

# Draft Environmental Impact Assessment Report for the Proposed PWV 17 Freeway



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## LIST OF ABBREVIATIONS

**CBD:** Central Business District

**C-Plan:** Conservation Plan

**DEA:** Department of Environmental Affairs

**DFA:** Development Facilitation Act

**DWS:** Department of Water and Sanitation

**EAP:** Environmental Assessment Practitioner

**ECA:** Environmental Conservation Act

**EIA:** Environmental Impact Assessment

**IEMA:** Institute of Environmental Management and Assessment

**EIAR:** Environmental Impacts Assessment Report

**CoT:** City of Tshwane

**EMPr:** Environmental Management Programme

**GAPA:** Gauteng Agricultural Potential Atlas

**GDARD:** Gauteng Department of Agriculture, Conservation and Environment

**GSDF:** Gauteng Spatial Development Framework

**I&AP:** Interested and affected party

**IDP :** Integrated Development Plan

**MOU:** Memorandum of Understanding

**NSBA:** National Spatial Biodiversity Assessment

**NEMA :** National Environmental Management Act

**PoS:** Plan of Study

**SACLAP:** The South African Council of the Landscape Architects Profession

**SAHRA:** South African Heritage Resources Agency

**SR:** Scoping Report

**SDF:** Spatial Development framework

**TIA:** Traffic Impact Assessment

**UNCED :** United Nations Conference on Environment and Development

## GLOSSARY OF TERMS

**Agricultural Hub:** An area identified for agricultural use by GDARD according to the Draft Policy on the Protection of Agricultural Land (2006).

**Alien species:** A plant or animal species introduced from elsewhere: neither endemic nor indigenous.

**Applicant:** Any person who applies for an authorisation to undertake an activity or to cause such activity to be undertaken as contemplated in the National Environmental Management Act (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2006.

**Biodiversity:** The variability among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are apart.

**Conservation of Agricultural Resources Act (Act No. 43 of 1983):** This 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.

**C-Plan:** The GDARD's C-Plan focuses on the mapping and management of biodiversity priority areas within Gauteng. The C-plan includes protected areas, irreplaceable and important sites due to the presence of Red Data species, endemic species and potential habitat for these species to occur. GDARD C- Plan Version 2, 2005.

**Ecology:** The study of the interrelationships between organisms and their environments.

**EIS:** Ecological importance and sensitivity.

**Environment:** All physical, chemical and biological factors and conditions that influence an object and/or organism. Also defined as the surroundings within which humans exist and are made up of the land, water, atmosphere, plant and animal life (micro and macro), interrelationship between the factors and the physical or chemical conditions that influence human health and well-being.

**Environmental Impact Assessment:** Assessment of the effects of a development on the environment.

**Environmental Management Plan:** A legally binding working document, which stipulates environmental and socio-economic mitigation measures that must be implemented by several responsible parties throughout the duration of the proposed project.

**GDARD Draft Ridges Policy, 2001:** According to the GDARD Draft Ridges Policy no development should take place on slopes steeper than 8.8%.

**GDARD Draft Red Data Species Policy, 2001:** A draft policy to assist with the evaluation of development applications that affects Red Data plant species.

**GDARD Requirements for Biodiversity Assessments Version 3, June, 2014:** GDARD requirements for biodiversity assessments.

**National Environmental Management Act (NEMA), 1998 (Act No 107 of 1998):** NEMA provides for co-operative, environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for co-ordinating environmental functions exercised by organs of state; and to provide for matters connected therewith.

**National Environmental Management: Air Quality Act (Act No. 39 of 2004):** The purpose of the Act is "To reform the law regulating air quality in order to protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development; to provide for national norms and standards regulating air quality monitoring, management and control by all spheres of government; for specific air quality measures; and for matters incident thereto".

**National Environmental Management: Biodiversity Act, 2004 (Act No 10 of 2004):** The purpose of the Biodiversity Act is to provide for the management and conservation of South Africa's biodiversity within the framework of the NEMA and the protection of species and ecosystems that warrant national protection. As part of its implementation strategy, the National Spatial Biodiversity Assessment was developed.

**National Environmental Management: Protected Areas Act, 2003 (Act No 57 of 2003):** The purpose of this Act is to provide the protection, conservation and management of

ecologically viable areas representative of South Africa's biological diversity and its natural landscapes.

**National Heritage Resource Act, 1999 (Act No 25 of 1999):** The National Heritage Resources Act legislates the necessity for cultural and heritage impact assessment in areas earmarked for development, which exceed 0.5 ha. The Act makes provision for the potential destruction to existing sites, pending the archaeologist's recommendations through permitting procedures. Permits are administered by the South African Heritage Resources Agency (SAHRA).

**National Veld and Forest Fire Act, 1998 (Act No. 101, 1998):** The purpose of this Act is to prevent and combat veld, forest and mountain fires throughout the Republic. Furthermore the Act provides for a variety of institutions, methods and practices for achieving the prevention of fires.

**National Road Traffic Act, 1996 (Act No. 93 of 1996):** This Act provides for all road traffic matters which shall apply uniformly throughout the Republic and for matters connected therewith.

**National Water Act, 1998 (Act No 36 of 1998):** The purpose of this Act is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled.

**Open Space:** Areas free of building that provide ecological, socio-economic and place-making functions at all scales of the metropolitan area.

**Study Area:** Refers to the entire study area compassing the total area of the land parcels as indicated on the study area map.

**Sustainable Development:** Development that has integrated social, economic and environmental factors into planning, implementation and decision making, so as to ensure that it serves present and future generations.

**Water Services Act, 1997 (Act No 108 of 1997):** The purpose of this Act is to ensure the regulation of national standards and measures to conserve water.

## 1 INTRODUCTION, BACKGROUND AND WAY FORWARD

### 1.1 Introduction

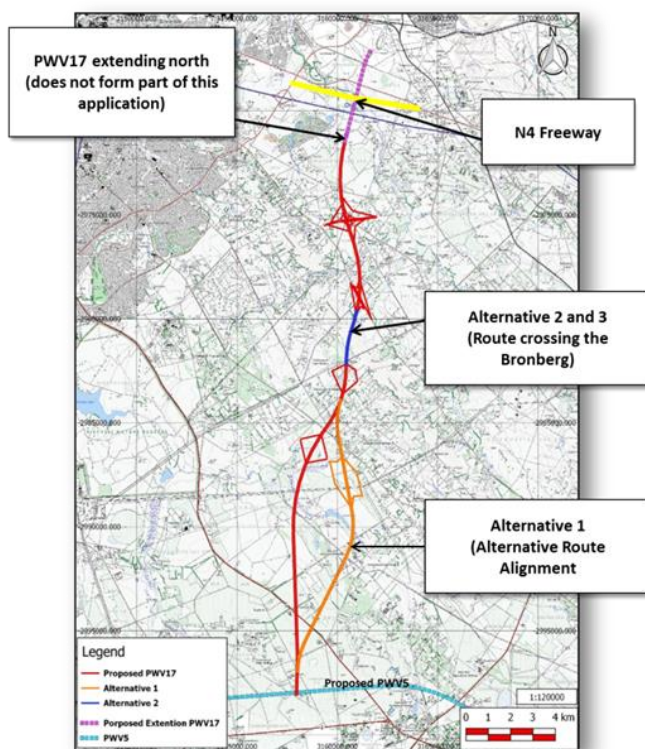
The application is made for authorization of the design and construction of the proposed **PWV 17** freeway. The freeway will join the future planned PWV 5 road at a point located south of Delmas Road and east of Elandsfontein Road on Portion 75 of the Farm Elandsfontein 412 JR. It will then extend northwards intersecting the following roads: Garsfontein Road either on Portion 1 of the Farm Grootfontein 394 JR or Portions 2, 28, 245 and 235 of the Farm Tiegerpoort 371 JR; Graham Road on Portion 299 and Remainder of Portion 250 of the Farm Zwavelpoort 373 JR and Boschkop Road on Portions 43 and 34 of the Farm Zwavelpoort JR, which falls within the area of jurisdiction of the City of Tshwane Metropolitan Municipality. The section of the PWV17 road which forms part of this application terminates at a point east of Silverlakes Drive and south of the N4 on the Farm Zwartkoppies 364. The section of the proposed PWV17 road, which extends northwards, intersecting the N4 does not form part of this application (**Refer to Figure 1: Locality Map and Figure 2: Aerial Map**).

The freeway as described in this application specifically terminates a certain distance away from the N4 in order to allow some space for the future interchange across the freeway. The EIA process for the proposed interchange across the N4 and for the section of the freeway to the north of the N4 will only be conducted when the need arises for the finalisation of the design and construction of this section of the freeway.

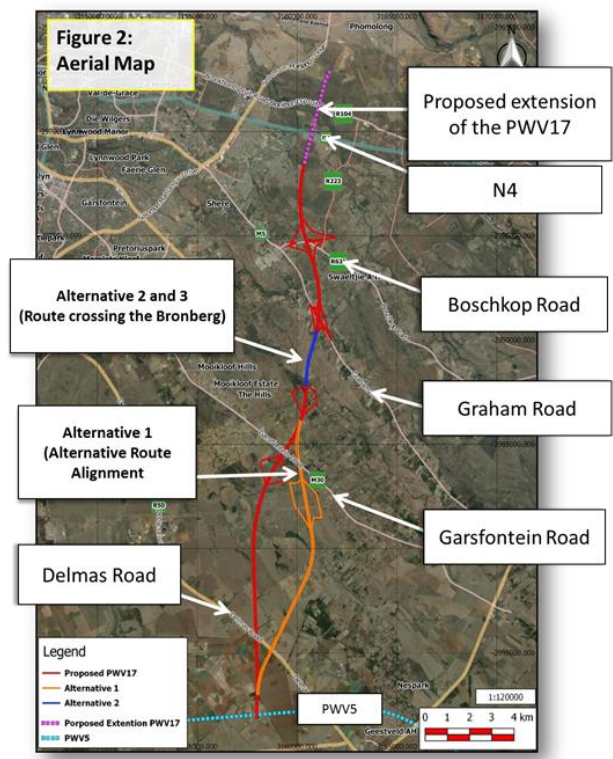
The purpose of the proposed PWV 17 is to provide a freeway consisting of three (3) lanes in each direction as part of a planned freight route, which will eventually connect Heidelberg with Limpopo Province.

As in the case on most other provincial and national roads, the proposed PWV 17 road will be constructed in phases. The section of the PWV 17 freeway that will be discussed in the EIA Report is approximately 24,6km in extent and the northern segment of the freeway (the piece between the N4 freeway and Garstfontein Road (K50)) is regarded as the priority phase, because this segment cuts through an urban area with high traffic volumes and development pressure. The anticipated construction timeframe for this phase is between 5 years and 15 years.

The southern segment of the freeway (the piece between Garstfontein Road (K50) and the proposed PWV 5) is not currently a priority, because this section of the freeway runs through rural areas with less development pressure and lower traffic volumes. At this stage, it is not foreseen that this section of the freeway will be constructed within the next 15 – 20 years.



**Figure 1 – Locality Map**



**Figure 2 – Aerial Map**



**Note: Enlarged copies of the figures inserted in between the text below are included in Annexure A of this report**

## **1.2 Provincial and National Road Planning in Gauteng**

During the mid-seventies, Gautrans compiled a grid road network covering the traditional PWV area. The grid network concept was based on a road hierarchy system comprising of a range of mobility and access routes for Gauteng Province and the PWV17 which plays an important role in achieving these objectives.

The involved section of the PWV17 lies in the quarter degree grid square 2528CD and stretches in a south-north direction from the proposed PWV5 road north of the R25 and south of Delmas Road on Portion 75 of the Farm Elandsfontien 412. The PWV17 has been on the Gauteng planning maps since the 1970's. Due to the fact that significant social mobilization has been experienced against the proposed alignment, many alignment alternatives, including the no-go alternative have already been considered in various road planning reports compiled by the former PWV Consortium and representatives of Gautrans.

According to the Gauteng 25-year Integrated Transport Master Plan, the Gauteng road network remains one of the most important infrastructure assets of the province that underpins and support local economic growth and the resultant growth in job opportunities within the identified corridors and nodes. It also identifies the PWV17 route as a Class 1 Priority Road.

The Gauteng 5-year Transport Implementation Plan, 2013 (GTIP5) sets out an implementation plan of key intervention projects based on a detail analysis of the current planning and construction projects in Gauteng as a precursor to achieving the 25 Year - Integrated Transport Master Plan (ITMP25) goals and objectives. The GTIP5 recognises that the PWV 17 project will enable freight flows around core urban areas and central

business districts, as well as provide for adequate connectivity to major freight intermodal facilities.

The long terms plan is to establish a freight route, which will eventually connect Heidelberg with Limpopo Province. In the medium term the proposed freeway will connect the East Rand with the Eastern Suburbs of Pretoria and in the short term the section of the freeway between the N4 (in the north) and Garstfontein Road (the K50) can be implemented to assist with the alleviation of traffic problems on the N1 and other congested roads in the eastern suburbs.

The proposed alignment of the PWV17 was included in the Gauteng Strategic Road Network Review- 2010, subsequently reviewed again in 2013, and is protected in terms of the Gauteng Transport Infrastructure Act, 2001 (Act 8 of 2001). This Act in essence protects all roads that have been proclaimed, thus it protects the PWV17 which forms part of the proclaimed Gauteng Strategic Road Network. ***(Refer to Figure 3: Gauteng Road Network). The Act provides for the protection of the PWV17 route from any development which may affect it/be affected by it.***

**Important:** The alleviation of traffic on local and provincial roads is however not the long-term purpose of this freeway and it will therefore be necessary for the provincial and local authorities to plan the surrounding local and provincial roads in such a way that the various roads with their various hierarchy's and roles become an integral part of the road masterplan for the larger area.

Freeways (PWV-routes) are spaced at an 8 km to 12 km grid, while major arterials (K-routes) are spaced at approximately 1, 8 km to 2, 4 km intervals. Minor arterials and collector roads are again linked to the K-routes at 600m or larger intervals to complete the higher order road network.

This EIA report represents a completely new EIA Process followed in terms of the 2014 NEMA EIA Regulations, but it will take the history of the proposed road as well as the most viable and recent alignment alternatives identified (including the published alignment) into consideration.

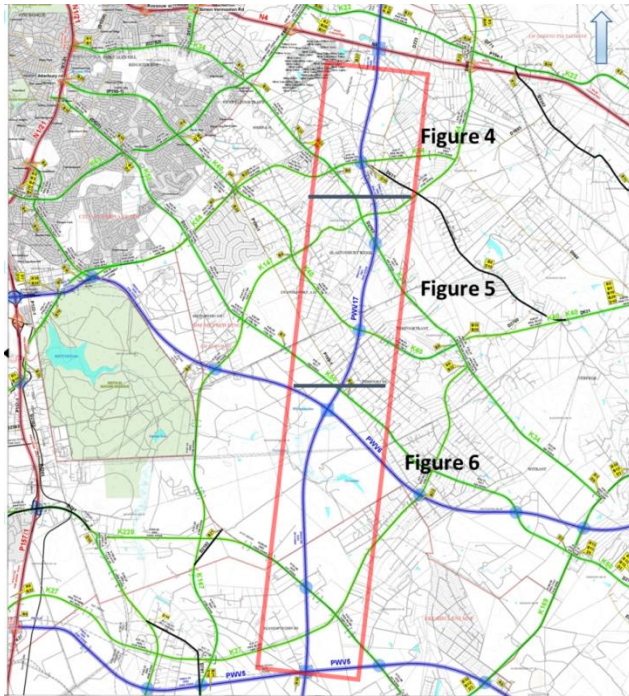
For purpose of the scoping phase, Hatch Goba Engineers and Bokamoso compiled, based on the history of the road, a combined alternative map with at least **four (4)** workable alternatives<sup>1</sup>. The intention was to compare such alignment alternatives with each other (mainly on a desktop level) during the scoping phase and to eliminate the least preferred alternative/s (from a social, ecological, economical and institutional point of view) already at this early stage.

This early comparative assessment process was based on data collected from former reports (road history reports, route determination reports, environmental scans, scoping reports etc.) and from studies conducted for surrounding developments and due to similarities in the data and the dovetailing of some of the information, such data was regarded as accurate for usage during the preliminary elimination of the least preferred alternatives.

During the EIA phase one alternative, namely Alternatives 4 was regarded as the least preferred alternative and therefore such an alternative was already eliminated during the scoping phase. For purpose of this EIA only alternatives 1, 2 and 3 were assessed in more detail. **Refer to Figures 1 and 2 above**

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<sup>1</sup> Alternative 4/ the Alternative to the eastern side of the neighborhood of Grootfontein Country Estate was proposed by one of the land-owners, Elizabeth S.N. Bremer De Sa



**Figure 3 – Strategic Road Review Holistic/Gauteng Grid Road Network System (Key Map) – Blue route is the published route**

At present, there is endless confusion and ambiguity (mainly amongst affected land-owners) regarding the alignment of the PWV17 and this on-going uncertainty has a significant impact on land-use planning and property values in the area. Many surrounding land-owners already have development plans for their properties and are aware of the fact that the published alignment (as published in terms of the Gauteng Infrastructure Act) is not necessarily the Gautrans preferred alignment for the involved section of the PWV17 and this creates even more confusion and hampers the finalisation of such development plans, frameworks etc. for the area, especially since the Gauteng Infrastructure Act requires that all development plans take the Gauteng

Road Network Planning into consideration. **(Refer to figures 1 and 2 above – The Red-Blue-Red combined alignment on the map represents the original published alignment and the Orange-Red-Blue-Red combined alignment for which the southern section was re-aligned to run more to the east, represents Alignment Alternative 1 as investigated and determined in a former environmental scan. The blue section of the alignment represents 2 vertical alignment alternatives for the Bronberg Crossing – the 1 alternative is to align the freeway across the Bronberg Mountain and this will involve extensive cutting and filling exercises and the 2<sup>nd</sup> alternative represents the tunnelling of the freeway through the Bronberg, which is regarded as ecologically sensitive).**

### 1.3 Details of the EIA Application Process Followed

The application is made in terms of Government Notices No. R982 published in the Government Gazette No. 38282 of 04 December 2014, of the National Environmental Management Act, 1998 (Act No. 107 of 1998) governing Environmental Impact

Assessment Procedures (Notice 1, 2 & 3 – Government Notices R983, R984 & R985). Take note that the EIA Regulations were amended in 2017 and therefore such amendments were also taken into consideration for this EIA application.

According to the above-mentioned Regulations and Notices, an Environmental Impact Assessment (EIA) Process is required for the above-mentioned project, due to the following listed activity/ activities:

**Table 1: Listed activities in terms of Notice No. R 983, R984 and R985**

**(The applicable section of activities are indicated in bold and underlined)**

<b>Notice No. R983 (Listing Notice 1)</b>		
<b>R. 983, December 2014</b>	<b>Activity 12</b>	<p>The development of-</p> <p>(i) canals exceeding 100 square metres in size;</p> <p><b>(ii) channels exceeding 100 square metres in size;</b></p> <p><b>(iii) bridges exceeding 100 square metres in size;</b></p> <p>(iv) dams, where the dam, including infrastructure and water surface area, exceeds 100 square metres in size;</p> <p>(v) weirs, where the weir, including infrastructure and water surface area, exceeds 100 square metres in size;</p> <p>(vi) bulk storm water outlet structures exceeding 100 square metres in size;</p> <p>(vii) marinas exceeding 100 square metres in size;</p> <p>(viii) jetties exceeding 100 square metres in size;</p> <p>(ix) slipways exceeding 100 square metres in size;</p> <p>(x) buildings exceeding 100 square metres in size;</p> <p>(xi) boardwalks exceeding 100 square metres in size; or</p> <p><b>(xii) infrastructure or structures with a physical footprint of 100 square metres or more;</b></p> <p>where such development occurs-</p> <p><b>(a) within a watercourse;</b></p>

		<p>(b) in front of a development setback; or</p> <p><b>(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; -</b></p> <p>excluding-</p> <p>(aa) the development of infrastructure or structures within existing ports</p> <p>or harbours that will not increase the development footprint of the port or harbour;</p> <p>(bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies;</p> <p>(cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies;</p> <p>(dd) where such development occurs within an urban area; or</p> <p>(ee) where such development occurs within existing roads or road reserves.</p>
R. 983, December 2014	Activity 19	<p><b>The infilling or depositing of any material of more than 5 [10]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-</b></p> <p><b>(i) a watercourse;</b></p> <p>(ii) the seashore; or</p> <p>(iii) the littoral active zone, an estuary or a distance of 100 meters inland of the high-water mark of the sea or an estuary, whichever distance is the greater but</p> <p>excluding where such infilling, depositing, dredging, excavation, removal or moving-</p> <p>(a) will occur behind a development setback;</p> <p>(b) is for maintenance purposes undertaken in accordance with a maintenance management plan; or</p> <p>(c) falls within the ambit of activity 21 in this Notice, in which case that activity applies.</p>
R. 983, December 2014	Activity 21	<p>Any activity including the operation of that activity which requires a mining permit in terms of section 27 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including associated infrastructure, structures and earthworks directly related to the extraction of a mineral resource, including activities for which an exemption has been issued in terms of section 106 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of</p>



		2002).  <b>Even though borrow pits will most probably be required for the sourcing of road construction materials, the exact localities and sizes of the proposed borrow pits are not yet available. The borrow pit applications will therefore be treated as separate applications and such mining activities will be submitted to the Department of Mineral Resources (DMR) as soon as more information becomes available.</b>  <b>Activity 21 will thus be excluded from this EIA application</b>
R. 983, December 2014	Activity 24	The development of-  (i) a road for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or  (ii) a road with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;  but excluding-  (a) roads which are identified and included in activity 27 in Listing Notice 2 of 2014; or  (b) roads where the entire road falls within an urban area.  <b>(Not Applicable - Activity 27 of R984 applies)</b>
<b>Notice No. R984 (Listing Notice 2)</b>		
R. 984, December 2014	Activity 15	The clearance of an area of 20 hectares or more of indigenous vegetation, <b>excluding</b> where such clearance of indigenous vegetation is required for-  (i) the undertaking of a linear activity; or  (ii) maintenance purposes undertaken in accordance with a maintenance management plan.  <b>(Not applicable – Application is made for a linear activity)</b>
R. 984, December 2014	Activity 27	The development of -  (i) a national road as defined in section 40 of the South African National Roads Agency Limited and National Roads Act, 1998 (Act No. 7 of 1998);  (ii) a road administered by a provincial authority;  (iii) a road with a reserve wider than 30 metres; or  (iv) a road catering for more than one lane of traffic in both directions;  but excluding the development and related operation of a road for which an environmental authorisation was obtained for the route

		determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010, in which case activity 24 in Listing Notice 1 of 2014 applies.	
<b>Notice No. R985 (Listing Notice 3)</b>			
<b>R. 985, December 2014</b>	<b>Activity 4</b>	The development of a road wider than 4 meters with a reserve less than 13,5 meters	<p>c) In Gauteng:</p> <ul style="list-style-type: none"> <li>i. A protected area identified in terms of NEMPAA, excluding conservancies;</li> <li>ii. National Protected Area Expansion Strategy Focus Areas;</li> <li>iii. Gauteng Protected Area Expansion Priority Areas;</li> <li><b>iv. Sites identified as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans;</b></li> <li>v. Sites identified within threatened ecosystems listed in terms of the National Environmental Management Act: Biodiversity Act (Act No. 10 of 2004);</li> <li>vi. Sensitive areas identified in an environmental management framework adopted by relevant environmental authority;</li> <li><b>vii. Sites identified as high potential agricultural land in terms of Gauteng Agricultural Potential Atlas;</b></li> <li><b>viii. Important Bird and Biodiversity Area (IBA);</b></li> <li><b>ix. Sites or areas identified in terms of an International Convention;</b></li> <li>x. Sites managed as protected areas by provincial authorities, or declared as nature reserves in terms of the Nature Conservation Ordinance (Ordinance 12 of 1983) or the National Environmental Management: Protected Areas Act (Act No. 57 of 2003);</li> <li>xi. Sites designated as nature reserves within municipal SDFs; or</li> <li>xii. Sites zoned for a conservation or public open space or equivalent zoning.</li> </ul> <p><b>If is requested that GDARD confirm</b></p>

			<p><b>whether the affected section of the Bronberg Mountain Range is a declared protected area/ proclaimed natural environment in terms of the Protected Area Act. GDARD to confirm whether this listed activity is applicable.</b></p>
<p><b>R. 985, December 2014</b></p>	<p><b>Activity 12</b></p>	<p>The clearance of an areas of 300 square meters or more of Indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a management plan.</p>	<p><b>(d) In Gauteng:</b></p> <p>i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;</p> <p><b>ii. Within critical biodiversity areas identified in bioregional plans;</b></p> <p>iii. Within the littoral active zone or 100 metres inland from high water mark of the sea or an estuarine functional zone, whichever distance is the greater, excluding where such removal will occur behind the development setback line on erven in urban areas; or</p> <p>iv. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.</p> <p><b>It is requested that GDARD confirm whether the affected section of the Bronberg Mountain Range is an endangered ecosystem listed in terms of section 52 of the NEMBA.</b></p> <p><b>GDARD to confirm whether this listed activity is applicable.</b></p>
<p><b>R. 985, December 2014</b></p>	<p><b>Activity 14</b></p>	<p>The development of-</p> <p>(ii) channels exceeding 10 square metres in size;</p> <p>(xii) bridges exceeding 10 square metres in size;</p> <p>(ix) slipways exceeding 10 square metres in</p>	<p><b>(b) In Gauteng:</b></p> <p>i. A protected area identified in terms of NEMPAA, excluding conservancies;</p> <p>ii. National Protected Area Expansion Strategy Focus Areas;</p> <p>iii. Gauteng Protected Area Expansion Priority Areas;</p> <p><b>iv. Sites identified as Critical Biodiversity Areas (CBAs) and Ecological Support</b></p>

		<p>size;</p> <p>(xii) infrastructure or structures with a physical footprint of 10 square metres or more</p>	<p><b>Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans; -</b></p> <p>v. Sites identified within threatened ecosystems listed in terms of the National Environmental Management Act: Biodiversity Act (Act No. 10 of 2004);</p> <p>vi. Sensitive areas identified in an environmental management framework adopted by relevant environmental authority;</p> <p>vii. Sites or areas identified in terms of an International Convention</p> <p>viii. Sites managed as protected areas by provincial authorities, or declared as nature reserves in terms of the Nature Conservation Ordinance (Ordinance 12 of 1983) or the National Environmental Management: Protected Areas Act (Act No. 57 of 2003);</p> <p>ix. Sites designated as nature reserves within municipal SDFs; or</p> <p>x. Sites zoned for conservation or public open space or equivalent zoning</p> <p><b>It is requested that GDARD confirm whether the affected section of the Bronberg Mountain Range is an endangered ecosystem listed in terms of section 52 of the NEMBA.</b></p> <p><b>It is requested that GDARD confirm whether the affected section of the Bronberg Mountain Range is a declared protected area/ proclaimed natural environment in terms of the Protected Area Act.</b></p> <p><b>GDARD to confirm whether this listed activity is applicable.</b></p>
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Since the proposed development includes listed activities from No. R983, No. R984 and No. R985, an application for a full EIA process was lodged at the Gauteng Department of

Agriculture and Rural Development (GDARD). The reference number **Gaut: 002/16-17/E0242** had been assigned to the application.

We perused the Amended 2017 NEMA EIA Regulations and the listed activities in the amended 2017 EIA Regulations are very similar to the listed activities as supplied in the 2014 NEMA EIA Regulations.

We included the applicable 2017 listed activities in order to illustrate the listed activities that will most probably be triggered in terms of such Regulations (**Refer to Table 2 below**). The activities identified are very similar to the activities applied for in terms of the 2014 NEMA EIA Regulations and we therefore feel confident that all the activities as listed have been assessed.

**Table 2: Listed activities in terms of Notice No. R 326**

<b>Notice No. R327 (Listing Notice 1)</b>		
<b>R. 327, April 2017</b>	<b>Activity 12</b>	<p>The development of-</p> <p>(i) canals exceeding 100 square metres in size;</p> <p><b>(ii) channels exceeding 100 square metres in size;</b></p> <p><b>(iii) bridges exceeding 100 square metres in size;</b></p> <p>(iv) dams, where the dam, including infrastructure and water surface area, exceeds 100 square metres in size;</p> <p>(v) weirs, where the weir, including infrastructure and water surface area, exceeds 100 square metres in size;</p> <p>(vi) bulk storm water outlet structures exceeding 100 square metres in size;</p> <p>(vii) marinas exceeding 100 square metres in size;</p> <p>(viii) jetties exceeding 100 square metres in size;</p> <p>(ix) slipways exceeding 100 square metres in size;</p> <p>(x) buildings exceeding 100 square metres in size;</p> <p>(xi) boardwalks exceeding 100 square metres in size; or</p> <p><b>(xii) infrastructure or structures with a physical footprint of 100 square metres or more;</b></p>

		<p>where such development occurs-</p> <p><b>(a) within a watercourse;</b></p> <p>(b) in front of a development setback; or</p> <p><b>(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; -</b></p> <p>The development of—</p> <p>i. dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or</p> <p>ii. infrastructure or structures with a physical footprint of 100 square metres or more;</p> <p>where such development occurs—</p> <p>(a) within a watercourse;</p> <p>(b) in front of a development setback; or</p> <p>(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; —</p> <p>excluding—</p> <p>(aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour;</p> <p>(bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies;</p> <p>(cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies;</p> <p>(dd) where such development occurs within an urban area; [or]</p> <p>(ee) where such development occurs within existing roads, [or] road reserves or railway line reserves; or</p> <p>(ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared</p>
<p><b>R. 327, April 2014</b></p>	<p><b>Activity 19</b></p>	<p><b>The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from-</b></p> <p><b>(i) a watercourse;</b></p> <p>(ii) the seashore; or</p> <p>(iii) the littoral active zone, an estuary or a distance of 100 metres</p>



		<p><i>inland of the high-water mark of the sea or an estuary, whichever distance is the greater</i></p> <p><i>but excluding where such infilling, depositing, dredging, excavation, removal or moving-</i></p> <p><i>(a) will occur behind a development setback;</i></p> <p><i>(b) is for maintenance purposes undertaken in accordance with a maintenance management plan; or</i></p> <p><b>(c) falls within the ambit of activity 21 in this Notice, in which case that activity applies.</b></p> <p><i>(d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or</i></p> <p><i>(e) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies</i></p>
R. 327, April 2017	Activity 21	<p>Any activity including the operation of that activity which requires a mining permit in terms of section 27 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including -</p> <p><i>(a) associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource; or including activities for which an exemption has been issued in terms of section 106 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)]</i></p> <p><i>(b) the primary processing of a mineral resource including winning, extraction, classifying, concentrating, crushing, screening or washing;</i></p> <p><i>but excluding the secondary processing of a mineral resource, including the smelting, beneficiation, reduction, refining, calcining or gasification of the mineral resource in which case activity 6 in Listing Notice 2 applies.</i></p> <p><b>Even though borrow pits will most probably be required for the sourcing of road construction materials, the exact localities and sizes of the proposed borrow pits are not yet available. The borrow pit applications will therefore be treated as separate applications and such mining activities will be submitted to the Department of Mineral Resources (DMR) as soon as more information becomes available.</b></p> <p><b>Activity 21 will thus be excluded from this EIA application</b></p>
R. 327, April 2017	Activity 24	<p>The development of-</p> <p><i>(i) a road for which an environmental authorisation was obtained</i></p>

		<p>for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or</p> <p><b>(ii) a road with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;</b></p> <p>but excluding-</p> <p><b>(a) roads which are identified and included in activity 27 in Listing Notice 2 of 2014;</b> or</p> <p>(b) roads where the entire road falls within an urban area; or</p> <p>(c) which is 1 kilometre or shorter.</p> <p><b>(Not Applicable - Activity 27 of R984 applies)</b></p>
<b>Notice No. R325 (Listing Notice 2)</b>		
<b>R. 325, April 2017</b>	<b>Activity 15</b>	<p>The clearance of an area of 20 hectares or more of indigenous vegetation, <b>excluding</b> where such clearance of indigenous vegetation is required for-</p> <p><b>(i) the undertaking of a linear activity;</b> or</p> <p>(ii) maintenance purposes undertaken in accordance with a maintenance management plan.</p> <p><b>(Not applicable – Application is made for a linear activity)</b></p>
<b>R. 325, April 2017</b>	<b>Activity 27</b>	<p>The development of -</p> <p>(i) a national road as defined in section 40 of the South African National Roads Agency Limited and National Roads Act, 1998 (Act No. 7 of 1998);</p> <p><b>(ii) a road administered by a provincial authority;</b></p> <p><b>(iii) a road with a reserve wider than 30 metres; or</b></p> <p><b>(iv) a road catering for more than one lane of traffic in both directions;</b></p> <p>but excluding the development and related operation of a road —</p> <p>(a) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010, in which case activity 24 in Listing Notice 1 of 2014 applies;</p> <p>(b) which is 1 kilometre or shorter; or</p> <p>(c) where the entire road falls within an urban area.</p>
<b>Notice No. R324 (Listing Notice 3)</b>		
<b>R. 324, April</b>	<b>Activity 4</b>	<p>The development of a</p> <p>c) In Gauteng:</p>

<p><b>2017</b></p>		<p>road wider than 4 metres with a reserve less than 13,5 metres</p>	<p>i. A protected area identified in terms of NEMPAA, excluding conservancies;</p> <p>ii. National Protected Area Expansion Strategy Focus Areas;</p> <p>iii. Gauteng Protected Area Expansion Priority Areas;</p> <p><b>iv. Sites identified as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans;</b></p> <p>v. Sites identified within threatened ecosystems listed in terms of the National Environmental Management Act: Biodiversity Act (Act No. 10 of 2004);</p> <p>vi. Sensitive areas identified in an environmental management framework adopted by relevant environmental authority;</p> <p><b>vii. Sites identified as high potential agricultural land in terms of Gauteng Agricultural Potential Atlas;</b></p> <p><b>viii. Important Bird and Biodiversity Area (IBA);</b></p> <p><b>ix. Sites or areas identified in terms of an International Convention;</b></p> <p>x. Sites managed as protected areas by provincial authorities, or declared as nature reserves in terms of the Nature Conservation Ordinance (Ordinance 12 of 1983) or the National Environmental Management: Protected Areas Act (Act No. 57 of 2003);</p> <p>xi. Sites designated as nature reserves within municipal SDFs; or</p> <p>xii. Sites zoned for a conservation or public open space or equivalent zoning.</p> <p><b>It is requested that GDARD confirm whether the affected section of the Bronberg Mountain Range is a declared protected area/ proclaimed natural environment in terms of the Protected Area Act. GDARD to confirm whether this listed activity is applicable.</b></p>
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R. 324, April 2017	Activity 12	The clearance of an areas of 300 square meters or more of Indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a management plan.	<p><b>(d) In Gauteng:</b></p> <p>i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;</p> <p><b>ii. Within critical biodiversity areas identified in bioregional plans; or</b></p> <p>iii. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.</p>
R. 324, April 2017	Activity 14	<p>The development of —</p> <p>(i) canals exceeding 10 square metres in size ;</p> <p>(ii) channels exceeding 10 square metres in size;</p> <p>(iii) bridges exceeding 10square metres in size;</p> <p>(iv) dams, where the dam, including infrastructure and water surface area exceeds 10 square metres in size;</p> <p>(v) weirs, where the weir, including infrastructure and water surface area exceeds 10 square metres in size;</p> <p>(vi) bulk storm water outlet structures exceeding 10 square metres in size;</p> <p>(vii) marinas exceeding 10 square metres in size;</p> <p>(iv) dams, where the dam, including</p>	<p><b>(b) In Gauteng:</b></p> <p>i. A protected area identified in terms of NEMPAA, excluding conservancies;</p> <p>ii. National Protected Area Expansion Strategy Focus Areas;</p> <p>iii. Gauteng Protected Area Expansion Priority Areas;</p> <p><b>iv. Sites identified as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans; -</b></p> <p>v. Sites identified within threatened ecosystems listed in terms of the National Environmental Management Act: Biodiversity Act (Act No. 10 of 2004);</p> <p>vi. Sensitive areas identified in an environmental management framework adopted by relevant environmental authority;</p> <p>vii. Sites or areas identified in terms of an International Convention</p> <p>viii. Sites managed as protected areas by provincial authorities, or declared as nature reserves in terms of the Nature Conservation Ordinance (Ordinance 12 of 1983) or the National Environmental Management: Protected Areas Act (Act No. 57 of 2003);</p> <p>ix. Sites designated as nature reserves</p>

		<p>infrastructure and water surface area exceeds 10 square metres in size;</p> <p>(v) weirs, where the weir, including infrastructure and water surface area exceeds 10 square metres in size;</p> <p>(vi) bulk storm water outlet structures exceeding 10 square metres in size;</p> <p>(vii) marinas exceeding 10 square metres in size;</p> <p>(viii) jetties exceeding 10 square metres in size;</p> <p>(ix) slipways exceeding 10 square metres in size;</p> <p>(x) buildings exceeding 10 square metres in size;</p> <p>(xi) boardwalks exceeding 10 square metres in size; or</p> <p>(xii) infrastructure or structures with a physical footprint of 10 square metres or more;</p> <p>(i) dams or weirs, where the dam or weir including infrastructure. and water surface area exceeds 10 square metres; or</p> <p>(ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs—</p> <p>(a) within a</p>	<p>within municipal SDFs; or</p> <p>x. Sites zoned for conservation or public open space or equivalent zoning</p> <p><b>It is requested that GDARD confirm whether the affected section of the Bronberg Mountain Range is an endangered ecosystem listed in terms of section 52 of the NEMBA.</b></p> <p><b>It is requested that GDARD confirm whether the affected section of the Bronberg Mountain Range is a declared protected area/ proclaimed natural environment in terms of the Protected Area Act.</b></p> <p><b>GDARD to confirm whether this listed activity is applicable.</b></p>
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		<p>watercourse;</p> <p>(b) in front of a development setback; or</p> <p>(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;</p> <p>excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour</p>	
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#### 1.4 Historical Background of the Road

The original route proposal for **Road PWV17** was published by the PWV Consortium in 1974. The route originally crossed through the natural Swavelpoort, which was situated in a green belt. This led to a relocation of the proposed route in 1975 to cross the Bronberg though a 35m deep open cut. The route was later deviated further to the south of the mountain range for the systems interchange with the proposed PWV6 route.

