option	A No Go Option will not add to the destruction of any heritage resources within the area.	
OPERATIONAL PHASE		
No further impact is expected during operation of the road and intersections.		
Mitigation: The cemetery and grave must be demarcated and **avoided,** and should any archaeological sites or graves be exposed during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.		
Cumulative impacts: None anticipated. There are no anticipated fatal flaws with regard the construction of the road preferred		
Residual Risks: None anticipated provided that the mitigation measures are implemented.		

6.3.3.3 Comparative Assessment of alternative roads

In terms of impacts arising from destruction/alteration of Heritage artefacts or features a result of construction activities, the impacts would be the similar for Alternative 1 and Alternative 2 for most of the alignment, apart from the fact that **Alternative 2 would impact on the graves**. Therefore **Alternative 1 is nominated as the preferred** alternative for the road alignment.

6.3.4 Impacts on traffic of existing roads

6.3.4.1 Description of traffic Impacts

In summary it was found in that study (Projected Traffic demand at the N3/K148 Interchange at the Tambo Springs Freight Hub in Gauteng) that the proposed N3/K148 interchange will serve a high proportion of the projected traffic demand, particularly the high turning volumes from north to west and vice versa. The filling stations that have been developed within the interchange area with direct access to the N3 will have a significant impact on the planning and design of the interchange. In the long term, a third of the traffic on the N3 can be diverted to other roads if it is assumed that 50% of the traffic to and from areas such as Alberton, Kempton Park, Tshwane, Midrand, Soweto and the West Rand would make use of alternative routes. Once the planning of the rail concept and associated freight and logistics infrastructure have been finalised, the road network within the Tambo Springs Freight Hub can be planned to accommodate the projected demand. The N3/K148 interchange is the

primary road access to the area and is not expected to be significantly affected by the internal road layout.

6.3.4.2 Summary of impacts associated with the proposed road during the construction and operational phase

The two alternatives road alignment discussed in section 6.2 do not differ in any significant way as far as the impacts on the traffic is concerned. Therefore, there is no significant difference in the potential impacts associated with these alternatives, and the impacts for the two alternatives are not comparatively assessed in the assessment tables below. *The impacts assessment tables below apply to alternative 1 and 2 road alignment.*

Traffic		
Nature: Traffic will be congested on the crossing as a result of construction activities. In addition, traffic increase can lead to road damage, erosion, accidents and even traffic delays. Construction machinery and heavy vehicles are likely to generate dust which is likely to be perceptible by adjacent residents. Trucks may potentially distribute dust along internal access roads. During operation, traffic circulation is expected to improve from the current situation. An increase in high AM peak hour volume of right turn traffic from north to west is expected. Planned future roads that have a realistic probability of construction within the next 25 years will divert traffic away from the N3 and the N3/K148 interchange. • Arterial roads that cross the N3 should be used to alleviate east-west traffic demand through the interchange along K148.		
NO GO Option	A No Go Option means no additional traffic to the area and will prevent disruption on roads.	
CONSTRUCTION PHASE		
Rating of Impacts	**Without mitigation**	**With mitigation**
Probability	Probable (3)	Improbable (2)
Duration	Long term (4)	Short Duration (2)
Extent	Limited to Local Area (2)	Limited to Site (1)
Magnitude	Moderate (6)	Low (4)
Significance	36 (moderate)	14 (low)
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Moderate	Low
Can impacts be mitigated?	Yes	
OPERATIONAL PHASE		
The K148/N3 forms part of the road network supporting the Tambo Springs Freight Hub. The N3 is part of the national road network under the jurisdiction of SANRAL, and SANRAL supports the upgrading of the interchange. The need for the project exits, as it will contribute towards the freight transportation on the East Rand and inland distribution on the road network of goods between air, land and sea.[9]		
Probability	Probable (3)	Probable (3)
Duration	Long term (4)	Long term (4)
Extent	Limited to Local Area (2)	Limited to Local Area (2)
Magnitude	Moderate (6)	Moderate (6)
Significance	**36 (moderate)**	**36 (moderate)**

[9] *http://www.roadsandtransport.gpg.gov.za/publications/Publication%20Library/First%20Quarter%20Report%20(2014-15).pdf*

Status (positive or negative)	Positive	Positive
Mitigation: • Vehicular movement of construction vehicles beyond the property boundaries of the site should be outside the am and pm peak hours. • Where new access roads are required, they should disturb as limited an area as possible • Areas demarcated as being out of bounds for construction personnel must be sign posted and must be regarded strictly as "no-go' areas. No contractor's personnel, vehicles or machinery may access these areas. Very strict control must be exercised over this aspect of construction activities • Ensure that the necessary signage and traffic measures are implemented for safe and convenient access to the site from. Measures must also be put in place to ensure that these access points do not get built up with mud or sand.		
Cumulative impacts: Expected to be moderate, should the recommended mitigation measures not be adequately implemented. Residents within close vicinity to the proposed infrastructure are expected to be affected.		
Residual Risks: None anticipated provided that the mitigation measures are implemented correctly and rehabilitation of the site is undertaken.		

6.3.4.3 Comparative Assessment of alternative roads

In terms of impacts arising from traffic as a result of construction activities, there is **no significance difference** in the potential impacts associated with the two alternatives. The traffic impact will be similar for both alternatives. Therefore, there is **no preference** between the two alternatives.

6.3.5 Soil and Agricultural Impacts

6.3.5.1 Description of agricultural Impacts

The following impacts are identified as the major impacts associated with the development and which are assessed, for the construction and operational phases of road alternatives.

- Impacts on vegetation cover and soil stability*:* The development would require vegetation clearance of approximately 370 ha. These impacts will occur during both the construction phase of the development.

- Increased erosion risk*:* The large amount of disturbance created during construction would leave the site vulnerable to soil erosion. Erosion is a major concern with patterns of existing natural erosion visible on site. Special consideration should be given to any roads crossing ephemeral drainage lines because of the erodibility of the embankments.

- Loss of agricultural land: The construction and occupancy of a road on high value agricultural land will lead to the loss of agricultural production in the area. Impacts are regarded as medium because most of the proposed route traverses highly modified area. Although there is some high value agricultural land in the vicinity, the small holdings in the area are not commercially viable as agricultural units.

6.3.5.2 Summary of impacts associated with the proposed road during the construction and operational phase

Soil erosion		
Nature: Soil erosion on impacted sites of development during construction and post construction phase due to decreased vegetation cover and increased water run-off.		
NO GO Option	No Go Option will not impact on soil erosion.	
CONSTRUCTION PHASE		
Rating of Impacts	Without mitigation	With mitigation
Probability	Definite (5)	Probable (3)
Duration	Medium-term (3)	Short (2)
Extent	Local (2)	Onsite (1)
Magnitude	Moderate (6)	Minor (2)
Significance	**Moderate (55)**	**Low (15)**
Status (positive or negative)	Negative	Less Negative
Reversibility	No	Yes
Irreplaceable loss of resources?	Moderate	Low
Can impacts be mitigated?	Yes	
OPERATIONAL PHASE		
The operational impacts are similar to those of the construction		
Mitigation: » Care must be taken with the ground cover during and after construction on the site. » If it is not possible to retain a good plant cover during construction, technologies should be employed to keep the soil covered by other means, i.e. straw, mulch, erosion control mats, etc., until a healthy plant cover is again established. Care should also be taken to control and contain storm water run-off. » Rehabilitate construction sites by using indigenous grasses. » Minimise activity on steep slopes / the side of slopes. » Implement effective erosion control measures and Erosion Management Plan. » Keep to existing roads, where practical, to minimise impact on undisturbed ground. » Ensure stable slopes of stockpiles/excavations to minimise slumping. » Stockpiles should not exceed 2m in height. » Stockpiles not used in three (3) months after stripping must be seeded to prevent dust and erosion, only if natural seeding does not occur. » Limit soil disturbance to dry season.		
Cumulative impacts: Expected to be low to moderate, should the recommended mitigation measures not be adequately implemented.		
Residual Risks: None anticipated provided that the mitigation measures are implemented correctly and rehabilitation of the site is undertaken. **Farming can continue on areas outside of the proposed road reserve.**		