Five separate letters of proposals were later received by farmers and their attorneys about the PWV17 dividing their properties. These requests were considered in the scoping and planning phase.

The then Department of Nature Conservation of the Transvaal Province suggested that the route should go through a tunnel instead of an open cut, but geological conditions

of the area made this suggestion impossible. Furthermore, the Bantu Administration of Central Transvaal requested that the Mamelodi hinterland be avoided. After discussions with the Director of the Board and town planners, it was confirmed to avoid the floodplains and marshes.

Further investigations were made to ensure safety when travelling on the PWV17 route due to black townships unrest in July 1976. The result was a crossing through a proposed railway interchange, which was discussed with the South African Railways. The proposal was accepted, which resulted in a route 700m longer than originally planned for. The route could then serve as a buffer between the road and the Mamelodi Township so that the land west of the railway is available for black housing projects. The Bantu Administration accepted the proposal.

The original alignment as contained in the Route Determination Report of 17 August 1976 was listed in the Extraordinary Government Gazette No. 331 (Notice 2625 of 2003). Gauteng Department of Roads and Transport finalised the 25-Year Integrated Transport Master Plan for Strategic Road Networks in November of 2013. The PWV17 is listed as one of the top 20 Class 1 Priority roads as a link between the N3 and N4 Maputo corridor through Ekurhuleni. Consideration may be given to linking the N3 south of Heidelberg to the N4 Maputo corridor south of Roodeplaat Dam.

This will create a linkage between the Durban harbour and the N4 corridor (to link to localities such as Brits and Rustenburg), bypassing the Johannesburg and Tshwane metropolitan areas. This link will also provide the strong industrial sector of Ekurhuleni to directly access the N4 corridor. This will require this link to be designed for freight haulage. In particular, this freight route will pass the Sentrarand rail junction, which was earmarked by Spoornet to become a future alternative container depot to City Deep.

This freeway will facilitate road to rail transfer at Sentrarand. The proposed link between the N3 and the N4 freeway will also improve the linkage to former settlements of exclusion. The alignment of this road will pass the settlements of Kwa-Thema, Tshakane and Daveyton, located in the Ekurhuleni Municipality, and Mamelodi, located in the Tshwane Municipality.

The planned PWV17 freeway alignment will be suited for the proposed link between the N3 and N4 freeway, as it links all the settlements and industrial areas mentioned above. Accepting the PWV17 as the appropriate link will require National Government to consider the PWV17 to be an extension of the N4 corridor.

In order to ensure that an optimum alignment for the PWV17 is taken into consideration during development planning and in reaction to environmental considerations, Gautrans embarked on a review for the route determination between PWV5 in the south and the Pienaars River north of the N4. In terms of the ECA EIA Regulations, which came into effect in September 1997, the preliminary design of the PWV17 provincial road qualified for an Environmental Impact Assessment (EIA) and consequently Plan Associates was appointed to compile and submit the required environmental scan.

Although many alternative alignments were investigated, the section south of the Bronberg is relatively fixed. Preliminary design for the interchange between the PWV17 and N4 freeway and the PWV17 to the north of the interchange has been completed already. Two alternative alignments were considered in the sensitive Bronberg. One alternative runs through Zwavelpoort, while the other necessitates the tunnelling of the PWV17 through the Bronberg. From an environmental perspective, the tunnelling of the route through the Bronberg was considered as the preferred alternative. Nevertheless, open cutting is less expensive.



The above-mentioned Scanning Report indicated that the Kungwini Local Municipality is in favour of the development of the Western Kungwini area due to its close proximity to Tshwane urban areas and the ability to increase rates and taxes income. Also, the area is earmarked for development and further urbanisation.

The Gauteng Environmental Management Framework (GEMF) indicates that no development should occur on ridges, irreplaceable areas and areas with moderate agricultural potential. All developments are to take environmental aspects into consideration. It is important to note that Tshwane is expected to expand towards the western sections of Kungwini. Once urbanisation takes place in the western sections of Kungwini, subdivision and rezoning will be put into place. Should the proposed PWV17 alignment be in place at that time, it would be possible to do future planning for expansion of the PWV17 which would create opportunities for commercial, residential and tourism related developments to occur.

The report dated November 2005 documented the findings of the above-mentioned investigations. Refer to **Annexure M** for a copy of the environmental scan that concluded that the alignment of PWV17 is a necessity for future urban expansion.

### **1.5 Legislative Requirements for Provincial Road Applications**

The Environmental Impact Management Guideline document published by the Department of Environmental Affairs and Tourism in April, 1998 identified the activity of the planning and construction of a provincial road numbered and administered by a provincial authority as a potentially detrimental activity that needs to be investigated. In Regulation 1182, Schedule 1 (c) and (d) of the former EIA Regulations and in Part 4 of the National Environmental Management Act (Act 107 of 1998), the construction and upgrading of transportation routes were identified as specific listed activities, which required that the EIA process be followed. However, the fact that road planning consists

of various planning phases (network planning phase, route determination phase, preliminary design phase and the detail design phase) made it difficult for authorities, applicants and environmental consultants to determine the specific EIA process (scoping/ EIA) required for each planning phase.

As a consequence, Gautrans and the Department of Agriculture, Conservation Environment and Land Affairs (GDARD) agreed (in a Memorandum of Understanding (MOU)) that an Environmental Scan be conducted for the Route Determination Stage, that a Scoping Report be conducted for the Preliminary Design Stage and that an EIA Report be compiled for the Detail Design Stage of each provincial road. Although the Scoping and EIA reports were a requirement of the former EIA Regulations, the environmental scan report required for the route determination phase of a road was not a requirement of the EIA process.

*The environmental scan was however added to the road planning process to assist with the determination and identification of the most significant environmental issues and "fatal flaws" before entering into the costly preliminary and detailed design stages of roads. The MOU also required that a Road History Report, which supplies the history and background of the road applied for, be included as part of the specific road report submitted to the authorities for evaluation. The purpose of the road history report was to supply the planning history of a specific road to GDARD, because the network planning for the Gauteng Roads already commenced more than 30 years ago and all the roads on the network plan are at different planning stages and different levels of engineering and environmental reports have been compiled for the various roads.*

The MOU as discussed above was however compiled when the former ECA EIA Regulations were still in place and is no longer regarded as applicable. The road history report and the scans that were conducted in terms of the former agreements and processes however supplied an excellent basis for this new EIA process.

Another aspect that has to be taken into consideration is the fact that Gautrans revisited the Gautrans Road Network in 2013 in an attempt to re-align the environmental sensitivities (as reflected in the GDARD C-Plan) with the road network system which has already been determined in the 1970's. The document compiled for the purpose of this road review is named the "Review of the Strategic Road Network for Gauteng" May 2010. Note that Alignments 1 (the original alignment as published) and 4 are both indicated on the Strategic Road Network Map for Gauteng, which has been compiled in 2010.

Even though the authorities compiled the revised network map which will act as guideline for planning in the area, the proposed road planning phases still qualifies for an EIA process in terms of the Amended 2014 NEMA EIA Regulations. As already mentioned an Environmental Impact Assessment Process is required for the route determination phase of the involved section of the PWV17.

This Environmental Impact Assessment Report (EIAR) has been prepared to comply with Section 24 of the National Environmental Management Act (NEMA), 1998 (Act 107 of 1998).

The Gauteng Department of Agriculture, Conservation and Environment (GDARD) approved the Plan of Study for Environmental Impact Assessment (EIA) and Scoping Report for EIA, which was submitted by Bokamoso Landscape Architects and Environmental Consultants and approved by the Department on 28 February 2017. GDARD requested that the following information requirements be addressed in the EIAR:

1. All specialist studies conducted and referred to in the Final Scoping Report (FSR) must be included in the Environmental Impact Assessment Report. These specialist studies include Biodiversity Assessment, Wetland Delineation and/or Riverine Study, Visual Assessment, Heritage Impact Assessment, Social Impact Assessment, Noise

Impact Assessment, Geotechnical investigations and a Storm Water Management Plan.

2. Based on the Gauteng C-Plan Version 3, the proposed development will traverse Irreplaceable Area, Important Area and Sensitive Ecological Areas. An Ecological Assessment Report must be submitted to the Gauteng Department of Agriculture and Rural Development (GDARD).
3. The ecological specialist studies must meet the Department's Directorate of Nature Conservation requirements for biodiversity assessments.
4. The proposed route (Alternative 1) will traverse the Sesmylspruit and Swavelpoortspruit watercourses. All crossings of the watercourses must be indicated on the route plan.
5. With the consideration that the proposed routes will traverse the undeveloped parts of the Brondberg Ridge renowned for the occurrence of the threatened Juliana's Golden Mole which is endemic to the ridge, it must clearly be stated how the Juliana Golden Mole will be protected from the impacts of the proposed route, particularly the burrow pits for technical investigation and blasting as well as drilling during the construction of the tunnel (as stated by the Friend of Faerie Glen Nature Reserve, FFGNR)
6. It is stated that there is a definite need for the south-north link in Pretoria. Taking into cognizance the attached locality plan (Figure 2 of the report) in the Final Scoping Report (FSR), GDARD is confused as to how there will be a link between Heidelberg and Limpopo considering the fact that the proposed route ends in the developed township of Hatherly.
7. All alternatives given in the scoping report must be assessed and provided in more detail during submission of the Draft and Final Environmental Impact Assessment Report which includes appropriate mitigation measures. GDARD is of the view that the proposed development must be aligned more to the west where it is at least less sensitive.
8. The revised route plan must indicate the proposed PWV17 in relation to the existing roads along the Brondberg which includes the R25 and Solomon Mahlangu and all the environmental sensitivities found along the proposed route alignment.

9. Further, consider to incorporate the findings and recommendations of all specialist studies undertaken when designing the final route plan.
10. It must be noted that a Storm Water Management Plan will also be undertaken as part of the EIA and it must comply with the standards and requirements of the City of Tshwane Roads and Storm Water Division.
11. All issues raised by interested and affected parties which include the Friends of Faerie Glen Nature Reserve (FFGNR) must be addressed on the Environmental Impact Assessment Report and an updated Comment and Response Report must be included.
12. Both adverts published on 13 November 2015 and 17 November 2016 including site notices must be appended in the EIA report.
13. A comprehensive and site specific Environmental Management Program (EMPr) for the proposed activity (construction and operation phases) must be compiled and included in the EIA report. The EMPr must include a discussion on the implementing such measures.

## 2 ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

The new Environmental Regulations require that relevant details of the Environmental Assessment Practitioner be included as part of the EIAR. In this regard, attached as **Annexure C**, is a copy of the CV of the EAP for this project, Ms. Lizelle Gregory from Bokamoso Landscape Architects and Environmental Consultants. In summary details of the EAP are indicated below:

- o **Name:** Lizelle Gregory
- o **Company:** Bokamoso Landscape Architects and Environmental Consultants.
- o **Qualifications:** Registered Landscape Architect and Environmental Consultant (degree obtained at the University of Pretoria) with more than 25 years' experience in the following fields:
  - Environmental Planning and Management;

- Compilation of Environmental Impact Assessment;
- Landscape Architecture; and
- Landscape Contracting

Ms. L. Gregory also lectured at the Technicon of South Africa and the University of Pretoria. She is a registered member of the South African Council of the Landscape Architects Profession (SACLAP), the International Association of Impact Assessments (IAIA) and the Institute of Environmental Management and Assessment (IEMA).

### **3 SCOPE OF WORK AND APPROACH TO THE STUDY**

An application form for environmental authorisation of the relevant activity as well as an Environmental Scoping Report has been submitted to Gauteng Department of Agriculture, Conservation and Environment (GDARD). An investigative approach was followed and the relevant physical, social, economic and institutional environmental aspects were assessed.

The scope of work includes the necessary investigations, to assess the suitability of the study area and the surrounding environment for the proposed activities. The scoping exercise identified the anticipated environmental aspects in an issues matrix and it also supplied a preliminary significance rating for the impacts identified. The scoping process also assessed the possible impacts of the proposed development on the surrounding environment (including the interested and affected parties).

This document represents the EIA for the proposed development. The EIA must be in line with Section 24 of the National Environmental Management Act (NEMA), 1998 (Act 107 of 1998) and the Approved Plan of Study for EIA that was submitted as part of the Scoping Report.

The EIA takes into consideration the environment that may be affected by the activity and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity. A description of the property on which the activity is to be undertaken and the location of the activity on the property are described. A description of the proposed activity and any feasible and reasonable alternatives were identified. In addition, a description of the need and desirability of the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have, on the environment and community that may be affected by the activity are included.

An identification of all legislation and guidelines that Bokamoso is currently aware of is considered in the preparation of this EIA Report. Furthermore, a description of environmental issues and potential impacts, including cumulative impacts, are identified and discussed. Information on the methodology that will be adopted in assessing the potential impacts is furthermore identified, including any specialist studies or specialised processes that were/ should be undertaken. The EIA Report eventually determines whether a proposed project should receive the "go-ahead" or whether the "no-go" option should be followed. If the EAP recommends that the project receive the "go-ahead", it will (in most cases) be possible to mitigate the issues identified to more acceptable levels. Reference is also made to the mitigation of identified impacts or for further studies that may be necessary to facilitate the design and construction of an environmentally acceptable facility.

Details of the Public Participation Process (in terms of Sub-Regulation 1) are also included. Sub-Regulation 1 requires that the following information be included as part of the Public Participation Section of the EIA report:

- (i) The steps undertaken in accordance with the Plan of Study For EIA,
- (ii) A list of persons, organisations and government organs of state that were registered as interested and affected parties;

- (iii) A summary of comments received from, and a summary of issues raised by the interested and affected parties, the date of receipt of these comments and the response of the EAP to those comments;
- (iv) Copies of any representations, objections and comments received from the registered Interested and Affected Parties.

The mitigation measures and guidelines that are listed in the EIA Report are also summarised in a user-friendly document named an Environmental Management Plan (EMP) (**refer to Annexure H**). A Draft EMP is also a requirement of the EIA Process (Section 32 and 34 of the National Environmental Management Act (NEMA), 1998 (Act 107 of 1998)).

## **4 DESCRIPTION OF THE PROPOSED ACTIVITY**

### **4.1 Name of Activity**

The Application for the Environmental Impact Assessment (EIA) Authorisation is for the design and construction of the PWV17 freeway between the PWV5 route to the south and just south of the N4 to the north. The involved section of the PWV17 is approximately **24.6 km** in extent.

### **4.2 Particulars of Applicant**

Applicants Name: Mr. Zandile Mosia  
On behalf of Gauteng Department of Roads and Transport

Postal Address: P O Box 1335  
Pretoria  
0001  
Tel: (011) 355 7247  
Fax: (086) 592 8688



Contact Person: Mr. Zandile Mosia

### **4.3 Particulars of the Activity**

#### **4.3.1 Nature of Activity**

The purpose of PWV17 is two-fold, namely to serve through traffic i.e., traffic having neither an origin nor a destination in the area traversed by them, as well as to provide area access from the higher order freeway system to the surrounding land. Freeways (PWV-routes) are spaced at an 8 km to 12 km grid, while major arterials (K-routes) are spaced at approximately 1, 8 km to 2, 4 km intervals. Minor arterials and collector roads are again linked to the K-routes at 600m or larger intervals to complete the higher order road network.

The proposed activity is the **Route Determination** and **Preliminary Design** of the **PWV17** between the future PWV5 route to the south and terminating just south of the N4 to the north.

Even though Route Determination no longer requires an EIA Process in terms of the 2014 NEMA EIA Regulations (and updated in April 2017), the Gauteng Transport Infrastructure Act, 2001 and the Gauteng Transport Infrastructure Amendment Act, 2004 require some public participation. This report will therefore also serve as the public participation as required in terms of the Gauteng Transport Infrastructure Act, 2001 and the Gauteng Transport Infrastructure Amendment Act, 2001.

#### **4.3.2 Location of Activity**

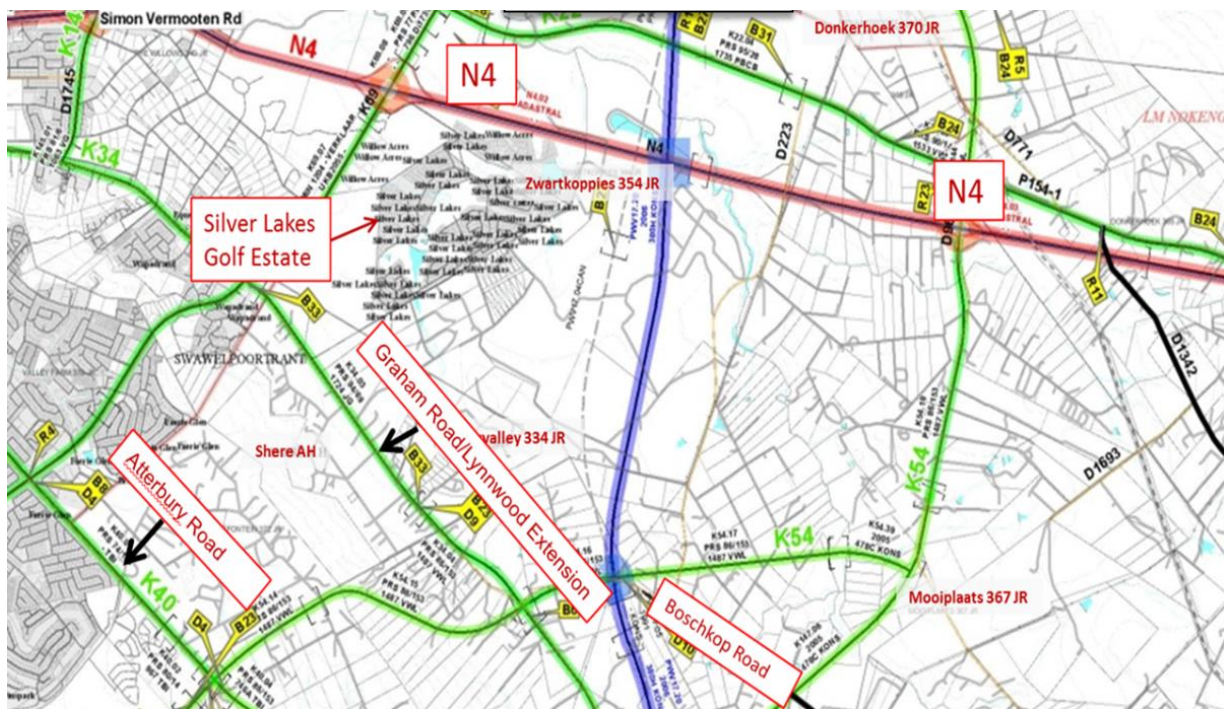
**Refer to Figure 1 for Locality Map and Figure 2, Aerial Map**

The involved section of the PWV17 lies in the quarter degree grid square 2528CD and stretches in a south-north direction from the proposed PWV5 road north of the R25 and south of Delmas Road on Portion 75 of the Farm Elandsfontein 412.

The route will traverse Garsfontein Road (K50) either on the Farm Grootfontein 394 (Ptn 1) or the Farm Tiegerpoort 371 (Ptns 2, 28, 245 and 235); Graham Road on the Farm Zwavelpoort 373 (Ptn 299 and RE/250); and Boschkop Road on the Farm Zwavelpoort (Ptn 43 and 34). The section of the PWV17 road which forms part of this application terminates at a point east of Silverlakes Drive and south of the N4 on the Farm Zwartkoppies 364.

**Refer to Figures 4, 5, and 6 for the alignment of each section of the PWV17**

The most northern section of the proposed route falls within the Provincial Urban Edge, whilst the remaining section falls outside the urban edge. **Refer to Figure 7: Urban Edge**



**Figure 4 – Northern alignment, just south of the N4**

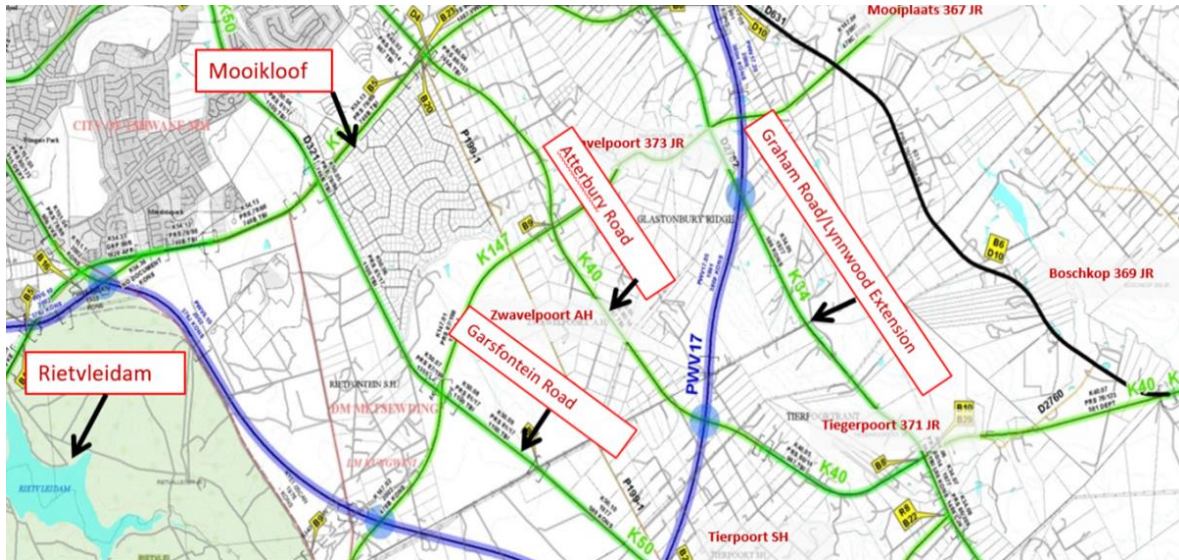


Figure 5 – Central alignment, Boschkop Rd to Garfontein Rd

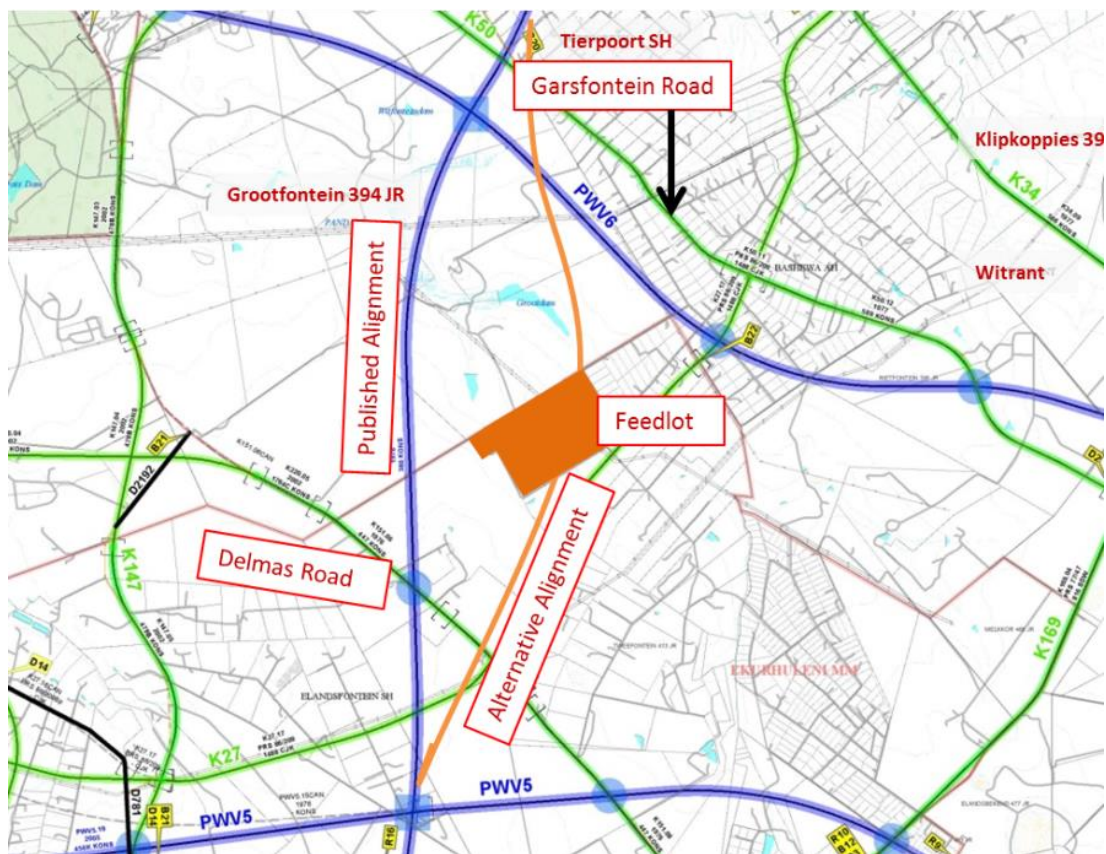
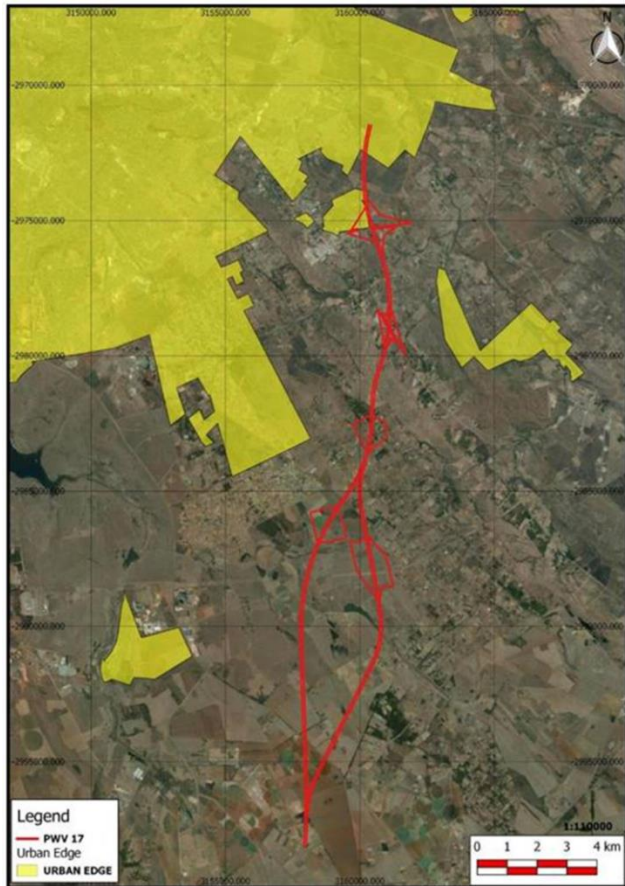


Figure 6 – Southern alignment, Garsfontein Rd to PWV5





**Figure 7 – Urban Edge**

### 4.3.3 Delineation of the study area

The section of the PWV 17 investigated in this EIA represents approximately **24, 6 km** of a Provincial Route which forms an important link in the Gauteng Road Network system (**refer to Figure 8**).

Although the Gauteng Transport Infrastructure Act, 2001, requires that all listed roads be accommodated in the layouts of new developments, EIA authorisation in terms of the new NEMA Regulations must still be obtained for the roads and if any “fatal flaws” / significant environmental issues along the listed alignment are identified the regulations provides for alignment alternatives and even

for the “no-go” alternative. This variable makes it difficult to finalise development layouts around such roads or only small portions of a larger road.

In order to prevent such cases, GDARD now requires that EAPs not only limit their environmental assessments to the portion of a road applied for, but that they also extend their investigations to incorporate a longer section of the road (to both sides of the involved portion of the road). This will allow for two options: (i) amendments in the alignment or (ii) to investigate a portion of road that can easily terminate into existing roads and act as an independent internal / local road if “fatal flaws” prevent the remainder of the route from happening.



#### **4.4 The Role of Route PWV17 in the Gauteng Road Network and the Importance of the Proposed Road for the City of Tshwane and the Ekurhuleni Municipality**

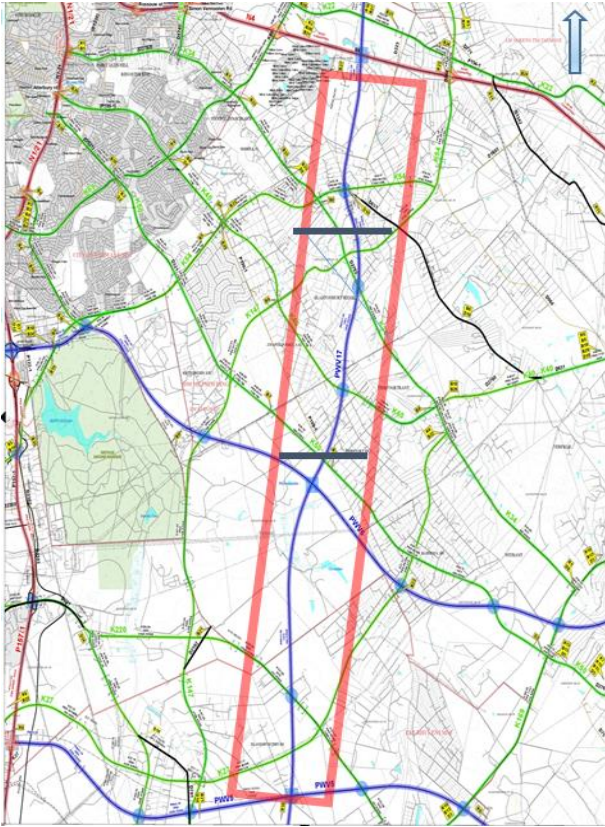
***Refer to Figure 8 that indicates the locality of the involved sections of the PWV17 within the larger Gauteng Road Network System.***

**Figure 8 – Delineation of the study area**

The road network in Gauteng is under increasing pressure due to a number of factors, including:

- The economic growth of the province which currently stand at almost double the national growth rate;
- Increased car ownership;
- Increased urbanization towards the major cities; and
- Increased job opportunities resulting in more people entering the business market thereby increasing their personal wealth through property and car ownership.

Amongst others this has resulted in increased demand for road capacity in general in Gauteng. The current system has over the last couple of years become notorious for the lack of capacity, with great congestion, huge delays, and severe safety concerns raised by various sectors, including the public, all spheres of government and other institutions.



**Figure 9: Strategic Road Review Holistic/ Gauteng Grid Road Network System (Key Map) – Blue route is the published route**

Due to the lack of building new infrastructure to create a balanced road network or transport system the system has also resulted in increased pollution due to the congestion on the network.

The overall objectives of the Gautrans road network are to provide mobility and access in the Gauteng Province. The PWV17 plays an important role in achieving these objectives. The Strategic Road Network Review (2010/2013) identified the PWV17 as a high priority (class 1) road. **Refer to Figure 9.**

#### **4.4.1 The Need for Route PWV17**

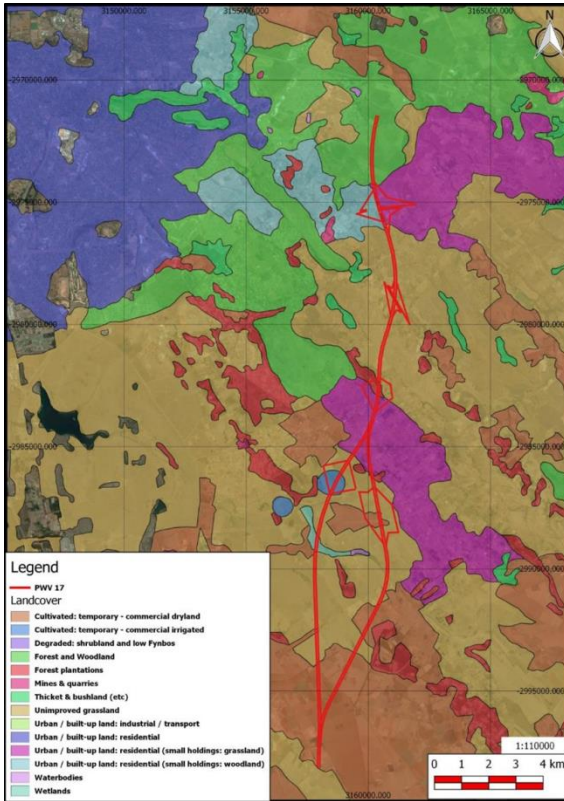
**Refer to Figure 10 for Surrounding Land Use Map**

The Strategic Road Network Review (2010/2013) identified the PWV17 as a high priority (class 1) road. The proposed road network, which already forms part of the road network planning of Local, Provincial and National Government, will have the following primary functions:

- It will divert traffic from existing road network links and alleviate congestion on the existing road network system;
- Will assist with the alleviation of traffic congestion to be caused by future developments in the area; **(refer to Figure 10 below for surrounding land-use map);**
- It will provide local accessibility by means of well-spaced intersections with minor arterials and collector roads;



- In some instances, it will supply direct access to minor tracts of land; and
- This road link will contribute to a more balanced road network system



Zwavelpoort (Ptn 43 and 34)

**Figure 10 – Surrounding Land-uses Map**

#### 4.4.2 Intersecting roads and accesses

The involved section of route PWV17 intersects with the following roads:

- Future planned PWV5;
- Garsfontein Road either on the Farm
- 
- Grootfontein 394 (Ptn 1) **or** the Farm Tiegerpoort 371 (Ptns 2, 28, 245 and 235);
- Graham Road on the Farm Zwavelpoort 373 (Ptn 299 and RE/250); and
- Boschkop Road on the Farm

#### 4.4.3 End Points and Length

The section of the PWV17 to be constructed is proposed to be located between the **future PWV5** in the south and a point just **south of the N4**.

The proposed section has a total length of approximately **24.6 km**.

#### **4.4.4 Geometric Design Standards**

**Information obtained from Preliminary Design of Route PWV17 between Route K54 and Route PWV6, prepared by Hatch Goba, May, 2017.**

##### **Design Speed**

The SARTSM requires a design speed of 120 km/h since this section of road passes through signalized intersections.

##### **Road reserve Width**

A minimum 80 m road reserve has been provided for the PWV17 road.

##### **Cross Section**

Road classification, minimum road reserve width and typical Gautrans cross section plan numbers that have been used for the preliminary design of the Road PWV17, Road K54, Road K34, Road K40 and Road PWV6. The typical cross-section used for route PWV17 is in accordance with the Gauteng Department of Public Transport, Roads and Works' Typical Plans GTP 2/13 and GTP 2/14 for rural freeways within an 80, 0 m minimum road reserve.

A four lane stage using the two outer lanes is applied for preliminary design purposes.

##### **Intersection spacing and access**

Future intersections / access positions have been allowed for at a minimum intersection spacing of 600 m to provide points of possible access from adjacent properties should it be required at some stage in future.

##### **Horizontal and vertical alignment**

The comparison between the design standard and what is achieved on the route, is shown in **Tables 3**. The proposed 24,6km of PWV17 under this appointment will be



accessed by one K-route expressway, two conventional K-routes that are aligned east-west and the future PWV6 freeway.

**Table 3: Geometric Design Standards for PWV17 and K54, K34, K40 and PWV6 crossing roads**

	Unit	PWV17		K54		K34		K40		PWV6	
		Specified	Achieved	Specified	Achieved	Specified	Achieved	Specified	Achieved	Specified	Achieved
<b>Design Speed</b>	(km/h)	<b>120</b>	120	<b>100</b>	100	<b>100</b>	100	<b>100</b>	100	<b>120</b>	120
<b>Horizontal</b>											
Desired min. radius (GTP 7/3)	(m)	<b>1500</b>	4000	<b>1000</b>	1500	<b>1000</b>	1508	<b>1000</b>	1500	<b>1500</b>	7000
Absolute min. radius (GTP 7/3)	(m)	<b>1000</b>	-	<b>850</b>	-	<b>850</b>	-	<b>850</b>	-	<b>1000</b>	-
Max. super elevation (GTP 7/3)	(m/m)	<b>0,08</b>	0,02	<b>0,06</b>	0,032	<b>0,06</b>	0,02	<b>0,06</b>	0,032	<b>0,08</b>	0,02
Min. length of curve (Road Design Manual Vol 1: Geometrics)	(m)	<b>300 des</b> <b>150 min</b>	1122	<b>300 des</b> <b>150 min</b>	386	<b>300 des</b> <b>150 min</b>	407	<b>300 des</b> <b>150 min</b>	623	<b>300 des</b> <b>150 min</b>	4173
<b>Vertical</b>											
Max. slope (GTP 7/3)	(%)	<b>4,0</b>	5,0*	<b>6,0</b>	2,98	<b>6,0</b>	4,7	<b>6,0</b>	3,9	<b>4,0</b>	2,1
Min. slope (GTP 7/3)	(%)	<b>0,5</b>	0,5	<b>0,5</b>	0,5	<b>0,5</b>	1,7	<b>0,5</b>	0,6	<b>0,5</b>	1,1
Min. curve length (GTP 7/3)	(m)	<b>220</b>	220	<b>180</b>	200	<b>180</b>	180	<b>180</b>	200	<b>220</b>	600
"K" value - crest (GTP 7/1 and GTP7/3)	(m)	<b>105</b>	105	<b>62</b>	95,6	<b>62</b>	62,0	<b>62</b>	111	<b>105</b>	N/A
"K" value - sag (GTP 7/1 and GTP7/3)	(m)	<b>50</b>	50	<b>37</b>	112	<b>37</b>	38	<b>37</b>	61	<b>50</b>	191,8
Minimum Road Reserve Widths	(m)	<b>80</b>	80	<b>62</b>	62	<b>62</b>	62	<b>62</b>	62	<b>80</b>	80

#### 4.5 The Gautrans Network Planning and the Gautrans Road Planning Stages

- **Network Planning at 1:50 000 scale**

During the mid-seventies a grid network covering the traditional PWV area compiled by Gautrans was planned on a 1: 50 000 scale and maintained ever since. The grid network concept was based on a road hierarchy system comprising of a range of mobility and access routes.

- **Route Determination at 1: 10 000 scale**

During the Route Determination phase each route is investigated in more detail. Amongst others, the following aspects receive attention:

- The purpose of the route;
- Delineation of study area;
- Collection and interpretation of environmental information;
- Site visit;
- Literature Study;
- The description, analyses and interpretation of physical, biotic, socio-economic and environmental procedures; and
- Consultation with major landowners, local and other affected authorities.

- **Preliminary Design Phase - (Basic Planning)**

During this stage of planning, the issues addressed during the preceding stage are re-evaluated. Normally a long time period has passed between the above two stages and therefore revision is required.

The main purpose of Preliminary Design is to establish the road reserve and to conduct a cost framework. This phase includes also detail regarding bridge structures, culverts road fillings and road reserve boundaries. The commencement of this phase is normally

dependant on either/ both the traffic demand and land use development pressure within the area.

- **Detail Design and Construction.**

During this phase all-physical, environmental and socio-economic issues are integrated with the road planning. Land will be expropriated and detailed design of the road will depend on the priority of the route and the available funding.

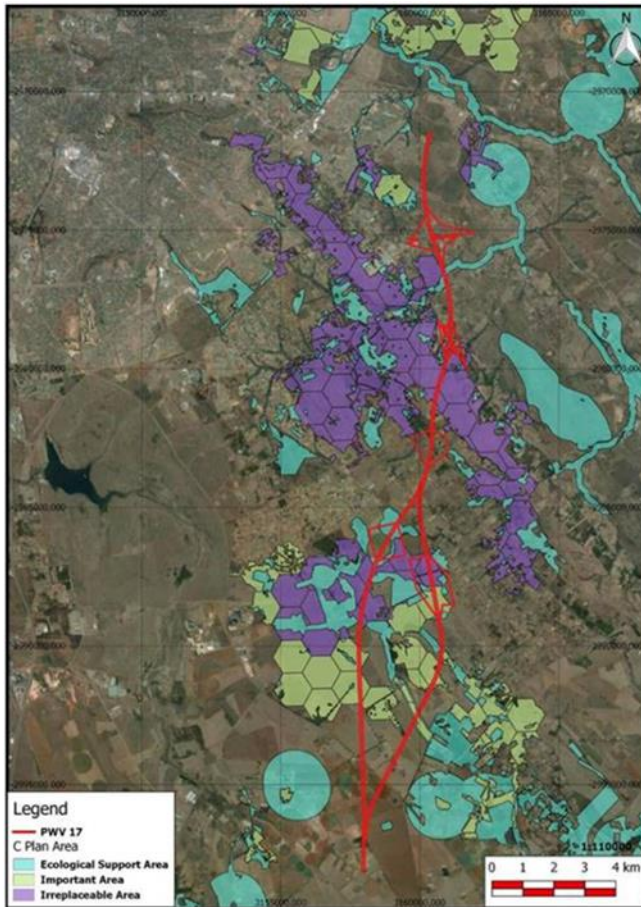
- **The Design Phase Of This Application**

The most southern portion of the proposed PWV 17 (the section between the Proposed PWV 5 and the K50/Garstfontein Road) is still at preliminary design stage. The section of the road between the K50 and the N4 freeway is higher on the priority list and therefore a section is already at detail design stage and another section is still at preliminary design stage. The main goal of this EIA is to "fix" the alignment of the section of the PWV17 between the proposed PWV5 and the K50 and to allow for the construction (when necessary) for the most important sections of the proposed PWV17 to the north of the K50.

At present, there is significant development pressure in the area between the R40 and the N4 and therefore this section of the proposed PWV 17 is regarded as the priority section.

Developers want to finalise their development layouts and parties affected by the proposed alignment alternatives cannot upgrade or sell their properties. This uncertainty regarding the proposed road is currently delaying development and the impact of the Gauteng Transport Infrastructure Act, 2001 and the Gauteng Transport Infrastructure Amendment Act, 2004 on development panning also applies pressure for the finalisation

of the PWV17 alignment in the area. **Refer to Annexure B for Draft EIA Phase Engineering Drawings of the Proposed Alignment Alternatives**



**Figure 11 – GDARD C-Plan Map**

## 5 ALTERNATIVES IDENTIFIED

### 5.1 The “No-Go” Alternative

According to the GDARD C-Plan 3.3, (updated 2014), the southern, central and northern sections of the route traverses irreplaceable, important and ecological support areas and large sections of the proposed freeway will affect ecologically sensitive areas. **Refer to Figure 11, C-Plan Map**


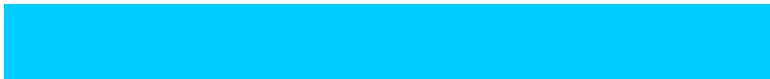
GDRT already considered it to remove the proposed freeway from their network system







during former environmental scans conducted during the route determination phase and during the 2010 Road Review exercise. Based on the results of such studies it is not regarded as possible to remove this freeway from the Gauteng Road Network System. The exclusion of this road will only put pressure on the other roads in the network and the system will not function as originally planned. There is a definite need for a south-north connection, especially since the R21 and the N1 already caters for a significant amount of South-North traffic.

At this stage, the “No-Go” alternative is not regarded as viable from a road planning point of view; nevertheless, it could be supported from a socio-economic point of view. Roads are however mostly regarded as unwanted by parties that are directly affected. Roads and infrastructure are needed by everyone and therefore road planning in a province cannot stop. It is the responsibility of the various roads authorities to protect future roads that form part of the national, provincial and local road planning networks.

To follow now are tables that represent a comparison between the “No-Go” alternative and the development alternative.

**Diagram 1: Environmental issues - “No-Go” Option**

Issue	Short term	Medium term	Long Term	Impact
Geology and soils				Positive Neutral Negative
<p>If no development takes place, it will not have a significant impact on the geology of the study area, especially in the short term. Indirect impacts created by the edge effects of the surrounding developments could however, in the long term, lead to a decrease in vegetative coverage and even to exposed areas. Erosion, siltation and water pollution problems could then be caused. Changes in the surface drainage patterns could also occur.</p>				
Hydrology				Positive Neutral Negative
<p>If no development takes place, it will not have a significant impact on the hydrology of the study area, especially in the short term. Indirect impacts created by the edge effects of the surrounding developments could however, in the long term, lead to a decrease in vegetative coverage and even to exposed areas. Erosion, siltation and water pollution problems could then be caused. Changes in the surface drainage patterns could also occur.</p>				
Vegetation				Positive

		Neutral
		Negative
<p>If no development takes place around the study area earmarked for the Freeway, the impacts on the Fauna and Flora and Bio-diversity will not be significant. The site is already being disturbed due to the fact that the area is currently developed.</p>		
Fauna		Positive
		Neutral
		Negative
<p>If no development takes place around the study area earmarked for the Freeway, the impacts on the Fauna and Flora and Biodiversity will not be significant. The site is already being disturbed due to the fact that the area is currently developed.</p>		
Social		Positive
		Neutral
		Negative
<p>The No-Go alternative is not viable from a traffic point of view, since the interchange is planned in order to provide mobility in the area and reduce traffic congestion. Therefore, the social impact will increase negatively in the long terms as the desirability for the Proposed Freeway increases.</p>		
Economic		Positive
		Neutral
		Negative
<p>If the road network system in the area earmarked area for the Proposed Freeway is not upgraded, high traffic congestion and slow flowing through traffic will increase. If there is no easy mobility within the area no developers will considered the area for future developments. This will eventually slow down economic development. It is expected from government to do infrastructure planning and it is important that I&amp;APs consider the responsibility of GDRT in terms of Pro-active Road Planning when they supply comments regarding new roads.</p>		

**Note:** The “no-go” option is predominantly neutral in the short and medium term, and turns negative in the long term.

**Diagram 2:** Environmental issues of the proposed section of the PWV17

Issue	Short term	Medium term	Long Term	Impact
Geology and soils				Positive
				Neutral
				Negative
<p>In the short term (the construction phase), the proposed Freeway will have a negative impact on the geology of the study area. It is, however possible to mitigate the impacts to acceptable levels. If well planned, the long term impacts on the geology will be neutral or even positive. Even though there might be some impact during the construction phase it will also not be major impacts as the site is already developed.</p>				
Hydrology				Positive
				Neutral
				Negative
<p>In the short term (the construction phase), the Proposed Freeway will have a negative impact on the hydrology. The impact on the hydrology will be considered higher at the bridge/culvert crossings across wetland/watercourses. It is, however possible to mitigate the impacts to acceptable levels. If well planned, the long term impacts on the hydrology will be neutral or even positive. Effective temporary and permanent storm water management and guidelines to reduce impacts on the water courses will have to be implemented during all the development phases.</p>				
Vegetation				Positive
				Neutral
				Negative
<p>In the short term the proposed Freeway will have a negative impact on the vegetation and Fauna and Bio-diversity of the study area, especially the sensitive ecological areas associated with the Bronberg Mountain Range. The rehabilitation works after the construction can be regarded as an opportunity to re-establish natural riparian vegetation that will prevent erosion, siltation and water pollution. If well planned and managed, the proposed rehabilitation works will have a neutral and positive effect.</p>				
Fauna				Positive
				Neutral
				Negative

In the short term the proposed Freeway will have a negative impact on the vegetation and Fauna and Bio-diversity of the study area, especially the sensitive ecological areas associated with the Bronberg Mountain Range. The rehabilitation works after the construction can be regarded as an opportunity to re-establish natural riparian vegetation that will prevent erosion, siltation and water pollution. If well planned and managed, the proposed rehabilitation works could (in the long term) have a neutral and positive effect.

Social



Positive

Neutral

Negative

From a social, institutional and economic point of view, the implementation of the proposed Freeway will have significant positive impacts. The construction phase will most probably cause some minimal social impacts (i.e. traffic congestions, dust pollution etc.), but in the longer term the surrounding area and larger region will benefit from the Interchange. The construction of the Freeway will also create some temporary job opportunities.

Economic



Positive

Neutral

Negative

From a social, institutional and economic point of view, the implementation of the proposed Freeway will have significant positive impacts. The construction phase will most probably cause some minimal social impacts (i.e. traffic congestions, dust pollution etc.), but in the longer term the surrounding area and larger region will benefit from the Freeway. The construction of the Freeway will also create some temporary job opportunities.

**Note:** *It is anticipated that the proposed section of the PWV17 is predominantly negative in the short term, but turns neutral in the medium term and long term. The Social and Economic issues will be positive from the short term to the long term.*

## 5.2 Alignment Alternatives

The following alternatives were supplied by Hatch Goba (the appointed Traffic Engineers): **A copy of Figure 2 was inserted below for convenience - Also Refer to Figure 1 above**

### The Original Alternative:



The original alternative is represented by the red line on the map above. In the vicinity of the Bronberg (at the blue insert) such blue line also represents the original published alignment for the PWV 17. To the north of the Bronberg/ Graham Road/ Lynnwood Road the alignment is regarded as fixed and no deviations from the original published alignment are proposed.

 **Alternative 1:**

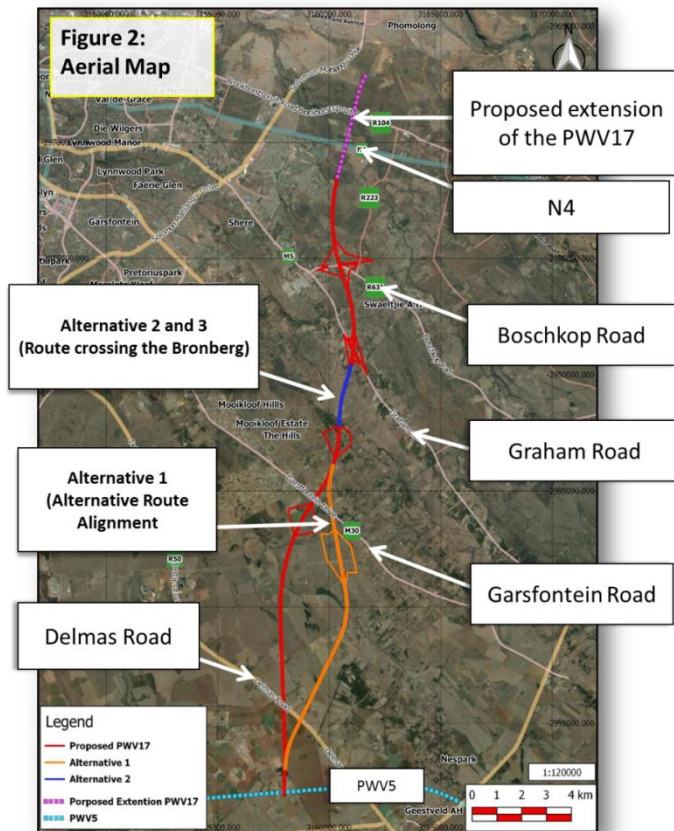
Alternative 1 represents an alignment to the east of the original published alignment for the section of the proposed freeway between the PWV 5 and the proposed new PWV 17/ Atterbury Interchange. This section of the road was aligned to avoid the ecologically sensitive areas associated with a dam and wetlands on the Farm Grootfontein 394 JR.

 **Alternatives 2 and 3:**

***Alternatives 2 and 3 represent the alternatives for the section of the freeway that cuts across the Bronberg.***

**Alternative 2** represents an alignment across the ridge and such alignment will require the removal of vegetation and some extensive cut and fill exercises.

**Alternative 3** represents a “tunneling” alternative. The proposed tunnel will require some major blasting and drilling exercises, but it will avoid the removal and disturbance of the ecological systems associated with this sensitive ridge series and it will also prevent the fragmentation of a continuous open space system.



**Figure 1: Alignment Alternatives (Re-Inserted for ease of Reference). Red alignment is the original published alignment**

## 6 THE DESCRIPTION OF THE BIOPHYSICAL AND SOCIO-ECONOMICAL ENVIRONMENTS AND IDENTIFICATION OF MOST SIGNIFICANT ISSUES ON A MORE HOLISTIC SCALE

### 6.1 THE BIOPHYSICAL ENVIRONMENT

This section briefly describes the Biophysical and Socio-economical Environments of the study area. It also lists the anticipated adverse and beneficial impacts of the proposed road on the environment. Where possible, mitigation measures were supplied for the adverse impacts and the significance of the impacts listed was also indicated in specific impact tables. In some cases the impacts have already (during the planning phase)

been addressed to such an extent that it was not regarded as necessary to carry the impacts over to the significance rating section of the report.

Although it was not necessary to mitigate the positive impacts listed in the impacts tables, the positive impacts identified in this section of the report will also automatically be carried over to the significance rating section of the report to indicate the specific benefits associated with the proposed Freeway. This will also make it possible to compare the severity of the adverse impacts with the advantages of the beneficial impacts and to eventually make an informed decision regarding the proposed road.

The following section incorporates the most important information supplied by specialist studies and reports.

### **6.1.1 Geology and Soils**

A preliminary Geotechnical Study was conducted by Hatch for the proposed PWV17.

#### **Geology**

According to the 1:50 000 Geological Map (2825CD, Rietvleidam) the proposed route and surrounding area is underlain by three major sequences, namely the Transvaal Supergroup, followed by the Karoo Supergroup, with the youngest geological deposits represented by Quaternary age unconsolidated alluvium and colluvium. Two faults (see geological map) intersect the PWV17 alignment, in a general north-east to south-west direction. **Refer to Figure 12 below.**

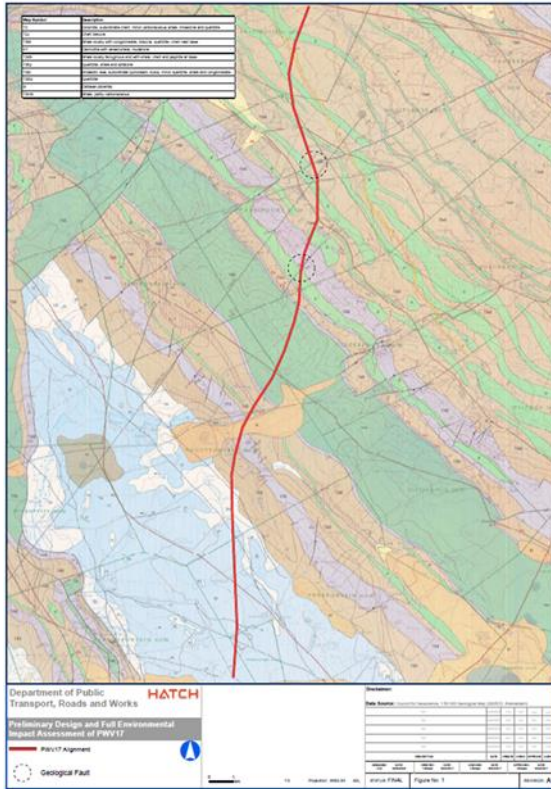
The resistant lithology's quartzite and chert form hill crests and ridge crests. Alluvium is present in drainage channels, marshy areas and flood plains. The area is predominantly

covered with colluvium, except in areas where alluvium or outcrop occurs. Intrusive dykes and sills of diabase and syenite occur, striking north-west to south-east.

The Transvaal Supergroup consists of clastic and chemical sediments and volcanic rocks, of the Chuniespoort Group and Pretoria Group. The Malmani Subgroup (Chuniespoort Group) comprises alternating bands of chert-bearing and chert-free dolomite, with local occurrences of carbonaceous shale and quartz. The overlying Pretoria Group comprises mainly clastic rocks of quartzite, shale and a prominent volcanic unit with locally occurring carbonates.

The overlying Karoo Supergroup is subdivided into the Dwyka and Eccca Groups. Remnants of Karoo Supergroup occur as pockets or outliers in dolomite of the Chuniespoort Group. The Dwyka Group is composed mainly of diamictite with subordinate shale and mudstone, containing pebbles, gravel and conglomerate. The overlying Eccca Group is represented by the Vryheid Formation, which comprises sandstone, alternating with beds of soft sandy shale and some coal seams.

According to the involved geotechnical engineers the contacts between the various geological materials are not clear and very detailed mapping test pits and drilling will be required to delineate these contacts accurately. A decision on any further geological investigations which may be considered necessary will have to be made at the detail design stage in conjunction with the detailed design materials investigation. The outcome of the EIA Process will also determine the areas for the more detailed geotechnical studies. Such geotechnical studies are very costly and therefore such studies will eventually be conducted for the preferred alternative as approved by the various authorities.



**Figure 12: Geology of the study area**

## Soils Derived from the Transvaal Supergroup

### Chuniespoort Group (Malmani Subgroup)

The Malmani Subgroup comprises dolomite and chert forming karst landscapes. This karst landscape (irregular bedrock of dolomite pinnacles) is overlain beneath younger deposits which may collapse or be transported into the voids and cave systems resulting in catastrophic ground movement at the surface, to form sinkholes or where subsidence is gradual to form dolines (Buttrick, 1992).

The occurrence of dolomite floaters that represents former dolomite pinnacles could cause excavation problems and/or can lead to a misleading interpretation of the bedrock depth and geotechnical conditions (Brink, 1979). Consolidation problems can also be expected where wad (highly compressible manganese earth derived from the weathering of dolomite) is present close to the surface (Brink, 1979).

### Pretoria Group

The Pretoria Group comprises mainly quartzite and shale. Brink (1979) reported that collapsible sands can be derived from the weathering of quartzite of the Pretoria Group, especially if it has a high feldspathic content. However, foundation problems at shallow depth are usually not encountered on residual shale or quartzite of the Pretoria Group, due to their high bearing capacities (Brink, 1979).

The Silverton and Strubenkop shale Formations exhibit smooth and even bedding planes, which can result in sliding of the rock mass along the direction of dip into excavations (Brink, 1979). Differential settlement can occur at the contact between residual soft shale and hard rock quartzite, due to differential weathering (Brink, 1979). Although residual shale of the Pretoria Group exhibits a generally low potential for expansiveness, portions of the Silverton Formation shale contain a high percentage of montmorillonite to give highly expansive residual soils (Brink, 1979). Similarly, residual soil on andesite of the Hekpoort Formation may also be moderately to highly expansive (Brink, 1979). An important feature of the andesite is the extreme variability in depth of weathering and soil profile thickness within several metres of an outcrop (Brink, 1979). This irregular bedrock profile, gives rise to differential settlement problems requiring shallow footings on outcrop and piling in deep residual soils when placing foundations (Brink, 1979). Attention should be given to the occurrence of andesite core-stones and 'floaters', which can lead to a misleading interpretation of the bedrock depth and geotechnical conditions (Brink, 1979).

### **Soils Derived from the Karoo Supergroup**

Tillite, shale and sandstone of the Dwyka Group weathers to form, brown or red brown, clayey to gravelly residual soils that are potentially collapsible and expansive (Brink, 1983). The Vryheid Formation of the Eccca Group comprises mainly sandstone, shale and coal seams. The sandstone weathers to brown or red, medium to fine-grained sand or silt, which may exhibit a collapsible fabric (Brink, 1983). The shale weathers to grey, yellow or black clays, that contain a high percentage of kaolinite and subordinate illite, which implies a low potential for expansiveness. The depth of weathering of the shale varies from 1m to greater than 2m. According to Brink (1983), dispersive clays are also associated with soils derived from the Dwyka and Eccca Groups.

### **Geological engineering properties**

No serious engineering geological problems are expected along the route, but an in depth study during the detail design is proposed to determine stability.

According to the involved geotechnical engineers and GIDS, 2007 dolomite is present over a large portion of the southern section of the proposed route.

The Malmani dolomite stretches north-south and dips eastwards. The formation of sinkholes and dolines are associated with dolomite areas and generally develops with development and changes in the ground and surface water regime and are caused mainly by concentrated ingress of water into the ground due to the concentration of storm water and/or leaking wet services.

The problems associated with dolomitic areas can therefore be minimized by designing and constructing the road in such a way as to minimise the risk of the occurrence of sinkholes along the route. The development of sinkholes in future must be predicted by doing risk zonation and it's necessary to recognise and identify circumstances which may lead to the formation of instabilities (sinkholes and dolines).

Provided that the ground and surface water regime is not disrupted significantly, the risk for the development of sinkholes should be minimised. Proper drainage of the road must be done and water may not be allowed to concentrate. The grading of a road above ground level is preferable but it is not always practical. The disturbance during construction and the removal of the blanketing layer in road cuttings, create conditions which increases the risk for sinkhole and doline formation. Preferably the road should be at ground level to facilitate drainage i.e. the natural drainage paths should not be disturbed and the road should be used to facilitate storm water drainage. The areas where structures are placed and where cuttings are made must be investigated in detail at the detail design stage.

No sinkholes were identified during the investigation along the proposed route of the PWV17 but the entire area should be investigated in detail by conducting a gravity survey and drilling percussion boreholes during the detail design stage.

The riverine/ drainage areas are usually associated with syenite. It will however be necessary to conduct detailed geotechnical investigations in the areas where watercourses will be crossed.

- **Pebble Marker**

From an engineering geotechnical perspective the pebble marker represents a stratum of free drainage, which must be sealed for certain constructions. Conversely, where drainage is required it may be retained and be usefully employed to provide free flow of water especially in areas susceptible to inundation (Jennings et al., 1973). The pebble marker may pose excavation problems where the unit comprises gravel and boulders of fresh quartzite, shale, andesite, chert, dolerite or diabase. Pebble markers vary in thickness from 0.1 to 0.4m, comprising gravel and boulders of quartzite, chert, shale and andesite, ferricrete concretions and occasionally diabase gravel and boulders.

- **Ferricrete deposits (Pedogenic material)**

According to Brink (1985), ferricrete can develop in any soil type where the hydrological conditions are favourable. Geomorphologically, these include gully heads, hillslope-pediment junctions and on pan and vlei side slopes (Partridge, 1975). Ferricrete typically occurs at depths of 0.1 to 2.0m and varies between 0.2 and 1.0m thick. The type of ferricrete varies from concretionary, honeycomb to hardpan ferricrete with the concretionary type being dominant. A ferricrete layer of adequate thickness can also provide stable founding conditions at a shallow depth for structures (Brink, 1985). Severe excavatability problems are also associated with hardpan ferricrete.



- **Colluvium**

The engineering characteristics of colluvium are controlled by the nature of the parent rock type and the processes of transportation to which it has been subjected to (Brink, 1985). Colluvial soils exhibit an intact to open structure with high void ratios and low in-situ densities. The main engineering geological problem associated with these soils is the presence of a collapsible soil fabric. Colluvial material derived from weathered sandstone and quartzite are potentially collapsible. The clays that occur in colluvial soils may also have dispersive properties (Brink, 1985). The good compaction characteristics of these soils render them suitable for use in the lower layers of road pavements.

- **Alluvium**

Alluvium includes the most recent deposits and is confined to drainage channels, flood plains and marshy areas. The behaviour of alluvial soils depends largely on the rock type from which it was derived (Haskins, 1994). For example, where quartzite or sandstone is the source, the transported soils will exhibit a collapse potential, whereas transported soils from shale, dolerite or Hekpoort Formation andesite will exhibit a potential for heave (Brink, 1985). The collapsible soils or soft alluvial clays may also exhibit low shear strength and is therefore highly compressible (Brink, 1985).

- **Slope Stability**

According to the Geohazard Atlas of South Africa the alignment is located in an area that has very low landslide susceptibility.

- **Mining Activities**

No mining activities are present or being planned along the route.

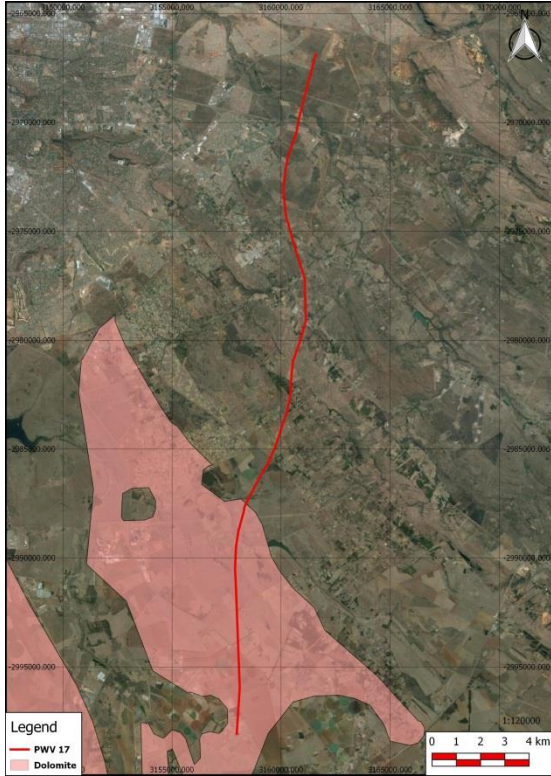
**Table 4: Issues and Impacts – Geology and Soils**

	<b>Issue/ Impact</b>	<b>Positive/ Negative/ Neutral ±</b>	<b>Mitigation Possibilities</b> High 🟢 Medium 😊 Low 🟡 Positive Impact - Not Necessary To Mitigate 🌟
1)	Risk for formation of sinkholes and dolines	-	😊
2)	Stability of road and structures	-	😊
3)	Excavatability problems are foreseen and some blasting exercises may be required	-	🟢
4)	Potential damage to metallic elements placed underground due to corrosive soils in dolomitic areas	-	🟢
5)	Erosion	-	🟢
6)	Stockpile areas for construction materials and topsoil	-	😊

**6.1.1.1 Discussion of issues identified, possible mitigation measures and significance of issue after mitigation – geology and soils**

**1) Risk for formation of sinkholes and dolines**

**(Refer to Figure 13: Dolomite Map)**



**Figure 13 – Dolomite Map**

The development of sinkholes and dolines are possible if poor water management takes place. The formation of sinkholes and dolines generally develops with development and changes in the ground and surface water regime and are caused mainly by concentrated ingress of water into the ground due to the concentration of stormwater and/or leaking wet services. Sections of the southern portion of the route are underlain by dolomite; however, a site specific geotechnical investigation will be required to confirm the presence, stability and extent of dolomite prior to detailed design.

**Table 5: Significance of Issue 1 (Risk for formation of sinkholes and dolines) After Mitigation**

Mitigation Possibilities High 🟢 Medium 😊 Low 🟡 Positive Impact/ Neutral - Not Necessary To Mitigate ✨	Mitigation Already achieved ✓ Must be implemented during Planning phase, Construction and/ or Operational phase <b>P / C / O</b> Mitigation	Significance of Issue after mitigation Low/ eliminated <b>L / E</b> Medium <b>M</b> High <b>H</b> Not possible to mitigate, but not regarded as a fatal flaw <b>NP</b>
<b>Medium 😊</b>	<b>P &amp; C</b> - The NHBRC precautionary measures for development in dolomitic areas must be implemented.  <b>P, C &amp; O</b> - The proposed road should be designed and constructed in such a way as to minimise the risk of the	<b>M</b> - To be included in EMP  <b>M</b> - To be included in EMP

	<p>occurrence of sinkholes along the route. Proper drainage of the road must be done and water may not be allowed to concentrate.</p> <p><b>P, C &amp; O</b> – Stormwater management is extremely important and must be designed to prevent the concentrated ingress and ponding of water.</p> <p><b>P, C &amp; O</b> –The road should preferably be at ground level to facilitate drainage i.e. the natural drainage paths should not be disturbed and the road should be used to facilitate storm water drainage.</p> <p><b>P, C &amp; O</b> – Wet surfaces such as water supply lines must preferably not run close to (within 10m ) along the road. Where such a service crosses the road alignment, all due care should be taken to ensure that the pipe does not leak.</p> <p><b>P, C</b> - The areas where structures are placed and where cuttings are made must be investigated in detail at the detail design stage i.e. where the route crosses the watercourses.</p> <p><b>O</b> - A monitoring plan must form part of the general maintenance plan for the road and allowance must be made for stability problems to be addressed immediately.</p>	<p><b>M</b> - To be included in EMP</p> <p><b>M</b> - To be included in EMP</p> <p><b>M</b> - To be included in EMP</p> <p><b>M</b> - To be included in EMP</p> <p><b>M</b> - To be included in EMP</p>
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**Result:** Although issue can be mitigated, the significance of the impact should still be determined / confirmed and assessed in the Significance Rating Table

## 2) Stability of Road and Structures

Consolidation problems can be expected where wad (highly compressible manganiferous earth derived from the weathering of dolomite) is present close to the surface (Brink, 1979). Problems soils associated with collapsible and expansive residual and transported soils may be present.

**Table 6: Significance of Issue 2 (Stability of structures) After Mitigation**

<b>Mitigation Possibilities</b> <b>High</b> 🟢 <b>Medium</b> 😊 <b>Low</b> 🟡 <b>Positive Impact/ Neutral - Not Necessary To Mitigate</b> ✨	Mitigation  Already achieved ✓  Must be implemented during <b>P</b> lanning phase, <b>C</b> onstruction and/ or <b>O</b> perational phase  <b>P / C / O</b> Mitigation	Significance of Issue after mitigation  Low/ eliminated <b>L</b> / <b>E</b> Medium <b>M</b>  High <b>H</b>  Not possible to mitigate, but not regarded as a fatal flaw <b>NP</b>
<b>Medium</b> 😊	<p><b>P &amp; C</b> - The precautionary measures and foundation design from the involved geotechnical engineers must be implemented to ensure the stability of structures and embankments.</p> <p><b>P &amp; C</b> - Collapsible material must pre-collapsed by impact rolling.</p> <p><b>P &amp; C</b> - More detailed foundation investigations should be conducted for structures such as bridges and culverts.</p>	<p><b>M</b> - To be included in EMP</p> <p><b>M</b> - To be included in EMP</p> <p><b>M</b> - To be included in EMP</p>

	<p><b>O</b> – A monitoring plan must form part of the general maintenance plan and must make allowance for all stability problems to be addressed immediately.</p>	<p><b>M</b> - To be included in EMP</p>
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**Result:** *Although issue can be mitigated, the significance of the impact should still be determined / confirmed and assessed in the Significance Rating Table*

### 3) Excavatability problems are foreseen and some blasting exercises may be required

Some blasting may be required where deep road cuttings are required, where shallow dolomite pinnacles or outcrops are present. Some blasting will also be required if the tunnelling option through the Bronberg is followed.