Loss of agricultural land Alternative 1		
Nature: The construction of a road has isolated impacts on the soil resource, due to the linear footprints in the road servitude of 62m. However, where a road is constructed, especially in areas where erodible soils occur, the possibility of accelerated soil erosion is a reality. Agricultural activities have been identified along the proposed K148, with grazing being most prominent. No areas of irrigation have been identified.		
NO GO Option	No Go Option will not impact on agricultural activities such as irrigation, grazing. No loss of land will occur to register servitudes.	
CONSTRUCTION PHASE		
Rating of Impacts	**Without mitigation**	**With mitigation**
Probability	Highly probable (4)	On site (1)

Duration	Permanent (5)	Short (2)
Extent	Minor (2)	Minor (2)
Magnitude	Moderate (6)	Probable (3)
Significance	**52 (moderate)**	**Low (15)**
Status (positive or negative)	Negative	Less Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Moderate	Low
Can impacts be mitigated?	Yes (close consultation with farmers recommended)	
OPERATIONAL PHASE		
No significant impacts are expected on agriculture during operation of the road. Farming can continue on areas outside of the proposed road reserve.		
Mitigation: • During construction specific soil conservation measures, such as contouring, culverts and diversion channels would need to be considered in susceptible areas. In addition, regular monitoring of such roads would need to be carried out. • Care should be taken to avoid any areas where grazing of livestock is currently being practiced. • Keep to existing road infrastructure and the footprint only to minimise the physical damage to crops and grazing areas around the road servitude; • Implement rehabilitation of disturbed areas as soon as possible to limit the duration of exposed surfaces and the risk of erosion • Previously rehabilitated areas must be monitored to prevent the infestation of weeds that may become an unsightly feature and impact on stock feeding behaviour.		
Cumulative impacts: Expected to be low to moderate, should the recommended mitigation measures not be adequately implemented.		
Residual Risks: None anticipated provided that the mitigation measures are implemented correctly and rehabilitation of the site is undertaken. **Farming can continue on areas outside of the proposed road reserve.**		

Loss of agricultural land – Alternative 2		
Nature: The construction of a road has isolated impacts on the soil resource, due to the linear footprints in the road servitude of 62m. However, where a road is constructed, especially in areas where erodible soils occur, the possibility of accelerated soil erosion is a reality. Agricultural activities have been identified along the proposed K148, with grazing being most prominent. No areas of irrigation have been identified.		
NO GO Option	No Go Option will not impact on agricultural activities such as irrigation, grazing. No loss of land will occur to register servitudes.	
CONSTRUCTION PHASE		
Rating of Impacts	**Without mitigation**	**With mitigation**
Probability	Definite (5)	Highly probable (4)
Duration	Medium-term (3)	Permanent (5)
Extent	Limited to Local Area (2)	Local (2)
Magnitude	High (8)	Moderate (6)
Significance	**65 (high)**	**52 (moderate)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	Yes (close consultation with farmers recommended)	
OPERATIONAL PHASE		

No significant impacts are expected on agriculture during operation of the road. Farming can continue on areas outside of the proposed road reserve.
Mitigation: • During construction specific soil conservation measures, such as contouring, culverts and diversion channels would need to be considered in susceptible areas. In addition, regular monitoring of such roads would need to be carried out. • Care should be taken to avoid any areas where grazing of livestock is currently being practiced. • Keep to existing road infrastructure and the footprint only to minimise the physical damage to crops and grazing areas around the road servitude; • Implement rehabilitation of disturbed areas as soon as possible to limit the duration of exposed surfaces and the risk of erosion • Previously rehabilitated areas must be monitored to prevent the infestation of weeds that may become an unsightly feature and impact on stock feeding behaviour.
Cumulative impacts: Expected to be low to moderate, should the recommended mitigation measures not be adequately implemented.
Residual Risks: None anticipated provided that the mitigation measures are implemented correctly and rehabilitation of the site is undertaken. **Farming can continue on areas outside of the proposed road reserve.**

6.3.5.3 Comparative Assessment of alternative roads

The most important impact was perceived at Alternative 2, which was proposed in a location that would require the Montic Dairy Farm to lose property and buildings. Therefore **Alternative 1 is nominated** as the preferred alternative for the road alignment.

6.3.6 Visual Impacts

6.3.6.1 Description of visual impacts

The N3 National road and the R103 regional road both traverse the site as well as a number of power lines running parallel to the proposed road alignments. The proposed road would be held in view by users of the N3 and the R103 and by users of other local roads in the vicinity. People living in farmsteads and working locally may become visually aware of the development.

The following potentially sensitive areas exist in the study area:
» Farmsteads/informal settlement located adjacent to the site
» Road users travelling along the N3 and the R103
» Road users travelling along the local roads nearby

Of all the above, it more likely that the local residents and road users travelling along the N3 and the R103 will be impacted to a greater extent. Due to the flat topography and terrain of the area, the project site is exposed, with little in the surrounding landscape (such as trees and buildings) that can shield the development from view.The landscape character of the site, and surrounds, is open grassland with few homesteads or informal settlement. The simplicity of the forms and the long open views in the agricultural areas bring visual clarity to the landscape. There is power line and a railway infrastructure and gravel roads which break the continuity of view.

6.3.6.2 Summary of impacts associated with the proposed road during the construction and operational phase

The two alternatives road alignment discussed in section 6.2 do not differ in any significant way as far as the impacts on the visual is concerned as they are very close to each other. Therefore, there is no significant difference in the potential impacts associated with these alternatives, and the impacts for the two alternatives are not comparatively assessed in the assessment tables below. *The impacts assessment tables below apply to alternative 1 and 2 road alignment.*

Visual impacts on sensitive receptors		
Nature: Visual impact of construction activities on sensitive receptors such as homesteads and road users of the R64 road within 5km (this includes the impact from initial site works, construction camp, site set up, setting out, laying services and ground works)		
NO GO Option	A No Go Option means no additional traffic to the area and will prevent disruption on roads.	
CONSTRUCTION PHASE		
Rating of Impacts	Without mitigation	With mitigation
Probability	Highly Probable (4)	Highly Probable (4)
Duration	Short -term (2)	Short-term (2)
Extent	Local (2)	Local (2)
Magnitude	Moderate (6)	Moderate-Low (4)
Significance	**Medium (40)**	**Medium (32)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
OPERATIONAL PHASE		
Visual impact on the sense of place for people living and working locally, change of local site character from agriculture to industrial		
Probability	Highly Probable (4)	Highly Probable (4)
Duration	Long - term (4)	Long – term (4)
Extent	Regional (3)	Regional (3)
Magnitude	Moderate (6)	Moderate-Low (4)
Significance	**Medium (52)**	**Medium (44)**
Status (positive or negative)	Negative	Negative
Mitigation: • Keep disturbed areas to a minimum. • No clearing of land to take place outside the demarcated footprint. • Buildings and similar structures must be in keeping with regional planning • Utilise existing roads and tracks to the extent possible. Where new roads are required, they should be two-track gravel roads, maintained to prevent dust plumes and erosion.		
Cumulative impacts: The associated industrial-type infrastructure such as railway line and electrical power lines already exist in the immediate surroundings, as well as similar developments i.e. N3 and R103 roads. Therefore, the cumulative impact will be increased with the establishment of the new road but contained in that area.		

Residual Risks: None anticipated provided that the mitigation measures are implemented correctly and rehabilitation of the site is undertaken.

6.3.6.3 Comparative Assessment of alternative roads

In terms of impacts arising from visual as a result of construction activities, there is no significance difference in the potential impacts associated with the two alternatives. The visual impacts will be similar for both alternatives as they are right next to each other. Therefore, there is **no preference** between the two alternatives.

6.3.7 Social and Socio-economic Impacts

6.3.7.1 Description of Social and Socio-economic Impacts

The following questions relate to the expected social impacts during and after construction of the proposed K148 (Phase 1):

SOCIO-ECONOMIC ISSUES	VALUE (SA RANDS)
Anticipated CAPEX of the project on completion	R 150 000 000.00
What is the expected annual income to be generated by or as a result of the project?	R 25 000 000.00
New skilled employment opportunities created in the development phase of the project	5
New skilled employment opportunities created in the construction phase of the project	40
New un-skilled employment opportunities created in the development phase of the project	10
New un-skilled employment opportunities created in the construction phase of the project	4000
What is the expected value of the employment opportunities during the development and construction phase?	R 40 000 000.00
What percentage of this new unskilled and skilled value that will accrue to previously disadvantaged individuals during both development and construction phase of the project?	30%
What percentage of this value that will accrue to previously disadvantaged individuals?	30%
The expected current value of the employment opportunities during the first 10 years	R 170 000 000.00
What percentage of this value that will accrue to previously disadvantaged individuals?	20%

a) Potential Construction Phase Social Impacts

The anticipated impacts associated with the construction phase of the project are of a short duration, temporary in nature, but could have long term effects on the surrounding environment. The following impacts are anticipated during the construction of the proposed road:

Impact on job opportunities

Limited opportunities for local labour are expected as the majority of the construction activities would be undertaken by specialist contractors, which are invariably from the larger population centres. The short term benefits in this regard are thus deemed to be of a low significance.

Influx of Workers

An influx of workers from outside the study area could negatively impact on the daily living and quality of life of the property owners whose properties are affected by the road alignment. This would mostly only materialise during the intermittent periods when the construction activities are taking place on those properties. An influx of jobseekers is possible, although the rural, remote and sparsely populated study area makes the gathering of large numbers of jobseekers at the construction areas unlikely.

Construction camp impacts

Road construction usually involves the development of a construction camp(s) where the temporary construction workers are accommodated. This in itself could impact on the daily living and movement patterns of those living in close proximity to such a facility. Cumulative impacts include misbehaviour of construction workers at the construction camp and mismanagement which could result in safety and security concerns, social conflict and environmental problems. The exact location of a construction camp would determine the intensity of the impact.

Impacts on daily living and movement patterns

Construction related activities could impact on the daily living and movement patterns of the locals e.g. increased construction vehicle activity on the local roads and possible construction of new access roads. This would especially be evident in the agricultural areas where gravel roads connect to tarred roads.

Disturbance of land use infrastructure and services

The proposed alignment is not in close proximity to existing infrastructure services (a distribution road is located to the north of Magagula Heights, but the road project – Phase 1 -stops south of the line). The proposed alternatives traverse some small holdings. A Dairy farm, existing cemetery and farm buildings area located in relative close proximity to the proposed road. Impact on road crossings such as at the K133 and N3 as well as local roads to the properties in the area would have to be mitigated. The impact on approved developments (Janus Park and Tamboekiesfontein East of the N3) needs to be managed and mitigated.

Health related impacts

Health related impacts during the construction phase of the proposed project refer to the spread of sexually transmitted diseases such as HIV/AIDS between workers (usually outsiders) and the local population. The impact of HIV/AIDS on productivity in the study area is already a source of concern.

Specific concerns relate to possible promiscuous activities at construction camps if these are located in close proximity to existing settlements and towns.

Safety and Security Impacts

Safety and security impacts include construction related risks and accidents, uncontrolled vehicular access, the perceived increase in crime as a result of outsiders being in the area. Whether real or perceived, these risks would need to be assessed, in particular where relevant to the Montic Dairy Farm and at the crossings with K133 and the N3.

b) Potential Operational Phase Social Impacts

The operational phase of a road is a long term process. The impacts usually associated with this phase are usually perceived by affected parties to be mostly positive. Maintenance undertaken during the operational phase is expected to have some short-term impacts.

The following impacts are anticipated to occur during the operational stages of the proposed project:

Impact on Job Opportunities

It could be expected that existing employees will be responsible for the maintenance of the K145, although some temporary maintenance work could be undertaken by locals, such as resurfacing or repairing of the road.

Impacts on daily living and movement patterns

Maintenance activities would be undertaken only when required. The impacts on the daily living and movement patterns of affected residents are thus expected to be negligible.

Impact on regional and local economy

Improved access to the areas of Magagula Heights, Janus Park, Tamboekiesfontein (new development to the east of the N3), the Road 550 and Vosloorus is anticipated. Improved access from the N3 and K133 is expected to have a positive economic effect on a local level It is not possible to assess such an impact's significance, as the distribution and operational details of businesses cannot easily be determined.

Property values

Devaluation of properties is not expected on the properties. Increased access may add value to the land, e.g. at the Montic Dairy Farm. Significance cannot be determined before construction. Land owners have not expressed any concern regarding this issue.

6.3.7.2 Summary of impacts associated with the proposed road during the construction and operational phase

The two alternatives road alignment discussed in section 6.2 do not differ in any significant way as far as the impacts on the social is concerned. Therefore, there is no significant difference in the potential impacts associated with these alternatives, and the impacts for the two alternatives are not comparatively assessed in the assessment tables below. *The impacts assessment tables below apply to alternative 1 and 2 road alignment.*

Impact on Job opportunities

Nature: Residents and local businesses can potentially benefit from work opportunities and expenditure. However, contractors appointed by GP DoRT may not necessarily come from these areas. Contractors usually have a percentage of permanently employed skilled personnel to work on the project. It is possible that where labour may be sourced from local communities, it will be to perform unskilled work such as land clearing and erecting fences. During operation, maintenance of the road and resurfacing may provide job opportunities in the future for the country and local economy

The number of job opportunities would be comparable for both alternatives, and this is a **positive impact** for the area where unemployment is a factor of serious concern.

NO GO Option	No Go Option will not provide job opportunities in the area. This is a negative impact.	
CONSTRUCTION PHASE		
Rating of Impacts	**Without mitigation**	**With mitigation**
Probability	Improbable (2)	Improbable (2)
Duration	Medium-term (3)	Very short-term (3)
Extent	Limited to the Local Area (2)	Limited to Local Area (2)
Magnitude	Moderate (6)	Moderate (6)
Significance	**22 (low)**	**22 (low)**
Status (positive or negative)	**Positive**	**Positive**
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
OPERATIONAL PHASE		
No significant impacts are expected during operation of the road but job opportunities will exist during maintenance of the road, e.g. grass cutting, etc.		
Probability	Improbable (2)	Probable (3)
Duration	Very short-term (1)	Very short-term (1)
Extent	Limited to Site (1)	Limited to Site (1)
Magnitude	Low (4)	Low (4)
Significance	**12 (low)**	**18 (low)**
Status (positive or negative)	**Positive**	**Positive**

Enhancements

- *GP DoRT to* follow approved tender procedures.
- Residents to be informed of the construction processes prior to commencement of construction activities. Notification must include possible timeframes for traffic disruption. Consequences of disturbance and inconvenience must be clearly indicated to all surrounding/affected land owners.
- Road signage to be used effectively.

Cumulative impacts: Expected positive (temporary) impact to be low and of temporary nature (mainly during construction).

Residual Risks: None anticipated provided that the mitigation measures are implemented correctly and local labour and suppliers be given the opportunity to participate during construction and when maintenance is required during operational phase.

Influx of jobseekers

Nature: Added pressure on economic and social infrastructure and increase in social conflicts during construction as a result of in-migration of jobseekers

NO GO Option	A No Go Option will not change the status quo of land values.	
CONSTRUCTION PHASE		
Rating of Impacts	**Without mitigation**	**With mitigation**
Probability	Local (2)	Local (2)
Duration	Short-term (2)	Short-term (2)
Extent	Moderate(6)	Low (4)
Magnitude	Probable (3)	Probable (3)
Significance	**Low (30)**	**Low (24)**
Status (positive or negative)	Negative	Negative
OPERATIONAL PHASE		
This impact is not anticipated during operation of the road		

Mitigation:

- A 'locals first' policy should be advertised for construction employment opportunities, especially for semi and low-skilled job categories. Enhance employment opportunities for the immediate local area; Vosloorus, and if this is not possible, then the broader focus areas should be considered for sourcing workers such as Ekuruleni and Lesedi Municipalities.
- Tender document should stipulate the use of local labour as far as possible
- Prior to construction commencing representatives from the local community (e.g. ward councillor, surrounding landowners) should be informed of details of the construction schedule and exact size of the workforce.
- Recruitment of temporary workers at the gates of the development should not be allowed. A recruitment office with a Community Liaison officer should be established in a nearby town to deal with jobseekers.
- Set up labour desk in a secure and suitable area to discourage the gathering of people at the gates of the construction site.
- Local community organisations and policing forums / neighbourhood watches should be informed of construction times and the duration of the construction phase. Also establish procedures for the control and removal of loiter at the construction site.
- A Community Liaison Officer should be appointed. A method of communication should be implemented whereby procedures to lodge complaints are set out in order for the local community to express any complaints or grievances with the construction process.