**Table 7: Significance of Issue 3 (Excavatability problems are foreseen and some blasting exercises may be required) After Mitigation**

<p><b>Mitigation Possibilities</b>  <b>High</b> 🟢 <b>Medium</b> 😊 <b>Low</b> 🟡  <b>Positive Impact/ Neutral - Not Necessary To Mitigate</b> ✨</p>	<p>Mitigation</p> <p>Already achieved ✓  Must be implemented during <b>P</b>lanning phase, <b>C</b>onstruction and/ or <b>O</b>perational phase  <b>P / C / O</b> Mitigation</p>	<p>Significance of Issue after mitigation</p> <p>Low/ eliminated <b>L / E</b>  Medium <b>M</b>  High <b>H</b>  Not possible to mitigate, but not regarded as a fatal flaw <b>NP</b></p>
<p><b>High</b> 🟢</p>	<p><b>C</b> – Surrounding residents must be informed of blasting exercises at least one week in advance.</p> <p><b>C</b> – Blasting operations should be carefully controlled and the necessary safety precautions must be implemented.</p> <p><b>C</b> – Allowance should be</p>	<p><b>M</b> - To be included in EMP</p> <p><b>M</b> - To be included in EMP</p> <p><b>M</b> - To be included in EMP</p>

	made in the quantities and specifications for the excavation of wad (or other soft material) selectively from the floor of cuttings and between pinnacles.	
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**Result:** *Although issue can be mitigated, the significance of the impact should still be determined / confirmed and assessed in the Significance Rating Table*

#### 4) Corrosive nature of the soils

Potential damage to metallic elements placed underground due to corrosive soils in dolomitic areas.

**Table 8: Significance of Issue 4 (Corrosive nature of the soils) After Mitigation**

Mitigation Possibilities High 🟢 Medium 😊 Low 🟡 Positive Impact/ Neutral - Not Necessary To Mitigate ⚡	Mitigation Already achieved ✓ Must be implemented during Planning phase, Construction and/ or Operational phase <b>P / C / O</b> Mitigation	Significance of Issue after mitigation Low/ eliminated <b>L / E</b> Medium <b>M</b> High <b>H</b> Not possible to mitigate, but not regarded as a fatal flaw <b>NP</b>
High 🟢	<b>P &amp; C</b> – any metallic elements placed underground must be galvanized or protected by some other means.	<b>L</b> - To be included in EMP

**Result:** *Although issue can be mitigated, the significance of the impact should still be determined / confirmed and assessed in the Significance Rating Table*

## 5) Erosion

Unnecessary clearing of vegetation could lead to exposed soils prone to erosive conditions. Insufficient soil coverage after placing of topsoil, especially during construction where large surface areas are applicable could also cause erosion. To cause the loss of soil by erosion is an offence under the Soil Conservation Act (Act No 76 of 1969). The management of surface water run-off during construction is very important to prevent soils erosion on the site. If construction takes place during the rainy season, sufficient storm water management will be required to manage water runoff.

According to the Geohazard Atlas of South Africa the alignment is characterised as follows with regards to susceptibility to water erosion:

### Central and Northern Portions

- Land with moderate susceptibility to water erosion.
- Generally moderately sloping land.
- Soils have low to moderate erodibility.

### Southern Portion

- Land with low susceptibility to water erosion.
- Generally, level to gently sloping.
- Soils have favourable erodibility index.

According to the Geohazard Atlas of South Africa the following soils are susceptible to wind erosion:

- Sandy Loams in the northern portion of the alignment
- Loamy Sands in the central and southern portions of the alignment

**Table 9: Significance of Issue 5 (Erosion) After Mitigation**

<p><b>Mitigation Possibilities</b>  <b>High</b> 🟡 <b>Medium</b> 😊 <b>Low</b> 🟢</p>	<p>Mitigation          Already achieved ✓</p>	<p>Significance of Issue after mitigation</p>
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<p><b>Positive Impact/ Neutral - Not Necessary To Mitigate</b> ☀️</p>	<p>Must be implemented during <b>P</b>lanning phase, <b>C</b>onstruction and/ or <b>O</b>perational phase</p> <p><b>P / C / O</b> Mitigation</p>	<p>Low/ eliminated <b>L / E</b> Medium <b>M</b> High <b>H</b></p> <p>Not possible to mitigate, but not regarded as a fatal flaw <b>NP</b></p>
<p><b>Medium</b> 😊</p>	<p><b>P &amp; C</b> - A storm water management plan must be compiled for the construction and operational phases of the proposed road.</p> <p><b>P &amp; C</b> - Cut-off drains should be excavated up- and down-hill of denuded areas to reduce run-off across these areas.</p> <p><b>P &amp; C</b> - Large exposed areas during the construction phases should be limited. Where possible areas earmarked for construction during later phases should remain covered with vegetation coverage until the actual construction phase. This will prevent unnecessary erosion and siltation in these areas.</p> <p><b>P &amp; C</b> - Rehabilitate exposed areas immediately after construction in these areas is completed (not at the end of the project).</p> <p><b>P &amp; C</b> - Unnecessary clearing of flora resulting in exposed soil prone to erosive conditions should be avoided.</p> <p><b>P</b> - Specifications for topsoil storage and replacement to</p>	<p><b>H</b> - To be included in EMP</p> <p><b>M</b> - To be included in EMP</p> <p><b>M</b> - To be included in EMP</p> <p><b>L</b> - To be included in EMP</p> <p><b>L</b> - To be included in EMP</p> <p><b>L</b> - To be included in EMP</p>

	<p>ensure sufficient soil coverage as soon as possible after construction must be implemented.</p> <p><b>P &amp; C</b> – All embankments must be adequately compacted and planted with grass to stop any excessive soils erosion and scouring of the landscape.</p> <p><b>C</b> – Storm water diversion measures are recommended to control peak flows during thunder storms.</p> <p><b>P &amp; C</b> – The eradication of alien vegetation should be followed up as soon as possible by replacement with indigenous vegetation to ensure quick and sufficient coverage of exposed areas.</p>	<p><b>L</b> - To be included in EMP</p> <p><b>M</b> - To be included in EMP</p> <p><b>M</b> - To be included in EMP</p>
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**Result:** *Although issue can be mitigated, the significance of the impact should still be determined / confirmed and assessed in the Significance Rating Table*

## 6) Stockpile areas for construction materials and topsoil

Designated areas for stockpiling of construction materials must be specified by the Environmental Control Officer (ECO) in an area that is already disturbed. Stockpiling in the wrong areas might be detrimental to fauna and flora and will deplete the soil quality. Topsoil should be stockpiled as specified in the EMP to ensure that the soil quality doesn't deplete and that the grass seed remain in the soil for later rehabilitation of the disturbed areas.

In addition to the impact discussed in the paragraph above, rainwater falling onto stockpiles may become polluted with dust originating from aggregate and other construction material, such as bitumen from pre-mix stockpiles. Therefore stockpiles of topsoil should be correctly covered to prevent this as well as loss of topsoil by wind erosion. The footprint of stockpile areas will be contaminated with the stored material and will require cleaning before rehabilitation.

**Table 10: Significance of Issue 6 (Stockpile areas for construction materials and topsoil) After Mitigation**

<p><b>Mitigation Possibilities</b>  <b>High</b> 🟢 <b>Medium</b> 😊 <b>Low</b> 🟡  <b>Positive Impact/ Neutral - Not Necessary To Mitigate</b> ✨</p>	<p>Mitigation</p> <p>Already achieved ✓</p> <p>Must be implemented during <b>P</b>lanning phase, <b>C</b>onstruction and/ or <b>O</b>perational phase</p> <p><b>P / C / O</b> Mitigation</p>	<p>Significance of Issue after mitigation</p> <p>Low/ eliminated <b>L / E</b></p> <p>Medium <b>M</b></p> <p>High <b>H</b></p> <p>Not possible to mitigate, but not regarded as a fatal flaw <b>NP</b></p>
<p><b>Medium</b> 😊</p>	<p><b>C</b> - Remove vegetation only in designated areas for construction.</p> <p><b>C</b> - Rehabilitation works must be done immediately after the involved works are completed</p> <p><b>C</b> -All compacted areas should be ripped prior to them being rehabilitated/landscaped;</p> <p><b>P/C</b> - The top layer of all areas to be excavated must be stripped and stockpiled in areas where this material will not be damaged, removed or compacted. This stockpiled material should be used for the rehabilitation of the site and for landscaping purposes</p>	<p><b>M</b> - To be included in EMP</p> <p><b>M</b> - To be included in EMP</p> <p><b>M</b> - To be included in EMP</p> <p><b>M</b>- To be included in EMP</p>

	<p><b>C</b> - Strip topsoil at beginning of works and store in stockpiles no more than 1,5 m high in designated materials storage area.</p>	<p><b>M</b>- To be included in EMP</p>
	<p><b>C</b> – Stockpiles should be covered correctly</p>	<p><b>M</b>- To be included in EMP</p>

**Result:** *Although issue can be mitigated, the significance of the impact should still be determined / confirmed and assessed in the Significance Rating Table*

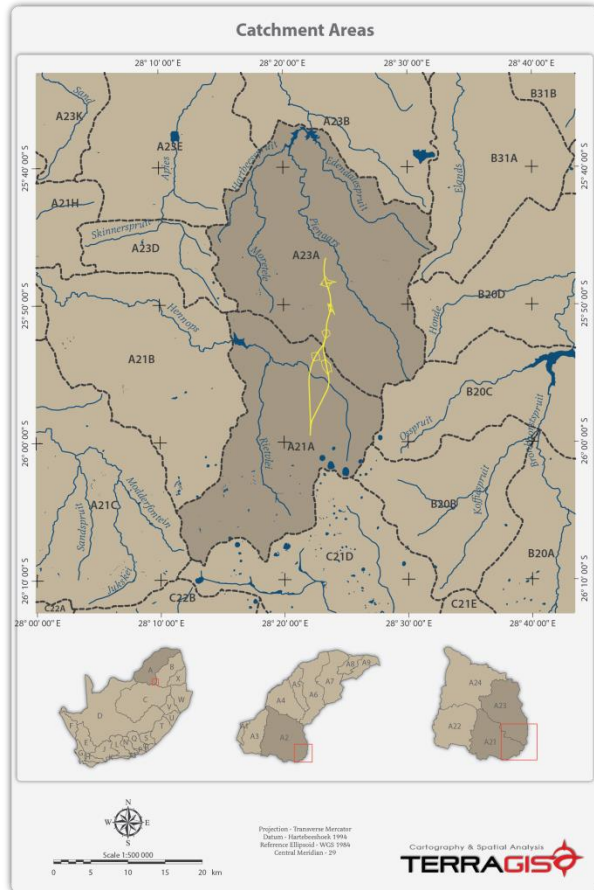
### 6.1.2 Hydrology

**(Refer to Figure 14: Catchment Map)**

The study area falls within two sub-catchments of the Crocodile West and Marico Water Management Area of the Mokolo Catchment.<sup>2</sup> The Crocodile (West) and Marico water management area borders on Botswana to the north-west. Its main rivers, the Crocodile and Marico, give rise to the Limpopo River at their confluence. The north and south sub-catchments of the PWV17 are divided at Garstfontein Road with the Apies/Pienaaers (A23) in the north and the Upper Crocodile (A21) in the south. The Pienaaers River joins the Crocodile River just below the confluence of the Crocodile and Elands rivers. The upper and middle reaches of this sub-management area in particular are densely settled. The Pienaaers River drains the area from Pretoria northwards to the Waterberg Mountains near the town of Bela-Bela. All the main rivers are perennial and their flows are supplemented by substantial discharges of treated domestic and industrial effluent. Flows in these rivers are also enhanced by water imported from the Vaal River system to the south of Johannesburg, which is used principally for domestic and industrial water supplies prior to

<sup>2</sup> Department of Water Affairs, South Africa, November 2013. Directorate Water Resource Classification. Classification of significant water resources in the Crocodile (West), Marico, Mokolo and Matlabas Catchment: Management Classes Report. Report No: RDM/WMA1, 3/00/CON/CLA/0612.

treatment and discharge. Main pollution sources are sewerage leaks, urban storm water and livestock farming. The sub-catchments comprise of a well-developed manufacturing and general commercial urban economy. The overall eco-status of the catchment is poor whereas water quality is fair.



**Figure 14: Catchment Map**

The northern part of the PWV17 alignment falls within quaternary catchment A23A of the Pienaars sub-catchment. The source of the catchment is at the Pienaars River and the outlet at Roodepoort Dam. The eco-classification of the catchment is low due to impacts from urbanisation, irrigation and water treatment works releases. The Roodeplaat Dam and Bon Accord Dam are responsible for changes in flow regimes. The Pienaars River downstream of the Roodeplaat Dam is an important river that allows for fish movement and provides habitat for fish species. The present ecological state (PES) of the river is E – largely modified and the recommended ecological category (REC) is low (D). The Swawelpoortspruit is a perennial tributary of the Pienaars River. The PWV17 route crosses the spruit just north of Graham/ Lynnwood Road.

**Refer to Figure 15: Northern hydrology map**

### 6.1.2.1 Surface Hydrology

#### Quaternary catchment A23A

The northern part of the PWV17 alignment falls within quaternary catchment A23A of the Pienaars sub-catchment. The source of the catchment is at the Pienaars River and the outlet at Roodepoort Dam. The eco-classification of the catchment is low due to impacts from urbanisation, irrigation and water treatment works releases. The Roodeplaat Dam and Bon Accord Dam are responsible for changes in flow regimes. The Pienaars River downstream of the Roodeplaat Dam is an important river that allows for fish movement and provides habitat for fish species. The present ecological state (PES) of the river is E – largely modified and the recommended ecological category (REC) is low (D). The Swawelpoortspruit is a perennial tributary of the Pienaars River. The PWV17 route crosses the spruit just north of Graham/ Lynnwood Road.



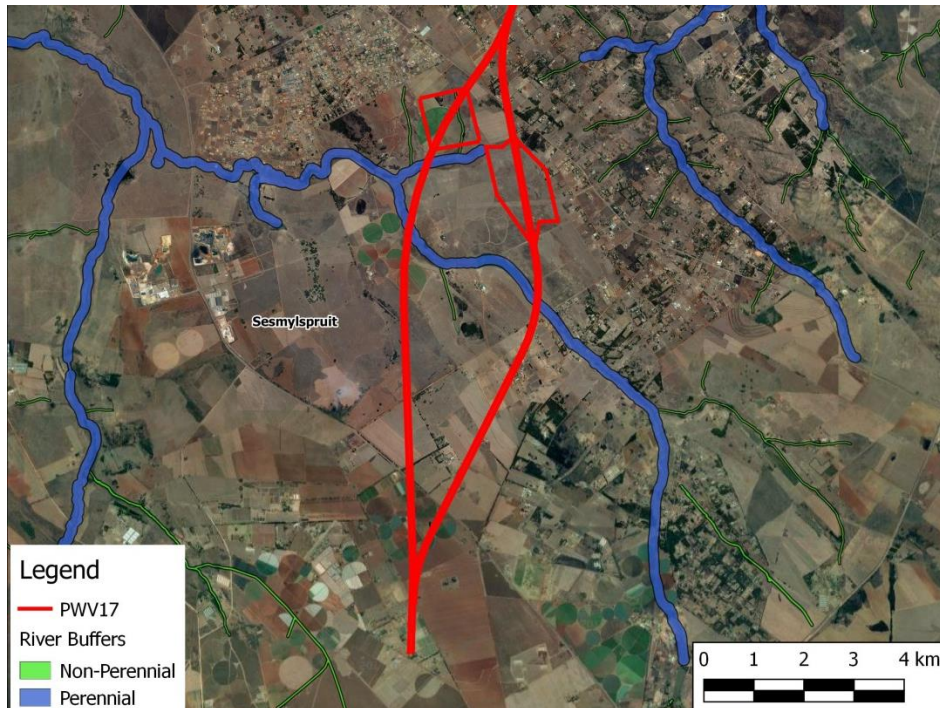
**Figure 15: Northern hydrology map**

### **Quaternary catchment A21A**

The southern section of the PWV17 alignment falls within quaternary catchment A21A of the Upper Crocodile sub-catchment. The catchment source is the Rietspruit River and the outlet is at Rietvlei Dam. The Hennops River splits into the Rietvlei River and Sesmyspruit 3km west of the proposed original alignment. Both the original and Alternative 1 alignments cross the Sesmyspruit and associated wetlands. The PES of the catchment is C – moderately modified and the REC is low (D). The Sesmyspruit has a PES of E –largely modified. The change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural habitat features are still recognisable. The REC is C – moderate, based on the argument that the higher the PES, the closer to the reference the REC should be. Impacts that have reduced water quality include urbanisation, industrialisation and increased flows generally from storm water and effluent.

**Refer to Figure 16: Southern hydrology map**





**Figure 16: Southern hydrology map**

Water resources which have a PES category of E or F are deemed unsustainable by the DWS. In such cases the recommended ecological category (REC) must automatically be increased to a D. This is recommended to enable important and/or sensitive water resources to maintain their functionality and continue to provide the goods and services for the environment and society. In such cases, involvement in activities to improve the condition of these watercourses should be encouraged.

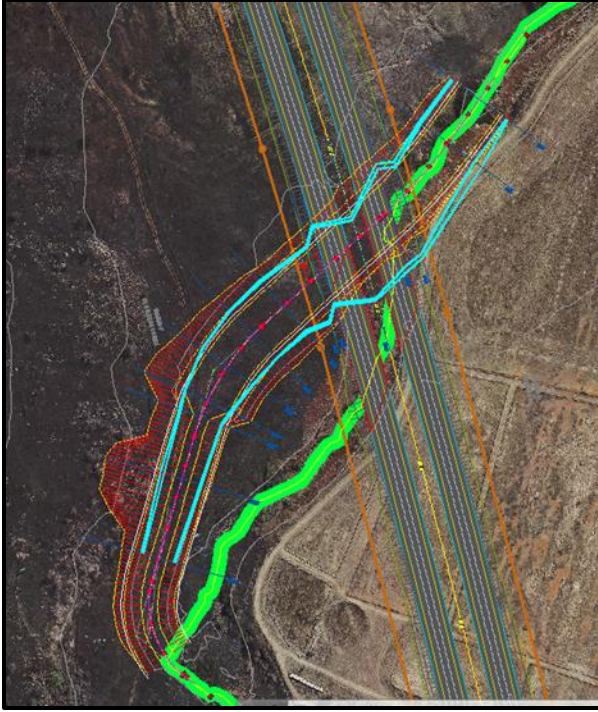
### **Floodlines**

The involved section of the PWV 17 crosses the Swavelpoortspruit and its tributaries in the northern section as well as the Sesmyspruit in the southern section and is therefore influenced by several 1:100 year floodlines, wetlands and watercourses.

**Refer to Figure 15-16, Hydrology Map and Figure 17, Floodline Map.**

## Wetlands

**(Refer to Annexure E (ii), Aquatic Ecosystem delineation)**



**Figure 17: Floodlines Map for Swawelpoortspruit crossing**

The proposed alignments are affected by the Swawelpoortspruit in the north, which eventually flows into the Pienaar's River to the east of Km 20, 0. The Sesmyspruit crosses the original alignment as well as Alternative 1 in the southern section.

**Refer to figure 18 – Wetland and rivers map**

All wetlands are considered as sensitive and applicable mitigation measures need to be applied to prevent damage from construction activities. A large part of the catchment has been converted to grasslands for industrial and residential developments. Historically unchannelled valley bottom

wetlands have been channelled due to changes in water flow regimes as a result of surface runoff and erosion. The riparian zones associated with the Sesmyspruit are regarded as sensitive from a hydrological and ecological point of view.

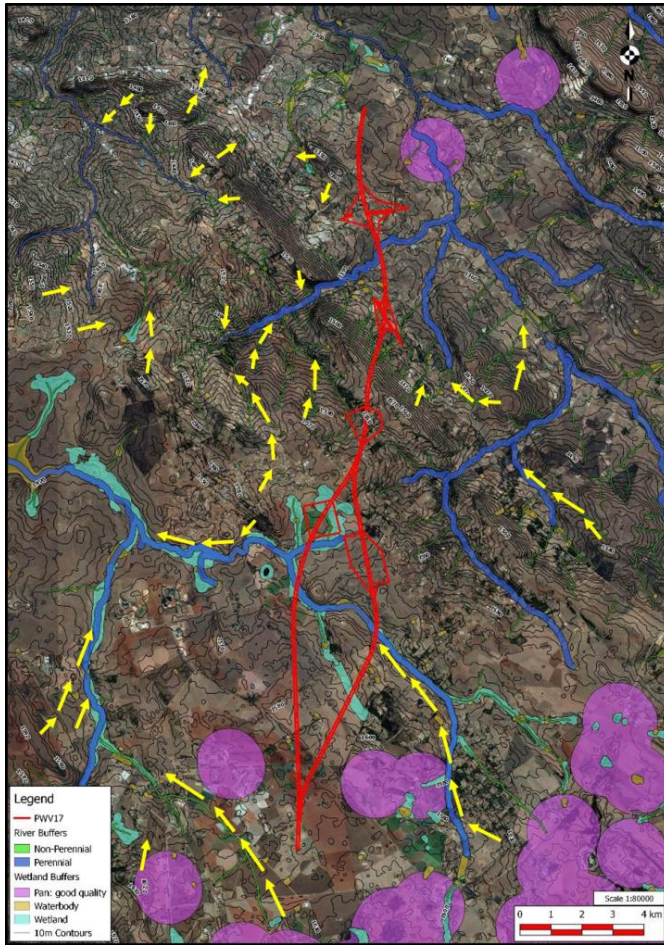
**The Original Alignment:** This alignment is regarded as not ideal from a wetland perspective. The alignment crosses the Sesmyspruit at 3 points in the south as well as the Swawelpoortspruit in the north.

Alternative 1: Crosses the Sesmyspruit wetlands at a single point. This alignment is therefore regarded as the preferred alignment.

Alternative 2: No stream crossing

Alternative 3: No stream crossing





**The Preferred Alternative:** Alternative 1 crosses wetlands and rivers at a single point and therefore is the preferred alignment.

**Figure 18: Wetlands and rivers map with flow paths**

**Table 11: Issues and Impacts – Hydrology**

	Issue/ Impact	Positive/ Negative/ Neutral ±	Mitigation Possibilities High 🟢 Medium 😊 Low 🟡 Positive Neutral - Impact/ Necessary Not Mitigate ☀ To
7)	Siltation, erosion and water pollution could occur in the Swawelpoortspruit, Sesmyspruit and associated wetlands and systems lower down in the catchment area if a stormwater management plan is not implemented.	-	😊

8)	Groundwater pollution and contamination of the Swawelpoortspruit, Sesmyspruit and associated wetlands.	-	😊
9)	Perched water conditions	-	😬
10)	Increased storm water runoff from road into surrounding natural areas	-	😊

### 6.1.2.2 Discussion of issues identified, possible mitigation measures and significance of issue after mitigation - Hydrology

**7) Siltation, erosion and water pollution could occur in the Swawelpoortspruit, Sesmyspruit River and associated wetlands and systems lower down in the catchment area due to a lack of suitable storm water management measures during construction and operational phases.**

If erosion, siltation and water pollution is not addressed, the sustainability of the wetlands and the open space systems lower down in the catchment area can be negatively impacted by the development.

More impermeable surfaces will lead to an increase in the speed, quantity and quality of the storm water and erosion could be caused at discharge points of storm water.

**Table 12: Significance of Issue 7 (Siltation, erosion and water pollution) After Mitigation/ Addressing of the Issue**

<b>Mitigation Possibilities</b>	Mitigation	Significance of Issue after mitigation
<b>High</b> 😊 <b>Medium</b> 😬 <b>Low</b> 🚫	Already achieved ✓	Low/ eliminated <b>L / E</b>
<b>Positive Impact/ Neutral - Not</b>	Must be implemented during	Medium <b>M</b>

<b>Necessary To Mitigate</b> ☀	Planning phase, Construction and/ or Operational phase  <b>P / C / O</b> Mitigation	High <b>H</b>  Not possible to mitigate, but not regarded as a fatal flaw <b>NP</b>
<b>Medium</b> 😊	<b>P / C / O</b> – The storm water design for the proposed road must be designed to:  - Reduce and/ or prevent siltation, erosion and water pollution.  - Storm water runoff should not be concentrated as far as possible and sheet flow should be implemented.  - Erosion of the soil surface must be prevented at all times, because the loss of topsoil will eventually create the risks of sinkhole formation.  - The vegetation must be retained as far as possible, and rehabilitated if disturbed by construction activities to ensure that erosion and siltation do not take place.	<b>M</b> - To be included in EMP

**Result:** *Although issue can be mitigated, the significance of the impact should still be determined / confirmed and assessed in the Significance Rating Table*

## 7) Groundwater pollution and contamination of Sesmyspruit and Swavelpoort Spruit

The dolomitic formation is regarded as one of the best aquifer in South Africa and it has a very high yielding and storage capacity as well as a high recharge potential. The ground

water pollution potential on the study area is regarded as high and if not planned and managed correctly, the construction and operational phases of the proposed road could cause sub-surface water pollution as discussed below.

Uncontrolled construction activities could cause run-off contaminated with silt or cement to reach the wetlands, streams and spring, leading to water contamination. Accidental spillages of diesel, oil or other hazardous substances could contaminate soil, leach into the groundwater or reach the water bodies through run-off.

The Storm Water Management Plan must be designed to:

- Reduce and/ or prevent siltation, erosion and water pollution; and
- Improve the surface and ground water quality of the study area and the lower lying areas within the catchment area.

**Table 13: Significance of Issue 8 (Ground water pollution and contamination of Swavelpoortspruit and Sesmyspruit After Mitigation/ Addressing of the Issue**

<p><b>Mitigation Possibilities</b></p> <p><b>High</b> 🟢 <b>Medium</b> 😊 <b>Low</b> 🟡</p> <p><b>Positive Impact/ Neutral - Not Necessary To Mitigate</b> ⚙️</p>	<p>Mitigation</p> <p>Already achieved ✓</p> <p>Must be implemented during planning phase, construction and/ or operational phase</p> <p><b>P / C / O</b></p>	<p>Significance of Issue after mitigation</p> <p>Low/ eliminated <b>L / E</b></p> <p>Medium <b>M</b></p> <p>High <b>H</b></p> <p>Not possible to mitigate, but not regarded as a fatal flaw <b>NP</b></p>
<p><b>Medium</b> 😊</p>	<p><b>P/C/O</b> - Compilation of a storm water management plan that will address storm water management during the construction and operational phases of the project.</p> <p><b>P/C</b> - Bridges or other</p>	<p><b>M</b> - To be included in EMP</p>

	<p>infrastructure to cross the stream and drainage line should be constructed first to allow the remainder of the work to be undertaken on grade and should preferably be constructed during the dry season.</p> <p><b>P/C</b> – Containment of run-off from construction areas should be implemented and the streams closed off from access by construction workers.</p> <p><b>P/C</b> – Cut-off drains should be trenched between the streams and the construction activities and hay bales should be stacked along the trenches where possible to contain siltation.</p> <p><b>P/C/O</b> – All spillages must be cleaned up and contaminated soil removed as hazardous waste.</p> <p><b>P/C/O</b> – Affected soil must be treated with DRIZIT or similar product.</p>	<p><b>M - T</b> - To be included in EMP</p> <p><b>M - T</b> - To be included in EMP</p> <p><b>M - T</b> - To be included in EMP</p> <p><b>M - T</b> - To be included in EMP</p> <p><b>M - T</b> - To be included in EMP</p> <p><b>M - T</b> - To be included in EMP</p>
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**Result:** Although issue can be mitigated, the significance of the impact should still be determined / confirmed and assessed in the Significance Rating Table

### 8) Perched Water Table

A perched water table can develop on the flood plain and in the riparian zones associated with syenite. Perched water table will most probably be close to the surface during wet seasons.

**Table 14: Significance of Issue 9 (Perched water table) After Mitigation**

<b>Mitigation Possibilities</b> <b>High</b> 🟢 <b>Medium</b> 😊 <b>Low</b> 🟡 <b>Positive Impact/ Neutral - Not Necessary To Mitigate</b> ✨	<b>Mitigation</b>  Already achieved ✓  Must be implemented during <b>P</b> lanning phase, <b>C</b> onstruction and/ or <b>O</b> perational phase  <b>P / C / O</b> Mitigation	<b>Significance of Issue after mitigation</b>  Low/ eliminated <b>L / E</b> Medium <b>M</b>  High <b>H</b>  Not possible to mitigate, but not regarded as a fatal flaw <b>NP</b>
<b>Medium</b> 😊	<b>C</b> – Special attention must be given to subsurface drainage during the detail design of the proposed road.  <b>P/C</b> – Precautionary measures to prevent seepage of groundwater into excavations should be implemented.	<b>M</b> - To be included in EMP

**Result:** Although issue can be mitigated, the significance of the impact should still be determined / confirmed and assessed in the Significance Rating Table

### 9) Increased storm water run-off from the proposed road into surrounding natural areas.

At present most of the study area is covered with vegetation and surface drainage is taking place. The proposed road will add a large amount of hard surfaces and will also lead to the compaction of soils. The soils layers will thus become less permeable, storm water will be canalised rather than evenly spread. The quantity and speed of the storm water will increase significantly and the quality of the surface water will deteriorate, because of the lack of vegetative coverage. Erosion and siltation will also become a problem.

In order to address this issue, it will be necessary to compile a storm water management plan/ system for the proposed development.

**Table 15: Significance of Issue 10 (Increased storm water run-off from the proposed road into surrounding natural areas) After Mitigation/ Addressing of the Issue**

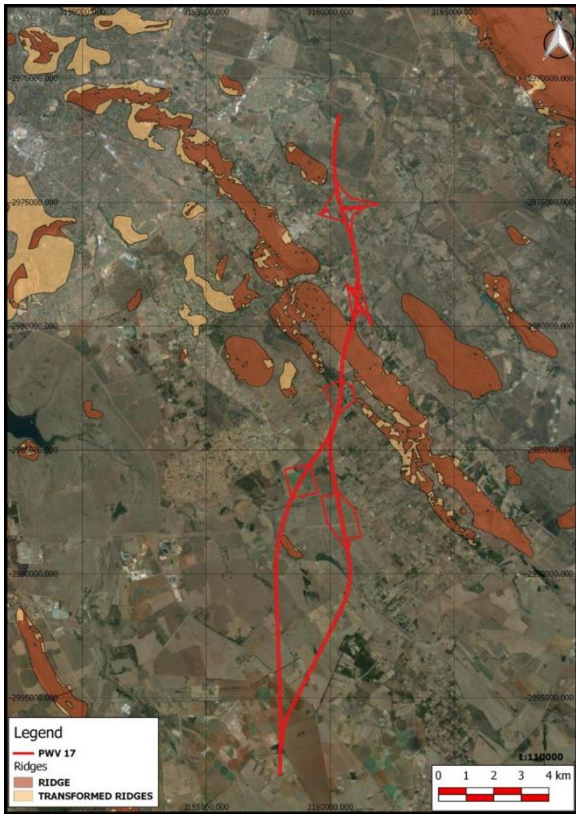
<p><b>Mitigation Possibilities</b></p> <p>High 🟢 Medium 😊 Low 🟡</p> <p>Positive Impact/ Neutral - Not Necessary To Mitigate ⚡</p>	<p>Mitigation</p> <p>Already achieved ✓</p> <p>Must be implemented during planning phase, construction and/ or operational phase</p> <p><b>P / C / O</b></p>	<p>Significance of Issue after mitigation</p> <p>Low/ eliminated <b>L / E</b></p> <p>Medium <b>M</b></p> <p>High <b>H</b></p> <p>Not possible to mitigate, but not regarded as a fatal flaw <b>NP</b></p>
<p>High 🟢</p>	<p><b>P</b> - Compilation of a storm water management plan that will address storm water management during the construction and operational phases of the project.</p> <p><b>P / C / O</b> - The storm water management plan must be designed to:</p> <ul style="list-style-type: none"> <li>• Reduce and/ or prevent siltation, erosion and water</li> </ul>	<p><b>M</b> - To be included in EMP and conditions of approval</p> <p><b>M</b> - To be included in EMP</p>



	<p>pollution.</p> <ul style="list-style-type: none"> <li>• Improve the surface and ground water quality of the study area and the lower lying areas within the catchment area; and</li> <li>• Ensure that no ponding of water and concentrated ingress of water take place.</li> </ul>	
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**Result:** *Although issue can be mitigated, the significance of the impact should still be determined / confirmed and assessed in the Significance Rating Table*

### 6.1.3 Topography



**Figure 19: Ridge map**

The study area predominantly slopes from north-west to south-east along the Bronberg Ridge.

According to the GDARD GIDS, 2007, a large section of Alternative 2 and 3 affects the Bronberg ridge (**refer to Figure 19, Ridge Map**).

Due to the topography the involved section of the PWV17 will be visible from the various view sheds that surround the study area. **Refer to Figure 20, Slope Map and Figure 21, Elevation Model.**



The proposed Alternative 2 will have a significant negative effect on the visual qualities and “Sense of Place” on surrounding properties due to the impact from cutting into the ridge. Alternative 3 is re-aligned to include tunnelling in order to reduce the visual impacts.

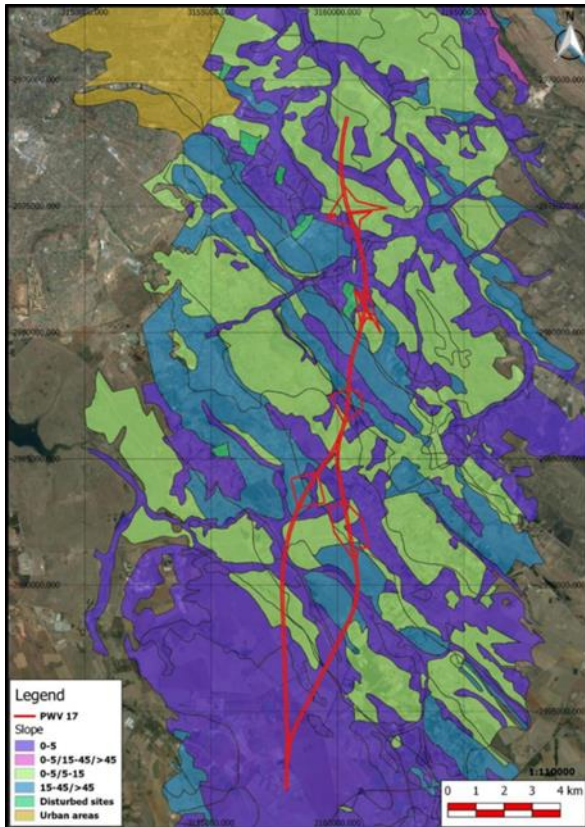


Figure 20: Slope map

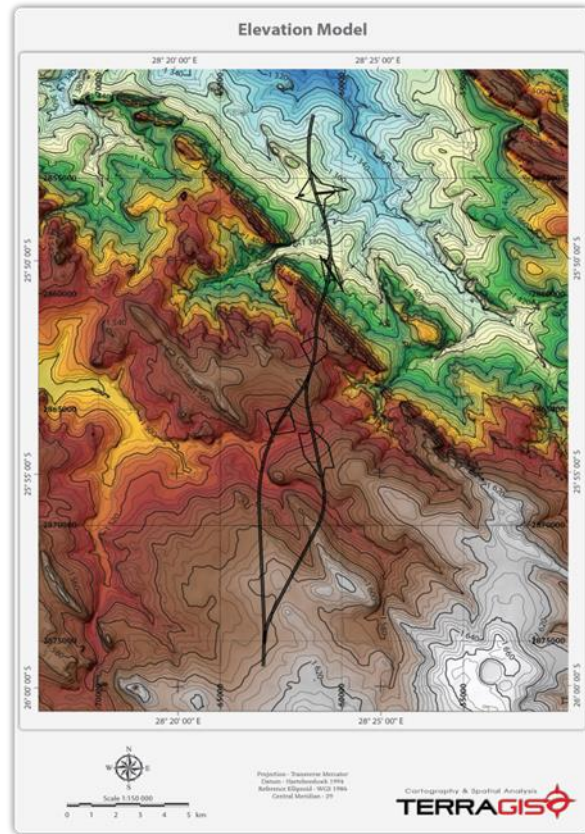


Figure 21: Elevation map

Table 16: Issues and Impacts – Topography

	Issue/ Impact	Positive/ Negative/ Neutral ±	Mitigation Possibilities High 🟢 Medium 😊 Low 🟡 Positive Impact - Not Necessary To Mitigate ✨

11)	The proposed road will be visible from surrounding view-sheds, particularly from Grootfontein, Mooikloof, Shere and Klipkopies areas.	-	😊
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### 6.1.3.1 Discussion of issues identified, possible mitigation measures and significance of issue after mitigation

10) Due to the topography the proposed road will be visible from surrounding view-sheds.