Cumulative impacts

» Additional pressure on infrastructure and municipal services in area due to additional people coming into the area.
» Possible increase in criminal activities and economic losses in area for property owners.

Residual impacts

Possibility of outside workers remaining in the area after construction is completed and subsequent pressures on local infrastructure and services.

Impacts on daily living and movement patterns

Nature: Where construction work has to be undertaken on private properties it could also have a negative impact on those owners' daily living and movement patterns. Impacts on daily living and movement patterns also refer to the increased noise pollution during construction activities. Right-of-way clearing and construction activities, however, will be short term. Noise will thus only be temporary generated and if construction activities adhere to all

relevant legislation in this regard and limit construction activities to normal working hours, the impact is anticipated to be minimal. In addition, road construction usually involves the development of a construction camp(s) where the temporary construction workers are accommodated. This in itself could impact on the daily living and movement patterns of those living in close proximity to such a facility

NO GO Option	No Go Option will not disrupt the daily living and movement patterns	
CONSTRUCTION PHASE		
Rating of Impacts	**Without mitigation**	**With mitigation**
Probability	Improbable (2)	Improbable (2)
Duration	Medium-term (3)	Very short-term (3)
Extent	Limited to the Local Area (2)	Limited to Local Area (2)
Magnitude	Moderate (6)	Moderate (6)
Significance	**22 (low)**	**22 (low)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
OPERATIONAL PHASE		
Maintenance activities would be undertaken only when required. The impacts on the daily living and movement patterns of affected residents are thus expected to be negligible		
Probability	Improbable (2)	Probable (3)
Duration	Very short-term (1)	Very short-term (1)
Extent	Limited to Site (1)	Limited to Site (1)
Magnitude	Low (4)	Low (4)
Significance	**12 (low)**	**18 (low)**
Status (positive or negative)	Negative	Negative

Mitigation

» All vehicles must be road worthy and drivers must be qualified, obey traffic rules, follow speed limits and made aware of the potential road safety issues.
» Heavy vehicles should be inspected regularly to ensure their road safety worthiness.
» Infrastructure such as fencing/ electric fencing along access route must be maintained in the present condition or repaired if damaged due to project activities.
» Ensure roads utilised are either maintained in the present condition or restored if damaged due to project related activities.
» The construction camps must be as close to the site as possible
» A comprehensive employee induction programme to cover land access protocols and road safety.
» A Community Liaison Officer should be appointed. A method of communication should be implemented whereby procedures to lodge complaints are set out in order for the local community to express any complaints or grievances with the construction process.

Cumulative impacts

Possible increased traffic and traffic disruptions impacting local community's movement patterns and increased risks for road users.

Residual impacts

Non anticipated

Impact on Property values

Nature: Property values may be impacted upon negatively due to the **visual** impact during construction. However, it is believed that once the road is operational, properties may increase in value due to the improvement of access and circulation when using the K148 linkage to the N3 and K146. **This is a positive impact and property values may be impacted equally upon along Alternative 1 and for Alternative 2.**		
NO GO Option	A No Go Option will not change the status quo of land values.	
CONSTRUCTION PHASE		
Rating of Impacts	**Without mitigation**	**With mitigation**
Probability	Improbable (2)	Improbable (2)
Duration	Short-term (3)	Very short-term (3)
Extent	Limited to the Local Area (2)	Limited to Local Area (2)
Magnitude	Moderate (6)	Moderate (6)
Significance	**22 (low)**	**22 (low)**
Status (positive or negative)	Positive	Positive
OPERATIONAL PHASE		
No significant impacts are expected on land values during operation of the road, but improved access may lead to higher marketability of properties.		
Probability	Improbable (2)	Probable (3)
Duration	Very short-term (1)	Very short-term (1)
Extent	Limited to Site (1)	Limited to Site (1)
Magnitude	Low (4)	Low (4)
Significance	**12 (low)**	**18 (low)**
Status (positive or negative)	**Positive**	**Positive**
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: • Negotiations between land owners and GP DoRT regarding servitudes are to be undertaken after the environmental authorisation of the EIA is obtained. An independent property valuer must be appointed during negotiations. • All landowners must be informed of the construction processes prior to commencement of construction activities.		
Cumulative impacts: Possible low positive impact.		
Residual Risks: Low risk anticipated, provided that the mitigation measures are implemented correctly.		

Health and safety issues		
Nature: The infrastructure may have a health impacts in the form of traffic at the crossings at the N3 and K133 (103). The impact of job seekers and the location of the construction camp is a social issue that could result in an increase in HIV/AIDS and crime. **This is valid equally for both Alternatives.**		
NO GO Option	No Go Option will not bring additional health risks or improved road network to the area.	
CONSTRUCTION PHASE		
Rating of Impacts	**Without mitigation**	**With mitigation**
Probability	Improbable (2)	Improbable (2)
Duration	Medium-term (5)	Very short-term (1)
Extent	Limited to the Local Area (1)	Limited to Site (1)
Magnitude	Low (4)	Low (4)

Significance	**32 (moderate)**	**12 (low)**
Status (positive or negative)	Negative	Negative
OPERATIONAL PHASE		
No significant impacts are expected on health during operation of the road, when motorists will have to abide by rules for driving within speed limits		
Probability	Improbable (2)	Improbable (2)
Duration	Very short-term (1)	Very short-term (1)
Extent	Limited to Site (1)	Limited to Site (1)
Magnitude	Minor (2)	Minor (2)
Significance	**8 (low)**	**8 (low)**
Status (positive or negative)	Negative	Negative (Negligible)
Reversibility	Low	Moderate
Irreplaceable loss of resources?	Moderate	Low
Can impacts be mitigated?	Yes	
Mitigation: • GP DoRT Standards and Specifications to be followed during construction, maintenance and operation • Working hours should be kept between daylight hours during the construction phase, and/or as any deviation that is approved by the relevant authorities. • The contractor must ensure that open fires on the site for heating, smoking or cooking are not allowed except in designated areas. • Contractor must provide adequate firefighting equipment on site and provide firefighting training to selected construction staff. • A comprehensive employee induction programme, covering land access protocols, fire management and road safety. This must be addressed in the construction EMPr as the best practice		
Cumulative impacts Possible increase in crime levels (with influx of people) with subsequent possible economic losses		
Residual Risks: None anticipated although operation of the road would present the associated risk of road accidents. Residents of the farming properties and of the new areas (Janus Park and Tamboekiesfontein east of the N3) would be most at risk.		

6.3.7.3 Comparative Assessment of alternative roads

From a social perspective, there is no significant difference in the potential impacts of the two alternative road alignments. A potential conflict of land use has, however been raised, Alternative 2 would impact on the graves which hold sentimental value for the community nearby. This land use conflict results in the Alternative 2 being less desirable from a social perspective. Therefore **Alternative 1 is nominated** as the preferred alternative for the road alignment.

6.3.8 Other Impacts

6.3.8.1 Impacts on Topography, Soils and Geology

The topography of the study area is very level. Little impacts are anticipated. The terrain along the route does have some clays. No Cumulative impacts would be relevant.

6.3.8.2 Impacts on the Land Use

The land use (mixed) will remain the same**,** therefore it is anticipated that the proposed road K148 and

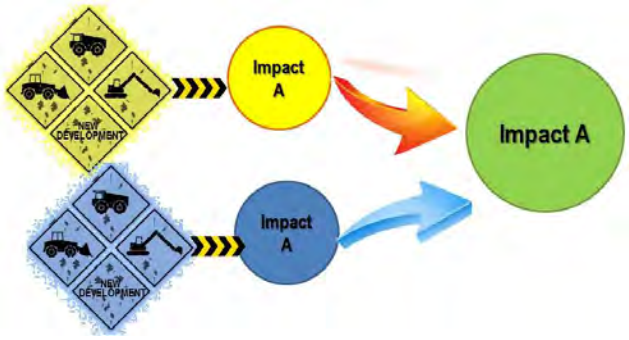
associated N3/K148 interchange will not contribute to cumulative impacts other than an improvement in access, circulation and distribution of traffic.

6.4 Cumulative Impacts

Cumulative impacts in relation to an activity are defined in the Environmental Impact Assessment Regulations (Government Notice R982) as meaning "the impact of an activity that in itself may not be significant, but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area".

There is a legislated requirement to assess cumulative impacts associated with a proposed development. This chapter looks at whether the proposed project's potential impacts become more significant when considered in combination with the other known or proposed development within the area.
As shown on the image below, there are Master Site Development Plans and housing applications (such as Magaguga Heights Ext 2) for the area that will benefit from the proposed road K148:

The project has a combined effect when assessed in conjunction with other activities. The individual insignificant impacts of several developments might have a significant **cumulative** adverse impact on the environment when viewed together, as illustrated in the graph below



The following cumulative impacts have been identified in terms of the proposed development:

- Potential loss of vegetation and habitat due to this and other developments in the area: Excessive clearing of vegetation as a result of multiple project could significantly impact local and regional population dynamics plants species regarded as Near Threatened as well as other type of grasslands within the project area. This can influence runoff and storm water flow patterns and dynamics, which could cause excessive accelerated erosion of plains, small ephemeral drainage lines, rivers and this could also have detrimental effects on the lower wetlands within the area. Large-scale disturbance of indigenous vegetation creates a major opportunity for the establishment of invasive species and the uncontrolled spread of alien invasive into adjacent agricultural land and rangelands. Cumulative impacts on ecology are expected to be of low to moderate significance as several developments planned around the o project are on similar habitats.
- Impact on wetlands: Downstream alteration of hydrological regimes due to the increased run-off from the area is the major cumulative impact on surface water. Potential cumulative water related impacts may occur with special reference to downstream erosion and sedimentation of the wetlands within the study area, changing the quantity and fluctuation properties of the watercourse by changing runoff characteristics of the area surrounding the wetland/riparian area, the potential for chemical pollution, downstream alteration of hydrological regimes due to the increased run-off from the area and downstream erosion. When considering the potential projects within the adjacent / nearby farms, the potential for changes to the surrounding hydrological habitat could be significant. It is however assumed that any such changes would be detrimental to the various projects areas (eroded areas) together with the low mean annual run-off and suitable stormwater management the impacts could however be mitigated, therefore the cumulative impact is considered to be low negative.
- Heritage Resources: Archaeological sites are non-renewable and impact on any archaeological context or material will be permanent and destructive. No surface indicators of archaeological (Stone or Iron Age) material was identified in the study area, the demolished stone and mud foundations of various ruins occur in the southern portion of the study area as well as two cemeteries. It still remains important for each planned development to observe mitigation measures and to incorporate any sensitive heritage features into the layout plans where possible. Given the scarcity of significant fossil remains in the region, cumulative impacts are likely to be minor.
- Impact on Traffic: Relief of congestion problem on secondary roads due to this project that provides access from the N3 with interchange and access to proposed new developments
- Potential loss of viable and high potential agricultural/ grazing land: The cumulative impact in terms of loss of agricultural land is unlikely to be significant due to the limited land take and in most cases agricultural activities would be allowed to continue following completion of construction activities. The cumulative impact is offset by major limitations to agriculture in the area although there is some high value agricultural land in the vicinity, the small holdings in the area are not commercially viable as agricultural units therefore expected to be low.

6.5 Assessment of the Do Nothing Alternative

The 'Do-Nothing' alternative is the option of not constructing the proposed K148 road. Should this alternative be selected, there would be no environmental impacts on the site due to the construction and operation activities. The road is proposed on an area already impacted by existing developments

ie linear infrastructures and future developments i.e. housing development and freight hub, and vegetation has been disturbed in some of these areas.

At a local level, the level of unemployment will remain the same and there will not be any transfer of skills to people in terms of the construction and operation of the road. The landowners would have lost an opportunity of selling their lands (for those that want to sell their lands). The objective of the Gauteng Province DoRT to improve the road network through the provision of mobility and access in the Gauteng province will not be realised for this area. Lastly, the K148 forms part of the road network supporting the Tambo Springs Freight Hub and the Do Nothing is the option of not contributing towards the freight transportation on the East Rand and inland distribution on the road network of goods between air, land and sea

6.6 Summary of Impacts

Table 6.2 summarises all potential impacts associated with the proposed construction of the K148 road

Table 11: Summary of impacts associated with the proposed construction of the K148

Environmental Aspect	Construction		Operation	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Destruction and deterioration of rocky grassland vegetation	High	Moderate	Moderate	Low
Destruction and deterioration of vegetation in and around moist grassland	High	Moderate	Moderate	Low
Exposure of soils to erosion and subsequent loss of topsoil for re-vegetation and sedimentation of moist grasslands	Moderate	Low	NO impact expected during operation	
Destruction of plants of conservation concern	High	Moderate	NO impact expected during operation	
Spread of alien invasive vegetation	Moderate	Low	NO impact expected during operation	
Loss of faunal habitat and ecological structure	High	Moderate	NO impact expected during operation	
Direct impact on faunal communities	High	Moderate	NO impact expected during operation	
Impact of disturbance and noise pollution on fauna	High	Moderate	Moderate	Low
Poaching of wildlife in the vicinity	Moderate	Low	NO impact expected during operation	
Reduction of natural migratory and faunal dispersal routes.	NO impact expected during construction		High	Moderate
Degradation of wetlands areas & drainage systems	High	Moderate	High	Moderate
Pollution of water courses and soil	High	Moderate	High	Moderate
Destruction/Alteration of Heritage artefacts or features - Alternative 1	Low	Low	NO impact expected during operation	
Destruction/Alteration of Heritage artefacts or features - Alternative 2	High	Moderate	NO impact expected during operation	
Impacts on traffic of existing roads	Moderate	Low	Moderate (Positive)	Moderate (Positive)
Soil erosion	Moderate	Low	Moderate	Low
Loss of agricultural land Alternative 1	Moderate	Low	NO impact expected during operation	
Loss of agricultural land Alternative 2	High	Moderate	NO impact expected during operation	

Visual impacts on sensitive receptors	Moderate	Moderate	Moderate	Moderate
Impact on Job opportunities	Low (Positive)	Low (Positive)	Low (Positive)	Low (Positive)
Influx of jobseekers	Low	Low	NO impact expected during operation	
Impacts on daily living and movement patterns	Low	Low	Low	Low
Impact on Property values	Low (Positive)	Low (Positive)	Low (Positive)	Low (Positive)
Health and safety issues	Low	Low	Low	Low

7. CONCLUSIONS AND RECOMMENDATIONS

Envirolution Consulting (Pty) Ltd was appointed by Ndodana Engineers to conduct the Environmental Impact Assessment (EIA) Process on behalf of the Gauteng Department of Roads and Transport (GPDoRT), and undertake a Scoping & Environmental Impact Assessment (EIA) process for the proposed construction of Road N3/K148 (phase 1) between k146 and K133 (including the interchange). This project is located in the Gauteng Province of South Africa on provincial Route K148. The project route commences at the intersection between Routes K148 and K154, km 0,000 on the K148 and continues in a north-easterly direction where it terminates at the intersection between Routes K148 and K133 at approximately 6 km. The details pertaining to each alternative considered, as well as the technical preference are provided below:

Alternative 1 (Red), the preferred option is proposed as indicated in the Figure 7.1 below. The road will form a link between the N3/K148 and K146. The road is a deviation from Alternative 2 (yellow line) that was initially proposed as the preferred alignment. The Alternative 1 (red line) was proposed to the south of the initial alignment to avoid land use features that would be impacted upon negatively.