Mitigation measures to restrict/ prevent the visual impacts of the road will have to be implemented.

**Table 17: Significance of Issue 11 (the proposed road will be visible from surrounding view-sheds in the Flatter Areas around the Study Area) After Mitigation/ Addressing of the Issue**

<p><b>Mitigation Possibilities</b></p> <p>High 🟢 Medium 😊 Low 🟡</p> <p>Positive Impact/ Neutral - Not Necessary To Mitigate ☀️</p>	<p>Mitigation</p> <p>Already achieved ✓</p> <p>Must be implemented during planning phase, construction and/ or operational phase</p> <p><b>P / C / O</b></p>	<p>Significance of Issue after mitigation</p> <p>Low/ eliminated <b>L / E</b></p> <p>Medium <b>M</b></p> <p>High <b>H</b></p> <p>Not possible to mitigate, but not regarded as a fatal flaw <b>NP</b></p>
<p><b>Medium 😊</b></p>	<p><b>P/C/O</b> - Possible mitigation measures that could be considered are the establishment of dense vegetation at strategic points to screen-off the most visible sections of the roads / construction of berms adjacent to the road/ a</p>	<p><b>H</b> - To be incorporated as part of the EMP</p>

	combination of berms with vegetation.	
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**Result:** *Although issue can be mitigated, the significance of the impact should still be determined / confirmed assessed in the Significance Rating Table*

#### **6.1.4 Climate**

The climate is typical of the Transvaal Highveld. The summers are mild to hot and the winters mild. It is a summer rainfall region with a mean annual precipitation of approximately 700mm. The moisture index is between 0 – 20, indicating a sub-humid area. The Weimert N value is approximately 2.4, which indicates that chemical decomposition is the predominant form of weathering of rock.

The climatological data for the site was taken from the weather station in Irene.

#### **Wind**

Summer prevailing winds northwest, winter winds southeast.

#### **Temperature °C**

Maximum 26.7 °C, minimum 14.4 °C in summer. Winter temperature maximum 18.2 C, minimum 2.7°C.

#### **Rain**

Maximum rainfall 960mm, minimum 559mm, with an average of 717mm.

#### **Mist**

10 Days

**Lighting**

87 Days

**Hail**

4 Days

**Table 18: Issues and Impacts – Climate**

	Issue/ Impact	Positive/ Negative/ Neutral ±	Mitigation Possibilities High 🟢 Medium 😊 Low 🟡 Positive Impact - Not Necessary To Mitigate 🌞
12)	Should the construction phase be scheduled for the summer months, frequent rain could cause very wet conditions, which makes road construction and environmental rehabilitation works extremely difficult.	-	🟢
13)	If dry and windy conditions occur during the construction phase, dust pollution could become a problem.	-	🟢

**6.1.4.1 Discussion of issues identified, possible mitigation measures and significance of issue after mitigation**

**12) Should the construction phase be scheduled for the summer months, frequent rain could cause very wet conditions, which makes it extremely difficult to build in and to do rehabilitation works of disturbed areas.**

These wet conditions often cause delays to building projects and the draining of water away from the construction works (in the case of high water tables) into the Sesmyspruit, Swavelpoortspruit and associated wetlands/ riparian zones, could (if not planned and managed correctly) have an impact on the water quality of these water bodies.

**Table 19: Significance of Issue 12 (Should the construction phase be scheduled for the summer months, frequent rain could cause very wet conditions, which makes it extremely difficult to build in and to do rehabilitation works of disturbed areas) After Mitigation/ Addressing of the Issue**

<p><b>Mitigation Possibilities</b></p> <p><b>High</b> 🟢 <b>Medium</b> 😊 <b>Low</b> 🟡</p> <p><b>Positive Impact/ Neutral - Not Necessary To Mitigate</b> ⚙️</p>	<p>Mitigation</p> <p>Already achieved ✓</p> <p>Must be implemented during planning phase, construction and/ or operational phase</p> <p><b>P / C / O</b></p>	<p>Significance of Issue after mitigation</p> <p>Low/ eliminated <b>L / E</b></p> <p>Medium <b>M</b></p> <p>High <b>H</b></p> <p>Not possible to mitigate, but not regarded as a fatal flaw <b>NP</b></p>
<p><b>High</b> 🟢</p>	<p><b>P/C</b> – Construction workers and construction vehicles and machinery must stay out of the soggy areas during the wet periods. Barrier tape should be used to demarcate the areas that are drenched with water and it should only be removed when the appointed Environmental Control Officer (ECO)/ site supervisor/ project manager/ main contractor regard the conditions in the affected areas as favourable.</p>	<p><b>M</b> - To be included in EMP</p>

**Result:** Although issue can be mitigated, the significance of the impact should still be determined / confirmed assessed in the Significance Rating Table

**13) If dry and windy conditions occur during the construction phase, dust pollution could become a problem.**

If dry and windy conditions occur during the construction phase, dust pollution could become a problem. During the summer months dust pollution could be carried over the properties to the south-east (i.e. Boschkop and Garstfontein developments) and during the winter months dust could be carried over the properties to the north-west (i.e. Mooikloof and Shere).

Sweeping of the construction site, clearing of builders' rubble and debris as well as the regular watering of the construction site (storage areas, roads etc.) must take place at least once a day.

**Table 20: Significance of Issue 13 (Dust Pollution) After Mitigation/ Addressing of the Issue**

<p><b>Mitigation Possibilities</b></p> <p><b>High</b> 🟡 <b>Medium</b> 😊 <b>Low</b> 🟢</p> <p><b>Positive Impact/ Neutral - Not Necessary To Mitigate</b> ✨</p>	<p>Mitigation</p> <p>Already achieved ✓</p> <p>Must be implemented during planning phase, construction and/ or operational phase</p> <p><b>P / C / O</b></p>	<p>Significance of Issue after mitigation</p> <p>Low/ eliminated <b>L / E</b></p> <p>Medium <b>M</b></p> <p>High <b>H</b></p> <p>Not possible to mitigate, but not regarded as a fatal flaw <b>NP</b></p>
<p><b>High</b> 🟡</p>	<p><b>P/C</b> - Sweeping of the construction site, clearing of builders' rubble and debris as well as the regular watering of the construction site (storage</p>	<p><b>L</b> - To be included in EMP</p>

	areas, roads etc.) must take place at least once a day.	
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**Result:** *Although issue can be mitigated, the significance of the impact should still be determined / confirmed assessed in the Significance Rating Table*

### Conclusion of the physical environment

- The environmental sensitivities associated with the ridge area are regarded as more significant than the environmental sensitivities associated with the riparian zone, which is already very disturbed.
- The riparian zone is however regarded as very sensitive from an avifaunal point of view and it will be necessary to appoint an avifaunal specialist to assist with the detail planning of the road through the riparian areas in order to protect the existing bird habitats and to create additional habitats.
- The Swawelpoortspruit and Sesmyspruit floodplain areas are of concern and suitable mitigation measures must be applied to ensure the ecological functioning of the floodplain must be incorporated into the planning.
- The proposed bridge crossings/ culvert crossings across the watercourse/ spruit must be done to prevent erosion and siltation and the points of crossing must preferably be located in areas where the vegetation is the most disturbed. Where possible the alignment in the riparian zone must take existing large indigenous trees into consideration.
- Mitigation measures and rehabilitation planning must be completed to ensure the impact to the system is negated.
- It must be noted that any development on the study area will have an impact on the aquatic ecosystems and must be authorised in terms of section 21 of the National Water Act (Act 36 of 1998).
- Because of the slope of sections of the proposed road, the storm water release from the site into the watercourse areas must be well planned and managed.

- Storm water and associated engineering should be designed with the assistance of an aquatic specialist to ensure that the riparian zone and watercourse are not severely impacted and in order to ensure that the impacts are only temporary of nature.

## **6.2 THE BIOLOGICAL ENVIRONMENT**

### **GDARD Biodiversity Information:**

According to the information received from GDARD specialist biodiversity studies are required to investigate the following aspects:

- Mammals, with specific reference to *Juliana's Golden Mole*;
- Invertebrates;
- Amphibians;
- Vegetation;
- Avifauna;
- Rivers; and
- Wetlands

**C Niemandt and SE van Rooyen were appointed to conduct a flora survey for the involved section of the PWV17. CW Vermeulen, SE van Rooyen and MI Cooper were appointed to conduct the fauna habitat assessment (refer to Annexure E for the reports). I. L. Rautenbach was additionally appointed to conduct a study on the occurrence of Juliana's Golden Mole along the proposed route.**

### **6.2.1 Vegetation**

The study site is situated in the quarter degree square (QDS) 2528CD and falls in four vegetation units according to Mucina and Rutherford (2006): Carletonville Dolomite



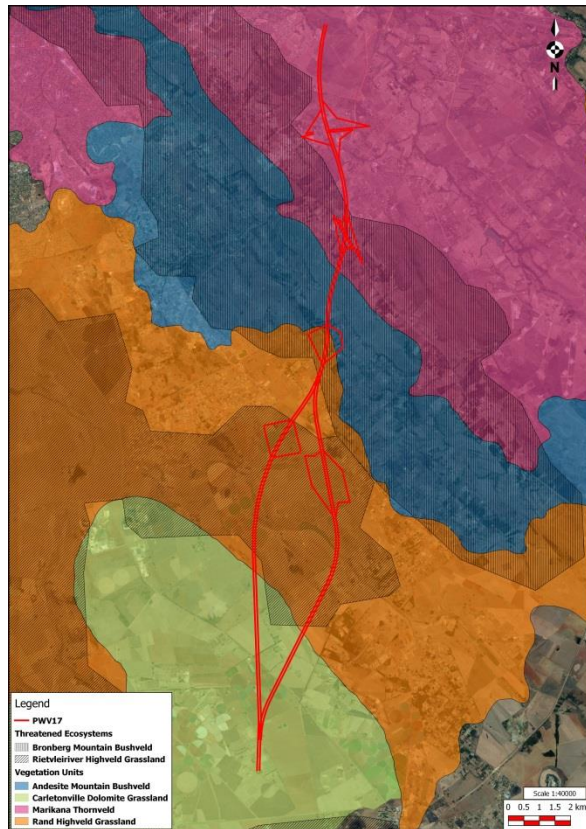
Grassland (Gh 15), Rand Highveld Grassland (Gm 11), Andesite Mountain Bushveld (SVcb 11) and Marikana Thornveld (SVcb 6). The study site is further located in two threatened ecosystems, both considered Critically Endangered: the Bronberg Mountain Bushveld (BMB) and the Rietvleiriver Highveld Grassland (RRHG; Government Gazette no. 34809, 2011). **Refer to Figure 22: Vegetation Map**

Carletonville Dolomite Grassland is considered Least Concern. The conservation target is 24%, while only a small extent is currently protected and 23% is considered to be transformed, mostly by cultivation (17%), urbanization (4%), forestry (1%) and mining (1%) (Mucina and Rutherford, 2006). This is a species-rich mosaic of plant community types occurring on undulating plains dissected by rocky chert ridges. This vegetation unit occurs in the southern section of the PWV17.

Rand Highveld Grassland is regarded as Vulnerable. Although 60% of this vegetation unit remains as natural area, only approximately 1% of the original area is protected (Mucina and Rutherford, 2006). Five endemic plant species are known to occur in this vegetation unit (Mucina and Rutherford, 2006; Government Gazette no. 34809, 2011). The landscape is described as highly variable with extensive sloping plains and a series of ridges slightly elevated over undulating surrounding plains. The vegetation is species-rich, wiry, sour grassland alternating with low, sour shrubland on rocky outcrops and steeper slopes. The vegetation unit occurs south of the Bronberg Ridge and ends approximately at Delmas Road.

Andesite Mountain Bushveld is considered Least Threatened according to Mucina and Rutherford (2006). Although the conservation target for this vegetation type is 24%, only about 7% is statutorily conserved, mainly in the Suikerbosrand Nature Reserve and Magaliesberg area. Approximately 15% of SVcb 11 is already transformed by cultivation and urban development. This vegetation unit is located on the eastern portion of the Bronberg Ridge.

Marikana Thornveld is regarded as Vulnerable (Mucina and Rutherford, 2006; Government Gazette no. 34809, 2011). Although 55% of this vegetation unit remains as natural area, less than 1% of the original area is protected. It is described as open *Vachellia* karroo woodland, occurring in valleys and slightly undulating plains, and some lowland hills. Shrubs are denser along drainage lines, on termitaria and rocky outcrops or in other habitat protected from fire. This vegetation unit is considerably impacted, with



**Figure 22 – Vegetation Map**

48% transformed, mainly due to cultivated and urban or built-up areas. In the east of Pretoria (in the study area), industrial development is a great threat of land transformation. Erosion is very low to moderate. Alien invasive plant species is found localised in high densities, especially along the drainage lines. The vegetation unit is located in the northern section of Lynnwood/ Graham Road.

The Bronberg Mountain Bushveld occurs within the Savanna and Grassland Biomes near Pretoria. Approximately 91% is still in its natural

state whereas 1% is conserved in the Faerie Glen Nature Reserve. There are 19 threatened

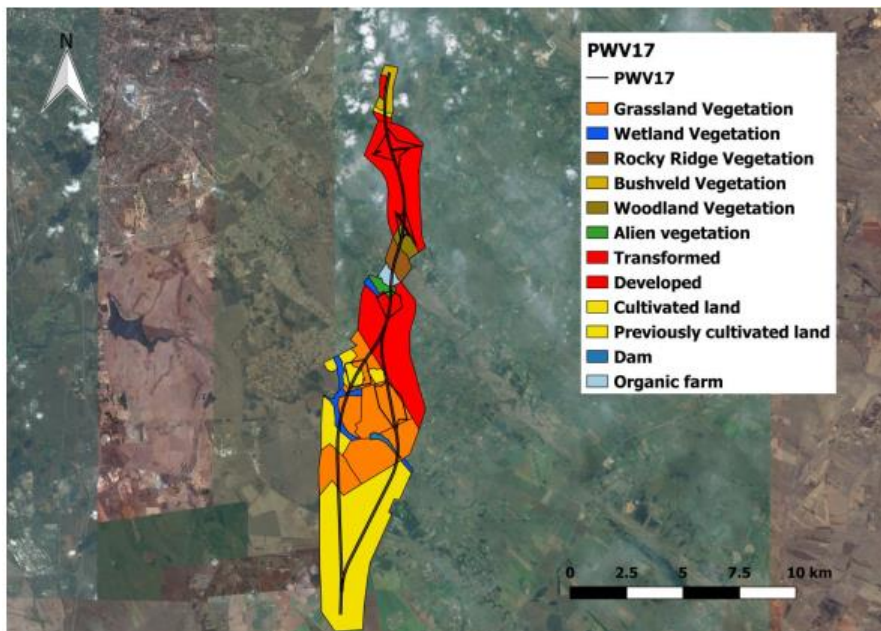
and endemic plant and animal species present in the area. This vegetation unit covers the Bronberg Ridge.

The Rietvleiriver Highveld Grassland occurs within the Grassland and Wetland Biomes. Approximately 85% is still in its natural state whereas 11% is protected. A number of rivers, pans and wetlands are present within the ecosystem. There are 25 threatened and listed plant and animal species in the area. The vegetation unit is located in the southern section of the PWV17 and covers the Original and Alternative 1 alignments.

## Study units

Six study units were identified that are crossed by the proposed and alternative road alignments (**Refer to Figure 23, Vegetation Study Units Map**):

1. Grassland Vegetation
2. Wetland Vegetation
3. Rocky Ridge Vegetation
4. Bushveld Vegetation
5. Woodland Vegetation
6. Riverine Vegetation



**Figure 23 – Vegetation Study Units**

- **Grassland Vegetation**

### Composition

In general, the grassland patches towards the south-west are in a semi-natural state. Grassland patches towards the north and north-east are more fragmented and used for grazing purposes. Some grassland patches are more degraded than others due to

grazing pressure and alien vegetation. Dominant grass species include *Eragrostis spp.*, *Heteropogon contortus* and *Themeda triandra*. The forb layer is dominated by *Berkheya radula*, *Gerbera ambigua*, *Helichrysum nudifolium*, *Hilliardiella oligocephala*, *Ledebouria revoluta*, *Nemesia fruticans*, *Polygala amatymbica*, *Polygala hottentotta*, *Tephrosia capensis* and *Wahlenbergia undulata*.

#### Red- and Orange List species

The two Orange List species, *Hypoxis hemerocallidea* and *Boophone disticha* were recorded for this study unit. There is suitable habitat for one Orange List species (*Callilepis leptophylla*) and three Red List species (*Argyrolobium campicola*, *Habenaria bicolor* and *Habenaria mossii*).

#### Medicinal and alien species

Ten medicinal species were recorded for this unit, of which *Hypoxis hemerocallidea* and *Boophone disticha* are the most threatened species. Alien species which dominate the landscape include *Campuloclinium macrocephalum*, *Cosmos bipinnatus*, *Plantago lanceolata*, *Tagetes minuta* and *Verbena bonariensis*.

#### Sensitivity

All of the grassland patches occur in the Critically Endangered Rietvleiriver Highveld Grassland, making the grassland vegetation ecologically **sensitive**. Some grassland patches are considered ecologically medium sensitive due to their natural state and their connectivity with other patches in addition to the two Orange List species that were recorded for these patches. Other patches cannot be regarded as typical of the Rietvleiriver Highveld Grassland due to grazing pressure, alien vegetation and development, and is therefore not sensitive.

- **Wetland Vegetation**

Composition

The number of species per growth form category is indicated in Table 5. This site is dominated by hydrophytes and herbs. The wetland towards the north-west is in a good ecological state, but is threatened by surrounding agricultural activities. Dominant species include *Berkheya radula*, *Cyperus spp.*, *Cyrtium tubulosum*, *Gladiolus crassifolius*, *Gladiolus papilio*, *Haplocarpha scaposa*, *Mimulus gracilis*, *Monopsis decipiens*, *Schoenoplectus spp.*, and *Typha capensis*.

Red- and Orange List species

One Orange List species, namely *Gunnera purpensa*, was recorded in this study unit. The habitat is suitable for three Orange List species and one Red List Species.

Medicinal and alien species

Seven medicinal species were recorded for this unit, of which *Gunnera purpensa* is the most threatened species. Seven alien species in this unit are classified as Category 1b invaders. Alien species which dominate the landscape include *Campuloclinium macrocephalum*, *Cosmos bipinnatus*, *Flaveria bidentis*, *Hibiscus trionum*, *Persicaria lapathifolia*, *Tagetes minuta* and *Verbena bonariensis*. *Asclepias curassavica* is not listed on POSA; it is therefore possible that this could be the first record for this species in the area.

Sensitivity

This unit is regarded as **highly sensitive** and should be excluded from development. Wetland connectivity is mainly intact, especially towards the north-west. Alien vegetation and agricultural activities threaten the ecological status and connectivity of these wetlands.

- **Rocky Ridge Vegetation**

Composition

The southern slope of the Bronberg has less species and a smaller area affected. Dominant tree and shrub species include *Diospyros lycioides*, *Searsia lancea*, *Searsia magalismontana* and *Vangueria infausta*. The forb layer is dominated by *Adiantum capillus-veneris*, *Commelina modesta*, *Euryops laxus*, *Kohautia amatymbica*, *Leonotis randii*, *Senecio venosus*, *Tephrosia elongata* and *Xerophyta retinervis*.

The northern slope of the Bronberg has a much larger area affected by the proposed road and is more species rich compared to the southern slope. More indigenous tree and shrub species were recorded for the northern slope, including *Combretum molle*, *Diospyros lycioides*, *Euclea crispa*, *Searsia lancea*, *Searsia pyroides* and *Vachellia karroo*. Dominant forbs include *Adiantum capillus-veneris*, *Bulbostylis hispidula*, *Commelina africana*, *Kohautia amatymbica* and *Xerophyta retinervis*.

Red- and Orange List species

No Red or Orange List species were recorded for this unit.

Medicinal and alien species

Five medicinal and seven alien species were recorded for this study unit. Alien species which dominate the southern slope include *Jacaranda angustifolia*, *Opuntia ficus-indica*, *Priva cordifolia*, *Richardia brasiliensis*, *Solanum sisymbriifolium* and *Solanum mauritanum*. For the northern slope, only *Eucalyptus sp.* was recorded. Six of the species are Category 1b invaders.

## Sensitivity

This site is regarded as highly sensitive as it is in a natural state and connectivity is still intact. The Bronberg is considered a Class 2 ridge according to GDARD C-Plan. Minimum disturbances occur and only a few alien species occur on site.

- **Bushveld Vegetation**

### Compositional aspects and Connectivity

The vegetation is in a natural state, but threatened by increasing urban development from the west. Dominant tree and shrub species include *Diospyros lycioides*, *Searsia lancea*, *Searsia pyroides*, *Vachellia karroo* and *Vachellia tortilis*. The forb layer is dominated by *Acalypha angustata*, *Aloe greatheadii*, *Amaranthus deflexus*, *Chaetacanthus setiger*, *Felicia muricata*, *Helichrysum nudifolium*, *Hilliardiella oligocephala*, *Hypoxis rigidula*, *Polygala amatymbica*, *Polygala hottentotta*, *Scabiosa columbaria* and *Tephrosia capensis*.

### Red- and Orange List species

One Red List species (*Habenaria kraenzliniana*) and one Orange List species (*Hypoxis hemerocallidea*) were recorded in this study unit. The appropriate buffer of 400m was applied for *H. kraenzliniana* in the sensitivity map (**Figure 28**). This species should be protected in situ, and no construction may take place within the buffer zone. The Orange List species is threatened due to it being harvested for its medicinal properties. There is also suitable habitat for two other Red List species.

### Medicinal and alien species

Seven medicinal and six alien species were recorded for this study unit. *Hypoxis hemerocallidea* is the most threatened medicinal species in this unit. Alien species which are abundant in this unit include *Campuloclinium macrocephalum*, *Lantana camara*, *Solanum mauritianum* and *Solanum sisymbriifolium*.

### Sensitivity

This site is considered **highly sensitive** due to the occurrence of a Red List species and the natural state of the habitat. Connectivity towards the east is restricted due to urban expansion, but less restricted to the west consisting of mixed land uses. The study unit is fragmented by the construction of the N4 highway towards the north; therefore there is no connectivity with surrounding patches.

- **Woodland Vegetation**

### Composition

The tree canopy covers most of this unit with some open woodland areas towards the Bronberg. Dominant species include *Celtis africana*, *Dombeya rotundifolia*, *Eragrostis nindensis*, *Ehretia rigida*, *Helichrysum nudifolium*, *Heteropogon contortus*, *Melinis repens*, *Searsia lancea*, *Themeda triandra* and *Vachellia karroo*.

### Red- and Orange List species

No Red or Orange List species were recorded for this site. The site is suitable for at least one Red List species and two Orange List species.

### Medicinal and alien species

Seven medicinal and six alien species were recorded for this study unit. Three alien species are Category 1b invaders and one species a Category 3 invader.

### Sensitivity

This vegetation of this site is **not** considered **sensitive**, but is still in a natural state. There is limited connectivity of this unit due to infrastructure development towards the west and the east.



- **Riverine Vegetation**

Composition

The riverine vegetation is disturbed by alien vegetation. Dominant species include *Arundo donax*, *Berkheya radula*, *Celtis africana*, *Combretum erythrophyllum*, *Imperata cylindrica*, *Typha capensis*, and *Vachellia karroo*.

Red- and Orange List species

No Red or Orange List species were recorded for this site.

Medicinal and alien species

Five medicinal and twelve alien species were recorded for this study unit. Seven alien species are Category 1b invaders, two species Category 2 invaders and two species Category 3 invaders.

Sensitivity

This unit is highly disturbed due to the high numbers of alien species. It is **not** considered **sensitive** from a current vegetation perspective; however, it is a riverine system which provides important ecological services and is therefore, important to preserve.

**Findings Made by C. Niemandt and S. E. van Rooyen and Potential Implications**

There are several sensitive units identified for this study site: wetland vegetation, rocky ridge vegetation and bushveld vegetation. One Red List species was recorded for this study, and two Orange List species. Wetland areas are generally considered ecologically sensitive and should be conserved. The proposed road development will affect large areas of wetland, while the proposed alternative road would have a lower impact. Through proper and efficient implementation of the recommended mitigation measures, the potential adverse impacts on the proposed alternative road could be mitigated which would reduce the level of adverse impacts. However, even when rigid mitigation

measures are implemented for the proposed road, some wetland habitat might be irreversibly lost.

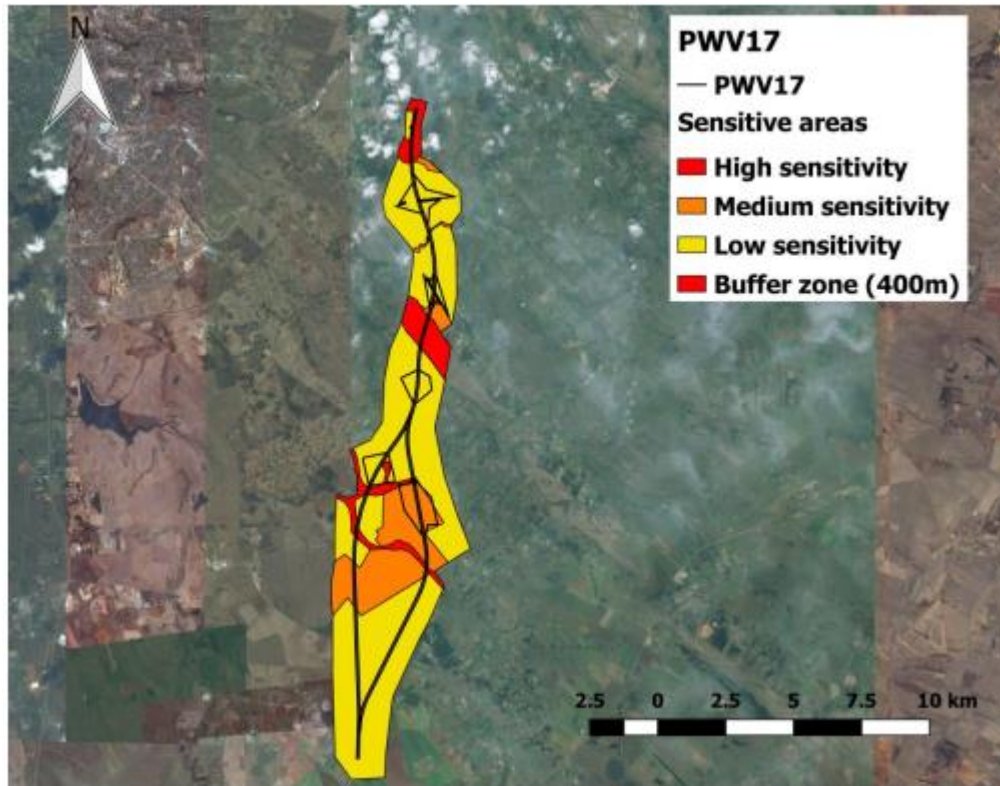
The rocky ridge (Bronberg Mountain Range) is considered extremely sensitive. The habitat is suitable for two Red List species, both indicated as Vulnerable. Although not recorded in this study, an effort should be made to search for and record these species.

The bushveld vegetation at the northern end of the proposed road is considered highly sensitive as there is a low presence of alien species, intermediate disturbances (mainly due to urban expansion), and the presence of a Red List species. There is a probability of recording two more Red List species for this site. It is suggested that this section of the proposed road be reconsidered due to the high sensitivity of the area, or permission from GDARD should be obtained for the removal of the Red List species.

Although not indicated as sensitive, the grassland vegetation has suitable habitats for two Red List species and five Orange List species of which two were recorded in this study. This grassland should be conserved if possible, especially if Red List species are found. If the proposed road development will proceed, it would cause fragmentation of this grassland which is already under threat due to agriculture in the area. The grassland patches affected by the proposed alternative road is mainly for grazing purposes; therefore grassland vegetation is less sensitive for the proposed alternative road.

Also not indicated as sensitive, the riverine system is disturbed due to encroachment of alien species. However, proper care should be taken when constructing a road across rivers/watercourses. The necessary mitigation measures should be followed to ensure that further degradation of this unit does not occur

***Refer to Figure 24 – Sensitive flora areas of the study site***



**Figure 24 – Sensitive flora areas of the study site**

### Recommended Mitigation Measures

Competent and appropriate management authority should be appointed to implement the Ecological Management Plan (EMP) and Environmental Impact Assessment (EIA) conditions throughout all phases of development, including the operational phase. The EMP should comply with the Minimum Requirements for Ecological Management Plans according to GDARD. The EMP and EIA should take into account all recommendations and mitigation measures as outlined by all vegetation assessments conducted for the EIA process.

The following recommendations and mitigation measures are proposed:

- The attached sensitivity map (**Figure 28**) should be used as a decision tool to guide the layout design.

- Before construction is initiated, ecologically sensitive areas should be fenced-off from construction, and all construction-related impacts must be contained within the fenced off development areas. These areas should be demarcated on site layout plans. All construction related impacts (including service roads, temporary housing, temporary ablution, disturbance of natural habitat, storing of equipment/building materials/vehicles or any other activity) should be excluded from ecologically sensitive areas. An overspill of construction activities into areas outside of the study area is permitted within designated non-sensitive areas. No personnel or vehicles may be permitted in ecologically sensitive areas except for those authorised to do so.
- A pre- and post-construction alien and invasive control, monitoring, and eradication programme must be implemented along with an ongoing programme to ensure persistence of indigenous species. A qualified botanist/ecologist should compile and supervise the implementation of this programme.
- Rehabilitation of natural vegetation should proceed in accordance with a rehabilitation plan compiled by a specialist registered in terms of the Natural Scientific Professions Act (No. 27 of 2003) in the field of Ecological Science.
- Where active rehabilitation or restoration is mandatory for terrestrial systems, it should make use of indigenous plant species native to the study area, but would otherwise be destroyed during clearing for development purposes, for example *Celtis africana*, *Vachellia karroo*, and *Hypoxis hemerocallidea*. The species selected should strive to represent habitat types typical of the ecological landscape prior to construction. Forage and host plants required by pollinators should also be planted in landscaped areas.
- It is strongly prohibited for Red List species to be relocated, but should be protected in situ according to GDARD. This means that if any Red List species is recorded on site, all development activity should be stopped, a qualified botanist should be consulted and the relevant buffers should be applied. No construction may take place within a buffered area of a Red List species. If not possible to protect in situ, permission should be obtained from GDARD for the removal of such Red List species.

### **Conclusions by the specialists**

The EMP and the proposed mitigation measures should be followed. Certain study units, indicated above, are highly sensitive and should be excluded from development. These include the wetland vegetation, rocky ridge vegetation (Bronberg) and the bushveld vegetation. If the proposed road or its alternative is approved, adverse impacts should be mitigated and where required, a rehabilitation plan should be followed. The northern section of the proposed road should be reconsidered as a Red Listed species was recorded in the area. If the relevant authority (GDARD) decides to rescue the plant, it should be translocated to favourable habitat or included in a breeding programme. This is not generally supported by GDARD as all Red List species should be protected in situ.

If the proposed road or its alternative is approved, dumping of builders' rubble and other waste must be prevented in ecologically sensitive areas. These areas should be properly managed throughout the lifespan of the project to ensure continuous biodiversity. The disturbed alien vegetation study unit can be used for storage of building material used for development. Alien plant species, especially in Category 1 and 2 must be eradicated as a matter of urgency to preclude their spreading during the construction phase in addition to a clean-up programme after construction.

***The northern section of the proposed road should be reconsidered as Red Listed species was recorded in the area. If the proposed road or its alternative is approved, the ecologically sensitive areas should be properly protected throughout the lifespan of the project to ensure continuous biodiversity.***

## 6.2.2 Fauna

### 6.2.2.1 Mammals

The primary focus of the fauna report falls on Red Data species and other species with conservation importance occurring on or near the study area to ensure that, should any such species exist, the appropriate actions are taken to guarantee the well-being of these species.

The purpose of the study by I.L. Rautenbach was to ascertain the presence (or absence) of the Critically Endangered Juliana's Golden Mole (*Neamblysomus julianae*) along the northern slope of the Bronberg Mountain (Tierpoortrand). Special attention was paid to the qualitative and quantitative habitat conditions for Juliana's Golden Mole, and if present offer mitigation measures to ameliorate the effect of the suggested development.

### Findings by the specialists

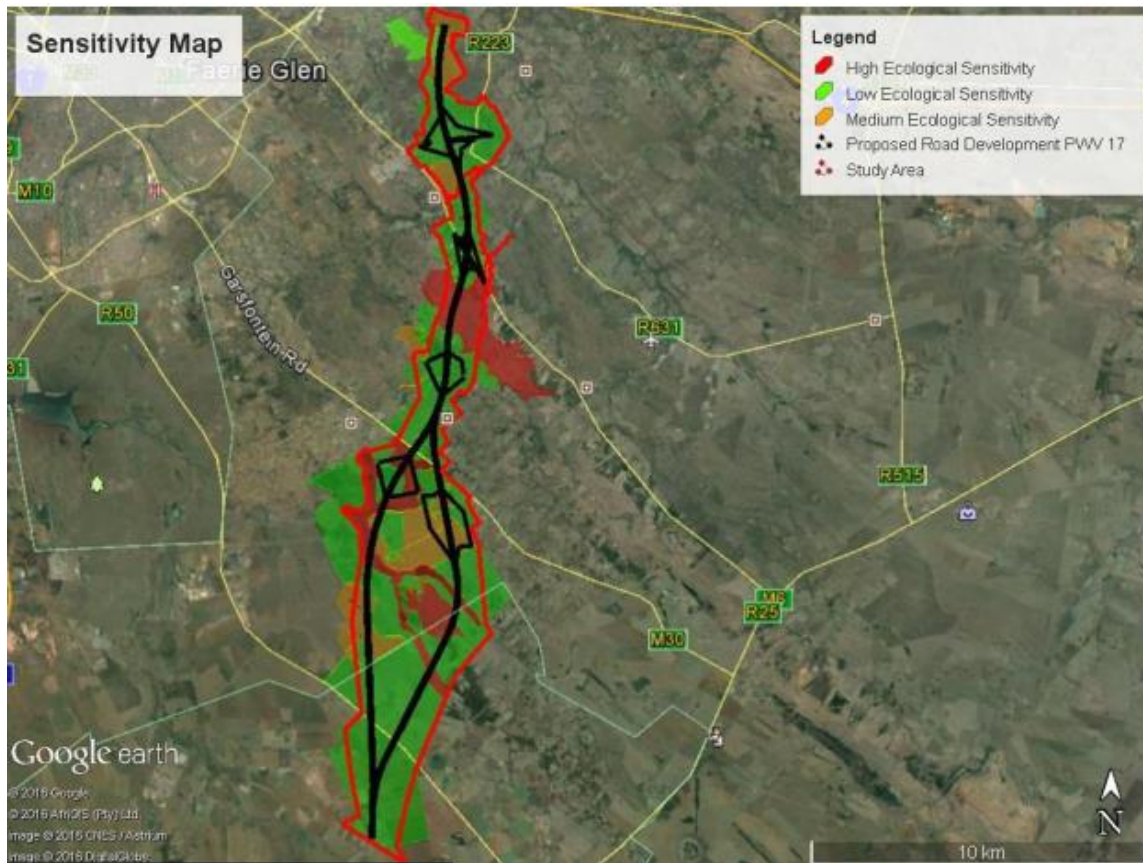
- During the habitat assessment six distinct mammalian habitats were identified in the study area. These habitats include: Near Natural Grassland, Wetland, Rocky Ridge, Savanna Grassland, Woodland and Riverine Area.
- The Near Natural Grassland has several study units that still remain in its pristine and primary condition, which is thought to support a high variety of widespread fauna species. As a result of the current, natural status of the aforementioned grassland habitats, it is deemed **highly sensitive** from a mammal perspective, as it creates suitable habitats for several important mammal species.
- Due to the majority of the Wetland Vegetation unit remaining in its pristine condition, it is deemed **highly sensitive**. Connectivity of the Wetland Vegetation unit with surrounding homogenous wetland habitats is mandatory to ensure sustainable demographic patterns of the mammal species relying on this habitat for survival.