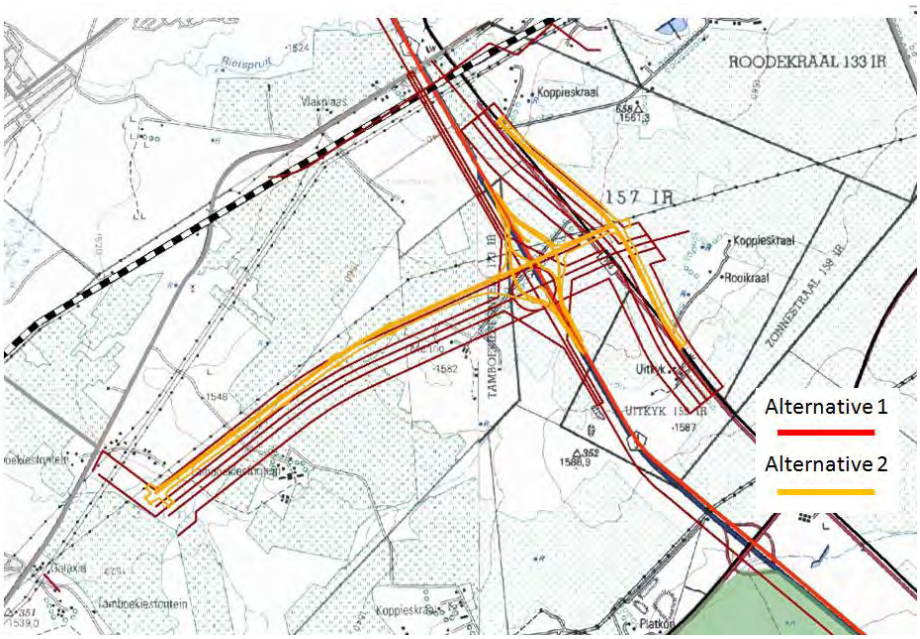


Figure 24: Alternative 1 and Alternative 2 (Refer to Appendix 1 for A3 maps)

Alternative 2 (Yellow) follows nearly the same alignment of Alternative 1 and Alternative 2 was initially proposed as the preferred alignment. However, during specialist investigations, it was found that this alignment would impact negatively upon an existing cemetery and other land uses (a dairy facility and buildings). The Alternative 1 (red line) was then proposed to the south of the initial alignment to avoid these features.

An EIA process, as defined in the NEMA EIA Regulations, is a systematic process of identifying, assessing, and reporting environmental impacts associated with an activity. The EIA process forms part of the planning of a project and informs the final design of a development. In terms of the EIA Regulations published in terms of Section 24(5) of the National Environmental Management Act

(NEMA, Act No. 107 of 1998), Gauteng Department of Roads and Transport (GPDoRT), requires authorisation from the Gauteng Department of Agriculture & Rural Development (GDARD) for the construction of the K148 road. In terms of sections 24 and 24D of NEMA, as read with the EIA Regulations of R982, R983, R984 and R985, a Scoping and an EIA Phase have been undertaken for the proposed project. As part of this EIA process comprehensive, independent environmental studies have been undertaken in accordance with the EIA Regulations. The conclusions and recommendations of this EIA are the result of the assessment of identified impacts by specialists, and the parallel process of public participation. The public consultation process has been extensive and every effort has been made to include representatives of all stakeholders in the study area. A summary of the recommendations and conclusions for the proposed K148 road project is provided in this Chapter.

7.1 Summary of Conclusions

The preceding chapters of this report together with the specialist studies contained within **Appendices 4-9** provide a detailed assessment of the potential impacts that may result from the proposed project. This chapter concludes the EIA Report by providing a summary of the conclusions of the assessment of the proposed K148 road. In so doing, it draws on the information gathered as part of the EIA process and the knowledge gained by the environmental specialist consultants and presents an informed opinion of the environmental impacts associated with the proposed project.

The most significant environmental impacts identified and assessed to be associated with the proposed road include:

- Impacts on ecology occurring on the site (Figure 7.2); and
- Impacts on wetlands (Figure 7.3).

Other impacts which could have an impact on the environment include:

- Impacts on the local soils, and agricultural potential of the site;
- Visual impacts
- Impact on traffic
- Impacts on heritage resources;
- Social and economic impacts; and

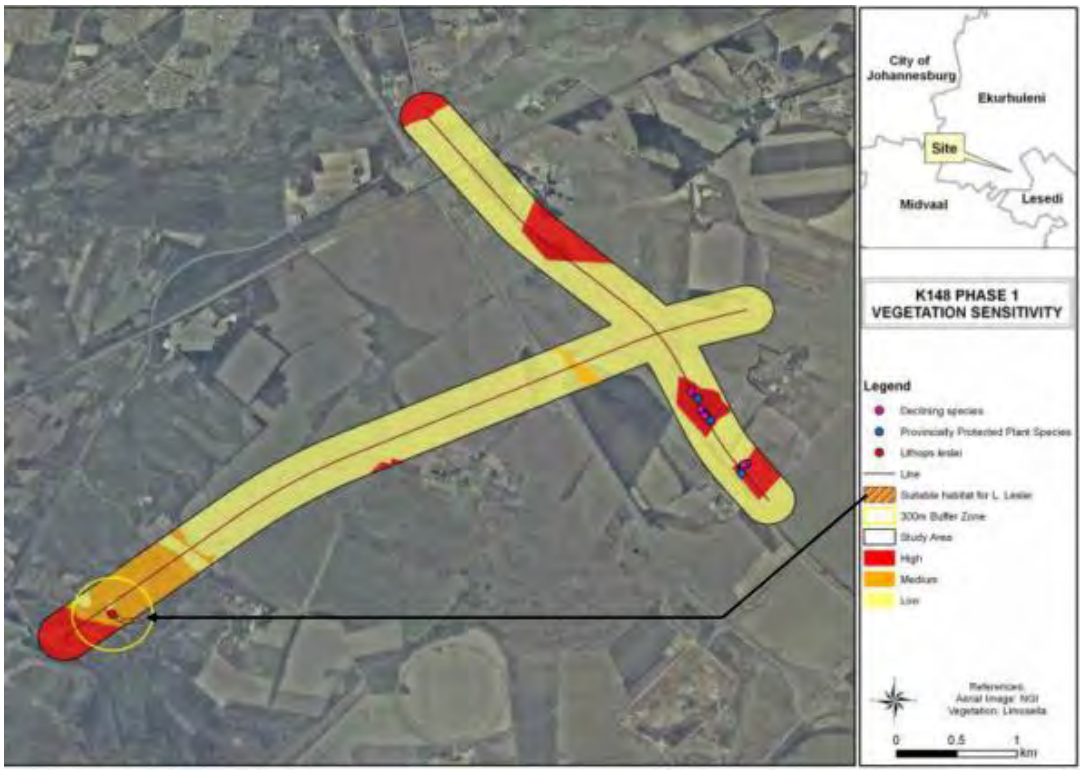


Figure 252: Vegetation sensitivity along the proposed development route (Refer to Appendix 1 for A3 maps)