- The Rocky Ridge habitat provides all the desirable nooks and crannies which will favour rupicolous mammal species. Due to the isolated nature and small surface area of the rocky outcrop it was **not** deemed to be an area of high ecological **sensitivity**.
- The Savanna Grassland study unit experience minimal disturbances, but still remains fragmented. This habitat unit is regarded as **moderately sensitive** from a mammal perspective.
- The Woodland habitat provides a micro-habitat within the Bronberg Mountain Bushveld vegetation unit. Although it is fairly small in size, a few mammal species still regard this habitat as suitable for roosting and foraging purposes. Due to this habitat's sustained connectivity with the Bronberg, it is deemed **moderately sensitive**.
- The riverine habitat experience minimal disturbances from urban and agricultural development, but is however threatened by the invasion of alien species. Due to this habitat's pristine condition, the probability of Red List species located in the riverine habitat is highly likely due to the sustained connectivity with homogenous habitats and good ecological status. This habitat unit is regarded as **sensitive**.
- The Riverine, Wetland, Woodland and Rocky Ridge habitats are regarded as ecological sensitive on account of the natural state of the areas. These areas provide suitable habitats and foraging areas for several Red List mammal species. It is therefore not advised to cause disturbances, fragment or destroy these areas as it plays a major role in the sustainable wellbeing of especially Red Listed mammal species utilising these areas.
- The presence of Juliana's Golden Mole as deduced by their characteristic tunnels was not recorded. Furthermore, nowhere was suitable habitat found. This "Critically Endangered" small insectivorous mole occurs in the loose sandy pockets of the Bronberg to the west of Tierpoortrand. This species is narrowly reliant on soft sand, and its absence on the study site is linked to the absence of such pockets of permanently loose sand. Wherever sandy pockets do occur on the site, they are shallow and very compacted.

## Conclusions made by the specialists

- Large sections of the study area remain in a near natural state with good connectivity with homogeneous habitats in the surrounding area. Suitable habitat for the Near Threatened Striped Harlequin Snake and Coppery Grass lizard were identified within the grassland and ridge habitat units.
- Four Near Threatened mammal species, of which two were confirmed to occur and the remaining two highly likely to occur, were judge to be resident within the grassland, wetland and riverine habitat unit. Suitable bat roosts were observed in the Rocky Ridge and Woodland habitats, thus it can be expected that some of the threatened bat species are resident within the study area on account of the good connectivity and minimal disturbances of the Ridge habitat unit.
- The drainage line and riverine habitat have the potential to support sensitive species and/or species with conservation concerns (Vlei Rats and Otters). Six amphibian species and 19 reptile species were given a high probability of occurring within the study area.
- The wetlands, woodland, rocky ridge and riverine areas are considered sensitive from a faunal perspective. Based on results from the fauna report and considering the recommendations and mitigation measures suggested, the proposed development will result in the destruction and/or loss of important or ecologically sensitive habitat units which could have a detrimental effect on faunal species.
- It is concluded that *Neamblysomus julianae* does not occur along the proposed route for the PWV17 road, or within 500 meters of the route. This is in agreement with findings in the vicinity of the proposed route. From the narrow perspective of this report, no objections can be raised against the construction of the PWV17 between localities 16 and 17 along the route investigated.
- Due to the sensitive nature of the wetlands, woodland, rocky ridge and riverine areas induction with all the partaking contractors, workers, road engineers and landowners is necessary, in order to make them aware of the areas deemed to be sensitive according to this report and to act accordingly (**Figure 25**).





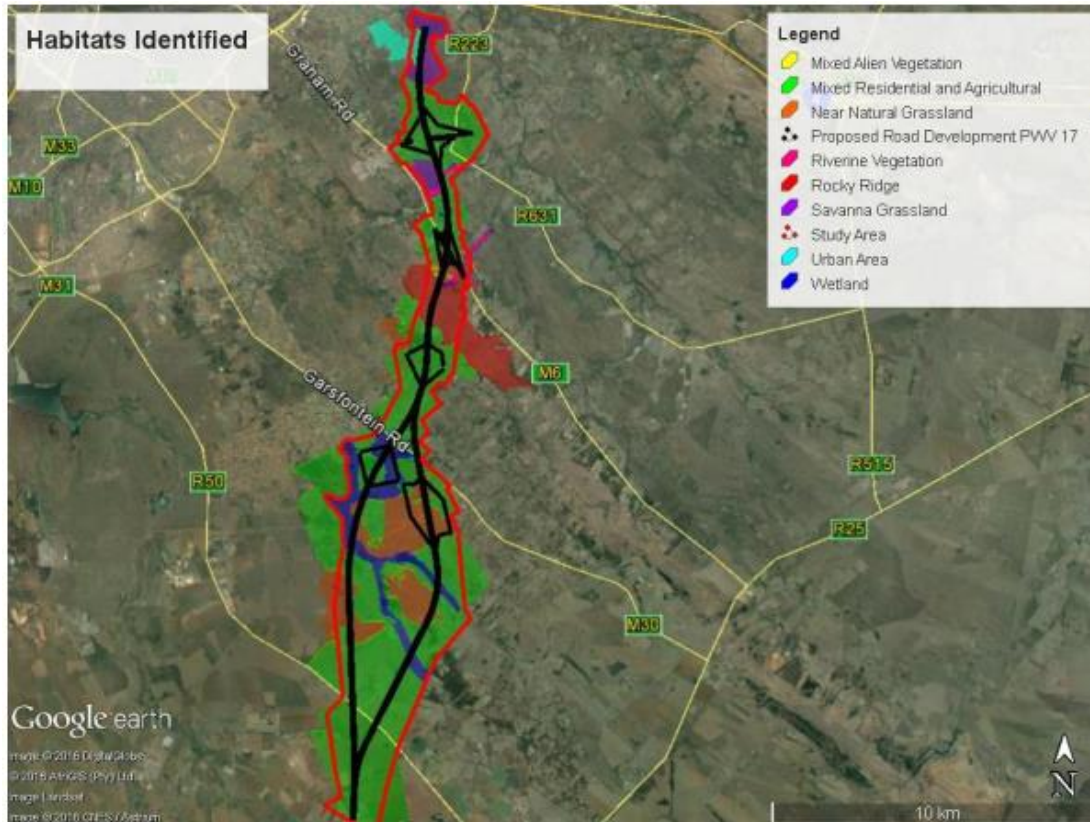
**Figure 25 – Fauna sensitivity map**

***Development should be restricted to areas deemed to have a low to medium ecological sensitivity. The proposed development will result in the destruction and/or loss of important or ecologically sensitive habitat units from a faunal perspective. A realignment of the proposed PWV17 is advised.***

### **6.2.2.2 Avifauna**

#### **Avifaunal Habitat Assessment:**

During the habitat assessment eight distinct bird habitats were identified within the study area. These habitats are: Mixed Alien Vegetation, Mixed Residential and Agricultural, Near Natural Grassland, Riverine Vegetation, Rocky Ridge, Savanna Grassland, Urban Area and Wetland **(Refer to Figure 26)**.



**Figure 26 – Avifauna Habitats identified**

### Urban Area:

This area contains various man-made disturbances associated with urban development. None of the natural occurring habitat remains. The reason for the inclusion of this area as a habitat in its own right is due to the large number of bird species that have adapted to this unique environment. Many of these species are widespread and common birds associated with urban gardens. No bird species with conservation concerns are expected to occur in this study unit. Species recorded in this area include Sparrows, Barbets, Doves, Pigeons and Indian Mynas. The area is deemed as **not sensitive**.

### Mixed Alien Vegetation:

This area contains various disturbances of which alien vegetation encroachment forms the main cause of the degraded state of this habitat. This study unit contains a large number of invasive plants including herbaceous weeds (*Zinnia peruviana* and *Tagetes*

*minuta*) and alien trees (*Melia azedarach*, *Tipuana tipu*.). The reason for the inclusion of this area as a habitat in its own right is due to the large number of bird species that have adapted to this perturbed environment. Many of these species are also nonspecialised and transient. This study unit does contain a number of large indigenous trees such as *Celtis africana*, *Searsia lancea* and *Vachellia karroo*. As a result, this habitat houses avifaunal species such as Honeyguides, Brown-hooded Kingfisher (*Halcyon albiventris*), Yellow-fronted Tinkerbird (*Pogoniulus chrysoconus*), Olive Pigeon (*Columba arquatrix*) and Green Wood-hoopoe (*Phoeniculus purpureus*) associate with woodland habitats. On account of the large amount of alien vegetation encroachment and the lack of natural habitat this area was deemed to have a **low avifaunal sensitivity** as no bird species with conservation concerns are expected to occur.

#### **Mixed Residential and Agricultural:**

This habitat is largely transformed due to agricultural activities and contains areas ranging from cultivated land to livestock farming as well as large open pastures. Species associated and adapted to this environment includes; Korhaan, Francolins, Spurfowl, Guinifowl, Ostrich, Cattle Egrets, Ibis, Storks, Pigeons, Chats and Starlings. Some of the properties in this study unit contain small dams where a variety of waterfowl and waders can be expected.

Although this habitat might occasionally be utilized for foraging purposes by threatened and near threatened avifaunal species, no suitable breeding habitat was observed. The area cannot be deemed sensitive solely on account of the sporadic and occasional presence of these IUCN Red listed bird species. Due to the agricultural zoning of most of the properties overlapping the study unit it is reasonable to anticipate that large open spaces will still be available for the purpose of foraging habitat for various bird species should the proposed road development take place. As a result of the lack of suitable breeding habitat for threatened and near threatened avifauna as well as the numerous disturbances associated with agricultural activities this habitat type was deemed to have a reasonably **low avifaunal sensitivity**.

**Savanna Grassland:**

The Savanna Grassland study unit contains a large number of dense tree species dominated by *Vachellia karroo*, *Vachellia tortilis* and *Diospyros lycioides* interspersed with various grass species dominated by *Eragrostis spp.*, *Heteropogon contortus* and *Themeda triandra*. This study unit supports high bird densities and has an overall high species composition.

Some of the bird species observed within this study unit include; Chinspot Batis (*Batis molitor*), White-fronted Bee-eater (*Merops bullockoides*), Lizard Buzzard (*Kaupifalco monogrammicus*), Rattling Cisticola (*Cisticola chiniana*) and Black-shouldered Kite (*Elanus caeruleus*). The largest part of this study unit remains in a natural state with moderate connectivity to the east. The occurrence of threatened and near threatened bird species is questionable due to the various development and man-made activities in the surrounding areas. No suitable breeding habitat for any threatened bird species were observed on site, however the habitat might be suitable in terms of foraging and hunting for certain threatened species such as Lanner Falcon (*Falco biarmicus*). On account of the near natural state of the study unit together with the overall high avifauna species composition, this study unit was deemed **moderately sensitive** from an avifaunal perspective.

**Near Natural Grassland:**

The Near Natural Grassland habitat contains mostly grass and forb vegetation. The majority of the habitat is situated on the southernmost section of the study area with the exception of two small patches in the north. The habitat is dominated by *Eragrostis spp.*, *Heteropogon contortus* and *Themeda triandra* grass species and by a mixture of forb species. Grassland habitats normally have low to medium avifaunal species richness as a result of the highly specialised environment. The habitat does provide the optimal foraging habitat for Secretary birds, known to be present in the area, as well as providing the preferred habitat for other threatened and near threatened avifauna

species such as White-bellied Korhaan and Melodious Lark (*Mirafra cheniana*) and African Grassowls (*Tyto capensis*).

As a result of the unique environment a number of habitat specific species are present such as Anteater Chat (*Myrmecocichla formicivora*), Zitting Cisticola (*Cisticola juncidis*), Cape Longclaw (*Macronyx capensis*) and African Quailfinch (*Ortygospiza atricollis*) as well as a few endemic species including; Cloud Cisticola (*Cisticola textrix*), Cape Grassbird (*Sphenoeacus afer*) and South African Cliff-swallow (*Hirundo spilodera*).

Connectivity of the habitat unit with surrounding homogenous habitats is relatively good throughout the study area and to the east of the study area. The largest part of this habitat was deemed to be **moderately sensitive** from an avifaunal perspective. One section of this habitat unit was deemed to be highly sensitive as it is located between two **highly sensitive wetland sections** and connects two of the three near natural grassland habitats in the southern portion of the study area. This highly sensitive section of the near natural grassland also provides the optimal breeding and foraging habitat for Grass owls.

### **Rocky Ridge:**

The Rocky ridge habitat unit is situated in the middle of the study area between Graham Road and Garsfontein Road. This habitat comprises of mixed rocky grassland dominated by *Aristida junciformis* and *Melinos repens* and rocky woodland dominated by *Diospyros lycioides*, *Searsia lancea*, *Searsia magalismsontana* and *Vangueria infausta*.

The ridge is commonly known as Bronberg and is classified as a class 2 Ridge which includes ridges of which more than 5%, but less than 35%, of their surface area has been converted to urban development, quarries and/or alien vegetation. The implications of the classification of this study unit's as a Class 2 ridge is stipulated in the Gauteng Ridge Police of 2001.

This habitat is in a pristine natural condition and provides the optimal habitat for numerous habitat bound bird species such as Mocking Cliff-chat (*Thamnolaea cinnamomeiventris*), Mountain Wheatear (*Oenanthe monticola*), Cape Rock-thrush (*Monticola rupestris*), Lazy Cisticola (*Cisticola aberrans*) and Cinnamon-breasted Bunting (*Emberiza tahapisi*). The habitat does not necessarily provide the preferred habitat for threatened bird species; however it does provide the optimal habitat for ridge bound bird species. In terms of avifauna this habitat unit plays a critical connectivity role as it forms part of the larger 2200 ha Bronberg Ridge which is already isolated from similar ridges in the surrounding area. The habitat was found to have high avifaunal species richness as well as a high species density. Of the 106 bird species observed during the field assessment 37 were present in this habitat. No threatened bird species were observed or are expected to be resident within this study unit.

On account of the pristine natural avifaunal habitat and the critical connectivity function fulfilled by this study unit, the habitat was deemed to be **highly sensitive** from an avifaunal perspective.

#### **Wetland:**

The larger study area contains a number of scattered wetlands, some of which forms part of surrounding rivers and streams, man-made dams and natural drainage lines and seepage area. The largest wetland is situated on the southern section of the study area and contains one big dam and a few smaller dams connected by vast stretches of natural wetlands. This habitat is dominated by palustrine vegetation such as *Cypress spp.*, *Schoenoplectus spp.* and *Typha capensis* as well as other wetland associated vegetation. This habitat unit contains very little trees; however scattered indigenous and alien trees are present throughout the wetland areas as well as some dense tree and shrub stands where small streams connect different sections of the wetland network.

The wetland habitat provides the preferred habitat for large number of bird species. Sixty-three bird species were recorded within this habitat unit. Nine threatened bird species are

expected to occur within this habitat unit namely; African Marsh Harrier, Blue Crane (*Anthropoides paradiseus*), Lesser and Greater Flamingo (*Phoenicopterus sp.*), Maccoa Duck (*Oxyura maccoa*), Half-collared Kingfisher (*Alcedo semitorquata*), African Grass-owl (*Tyto capensis*), Black-wing Pratincole (*Glareola nordmanni*) and Caspian Tern (*Sterna caspia*). Of the aforementioned threatened bird species, four (African Marsh Harrier (*Circus ranivorus*), Blue Crane, Half-collared Kingfisher and African Grass-owl) are prioritized in the Gauteng C plan version 3.3. The wetland habitat provides the ideal breeding habitat for African Marsh-harrier, Blue Crane and African Grass-owl. The scattered dams in-between wetland sections provides the preferred foraging habitat for both Greater and Lesser flamingos, Caspian Tern and Black-winged Pratincole as well as providing optimal breeding habitat for Half-collared Kingfisher and Maccoa Duck. The wetland habitat is largely intact apart from some man-made and agricultural disturbances such as dam walls and recreational use activities. In terms of habitat connectivity this study unit forms part of a largely undisturbed and well connected wetland network of approximately 490 ha.

As a result of the intact and undisturbed nature of the wetland habitat along with the optimal habitat it provides for a number of threatened and near threatened bird species this study unit was deemed **highly sensitive** from an avifaunal standpoint.

### **Riverine Vegetation:**

The riverine vegetation habitat unit is located at the sections where the proposed road development intersects the Zwavelpoort Spruit and Pienaars River. Both of the watercourses are classified as perennial rivers. This habitat is densely vegetated and contains a number of large riparian trees (*Celtis africana*, *Combretum erythrophyllum*, *Vachellia karroo*), shrubs and grasses (*Imperata cylindrical*, *Typha capensis*, *Phragmites australis*). As a result, the habitat supports a large avifaunal density and diversity. Species observed within this habitat unit includes; Kingfishers, Moorhen, Weavers, Bishops, Ibis, Herons and Ducks. The riverine habitat provides the prime breeding habitat for the near threatened Half-collared Kingfisher in that it contains stretches of fast flowing water with

vertical bank along with over-hanging dense vegetation. No other threatened bird species are expected to occur within the riverine habitat.

Although some disturbances in the form of berms, extraction, recreational use and alien vegetation encroachment along the both watercourses are evident, connectivity to homogeneous habitats are very good which promotes the movement of species. Due to the connectivity function, high avifaunal diversity and optimal habitat for the near threatened Half-collared Kingfisher this habitat unit was deemed to be **highly sensitive**.

### **Findings by CW Vermeulen**

The discrete habitats identified on the study area supports a large variety of bird species; approximately 254 have a high to medium occurrence probability, of which 9 threatened and near threatened avifaunal species are likely to recur and/or be resident. The following findings were made for each of the associated habitat units within the larger study area.

- Mixed Residential and Agricultural: As a result of the lack of suitable breeding habitat for threatened avifauna as well as the numerous disturbances associated with agricultural activities this habitat type was deemed to have a reasonably low avifaunal sensitivity.
- Savanna Grassland: No suitable breeding habitat for any threatened bird species were observed on site, however the habitat might be suitable in terms of foraging and hunting for certain threatened and near threatened species such as Lanner Falcons. On account of the near natural state of the study unit together with the overall high avifaunal species composition, this study unit was deemed moderately sensitive from an avifaunal perspective.
- Near Natural Grassland: On account this habitat unit's connectivity function, optimal habitat for threatened and near threatened bird species, natural state of the habitat and unique species composition the largest part of this habitat was deemed to be moderately sensitive from a avifaunal perspective. One section of this habitat unit was deemed to be highly sensitive as it is located between two



highly sensitive wetland sections and connects two of the three near natural grassland habitats in the southern portion of the study area. This highly sensitive section of the near natural grassland provides the optimal breeding and foraging habitat for Grass-owls.

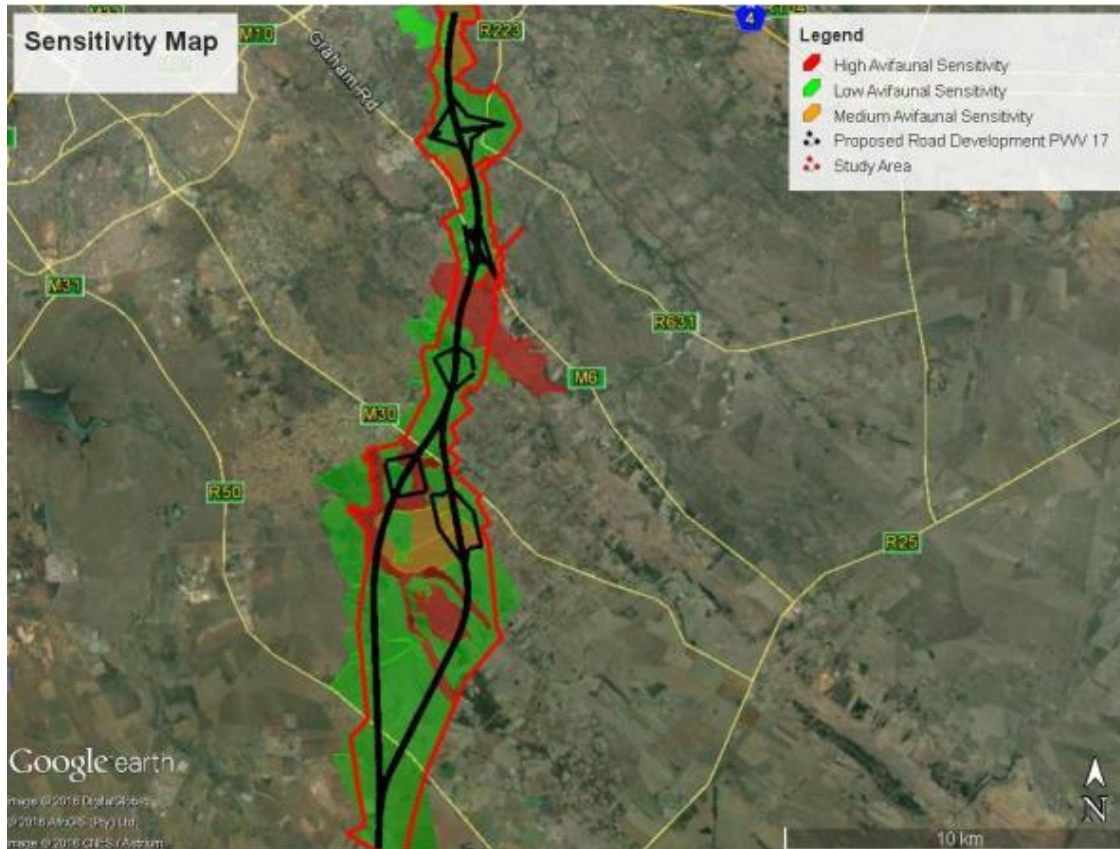
- Rocky Ridge: The habitat unit was found to have high avifaunal species richness as well as a high species density. No threatened bird species were observed or are expected to be resident within this study unit, however, it remains suitable in terms of foraging and hunting for certain threatened and near threatened species. On account of the pristine natural avifaunal habitat and the critical connectivity function fulfilled by this study unit the habitat was deemed to be highly sensitive from an avifaunal perspective.
- Wetland: The wetland habitat is largely intact apart from some man-made and agricultural disturbances such as dam walls and recreational use activities. In terms of habitat connectivity this study unit forms part of a largely undisturbed and well connected wetland network of approximately 490 ha. As a result of the intact and undisturbed nature of the wetland habitat along with the optimal habitat it provides for a number of threatened and near threatened bird species this study unit was deemed highly sensitive from an avifaunal standpoint.
- Riverine vegetation: Although disturbances in the form of berms, water extraction, recreational use and alien vegetation encroachment along both watercourses are evident, connectivity to homogeneous habitats are very good and promotes the movement of bird species. Due to the connectivity function, high avifaunal diversity and optimal habitat for the near threatened Half-collared Kingfisher this habitat unit was deemed to be highly sensitive.
- The Urban area and Mixed Alien Vegetation habitat units were deemed to have a low avifaunal sensitivity on account of the various disturbances within these areas as well as their avifaunal species composition.

### **Conclusions made by CW Vermeulen**

The study area contains a total of 8 distinct habitats of which the Rocky Ridge, Riverine Vegetation and Wetland habitat units were deemed to be highly sensitive. Development within these habitat units should be restricted as far as possible.

Although 21 threatened and/or near threatened bird species have been recorded within the larger 2528CD QDS, only 9 of these species are judged to still occur and/or be resident within the study area. These species are highly specialized and restricted to their associated habitats, thus care should be taken to preserve these unique habitats by restricting disturbances and minimizing transformation in these areas.

Special attention should be assigned to ensure that connectivity of homogeneous habitats stays intact as connectivity of the various habitat units with surrounding homogenous habitats is mandatory to ensure sustainable demographic patterns of avifaunal species relying on certain habitats for survival. **See figure 27 below for the avifaunal sensitivity map.**



**Figure 27 – Avifauna sensitivity map**

### 6.2.2.3 Herpetofaunal Survey

The survey was completed by SE van Rooyen CW Vermeulen and MI Cooper.

#### Findings by the specialists

Suitable habitat for both the Striped Harlequin Snake (*Homoroselaps dorsalis*) and Coppery Grass Lizard (*Chaemaesaura aenea*) were identified within the study site. The occurrence probability of both these species was deemed to be moderate on account of habitat availability connectivity with homogeneous habitats as well as their individual habitat preferences. Six species of amphibians and 19 species of reptiles were given a high occurrence probability within the study area.

### 6.2.2.4 Invertebrate Fauna Habitat Survey

#### Status of invertebrates of special conservation significance

The major habitats of concern in this area were grassland and wetland habitats. The reason for this is because biodiversity in grasslands is only second to the Fynbos (WWF 2016). Wetlands are protected under the RAMSAR convention (<http://www.ramsar.org/>) and provide the habitat for many hemimetabolous insects to complete their life-cycles as they are amphibious and rely on water for breeding.

No Red Data invertebrate species were recorded on or near the study area. An assessment of invertebrate species of conservation concern should take into account the status of the following butterflies: Roodepoort Copper (*Aloeides dentatis dentatis*) (Endangered), Golden Opal (*Chysoritis aureus*) (Endangered), Highveld Blue (*Lepidochrysops praeterita*) (Endangered) and Mijburgh's Blue (*Orachrysops mijburghi*) (Endangered), Lilac Tip (*Colotis celimene amina*) (Rare Low Density), Grassland Blue (*Lepidochrysops procera*) (Rare Habitat Specialist), Marsh Sylph (*Metisella meninx*) (Rare Habitat Specialist) and Hilltop Hopper (*Platylesches dolomitica*) (Rare Low Density).

Beetles of conservation priority are *Ichneustoma stobbai* (previously uncertain or Endangered and currently not assessed) and *Trichocephala brincki* (previously uncertain but presently not assessed). Mygalomorph spiders include *Brachionopus pretoriae* (previously uncertain but presently not assessed). Scorpions include *Hadogenes gracilis* and *H. gunningi* (both previously uncertain and presently unassessed).

#### Fauna mitigation measures:

An appropriate management authority that must be contractually bound to implement the EMP and Environmental Authorization during the constructional and operational phase of the development should be identified and informed of their responsibilities in terms of the EMP and Environmental Authorization.

- Prior to any activities commencing on site, all construction staff should be briefed in an environmental induction regarding the environmental status and requirements of the site. This should include providing general guidelines for minimizing environmental damage during construction, as well as education with regards to basic environmental ethics, such as the prevention of littering, lighting of fires, etc.
- Induction should be done for all civil contractors and for each building contractor prior to them commencing on site.
- Construction should be restricted to areas deemed to have a low to medium ecological sensitivity.
- Areas where construction is to take place should be clearly demarcated and fenced off, all areas outside that of the defined works should be deemed no-go areas.
- All construction activities must be restricted to the demarcated areas to ensure that no further disturbance into the surrounding vegetation or habitat takes place.
- It is recommended that prior to the commencement of construction activities' initial clearing of all alien vegetation should take place.
- No vehicles should be allowed to move in or through the drainage line. This will cause destruction of faunal habitat and will leave notable scars on site.
- The contractor must ensure that no faunal species are trapped, killed or in any way disturbed during the constructional phase.
- It is recommended that all concrete and cement works be restricted to areas of low ecological sensitivity and defined on site and clearly demarcated. Cement powder has a high alkalinity pH rating, which can contaminate and affect both soil and water pH dramatically. A shift in the pH can have serious consequences on the functioning of soil, vegetation and fauna.
- To ensure minimal disturbance of faunal habitat it is recommended that construction should take place during winter, outside the reproductive season of the species present on site.
- Construction, vegetation clearing and top soil clearing should commence from a predetermined location and gradually commence to ensure that fauna present on the site have enough time to relocate.

- When construction is completed, disturbed areas should be rehabilitated using vegetation cleared prior to construction to ensure that the habitat stays intact and that faunal species present on the site before construction took place, return to the area.
- All constructional activities must comply with the guidelines, requirements and objectives of the Ridges Policy and Guidelines of Gauteng (GRARD 2006)

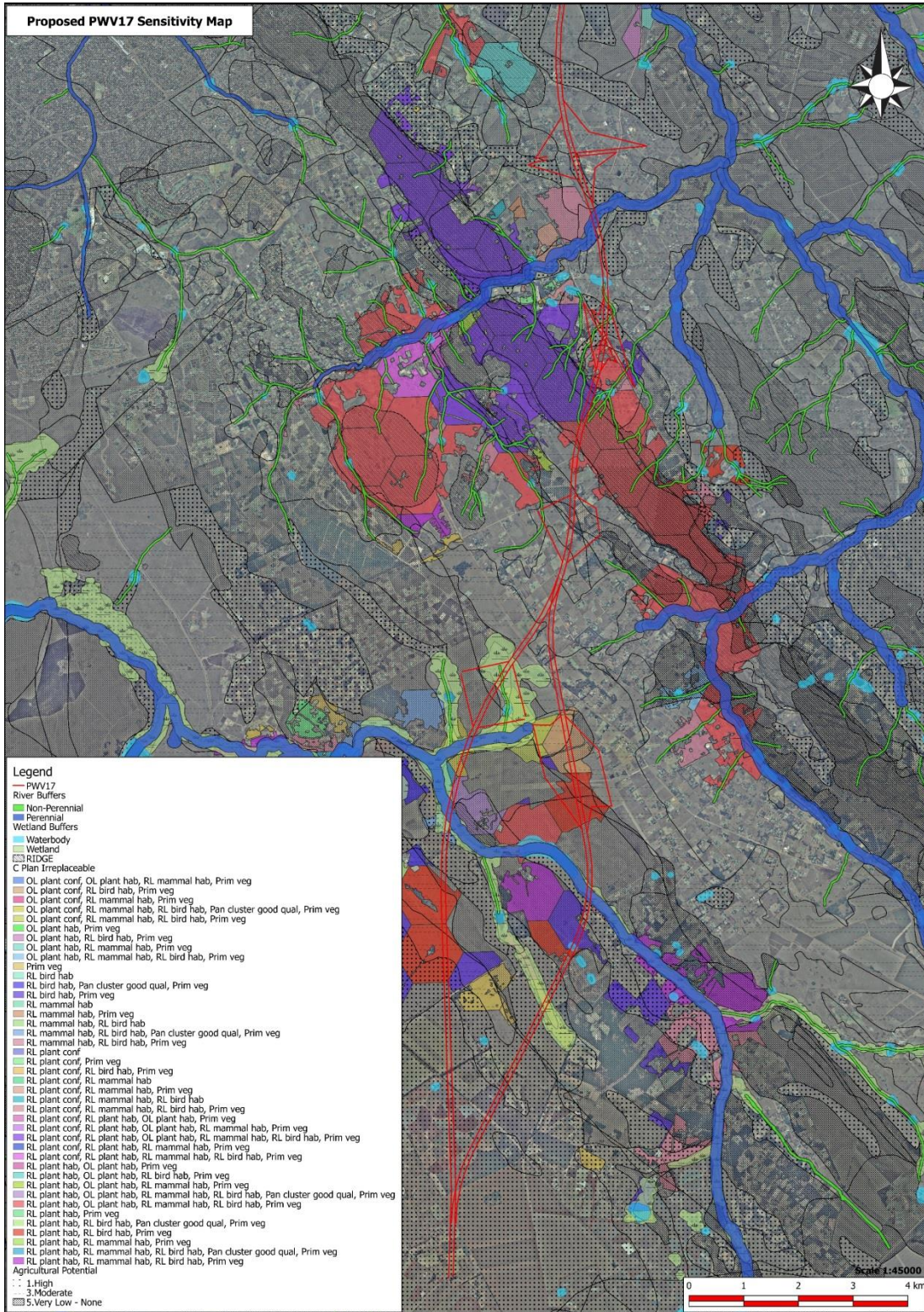
**Conclusion made by fauna and flora specialists:**

Due to the sensitive nature of the wetlands, woodland, rocky ridge and riverine areas induction with all the partaking contractors, workers, road engineers and landowners is necessary, in order to make them aware of the areas deemed to be sensitive according to this report and to act accordingly. Development should be restricted to areas deemed to have a low to medium ecological sensitivity.

Given the acceptance of the recommendations, the proposed development will result in the destruction and/or loss of important or ecologically sensitive habitat units from a faunal perspective. A re-alignment of the proposed PWV17 is advised.

***Refer to Figure 28 for the Ecological Sensitivity Map***





**Figure 28 – Ecological Sensitivity map**

### **6.2.3 Ecological Conditions of the Ridge<sup>3</sup>**

#### **Ecological conditions**

The Department has classified all ridges in Gauteng based on extent and percentage of area converted to urban development or other activities. The Bronberg Ridge is considered valuable from an ecological, aesthetic and historical point of view and is classified as a Class 2 ridge. Class 2 ridges include ridges of which more than 5%, but less than 35%, of their surface area has been converted to urban development, quarries and/or alien vegetation. The Bronberg ridge provides habitat for many fauna and flora species, some of which are considered as sensitive. General guidelines for Class 2 ridges are:

- (a) The consolidation of properties on Class 2 ridges is supported.
- (b) The subdivision of property on Class 2 ridges will not be permitted.
- (c) Development activities and uses that have a high environmental impact on a Class 2 ridge will not be permitted.
- (d) Low impact development activities, such as tourism facilities, which comprise of an ecological footprint of 5% or less of the property, may be permitted. (The ecological footprint includes all areas directly impacted on by a development activity, including all paved surfaces, landscaping, and property access and service provision).
- (e) Low impact development activities on a ridge will not be supported where it is feasible to undertake the development on a portion of the property abutting the ridge.

#### **Conclusion and recommendations:**

Impacts to sensitive species should be limited, particularly the impact on movement corridors. No red listed invertebrate species were recorded on or near the site.

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<sup>3</sup> GDARD Ridge Guidelines, April 2006.



**Table 21: Issues and Impacts – Flora and Fauna**

	<b>Issue/ Impact</b>	<b>Positive/ Negative / Neutral ±</b>	<b>Mitigation Possibilities</b> High 🟢 Medium 😊 Low 🟡 Positive Impact - Not Necessary To Mitigate ☀️
14)	Impact on natural grassland areas and sensitive vegetation	-	🟡
16)	The eradication of weeds and exotic invaders	+	☀️
17)	If the entire road alignment area is cleared at once, smaller birds, mammals and reptiles will not be afforded the chance to weather the disturbance in an undisturbed zone close to their Natural territories.	-	😊
18)	Noise of construction machinery could have a negative impact on the fauna species during the construction phase.	-	😊
19)	During the construction and operational phase (if not managed correctly) fauna species could be disturbed, trapped, hunted or killed.	-	🟢
20)	Loss of habitat can lead to the decrease of fauna numbers and species.	-	🟡

### **6.2.3.1 Discussion of issues identified, possible mitigation measures and significance of issue after mitigation**

#### **14) Impact on sensitive natural grassland areas and sensitive vegetation**

All alignments proposed for the route run through natural grassland areas with red listed plant species.

**Table 22: Significance of Issue 14 (Impact on natural grassland areas) After Mitigation/ Addressing of the Issue**

<p><b>Mitigation Possibilities</b></p> <p><b>High</b> 🟢 <b>Medium</b> 😊 <b>Low</b> 🟡</p> <p><b>Positive Impact/ Neutral - Not Necessary To Mitigate</b> ✨</p>	<p>Mitigation</p> <p>Already achieved ✓</p> <p>Must be implemented during p lanning phase, c onstruction and/ or o perational phase</p> <p><b>P / C / O</b></p>	<p>Significance of Issue after mitigation</p> <p>Low/ eliminated <b>L / E</b></p> <p>Medium <b>M</b></p> <p>High <b>H</b></p> <p>Not possible to mitigate, but not regarded as a fatal flaw <b>NP</b></p>
<p><b>Medium</b> 😊</p>	<p><b>P</b> – The 200m buffer zones of red listed plant species should be avoided.</p> <p><b>P/C/O</b> – No plants not indigenous to the area or exotic plant species, especially lawn grasses and other ground-covering plants should be used as soil-binding agents along new road verges as they will drastically interfere with the nature of the area.</p> <p><b>P/C/O</b> – All Category 1 Declared Weeds and other alien species must be removed from the vicinity of the proposed route.</p>	<p><b>M</b> -To be included in EMP</p> <p><b>M</b> -To be included in EMP</p> <p><b>M</b> -To be included in EMP</p>

**Result:** Although issue can be mitigated, the significance of the impact should still be determined / confirmed and assessed in the Significance Rating Table

**15)The proposed development will result in the eradication of exotic invaders and weeds.**

Category 1 declared weeds, Category 2 Declared invaders and Category 3 Declared invaders were recorded in the vicinity of the proposed route. All Category 1 weeds and other alien species must be eradicated on a continuous basis.

**Table 23: Significance of Issue 16 (The eradication of invasive species) After Mitigation/ Addressing of the Issue**

<p><b>Mitigation Possibilities</b></p> <p><b>High</b> 🟢 <b>Medium</b> 😊 <b>Low</b> 🟡</p> <p><b>Positive Impact/ Neutral - Not Necessary To Mitigate</b> ⚙️</p>	<p>Mitigation</p> <p>Already achieved ✓</p> <p>Must be implemented during planning phase, construction and/ or operational phase</p> <p><b>P / C / O</b></p>	<p>Significance of Issue after mitigation</p> <p>Low/ eliminated <b>L / E</b></p> <p>Medium <b>M</b></p> <p>High <b>H</b></p> <p>Not possible to mitigate, but not regarded as a fatal flaw <b>NP</b></p>
<p><b>Positive Impact - Not Necessary To Mitigate</b> ⚙️</p>	<p><b>P/C/O</b> – All Category 1 weeds and other alien species must be eradicated prior to construction and throughout the operational phase of the road.</p> <p><b>P/C/O</b> – No plants not indigenous to the area or exotic plant species, especially lawn grasses and other ground-covering plants should be used as soil-binding agents</p>	<p><b>L -To be included in EMP</b></p> <p><b>L -To be included in EMP</b></p>

	along new road verges as they will drastically interfere with the nature of the area.	
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**Result:** Positive impact, the significance of the impact should still be determined / confirmed and assessed in the Significance Rating Table

**16) If the entire road alignment area is cleared at once, smaller birds, mammals and reptiles will not be afforded the chance to weather the disturbance in an undisturbed zone close to their natural territories**

Due to the length of the proposed road it is unlikely that the entire area to be constructed will be cleared as once.

**Table 24: Significance of Issue 17 (If the entire road alignment area is cleared at once, smaller birds, mammals and reptiles will not be afforded the chance to weather the disturbance in an undisturbed zone close to their natural territories) After Mitigation/ Addressing of the Issue**

<p><b>Mitigation Possibilities</b></p> <p>High 🟢 Medium 😊 Low 🟡</p> <p>Positive Impact/ Neutral - Not Necessary To Mitigate ⚙️</p>	<p>Mitigation</p> <p>Already achieved ✓</p> <p>Must be implemented during planning phase, construction and/ or operational phase</p> <p><b>P / C / O</b></p>	<p>Significance of Issue after mitigation</p> <p>Low/ eliminated <b>L / E</b></p> <p>Medium <b>M</b></p> <p>High <b>H</b></p> <p>Not possible to mitigate, but not regarded as a fatal flaw <b>NP</b></p>
<p><b>Medium 😊</b></p>	<p><b>P/C</b> - Where possible, work should be restricted to one area at a time.</p>	<p><b>L</b> -To be included in EMP</p>

**Result:** *Although issue can be mitigated, the significance of the impact should still be determined / confirmed and assessed in the Significance Rating Table*

### 17) Noise of construction machinery could have a negative impact on the fauna species during the construction phase

If not managed correctly, noise pollution (i.e. by machinery without noise muffing devices) could have a negative impact on the fauna and birds in the area. This will however only be a short-term impact and it is expected that many of the birds will return to the area during the operational phase.

**Table 25: Significance of Issue 18 (Noise of construction machinery could have a negative impact on the fauna species during the construction phase) After Mitigation/ Addressing of the Issue**

<b>Mitigation Possibilities</b> <b>High</b> 🟢 <b>Medium</b> 😊 <b>Low</b> 🟡 <b>Positive Impact/ Neutral - Not Necessary To Mitigate</b> ✨	Mitigation  Already achieved ✓  Must be implemented during p[lanning] phase, c[onstruction] and/ or operational phase  <b>P / C / O</b>	Significance of Issue after mitigation  Low/ eliminated <b>L / E</b>  Medium <b>M</b>  High <b>H</b>  Not possible to mitigate, but not regarded as a fatal flaw <b>NP</b>
<b>Medium</b> 😊	<b>P / C</b> - Noise should be kept to a minimum and the construction of the road should be done in phases to allow faunal species to temporarily migrate into the conservation areas in the vicinity.	<b>L</b> -To be included in EMP

**Result:** *Although issue can be mitigated, the significance of the impact should still be determined / confirmed and assessed in the Significance Rating Table*

**18) During the construction phase (if not managed correctly) fauna species could be disturbed, trapped, hunted or killed.**

There is always a risk that construction personnel may disturb, trap, hunt or kill fauna on the study area. This will have a detrimental impact on the local biodiversity and will decrease fauna numbers. The issue can be mitigated if this issue is included in conservation-orientated clauses that may be built into contracts of construction personnel and if council prosecutes offenders of these actions.

Caught animals should also be relocated to conservation areas in the vicinity.

**Table 26: Significance of Issue 19 (During the construction and operational phase (if not managed correctly) fauna species could be disturbed, trapped, hunted or killed) After Mitigation/ Addressing of the Issue**

<p><b>Mitigation Possibilities</b></p> <p><b>High</b> 🟢 <b>Medium</b> 😊 <b>Low</b> 🟡</p> <p><b>Positive Impact/ Neutral - Not Necessary To Mitigate</b> ⚡</p>	<p>Mitigation</p> <p>Already achieved ✓</p> <p>Must be implemented during planning phase, construction and/ or operational phase</p> <p><b>P / C / O</b></p>	<p>Significance of Issue after mitigation</p> <p>Low/ eliminated <b>L / E</b></p> <p>Medium <b>M</b></p> <p>High <b>H</b></p> <p>Not possible to mitigate, but not regarded as a fatal flaw <b>NP</b></p>
<p><b>High</b> 🟢</p>	<p><b>C/O</b> - The integrity of remaining wildlife should be upheld, and no trapping or hunting by construction personnel should be allowed. Caught animals should be relocated to the conservation areas in the vicinity. Council shall prosecute offenders. Should hedgehogs be encountered during the construction phase of the</p>	<p><b>L</b> -To be included in EMP</p>

	<p>proposed road, these should be relocated to natural grassland areas in the vicinity.</p> <p><b>P</b> - Conservation-orientated clauses should be built into contracts for construction personnel complete with penalty clauses for non-compliance.</p>	<p><b>M</b> -To be included in EMP</p>
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**Result:** Although issue can be mitigated, the significance of the impact should still be determined / confirmed and assessed in the Significance Rating Table

**19) Loss of habitat can lead to the decrease of fauna numbers and species**

All mitigation measures for impacts on the indigenous flora of the area should be implemented in order to limit habitat loss and maintain and improve available habitat, in order to maintain and possibly increase numbers and species of indigenous fauna. This impact is not expected to be of high significance with regard to loss of bird habitat due to lack of sufficient breeding and foraging habitat.

**Table 27: Significance of Issue 20(Loss of habitat can lead to the decrease of local fauna numbers and species) After Mitigation/ Addressing of the Issue**

<p><b>Mitigation Possibilities</b></p> <p>High 🟡 Medium 😊 Low 🟢</p> <p><b>Positive Impact/ Neutral - Not</b></p>	<p>Mitigation</p> <p>Already achieved ✓</p>	<p>Significance of Issue after mitigation</p> <p>Low/ eliminated <b>L / E</b></p>
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<b>Necessary To Mitigate</b> ☀	Must be implemented during p lanning phase, c onstruction and/ or o perational phase  <b>P / C / O</b>	Medium <b>M</b>  High <b>H</b>  Not possible to mitigate, but not regarded as a fatal flaw <b>NP</b>
<b>Low</b> 🟩	<b>P / C / O</b> – All mitigation measures for impacts on the indigenous flora of the area should be implemented in order to limit habitat loss as far as possible and maintain and improve available habitat, in order to maintain and possibly increase numbers and species of indigenous fauna.	<b>M</b> - In terms of local fauna population  <b>L</b> - In terms of the global conservation status of fauna

**Result:** Although issue can be mitigated, the significance of the impact should still be determined / confirmed and assessed in the Significance Rating Table.

## 6.3 DESCRIPTION OF THE SOCIAL ENVIRONMENT

### 6.3.1 Cultural and Historical

In terms of the legislation, it is necessary to identify and list the specific legislation and permit requirements, which potentially could be infringed upon by the proposed project. The necessity and possibilities for the implementation of mitigation measures should also be identified.

It should be noted that in terms of the South African Resources Act (Act 25 of 1999) Section 35(4) no person may, without a permit issued by the responsible heritage resources authority destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or paleontological site or material.



Also important is that Section 34(1) of this act states that no person may alter or demolish any structure or part of a structure, which is older than 60 years without a permit, issued by the relevant provincial heritage resources authority.

According to the available information the involved section of the PWV17 does not traverse any cultural and historical features. To the north of the N1 Freeway the proposed alignment follows an existing road (Botha Avenue) and would not have an impact on cultural and historical features.

### 6.3.1.1 Issues & Impact Identification – Cultural and Historical

**Table 28: Issues and Impacts – Cultural and Historical**

	Issue/ Impact	Positive/ Negative/ Neutral ±	Mitigation Possibilities High 🟢 Medium 😊 Low 🟡 Positive Impact - Not Necessary To Mitigate 🌟
21)	Structures of cultural and historical significance may be destroyed.	+ -	🟢

### 6.3.1.2 Discussion of issues identified, possible mitigation measures and significance of issue after mitigation

**21) Structures of cultural and historical significance may be destroyed.**

**Table 29: Significance of Issue 21 (Structures of cultural and historical significance may be destroyed) After Mitigation/ Addressing of the Issue**

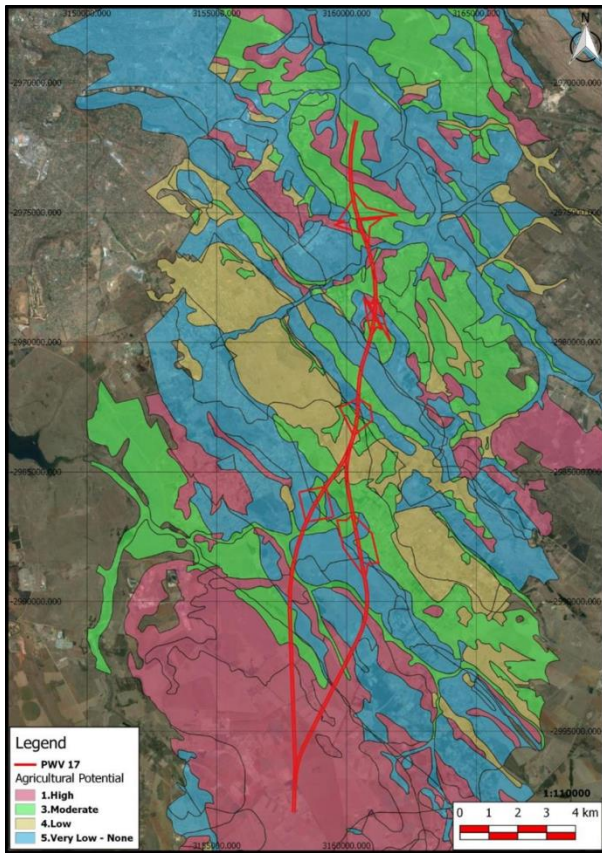
<p><b>Mitigation Possibilities</b></p> <p>High 🟢 Medium 😊 Low 🟡</p> <p>Positive Impact/ Neutral - Not Necessary To Mitigate ✨</p>	<p>Mitigation</p> <p>Already achieved ✓</p> <p>Must be implemented during planning phase, construction and/ or operational phase</p> <p><b>P / C / O</b></p>	<p>Significance of Issue after mitigation</p> <p>Positive ✨</p> <p>Low/ eliminated <b>L / E</b></p> <p>Medium <b>M</b></p> <p>High <b>H</b></p> <p>Not possible to mitigate, but not regarded as a fatal flaw <b>NP</b></p>
<p>High 🟢</p>	<p><b>P / C / O</b> - It should be noted that in terms of the South African Resources Act (Act 25 of 1999) Section 35(4) no person may, without a permit issued by the responsible heritage resources authority destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or paleontological site or material</p> <p><b>P / C</b> - Also important is that Section 34(1) of this act states that no person may alter or demolish any structure or part of a structure, which is older than 60 years without a permit, issued by the relevant provincial heritage resources authority.</p>	<p><b>L</b> – To be included in the EMP</p> <p><b>L</b> – To be included in the EMP</p>

**Result:** Although issue can be mitigated, the significance of the impact should still be determined / confirmed and assessed in the Significance Rating Table

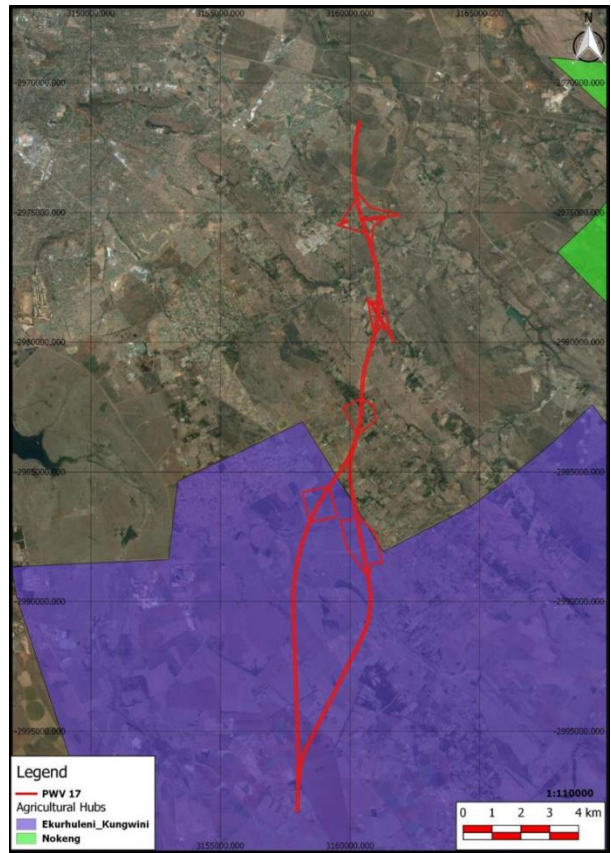
### 6.3.2 Agricultural Potential

According to GAPA 3 the involved section of route PWV17 traverses areas ranging from **high to very low agricultural potential soils (Refer to Figure 29 – Agricultural Potential)** and falls within the Ekurhuleni - Kungwini Agricultural Hub or an area identified for agricultural use by GDARD according to the **Draft Policy on the Protection of Agricultural Land (2006)**.

High agricultural potential areas are situated in the southern section of the PWV17 route, whereas the central and northern sections predominantly have a low to very low agricultural potential. No Agricultural hubs are situated in the northern half of the proposed alignment (**Refer to Figure 30 – Agricultural Hubs**).



**Figure 29: Agricultural Potential**



**Figure 30: Agricultural Hubs**

### 6.3.2.1 Issues & Impact Identification – Agricultural Potential

**Table 30: Issues and Impacts – Agricultural Potential**

	Issue/ Impact	Positive/ Negative/ Neutral ±	Mitigation Possibilities High 🟢 Medium 😊 Low 🟡 Positive Impact - Not Necessary To Mitigate ✨
22)	Loss of agricultural land	-	🟡

### 6.3.2.2 Discussion of issues identified, possible mitigation measures and significance of issue after mitigation

#### 22) Loss of agricultural land

The soils along the proposed alignment of the PWV17 range from very low to high agricultural potential (according to GAPA 3). The study area falls within the Ekurhuleni - Kungwini Agricultural Hub and is not located within the Provincial Urban Edge. The loss of agricultural land is therefore regarded as significant.

**Table 31: Significance of Issue 22 (Loss of agricultural land) After Mitigation/ Addressing of the Issue**

Mitigation Possibilities High 🟢 Medium 😊 Low 🟡 Positive Impact/ Neutral - Not Necessary To Mitigate ✨	Mitigation	Significance of Issue after mitigation
	Already achieved ✓	Positive ✨
	Must be implemented during planning phase, construction and/ or operational phase	Low/ eliminated L / E Medium M High H
	<b>P / C / O</b>	

		Not possible to mitigate, but not regarded as a fatal flaw <b>NP</b>
<b>Medium</b> 😊	<b>P/C/O</b> – Some agricultural land will be lost due to the proposed road.	Not possible to mitigate, but not regarded as a fatal flaw.  <b>NP</b>

**Result:** The significance of this impact needs to be determined/confirmed and assessed in the Significance Rating Table

### 6.3.3 Institutional Environment

The construction of the PWV17 is part of the Local Authority and Provincial Government's road network planning for the larger area. As mentioned the proposed alignment for the PWV17 has been on the planning maps of GDRT for more than 45 years. In terms of the original planning, Alignment 1 is the published road. Alternative 1 was however also regarded as a workable alternative in former environmental scans that were conducted for purpose of the route determination of the road and therefore the Strategic Road Review project of GDRT, which was completed in 2010, also indicated Alternative 1 as a possible workable alternative for the road.

#### 6.3.3.1 On an International Level

**Relevant International Conventions to which South Africa is party:**

- **Convention relative to the Preservation of Fauna and Flora** in their natural state, 8 November 1993 (London). The document's objective is to preserve natural fauna and flora located in specific parts of the world<sup>4</sup>.
- **Convention on Biological Diversity**, 1995  
The convention on biodiversity is for provided and added stimulus for a re-examining and harmonization of its activities relating to biodiversity conservation. This convention also allows for the in-situ and ex-situ propagation of gene material); and
- **Agenda 21** adopted at the United Nations Conference on Environment and Development (UNCED) in 1992. The document outlines an action plan and blueprint for sustainable development.

#### **6.3.3.2 On a National Level**

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

In 2014, new Environmental Impact Assessment Regulations were published in the Government Gazette (Gazette No. 38282). These regulations were published in terms of sections 24(5) and 44 of the National Environmental Management Act 107 of 1998. The above mentioned Government Gazette consists out of several Government Notices. Three of those Government Notices are *Listing Notices* (GN R983 of GG 38282. 04/12/2014, also known as **Listing Notice 1**, GN R984 of GG 38282. 04/12/2014, also known as **Listing Notice 2** and GN R985 of GG 38282. 04/12/2014, also known as **Listing Notice 3**). In April 2017, the 2014 NEMA EIA Regulations were amended by several Government Notices in Government Gazette No. 40772.

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<sup>4</sup> ECOLEX, The gateway to environmental law, <https://www.ecolex.org/details/treaty/convention-relative-to-the-preservation-of-fauna-and-flora-in-their-natural-state-tre-000069/>.

These *Listing Notices* comprise of listing activities which could have a detrimental impact on the environment. Proposed activities "triggering" one or more of the listed activities, listed within the *Listing Notices*, will not be allowed without an Environmental Authorisation from the Competent Authority. The Gauteng Department of Agricultural and Rural Development (GDARD) is an example of a Competent Authority. This is still very early in the environmental process and activities applied for will still be confirmed as soon as more information is available.

NEMA provides for co-operative, environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for co-ordinating environmental functions exercised by organs of state; and to provide for matters connected therewith.

This Act formulates a set of general principles to serve as guidelines for land development and it is desirable that:

- The law develops a framework for integrating good environmental management into all development activities;
- The law should promote certainty with regard to decision-making by organs of state on matters affecting the environment;
- The law should establish principles guiding the exercise of functions affecting the environment;
- The law should ensure that organs of state maintain the principles guiding the exercise of functions affecting the environment;
- The law should establish procedures and institutions to facilitate and promote co-operative government and intergovernmental relations;
- The law should establish procedures and institutions to facilitate and promote public participation in environmental governance; and

- The law should be enforced by the State and that the law should facilitate the enforcement of environmental laws by civil society.

If the involved authorities do not take the principles of NEMA into consideration when evaluating an environmental report/ document, the involved authority can be held responsible for any damage to the environment (social, ecological and economical).

The proposed PWV17 is listed under the activities as regulated under NEMA.

### ***The Development Facilitation Act (DFA) 1995 (Act 67 of 1995)***

This Act formulates a set of general principles to serve as guidelines for land development inter alia revolving around:

- The promotion of integration of the social, economic, institutional and physical aspects of land development;
- The promotion of integrated land development in rural and urban areas in support of each other;
- The promotions of the availability of residential land and employment opportunities in close proximity to or integrated with each other;
- The promotion of a combination of diverse land-uses, with each proposed land development area to be judged on its own merit and no specific use, whether residential, commercial, conservation etc., to be regarded as less important;
- Discouraging urban sprawl to promote more compact towns/ cities;
- Encouraging environmentally sound land development practices; and
- Promoting sustained protection of the environment.



### ***The Green Paper on Development Planning - 1999***

The Green Paper deals with how decision-making should be approached, i.e. political or technical. Pre-1994 legislation allocated land development decision-making responsibilities exclusively to elected representatives. The DFA makes a clear distinction between policy-making and implementation and decision-making power. It introduced a system whereby elected representatives approve policies and plans and skilled officials and others with technical skills interpret and apply these.

There was agreement, however, that decisions should be made according to the policies and plans drawn up through the integrated development planning process and should be able to be defended on those grounds. The City of Tshwane implemented this approach, but there is not yet a clear set of relevant land development policies that is debated, tested and implemented over time that can provide a clear guideline to developers and officials. For this reason it is essential that the DFA spatial principles continue to provide a knowledge base and interpretational framework.

### ***Integrated Environmental Management***

Integrated Environmental Management (IEM) is a philosophy, which prescribes a code of practice for ensuring that environmental considerations are fully integrated into all stages of the development process. This philosophy aims to achieve a desirable balance between conservation and development (Department of Environmental Affairs, 1992). The IEM guidelines intend endearing a pro-active approach to sourcing, collating and presenting information at a level that can be interpreted at all levels.

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

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

- Meeting the basic human needs of present and future generations;
- Promoting equitable access to water;
- Promoting the efficient, sustainable and beneficial use of water in the public interest;
- Reducing and preventing pollution and degradation of water resources;
- Facilitating social and economic development; and
- Providing for the growing demand for water use.

In terms of the Section 21 of the National Water Act, the developer must obtain water use licenses if the following activities are taking place:

- 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 water course;

- 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.

The study area is affected by water resources, flood lines and wetlands.

Section 21 water use licences will be required for any development which may take place within and/or impact any water resource and or floodlines. The National Water Act also requires (Section 144) that the 1:50 and 1:100 year flood line be indicated on all the development drawings that are being submitted for approval.

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

This act replaced the Atmospheric Pollution Prevention Act (Act No. 45 of 1965), however Part 2 of the act is still applicable. Part 2 deals with the control of noxious or offensive gases and has relevance to the proposed road.

The purpose of the Act is "To reform the law regulating air quality in order to protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development; to provide for national norms and standards regulating air quality monitoring, management and control by all spheres of government; for specific air quality measures; and for matters incident thereto".

#### ***Water Services Act, 1997 (Act No 108 of 1997)***

The purpose of this Act is to ensure the regulation of national standards and measures to conserve water taking into account, amongst other factors, the following:

- Basic sanitation;
- Basic Water supply;
- Interruption in provision of water services;
- Quality of potable water;
- Control of objectionable substances;
- Disposal of grey water;
- Use of effluent; and
- Quantity and quality of industrial effluent discharged into a sewerage system.

Interruption in provision of water services during the construction phase of the PWV17 must be according to national standards.

Mitigation measures must be implemented to prevent contamination of groundwater due to the construction and operational phase of the road.

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

The National Heritage Resources Act legislates the necessity for cultural and heritage impact assessment in areas earmarked for development, which exceed 0.5 ha. The Act makes provision for the potential destruction to existing sites, pending the archaeologist's recommendations through permitting procedures. Permits are administered by the South African Heritage Resources Agency (SAHRA).

***The proposed road will not have an impact on obvious features, sites or artefacts of cultural significance.***

It is important to note that in terms of the National Heritage Resources Act, (Act No 25 of 1999); all historical sites and materials older than 50 years are protected. It is an offence to destroy, damage, alter or remove such objects from the original site, or excavate any such site(s) or material without a permit from the National Monuments Council. Gravesites are subject to the requirements of Act 28 of 1969.

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

The purpose of the Biodiversity Act is to provide for the management and conservation of South Africa's biodiversity within the framework of the NEMA and the protection of species and ecosystems that warrant national protection. As part of its implementation strategy, the National Spatial Biodiversity Assessment was developed.

Specialist ecological assessment studies were conducted for the study area. Red data flora species were identified and some of the habitats are suitable for red data fauna species.

***National Spatial Biodiversity Assessment***

The National Spatial Biodiversity Assessment (NSBA) classifies areas worthy of protection based on its biophysical characteristics, which are ranked according to priority levels.

Specialist ecological assessment studies were conducted for the study area. Red Data Flora Species were identified and some of the habitats are suitable for Red Data Fauna Species.

***National Environmental Management: Protected Areas Act, 2003 (Act No 57 of 2003)***

The purpose of this Act is to provide the protection, conservation and management of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes.

Specialist ecological assessment studies were conducted for the study area. Red Data Flora Species was identified and some of the habitats are suitable for Red Data Fauna Species.

***National Veld and Forest Fire Act, 1998 (Act No. 101, 1998)***

The purpose of this Act is to prevent and combat veld, forest and mountain fires throughout the Republic. Furthermore the Act provides for a variety of institutions, methods and practices for achieving the prevention of fires.

Mitigation measures for the prevention of fires must be implemented.

***Conservation of Agricultural Resources Act (Act No. 43 of 1983)***

This 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. The removal of Category 1 Declared Weeds is **compulsory** in terms of this Act.

The proposed route traverses sections of medium agricultural potential soils (according to GAPA 3).

Category 1 Declared weeds must be removed on a continuous basis, as indicated in the EMP attached as **Annexure H**.

### ***National Road Traffic Act, 1996 (Act No. 93 of 1996)***

This Act provides for all road traffic matters which shall apply uniformly throughout the Republic and for matters connected therewith.

The design and construction of the PWV17 must comply with the National Road Traffic Act.

### ***Mine Health and Safety Act, 1996 (Act 29 of 1996)***

This Act introduced the concepts of risk assessment and occupational health and safety (OHS) management systems in the mining industry.

The alignment of the PWV17 must comply with the regulations of the Mine Health and Safety Act with regard to distance from mining operations.

#### ***6.3.3.3 On a Provincial Level***

### **Planning Responsibilities of the Involved Local Authority**

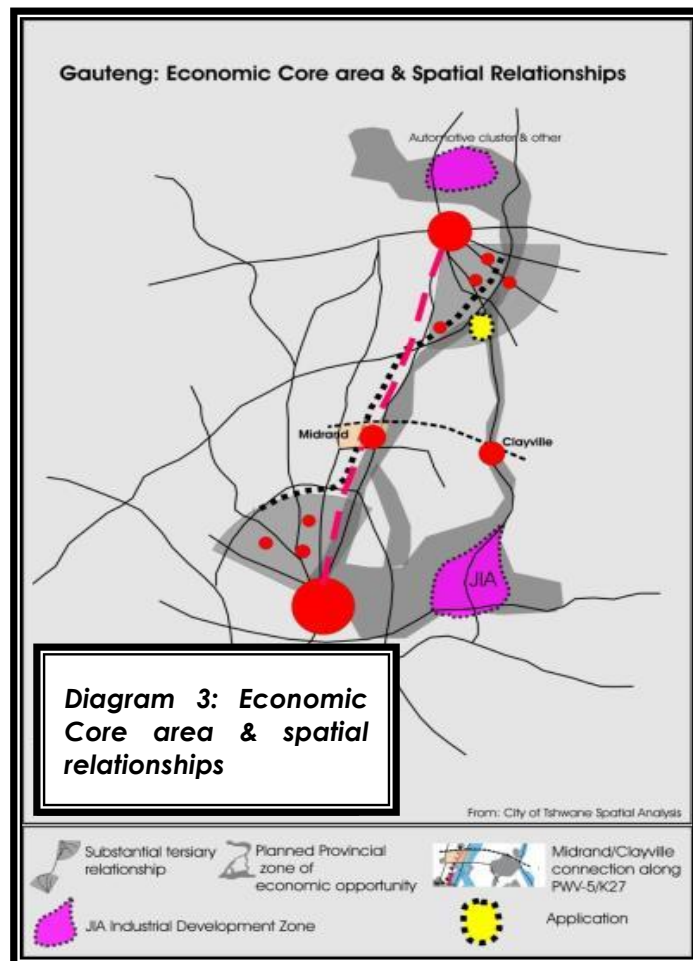
The prerogative to plan a development within its jurisdictional area has always constitutionally, in terms of the Local Government Transitional Act, 1993 and recently the Municipal Systems Act, 2000, vested in the local authority involved.

In order to ensure that the proposed developments comply with the standards and requirements of the involved local authority (City of Tshwane), the relevant officials were involved in the planning of the project from the start.

### **Gauteng Spatial Development Framework (GSDF)**

This document published by the Gauteng Department of Development Planning and Local Government provides a spatial development framework for the whole of the Gauteng Province, and focuses on growth and development on a broad level. This Document identifies several spatial development components, of which the following is relevant to the proposed development:

The GSDF also lists so-called interventions of which the following is applicable to the involved section of the proposed PWV17:





- Containing and Compacting the City: The infill of vacant land contributes towards the optimizing of municipal infrastructure
- Access and Mobility: The easy access development areas, as well as the densification of the city, also encourage the optimizing of municipal resources.

The following transport connections are of key importance for ensuring greater connectivity and enabling a balanced provincial spatial network:

- The PWV17-freight ring road from the north through the eastern parts down to the south.
- The K27-link between Midrand and Diepsloot.
- The K220-link between the R21 and the N1 (Midrand).
- The PWV3 between N3 and the eastern Agri-hub.
- The PWV15 and PWV16 connection between the N12 and the R21.
- The PWV9 between Soshanguve and Johannesburg.
- The section of the PWV5 that extends from Tembisa/Ivory Park westwards through the western parts of Johannesburg and down to Soweto, with the understanding that this road will be designed and constructed as a public transport route.

### ***The Gauteng Integrated Development Framework (Phase 3)***

This document provides a development framework Gauteng Province and focuses on growth and development on a broader level. Several spatial development components as so-called interventions were identified, of which the following are relevant to the proposed development:

- Pretoria East (including the Bronberg) is identified as a Growth Area,

- The study area is situated close to the provincial Urban Edge where growth should be stimulated and encouraged.
- Containing and Compacting the City: The infill of vacant land contributes towards the optimization of municipal infrastructure.
- Economic Growth: The proposed access interchange should be encouraged.

**Diagram 3** is an illustration of the Economic components of the IDF:

***Gauteng Transport Infrastructure Act, 2001 (Act No 8, 2001) and the Gauteng Transport Infrastructure Amendment Act, 2003***

The purpose of this Act is to consolidate the laws relating to roads and other types of transport infrastructure in Gauteng. It provides for the planning, design, development, construction, financing, management, control, maintenance, protection and rehabilitation of provincial roads, railway lines and other transport infrastructure in Gauteng.

According to this provincial act, the proposed alignments for all the Gautrans roads on the Gautrans Grid Road Network Map must be honoured by planners.

***25-year Integrated Transport Master Plan<sup>5</sup>***

It is one of the GDRT's initiatives to continuously update the existing Strategic Road Network (SRN). By updating existing roads it serves as a Strategic Transport Network (STN) that provides structure to the spatial development of the province. The land which is

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<sup>5</sup> Gauteng Province Roads and Transport, 25-YEAR INTEGRATED TRANSPORT MASTER PLAN, November 2013, Final, (<http://www.roadsandtransport.gpg.gov.za/services/Documents/Gauteng%2025-Year%20Integrated%20Transport%20MasterPlan.pdf>) Executive Summary

reserved for the STN should be utilised to its fullest potential due to the importance of the role the integrated transport corridors play. These corridors include all possible public transport networks and play just as important role as private vehicles and freight vehicles.

The Class 1 (freeway) network forms an integral part of road-based mobility in the province. To ensure the upgrading of our existing freeways, there must be Environmental Impact Assessments done for the freeways. As soon as this is implemented, the construction of new freeways can be undertaken once the necessary funds become available.

The GDRT should upgrade the P158/2 (R28); N4; N3; R24, and the P156/1 (R59). It should also construct the PWV9; PWV2; PWV5; PWV13; PWV15; PWV16; PWV17 and PWV3. The upgrading of the existing K-routes is also critical as well as the development of brand new K-route links in the support of public transport routes and access routes for freight vehicles to freight hubs.

### ***Infrastructure Planning Across Sensitive Areas***

Infrastructures to be installed are usually linear of nature and it is essential to implement infrastructure structure such as roads. In some cases authorities have no other choice than to align infrastructure through ridges and watercourses. Suitable mitigation measures are therefore required to minimise and prevent construction and operational phase impacts associated with such infrastructure.

### ***GDARD C-Plan 3, 2011***

The environmental data contained in the C-Plan 3, 2011, was taken into consideration during the compilation of the scoping report. According to the C-plan 3, the involved section of the proposed PWV17 traverses irreplaceable sites.

***GDARD Draft Red Data Species Policy, 2001***

According to the C-Plan 3, 2011, the involved section of the proposed PWV17 traverses irreplaceable sites. The presence of red data flora species and red data fauna habitat were confirmed during the EIA phase.

***GDARD Draft Ridges Policy, 2001***

According to the GDARD Draft Ridges Policy no development should take place on slopes steeper than 8.8%.

The proposed PWV17 cuts across the Bronberg ridge according to C-Plan 3, 2011, and therefore the Draft Ridges Policy is regarded as applicable. It is however important to note that infrastructure projects are treated differently than other development projects.

***GDARD Draft Biodiversity Requirements, June 2012***

The GDARD Draft Biodiversity Requirements, June 2012 had been taken into consideration during the EIA phase of the development.

***Environment Conservation Act, 1989 (Act No. 73 of 1989): Gauteng Noise Control Regulations***

The proposed PWV17 must comply with the Provincial Noise Control requirements as outlined in the Provincial Notice, 5479 of 1999: Gauteng Noise Control Regulations.

### ***Draft Policy on the Protection of Agricultural Land (2006)***

The study area lies within an Agricultural Hub that was identified by GDARD in 2006. The Draft Policy on the Protection of Agricultural Land (2006) is therefore applicable to the proposed road.

#### ***6.3.3.4 On a Local Level***

### ***Planning responsibilities of the involved Local Authority***

The prerogative to plan development within its jurisdictional area has always constitutionally, in terms of the Development Facilitation Act, 1995, the Local Government Transitional Act, 1993 and recently the Municipal Systems act, 2000 vested in the local authority involved.