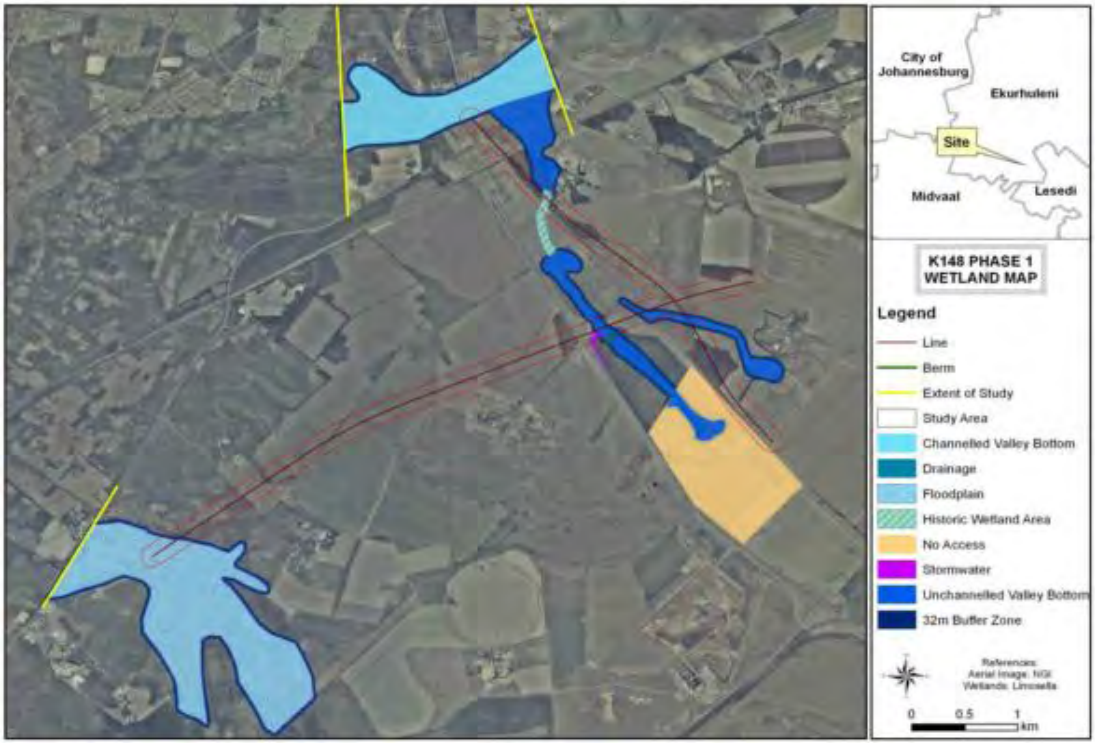


Figure 263: Wetland sensitivity areas delineated together with associated buffer zones (Refer to Appendix 1 for A3 maps)

The above mentioned impacts are summarised as follows:

Impacts on Vegetation

The proposed K148 will impact largely on transformed and secondary vegetation that were found to be of low conservation value (sensitivity). However, primary rocky grassland and near-natural (grazed) rocky grassland portions, as well as moist grasslands were also recorded along the route and were classified as medium to high sensitivity to the proposed road. In addition, a Near Threatened succulent occurs within the grazed rocky grassland and unless otherwise specified by the Gauteng Department of Agriculture and Rural Development, a 300m buffer around this species should be respected.

This assessment noted that the proposed development mainly makes use of areas where historical impacts took place. The moist grassland and rocky grassland along the K148 route comprise approximately 1.3km of the ±5.8km of the K148. Along the R103 deviation, the moist grassland and rocky grassland comprise about 0.3km of the ± 4.2km deviation. *Due to the transformed state of the remainder of the vegetation along the proposed route, the impacts on these areas are envisaged to be minimal.*

Impact on Fauna

Overall, the remaining natural terrestrial habitats are considered as of only Medium-Low sensitivity, except for the western riverine system which is considered of Medium-High sensitivity. The development is expected to displace individual animals rather than populations, hence it is concluded that irreplaceable loss of species will not occur within the general area nor will any Red Data vertebrate species be significantly affected. From a vertebrate perspective, **no objection can be raised** should development of the K148 and K146 proceed.

Impacts on Wetlands

Six wetland areas were found to cross the proposed road and interchange as shown in Figure 7.3. Other wetlands within the vicinity but outside of 500 m of the proposed development have been omitted from this wetland report. The majority of the wetland areas are located in the eastern section of the proposed road with only the floodplain located in the western section of the proposed development. The five wetlands located in the eastern section of the proposed development are largely impacted by current and historical farming as well as other anthropogenic activities such as developments and road construction. The two main wetlands are the Channelled Valley Bottom wetland, to which all three the unchannelled valley bottom wetlands are connected, and the Floodplain wetland, also the largest of the wetland systems and less impacted than the other smaller wetlands.
The current assessment finds that a minimum buffer of 30 m from the edge of the wetland boundaries should be respected. It is important that appropriate mitigation measures are put into place and carefully monitored to ensure minimal impact to regional hydrology.

Impacts on Heritage Resources

The study area was assessed in terms of the archaeological component of Section 35 of the NHRA and although the area to the south of the study area is known for Rock Art, Stone Age and Late Iron Age stone walling the extensive agricultural activities in the study area would have obliterated any possible surface indications of in-situ archaeological sites. This was confirmed during the survey and no surface indicators of archaeological (Stone or Iron Age) material was identified in the study area.

In terms of the built environment of the area (Section 34), the demolished stone and mud foundations of various ruins occur in the southern portion of the study area.

Two cemeteries were recorded, Cemetery 1 is located 4 meters from the road reserve and approximately 11 meters from the actual road (section 7.3.1 of Appendix 9). Cemetery 2 is a much smaller cemetery located 117 meters to the north of the proposed road corridor.

No significant cultural landscapes or viewscapes were noted during the fieldwork as the southern portion of study area is bordered by a large informal settlement. The high density agricultural activities impeded on the archaeological visibility in the study area it is recommended that a chance find procedure is incorporated into the EMP for this project.

Based on the results of the field survey of the proposed K148 there are **no significant archaeological risks** associated with the development and from an archaeological point of view there is no reason why the development should not proceed if the recommendations as made in the report area adhered by and based on approval from SAHRA.

Impacts on Soil, Agriculture and Land use

The large amount of disturbance created during construction would leave the site vulnerable to soil erosion. It is, therefore, important that there should be strict adherence to the Environmental Management Programme and good soil management measures regarding the management of stormwater runoff and water erosion control should be implemented, with the implementation of good soil management measures the impact of the road on soils can be managed to an acceptable level, without significant erosion issues. Loss of agricultural land impacts are regarded as medium because most of the proposed route traverses highly modified area. Although there is some high value agricultural land in the vicinity, the small holdings in the area are not commercially viable as agricultural units.

Visual Impacts

Due to the flat topography and terrain of the area, there is little in the surrounding landscape (such as trees and buildings) that can shield the development from view. The landscape character of the site, and surrounds, is open grassland with few homesteads. The visual exposure of the facility is therefore rated high for the immediate vicinity of the site. Other infrastructure such as the existing Eskom power line, railway line in close proximity to the site presents an existing change in the visual environment. The study concluded that the significance of the overall visual impact of the proposed development would be moderate, due to its extent, long term duration and medium magnitude. Mitigation measures are proposed which could moderate that visual impact. It is important that mitigation measures are complied with and it is advised that the environmental management programme set out principles for the implementation of these measures.

Social and Economic Impacts

The development will create employment and business opportunities for locals during both the construction and operational phase of the project. The enhancement measures listed in the report should be implemented in order to maximise the potential benefits. In addition, the proposed establishment of a number of renewable energy facilities in the area will create socio-economic opportunities, which, in turn, will result in a positive social benefit. The significance of this impact is rated as low positive based on the magnitude and duration of the project.

Cumulative Impacts

The cumulative impacts for the proposed K148 road have been assessed to be of low to moderate significance. The interchange should provide for the increase in traffic that forms part of the freight hub between KZN and Gauteng. The K148 (which is also known as the Heidelberg Road) crosses the N3 and forms part of the road network supporting the Tambo Springs Freight Hub. This implies that projects of the same nature will be consolidated in one area creating a node, and ultimately aiming to reduce the potential for cumulative impacts associated with such developments when spatially fragmented.

7.2 Comparison of Technology Alternatives

In terms of the specialist studies undertaken, the following conclusions were made regarding the two alternative road alignments:

	Alternative 1	**Alternative 2**
Ecology	No preference	No preference
Wetland	No preference	No preference
Soils and agricultural potential	No preference	No preference
Visual	No preference	No preference
Heritage & palaeontology	Preferred	Less preferred
Social	Preferred	Less preferred
Traffic	No preference	No preference

From a biophysical perspective, there are no impacts of unacceptably high significance associated with any of the access road alternative assessed for the proposed project. From a social perspective and heritage perspective, Alternative 2 is considered flawed as the route traverses graves nearby as well as buildings and the Montic Dairy Farm. For these reasons, **Alternative 1** is nominated as the **preferred alternative.**

7.3 Overall Conclusion (Impact Statement)

The project will enable the connection of existing road networks to improve circulation and allow for development of the area. Socio-economic benefits are likely to result from the proposed project and might include job creation, which cannot be achieved with a No Go Alternative. The project will bring about relief of congestion problems on secondary roads due to this project that provides access from the N3 with interchange and access to proposed new developments. The project will satisfy the demand for roads infrastructure to serve the area and improve access to the Transport Hub and new housing applications (such as Magaguga Heights Ext 2) for the area.

The proposed N3/K148 interchange will serve a high proportion of the projected traffic demand, particularly the high turning volumes from north to west and vice versa. The filling stations that have been developed within the interchange area with direct access to the N3 will have a significant impact on the planning and design of the interchange. In the long term, a third of the traffic on the N3 can be diverted to other roads if it is assumed that 50% of the traffic to and from areas such as Alberton, Kempton Park, Tshwane, Midrand, Soweto and the West Rand would make use of alternative routes. Once the planning of the rail concept and associated freight and logistics infrastructure have been

finalised, the road network within the Tambo Springs Freight Hub can be planned to accommodate the projected demand. The N3/K148 interchange is the primary road access to the area and is not expected to be significantly affected by the internal road layout.

Alternative 1 (Figure 7.1) avoids some of the high sensitivities identified on the site, and is nominated as the preferred alternatives following the full assessment through this EIA process for the following reasons:

» In terms of impacts arising from destruction/alteration of Heritage artefacts or features a result of construction activities, the impacts would be the similar for Alternative 1 and Alternative 2 for most of the alignment, apart from the fact that Alternative 2 would impact on the graves.
» From a social perspective, there is no significant difference in the potential impacts of the two alternative road alignments. A potential conflict of land use has, however been raised, Alternative 2 would impact on the graves which hold sentimental value for the community nearby. This land use conflict results in the Alternative 2 being less desirable from a social perspective.

However, it must be noted that they are certain sensitivities on site that are unavoidable by either of the alternatives. In order to protect biodiversity and conserve sensitive environments during development, steps that should be followed are to firstly avoid, then minimize, then repair or restore, and finally compensate for, or offset the negative effects of any development on biodiversity (Macfarlane *et al*, 2014). Thus where the impact is unavoidable, the impacts must be minimised and the unavoidable and unforeseen impacts restored or rehabilitated. The section below summarises how this mitigation hierarchy has been applied to mitigate impacts that are likely to occur on site.

» **Impacts on moist grassland**: Vegetation associated with the moist grassland was classified as being of high sensitivity, it is recommended that the road alignment through the moist grassland in the southern extent of the K148 be re-routed to avoid this area or to minimise the area traversed. Due to the nature of the development, neither of the proposed alterative can avoid this area, though the use of a wetland rehabilitation and monitoring plan (Appendix 6) as well certain road crossing design as suggested in the Hydrological Assessment (Appendix 8), this impact can be minimised and managed.
» **Impacts on rocky grassland**: Along the R103 deviation from the existing R103, primary rocky grassland was recorded. Although the three portions were isolated and surrounded by maize and pasture, the species diversity was high with Declining and provincially protected plant species occurring. Where the route cannot deviate to accommodate Declining plant species, these will have to be relocated as per instructions from the GDARD.
» **Impact on wetlands**: Both alternative cross some wetland areas located in the eastern and western section of the proposed road. It is recommended that a minimum buffer of 30 m from the edge of the wetland boundaries should be respected. However, technically based on the nature of the development, this impact cannot be totally avoided totally, but though the use of a wetland rehabilitation and monitoring plan (Appendix 6). The wetland rehabilitation and monitoring plan is specific to the construction of the proposed road and interchange within the delineated wetlands or within the protective buffer thereof, including construction upslope that could impact on the wetlands down the slope. In addition, the rehabilitation plan also applies to disturbances in wetlands where absolutely necessary in order to construct the road. The overall objective of this plan is to return the environment in and around footprint of the road to a state as close to the

state prior to construction and to limit or negate any construction and operational associated impacts.

In addition, a hydrological study (Appendix 8) has been undertaken in the EIA investigations as part of the formulation of mitigation for the impact of bridge structures on the receiving environment i.e. the floodplain and streams. These recommendations are aimed to reduce the impact the road construction will have on water resources within the study area. The hydrologist has recommended that the design of the roadway and bridge be modelled on Scenario 2 (with the bridge height being at least 4.63 m), Scenario 3 (with the bridge height being at least 4.07 m, if 0.7 m freeboard is a strict requirement) or Scenario 4 through a widened bridge with roadway raised and additional culverts added in order to minimise impact on wetlands and stream. Scenario 3 and 4 were further assessed for implementation and are discussed in the following section:

Option 1 (based on scenario 3 discussed above) is the **preferred option** where a filling across the wetland with a small bridge (25m span) at the permanent stream is constructed (Refer Appendix 1.4 - Wetland Crossing Option 1). Mitigation measure include inter alia:

- fill height of approximately 4m;
- 1:2 maximum embankment slopes;
- dump rock foundation to allow for movement of ground water underneath the fill;
- culverts at regular intervals (spaced at 150m) to assist in the drainage of the wetland and to allow crossing point for small animals;
- river training at the bridge structure; and
- erosion protection at the culvert outlet structures.

Option 2 (based on scenario 4 as discussed above) is the **not preferred option** where a bridge spanning the entire wetland is proposed. This option is not feasible from an economic perspective. Environmentally the wetlands will be impacted for either of the options.

» **Impact on heritage:** Cemetery 1 is located 4 meters from the road reserve and approximately 11 meters from the actual road (refer to section 7.3.1 of Appendix 9). Due to design constraints it is not possible to adhere to the 30 meter buffer zone preferred by SAHRA. It is recommended that a reduction of this buffer zone is negotiated with SAHRA based on a CMP (Cultural Management Plan) for the cemetery. The boundary of the cemetery must be pegged out on site with a surveyor and will need to be fenced with an access gate for family members. The social team should consult with the local community to determine the extent of the cemetery prior to being pegged out by the surveyor.

The findings of the specialist studies undertaken within this EIA to assess both the benefits and potential negative impacts anticipated as a result of the proposed project conclude that there are no insurmountable environmental or social constraints that prevent the proposed project from proceeding, provided that the recommended mitigation and management measures are implemented. The project has considered constraints, and is considered to meet the requirements of sustainable development. Environmental specifications for the management of potential impacts are detailed within the draft Environmental Management Programme (EMPr) for the K148 road and is included within **Appendix 10.** With reference to the information available at this planning approval stage in the project cycle, the confidence in the environmental assessment undertaken is regarded as acceptable provided all measures are taken to protect and preserve surrounding environment.

7.4 Overall Recommendation

Envirolution Consulting (Pty) Ltd recommends that the proposed project be considered for approval subject to the following conditions:

- Alternative 1 is implemented as a preferred road alternative from an environmental perspective.
- The draft Environmental Management Programme (EMPr) as contained within Appendix 10 of this report should form part of the contract with the Contractors appointed to construct and maintain the proposed road.
- A 300m buffer around the Near Threatened species within the grazed rocky grassland is recommended.
- Primary rocky grassland was recorded along the existing R103,.where the route cannot deviate to accommodate Declining plant species, these will have to be relocated as per instructions from the GDARD.
- Option 1 Wetland Crossing (based on scenario 3 as recommended by the hydrologist) is the preferred option for the bridge where a filling across the wetland with a small bridge (25m span) at the permanent stream is constructed
- It is recommended that a buffer zone of at least 20 meters should be kept from the ruins as these sites might contain unmarked graves. If this is not possible it is recommended that through the social team a community representative is taken to these areas to show and / or confirm the presence of graves prior to construction. An archival study must be conducted prior to construction to determine the age and history of the ruins if the ruins will be impacted on.
- The boundary of the cemetery must be pegged out on site with a surveyor and will need to be fenced with an access gate for family members. The social team should consult with the local community to determine the extent of the cemetery prior to being pegged out by the surveyor.
- If any protected plant is required to be removed/destroyed as part of the construction of the development, a collection/destruction permit to be obtained GDARD for protected plants.
- A water use license must be obtained from Department of Water Affairs prior to the commencement of construction activities.
- Compile a comprehensive storm-water management method statement, as part of the final design of the project and implement during construction and operation.
- An independent Environmental Control Officer (ECO) must be appointed by the project developer prior to the commencement of any authorised activities.
- Applications for all other relevant and required permits required must be submitted to the relevant regulating authorities.

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