In order to ensure that the proposed developments comply with the standards and requirements of the involved local authority, the relevant officials were involved in the planning of the project from the start.

### ***Municipal Systems Act (2000)***

This Act clearly establishes the Integrated Development Plan and Integrated Spatial Development Framework as guidelines to inform development and processes in this regard.

### ***City of Tshwane Spatial Development Framework (CTSDF)***

This document includes valuable concepts regarding the movement system and the development lattice. According to the CTSDf the movement system in an urban environment is literally the arteries of the city and without these linkages there can be no economy and no inter-relatedness. Movement systems can be used to create access, structure settlements, and promote integration, diversity and mixed land use.

Movement (flows of people, finance, goods) defines the energy networks of settlements and more continuous lines of movement represent planes of greater accessibility and, therefore, become the more desirable planes of connection for intensive use. A complex and diverse pattern of accessibility offers all activities, both large and small, the opportunity to find a place within the structural system, depending on their need for accessibility and their ability to pay for it.

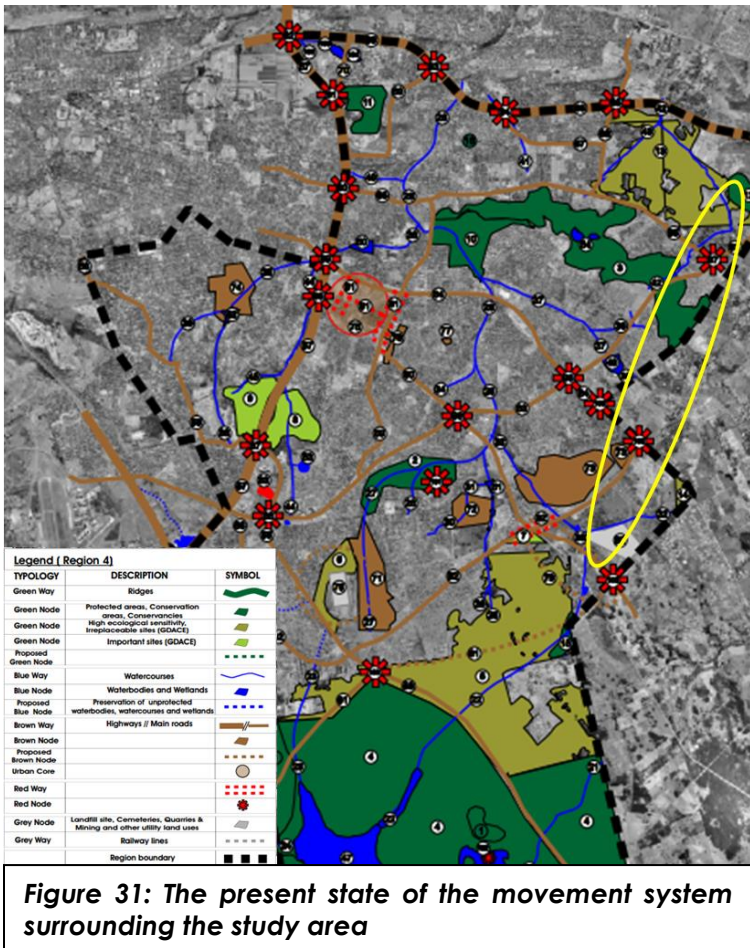
According to the CTSDf movement systems provide a powerful planning mechanism to bring about mixed, but broadly predictable, patterns of activity, provided activities are allowed to respond to them.

The present state of the movement system surrounding the study area is illustrated in **Figure 31**.

The area is severely influenced by the existence of large interstitial areas (represented by white colour between areas of settlement) and interstitial elements like freeways. This affects the accessibility of certain areas by preventing connections on the lower planes of hierarchy. Although such areas are situated centrally within a large area, their lower levels of accessibility prevent them from harbouring extensive economic opportunities.

The K103/K69 route (Solomon Mashlangu Ave), Garstfontein Drive (M30/ K50)) and the Delmas Rd (R50) are significant as they interconnect the major roads providing the local movement systems and provide access to the major motorways. It is only with these roads that the urbanisation of the suburbs can occur. Gasfontein Drive and Solomon Mashlangu Ave therefore play a very important role: connecting origins and destinations of various local nodes and precincts of different types of land uses. Capacity for movement on this road should be encouraged, as it will stimulate local economic development.

The proposed PWV17 will strengthen the movement system.



### ***City of Tshwane Open Space Framework, 2005***

According to the City of Tshwane Open Space Framework the route alignments is situated within and adjacent to the following open space typologies:

- A Blue Node (Pienaars River, Sesmylspruit and associated wetlands);
- A Blue Way (Kaalspruit, Sesmylspruit, Pienaars River and associated wetlands);
- A Green Way (Bronberg Ridge);
- A Green Node;
- A Brown Way (N4, Garsfontein Rd);

### ***City of Tshwane, Comprehensive Integrated Transport Plan, 31 March 2015 Draft Report***

The PWV 17 was identified as a new strategic road project by the City of Tshwane's Comprehensive Integrated Transport Plan, Draft Report. One of the PWV 17's extensions is the PWV 2 which will extend from the N4. The proposed PWV 17 will also be transecting to the N3. Both the PWV2 and PWV 17 are identified in the Gauteng 25 year ITMP as being part of the ring road. Access will be provided from the PWV17 to the PWV5 into Midrand and Johannesburg<sup>6,7</sup>.

### ***Bioregional Plan for the Gauteng Metropolitan Municipalities:***

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<sup>6</sup> City of Tshwane, Comprehensive Integrated Transport Plan, 31 March 2015 Draft Report, 8 <http://www.tshwane.gov.za/sites/Departments/Transport-andRoads/Transport/Documents/CIIP%20Draft%20front%20cover%20to%20ch13.pdf> (accessed on 28 June 2017).

<sup>7</sup> Gauteng Province Roads and Transport, Convention, 25-year Integrated Transport Master Plan, 3 – 4 September 2013, Gallagher Convention Canter, Midrand South Africa, [http://www.itssa.org/wp-content/itans2013/Jack\\_vdMerwe\\_S2-3092013.pdf](http://www.itssa.org/wp-content/itans2013/Jack_vdMerwe_S2-3092013.pdf) (accessed on 28 June 2017).



The proposed PWV17 route alignments are in terms of the Bioregional Plan for the Gauteng Metropolitan Municipalities situated within and/or adjacent to the following areas:

- Critical Biodiversity Area 1; and
- Ecological Support Areas 1 & 2.

***Ekurhuleni Draft Bioregional Plan:***

The Metropolitan Spatial Development Framework (MSDF) must be viewed as first step towards guiding future spatial development in Ekurhuleni to achieve a more sustainable metropolitan city structure, which can lead economic and social development in Gauteng. Improved regional connectivity needs to be achieved via the development of PWV 3, PWV 5 and PWV 17 routes.

***Gauteng Environmental Management Framework:***

The environmental parameters/constraints of the proposed PWV17 route alignment are in terms of the Gauteng Environmental Management Framework:

- **Development and Constraint Zones:** Ecological, Hydrological and Geotechnical Zones;
- **Vegetation type:** Carletonville Dolomite Grassland; and
- **Environmental Sensitivity:** Low to High

***Proposed Tshwane Open Space Framework:***

- At least 40% of Gauteng's threatened plant species are confined to the Bronberg Ridge and Magaliesberg Mountains;
- The Bronberg Ridge is a Class 2 Ridge and therefore is least transformed.
- The Bronberg open space must be conserved.
- Alternative 2 will fragment the Bronberg open space.
- Alternative 3 will preserve movement corridors and have limited impact on the open space present on the Ridge.

**6.3.3.5 The proposed construction of the PWV17 is in line with the future planning for the area.**

**6.3.3.5.1 Issues & Impact Identification – Institutional**

**Table 32: Issues and Impacts – Institutional**

	<b>Issue/ Impact</b>	<b>Positive/ Negative/ Neutral ±</b>	<b>Mitigation Possibilities</b>  High 🟢 Medium 😊 Low 🟡  Positive Impact - Not Necessary To Mitigate ☀️
23)	The proposed construction of the PWv17 will be in line with the international, national, provincial and local legislation, planning frameworks, guidelines, policies etc.	+	☀️

### 6.3.4 Qualitative Environment

#### 6.3.4.1 Noise Impact

The involved section of the PWV17 could have an impact on the area with regards to noise. Impact assessments were based on a modelled worst-case future traffic prediction (data of traffic expected in 2047). Night-time contours are likely only representative of early morning rush hour traffic just before 06:00 (night-time in terms of SANS 10103:2008). It's likely a gross overestimation of other night-time periods (e.g. dead-of-night times 24:00 – 04:00 etc.). It is also expected that the area will mature and with it noise levels (expansion of other road networks and suburbs). This will result in a much higher noise rating level than what is used in this report (and subsequently a lower noise impact as predicted in this report). **Refer to Figure 32 and 33.**

***Enviro-Acoustic Research cc (EARES) was appointed to conduct the noise impact assessment and the noise impact assessment is attached hereto as Annexure E (iv).***

#### **Results and Finding by EARES;**

The results of the full ENIA evaluation the significance rating of the noise impacts could be:

- Low (negligible) during planning phase;
- Low during Construction activities;
- High during the Operational phase (high for night-time operations of receptors within 50m of route, medium significance up to 600m);
- Low during Closure and Decommissioning phase; and
- Low during the Post-Closure Phase.

Mitigation options in the planning and operational phases are required. An atmospheric emission license in terms of AQA 2004 (Act no. 39 of 2004) would not be required in terms

of noise. Mitigation options include the consideration of parapets on bridges, elevations, berms & cut of routes in relation to receptors within 50m. These factors will in most cases act as a good acoustical screening tool from the route in relation to receptors.

Future developments close to the proposed road must carefully consider the potential impact of traffic noise and design their layouts appropriately to ensure that future residents are least impacted by the road traffic.

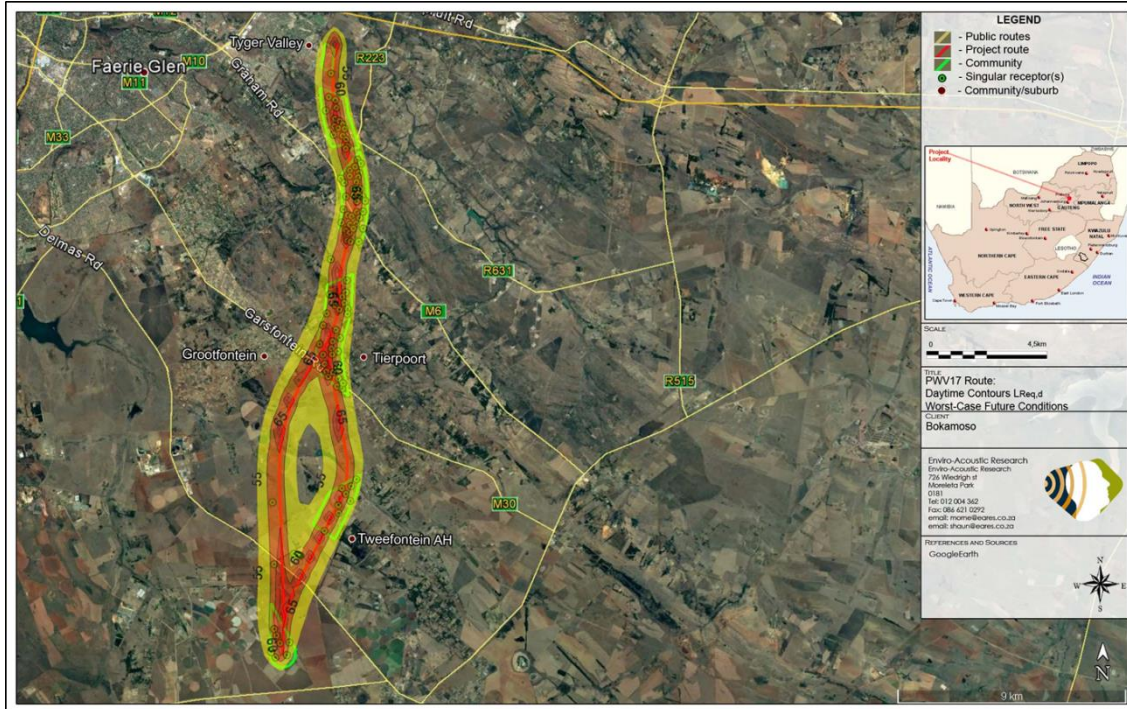
The road paving could also be considered to be quieter (e.g. Ultra-Thin Friction Course (UTFC)) stone-matrix asphalt (SMA) or open-graded friction course (OGFC) mix). The route should be also designated as a controlled a zone in terms of PN 5479. Although the receptors within 50m are the most important (high significance during the night for an impact), mitigation options should also be considered for receptors up to 200m (although a medium significance is still expected for receptors up to 600m).

It should be noted that with mitigation options, the sound from the project should not be inaudible under all circumstances, this is an unrealistic expectation that is not required (from legislation) or expected from any other agricultural, commercial, industrial or transportation related noise source, but rather that the sound due to the activities from the project should be at a reasonable level in relation to the ambient sound levels as per regulations (i.e. +5 dB from the noise rating level).

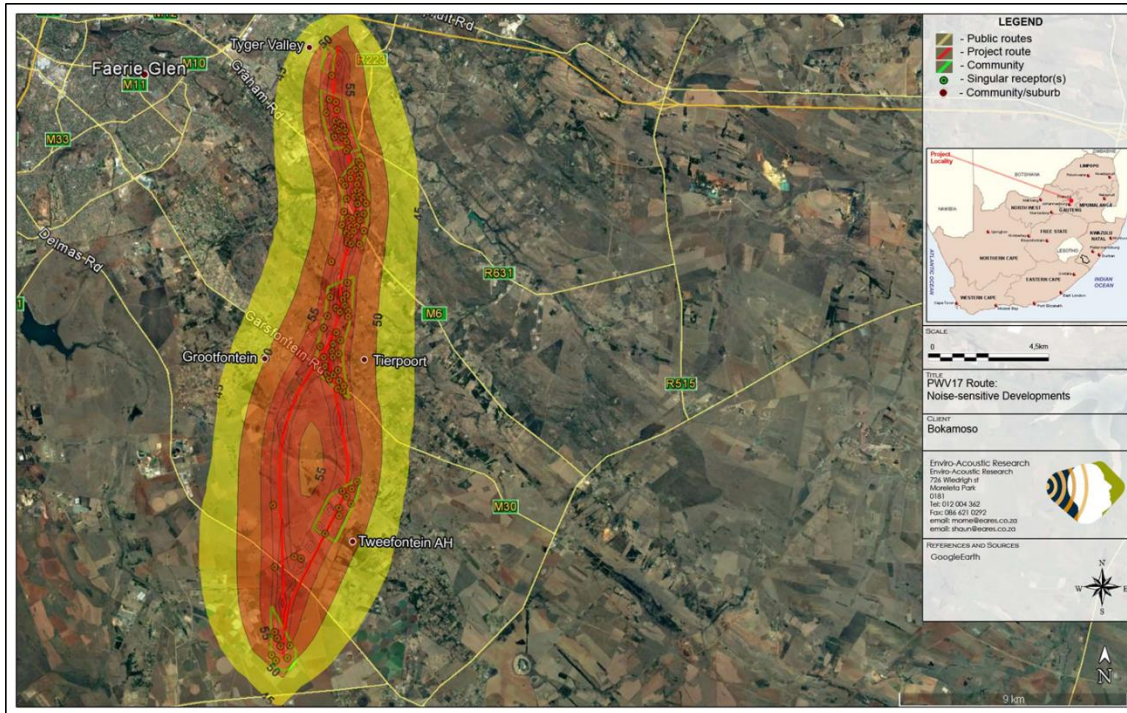
If the layout of the project significantly changes (or assumptions change) as used in this report, that this Environmental Noise Impact Assessment be reviewed with the appropriate information supplied by the developer, including:

- Locality of the noise source;
- Operational time of the noise source; and
- If possible specifications regarding the noise source.

In terms of acoustics it is recommend that the project be approved if mitigation options are implemented for receptors within 50m (although up to 200m is highly recommended).



**Figure 32: Day time noise levels**



**Figure 33: Night time noise levels**

Refer to **Annexure E (iv) for the Noise Impact Study and enlarged Figures.**

### Mitigation Measure by EARES:

The Mitigation options for road can be costly options and could impact on other design factors (e.g. areas where roads need traction on hills, however may not be particularly good acoustical paving).

Mitigation options are recommended for current receptors within app. 200 – 250m of the proposed road. The scenario indicated that a medium significance could be still likely up to 600m however, the developer should consider up to this distance (if feasible depending on budget). It should be noted that at a future stage if the road is developed other dwellings will have been implemented.

Only current receptors will be considered in this report. It should also be noted that if the developer only considers implementing the route at a much later stage (e.g. +5 years) the rating level of the area should be reviewed as the area will become louder (higher rating) due to the growth of the area (other noises). The higher rating level will enable a far less recommended constraints area for proposed mitigation areas (i.e. less than 200 – 250m).

### **Pre-Planning Phase**

The pre-planning phase is the most important of the phases. It has no noise generating potential, however during this stage design options can be considered (specifically relating to the operational phase). These options should ideally be implemented during the construction phase to limit the noise impact during the operational phase.

The mitigation options highlighted include technical or design concepts and include:

- Not compulsory but highly recommended – Land owners and proposed developers must consider the route alignment to minimise the potential future noise impact on residents. Formal developments must conduct a site specific noise impact assessment;
- Not compulsory but highly recommended - The developer should consider revising this ENIA if the route is altered or if the development is only planned at a much later stage (e.g. +5 years). The appropriate information supplied by the developer should include:



- Locality of the noise sources;
- Operational time of the noise source; and
- If possible specifications regarding the noise source.
- Not compulsory but recommended - An annual Acoustical Measurement & Audit Programme is recommended to be implemented and conducted prior to construction phase (to improve the characterisation of the baseline) and during all phases (except for closure and post closure). Refer to Section 11 which outlines the proposed acoustical measurement;
- Highly recommended (receptors within 200 – 250m) - If possible the route should be located in a cut to assist in breaking the line of sight (and reduce the noise levels at the potential noise-sensitive receptors);
- For consideration – The implementation of bridges parapets, tunnels and underpasses will greatly assist in the reduction of noise levels. At this stage these infrastructures are not defined. If a bridge is implemented, parapets walls should be sufficiently high;
- Highly recommended, consideration for the Environmental Authorisation (receptors within adjacent– 100m) - A berm/acoustical barrier could be considered at receptors within very close proximity (e.g. directly next to or up to 100m). If possible routes within 100m should be located in a cut to assist in breaking the line of sight (and reduce the noise levels at the potential noise-sensitive receptors). The following must be considered to ensure the wall acts as an affective acoustical screen:
  - Walls/berms/barriers to be built as close as feasibly possible to the road or receptors;
  - The height of the barrier is at least 2 - 3 m higher than the line of sight to the top of the highest noise source on the road in relation to the receptors, although the higher the berm/barrier the better acoustical screen tool it will be . Barriers must



also be sufficiently dense (at least 10 kg/m<sup>2</sup>) and sufficient in thickness. A brick wall provides a surface density of 244 kg/m<sup>2</sup> at thickness of 150 mm and is considered as a typically good acoustical barrier. A

- The barrier should be sufficiently long to block the line of sight from receptors to the sides of the road; and
- No apertures (gaps, entrances) should be implemented at walls.
- Highly recommended (receptors within 200 – 250m) – Acoustical pavement options could consider quieter pavements:
- Ultra-Thin Friction Course (UTFC);
- Research shows that stone-matrix asphalt (SMA) or open-graded friction course (OGFC) mix will reduce highway noise by 3 to 5 dB(A) or more ;
- Highly recommended (receptors within 200 – 250m) - If possible the land use could be demarcated as a controlled zone. A controlled zone is defined by PN 5479:

*"Controlled area means a piece of land designed by a local authority where, in the case of*

*(a) road traffic noise in the vicinity of a road-*

*(i) the reading on an integrating impulse sound level meter, taken outdoors at the end of a period of 24 hours while such meter was in operation, exceeds 60 dBA; or*

*(ii) the outdoor equivalent continuous "A" -weighed sound pressure level at a height of at least 1,2 metres, but not more than 1,4 metres, above the ground for a period of 24 hours as calculated in accordance with SABS 0210, and projected for a period of 15 years following the date on which the local authority has made such designation, exceeds 60 dBA"*

11.1) A local authority may -

*(a) designate a controlled area in its area of jurisdiction or amend or cancel an existing controlled area by notice in the Provincial Gazette.*

## Construction Phase

Due to the negligible significance for a potential for a noise impact to occur, mitigation options are recommended (not mandatory) only to ensure that this rating is achieved, and includes:

- Normal daily activities will generate other noises that would most likely mask construction noises, minimizing the probability of an impact happening. Ensure a good working relationship between the project representative and all potentially sensitive receptors. Communication channels should be established to ensure prior notice to the sensitive receptor if work is to take place close to them. Information that should be provided to the potentially sensitive receptor(s) includes:

- Proposed working times;
- How long the activity is anticipated to take place;
- What is being done, or why the activity is taking place;

Contact details of a responsible person where any complaints can be lodged should there be an issue of concern.

## Operational Phase

Highly recommended - Pre-planning phase mitigation options must be considered. Mitigation options are highly recommended (although it is up to the discretion of the developer to which mitigation should be opted for).

Future developments close to the proposed road must carefully consider the potential impact of traffic noise and design their layouts appropriately to ensure that future residents are least impacted by the road traffic. **See Table 33 below.**

**Table 33: Impact ratings for noise levels on PWV17**

Receiver no.	Projected operational noise level - $L_{Aeq,1hr}$ (dBA)	Rating Level ( $L_{Req,d/n}$ ) (dBA)	Magnitude	Duration	Extent	Probability	Significance Without Mitigation (WOM)	Significance With Mitigation (WM)
<b>Daytime</b>								
Receptors within 50m	<65	50 & 40	10	4	2	3	48 Medium	A low significance can be achievable for receptors within 50m
Receptors within 360m	<55	50 & 40	8	4	2	2	28 Low	
Receptors within 360m	0 < 55	50 & 40	6 or lower	4	2	2	24 Low	
<b>Comments</b>	Noise levels will deteriorate the further the receptors are from the planned route.							
<b>Probability of impact</b>	High.							
<b>Confidence in finding</b>	Moderate-high.							
<b>Mitigation measures</b>	Mitigation could be considered for receptors within 50m of the route.							
<b>Night-time</b>								
Receptors within 50m	< 65	50 & 40	10	4	2	4	64 High	A low significance can be achievable for receptors within 50m
Receptors within 360m	55 < 60	50 & 40	10	4	2	3	48 Medium	
Receptors above 360m	0 < 55	50 & 40	6 or lower	4	2	2	28 Low	
<b>Comments</b>	Noise levels will deteriorate the further the receptors are from the planned route.							
<b>Probability of impact</b>	High to low (depending on the distance of receptor in relation to the route).							
<b>Confidence in finding</b>	Moderate.							
<b>Mitigation measures</b>	Mitigation could be considered for <b>current</b> receptors within 50m of the route.							

## Closure Phase

See mitigation options for the construction phase above (section 10.1.2).

**Post-Closure Phase**

No mitigation options required.

**6.2.4.1.1 Issues & Impact Identification – Noise Impact****Table 34: Issues and Impacts – Noise Impact**

	Issue/ Impact	Positive/ Negative/ Neutral ±	Mitigation Possibilities High 🟢 Medium 😊 Low 🟡 Positive Impact - Not Necessary To Mitigate 🌟
24)	Noise impact	-	😊

**6.2.4.1.2 Discussion of issues identified, possible mitigation measures and significance of issue after mitigation****24) Noise Impact**

The construction phase will comply with the National (GN R154) Noise Control Regulations, SANS 10103:2008 guideline and International Finance Corporation if mitigation options are adhered to. It should be noted that construction phase is short-term.

The resulting worst-case noise projections for the operation phase indicated that the operations will comply with mentioned National & International criteria if mitigation options are adhered to.

The impact assessment during the closure phase will be similar to the construction phase.

**Table 35: Significance of Issue 24 (Noise Impact) After Mitigation/ Addressing of the Issue**

<p><b>Mitigation Possibilities</b></p> <p><b>High</b> 🟢 <b>Medium</b> 😊 <b>Low</b> 🟡</p> <p><b>Positive Impact/ Neutral - Not Necessary To Mitigate</b> ✨</p>	<p>Mitigation</p> <p>Already achieved ✓</p> <p>Must be implemented during planning phase, construction and/ or operational phase</p> <p><b>P / C / O</b></p>	<p>Significance of Issue after mitigation</p> <p>Positive ✨</p> <p>Low/ eliminated <b>L / E</b></p> <p>Medium <b>M</b></p> <p>High <b>H</b></p> <p>Not possible to mitigate, but not regarded as a fatal flaw <b>NP</b></p>
<p><b>Low</b> 🟡</p>	<p><b>P / C / O</b> – The layout designs of proposed new developments in the area must take the noise impact from the PWV17 into consideration and mitigation measures must be implemented if necessary i.e. strategic placement of vegetation, berms etc.</p>	<p><b>L</b> - to be included in the EMP</p>

**Result:** Although the impact can be mitigated, the significance of this impact still needs to be determined/confirmed and assessed in the Significance Rating Table.

#### 6.2.4.2 Visual Environment

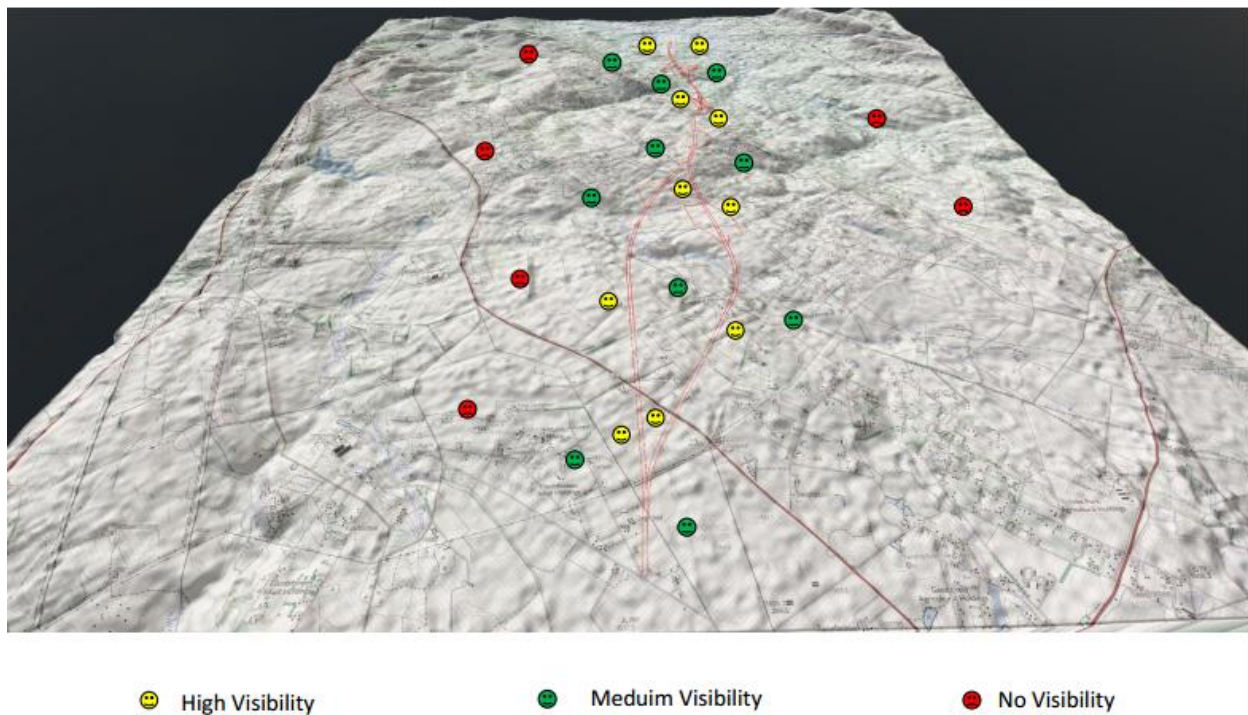
The following visual assessment criteria (**see Table 36**) have been used to determine the impact of the proposed development on the state of the environment – the significance is indicated by the respective colour coding for each of the impacts, being high, medium and low:

**Table 36: Visual Impact Criteria**

Criteria	Impact		
	High	Medium	Low
Visibility	<b>A prominent place with an almost tangible theme or ambience</b>	A place with a loosely defined theme or ambience	A place having little or no ambience with which it can be associated
Visual quality	A very attractive setting with great variation and interest – no clutter	<b>A setting with some visual and aesthetic merit</b>	A setting with no or little aesthetic value
Compatibility with the surrounding landscape	Cannot accommodate proposed road without the development appearing totally out of place – not compatible with the existing theme	<b>Can accommodate the proposed road without it looking completely out of place</b>	The surrounding environment will ideally suit or match the proposed road
Character	<b>The site or surrounding area has a definite character/ sense of place</b>	The site or surrounding environment has some character	The site or surrounding environment exhibits little or no character/ sense of place
Visual Absorption Capacity	<b>The ability of the landscape not to accept a proposed development because of a uniform texture, flat slope and limited vegetation cover</b>	The ability of the landscape to less easily accept visually a particular type of development because of less diverse landform, vegetation and texture	The ability of the landscape to easily accept visually a particular type of development because of its diverse landform, vegetation and texture
View distance	If uninterrupted view distances to the site are > 5 km	<b>If uninterrupted view distances to the site are &lt; 5 km but &gt; 1 km</b>	If uninterrupted view distances to the site are > 500 m and < 1000 m

Critical Views	Views of the site seen by people from sensitive view sheds i.e. farms, nature areas, hiking trails etc.	<b>Some views of the site from sensitive view sheds</b>	Limited or partial views of the site from sensitive view sheds
Scale	A landscape with horizontal and vertical elements in high contrast to human scale	<b>A landscape with some horizontal and vertical elements in some contrast to human scale</b>	Where vertical variation is limited and most elements are related to the human and horizontal scale

From the preliminary visual assessment it is evident that the proposed road will be visible from the various view sheds that surround the study area. It will be visible from existing and future developments in the area. **Refer to Figure 34.**



**Figure 34: Visibility of the Road Alignments**

### 6.2.4.2.2 Issues & Impact Identification – Visual

**Table 37: Issues and Impacts – Visual**

	Issue/ Impact	Positive/ Negative/ Neutral ±	Mitigation Possibilities High 🟢 Medium 😊 Low 🟡 Positive Impact - Not Necessary To Mitigate ✨
25)	Due to the topography Alignment 1 will be very visible from the surrounding areas (i.e. Cornwall Hill, Twin Rivers, Southdowns, Salberg and proposed Rietvlei X 12, 13 & 14, Rietvlei X 10, 11 & 15 and Strawberry farm developments). The southern and central sections of Alternative 3 (the preferred alternative) will be less visible and the most northern section, which will run across a ridge area will be very visible from the east, west and south. It will however not be very visible from the north.	- / +	😊

### 6.2.4.3 “Sense of Place”

The concept of “a Sense of Place” does not equate simply to the creation of picturesque landscapes or pretty buildings, but to recognise the importance of a sense of belonging. Embracing uniqueness as opposed to standardisation attains quality of place. In terms of the natural environment it requires the identification, a response to and the emphasis of the distinguishing features and characteristics of landscapes. Different natural landscapes suggest different responses. Accordingly, settlement design should respond to nature.



In terms of the human made environment, quality of place recognises that there are points where elements of settlement structure, particularly the movement system, come together to create places of high accessibility and these places are recognised in that they become the focus of public investment, aimed at making them attractive, user-friendly and comfortable to experience.

The landscape is usually experienced in a sensory, psychological and sequential sense, in order to provide a feel and image of place ("genius loci").

A landscape is an integrated set of expressions, which responds to different influences. Each has its unique spirit of place, or "genius loci". Each landscape has a distinct character, which makes an impression in the mind, an image that endures long after the eye has moved to other settings.

If planned correctly the proposed road could enhance the genius loci of the broader area by establishing infrastructure for the future development of the area.

Sense of Place is the subjective feeling a person gets about a place, by experiencing the place, visually, physically, socially and emotionally. The "Sense of Place" of a property/ area within the boundaries of a city, is one of the major contributors to the "Image of a City/ City Image".

**City Image** consists of two main components, namely **place structure** and **sense of place**. Place structure refers to the arrangement of physical place making elements within a space, whereas sense of place refers to the spirit of a place. It could be defined as follows:

- **Place Structure** refers to the arrangement of physical place making elements within a unique structure that can be easily legible and remembered.
- The **Sense of place** is the subjective meanings attached to a certain area by individuals or groups and is closely linked to its history, culture, activities, ambience and the emotions the place creates.

The surrounding area is surrounded by the Bronberg Ridge, a place used for cycling, hiking and other activities. The ridge is considered as a beautiful area with hills and valleys between and owners of properties nearby enjoy the views. This all contribute to a sense of an established fine balance and well-being within a special landscape where historic uses and landscapes blend in with a vibrant loci urban life where each individual and element plays its role.

The proposed PWV17 through the Bronberg Ridge could have a negative impact on the "Sense of Place" in this area, however, it should be noted that the PWV17 is located within an area earmarked for future developments and numerous new development applications are in the progress and the area will not remain rural much longer.

Today one aspect of South African city life (especially in Gauteng) that add frustration and break down the city-experience: must be traffic congestion. Most Public meetings for developments are dominated by discussions of traffic and roads. People want development but not more traffic, more roads to be built but not on their properties. In this regard the construction of the PWV17 will enhance the "Sense of Place" of the area. Areas with a high Sense of Place should however be considered when determining the proposed alignment of the PWV17.

#### **6.2.4.3.2 Issues & Impact Identification – "Sense of Place"**

**Table 38: Issues and Impacts – “Sense of Place”**

	<b>Issue/ Impact</b>	<b>Positive/ Negative/ Neutral ±</b>	<b>Mitigation Possibilities</b>  High 🟢 Medium 😊 Low 🟡  Positive Impact - Not Necessary To Mitigate 🌟
26)	If not planned and managed correctly (i.e. though the holistic planning of the entire development area) the proposed road could have a negative impact on the “Sense of Place” to be created in this developing area.	-	🟢

**6.2.4.3.3 Discussion of issues identified, possible mitigation measures and significance of issue after mitigation**

27) If not planned and managed correctly (i.e. though the holistic planning of the entire development area) the proposed road could have a negative impact on the “Sense of Place” to be created in this developing area.

**Table 39: Significance of Issue 26 (If not planned and managed correctly, the proposed development could have a negative impact on the “Sense of Place” of the study area and its surroundings) After Mitigation/ Addressing of the Issue**

<b>Mitigation Possibilities</b>  High 🟢 Medium 😊 Low 🟡  Positive Impact/ Neutral - Not Necessary To Mitigate 🌟	<b>Mitigation</b>	<b>Significance of Issue after mitigation</b>
	Already achieved ✓  Must be implemented during planning phase, construction and/ or operational phase	Low/ eliminated L / E  Medium M

	<b>P / C / O</b>	High <b>H</b>  Not possible to mitigate,  but not regarded as a fatal  flaw <b>NP</b>
<b>High</b> ☹️	<b>P/C/O</b> - Landscaping guidelines should be provided for the linear strips of land adjacent to the proposed road.	<b>L/E</b> - To be included in the EMP

**Result:** Although the impact can be mitigated, the significance of this impact still need to be determined/ confirmed and assessed in the Significance Rating Table

#### 6.2.4.4 Services and Infrastructure

##### 6.2.4.4.1 Issues and impacts identification - services and infrastructure

Table 40: Issues and Impacts – Services and Infrastructure

	Issue/ Impact	Positive/ Negative/ Neutral ±	Mitigation Possibilities  High ☹️ Medium 😊 Low ☒  Positive Impact - Not Necessary To Mitigate ✨
27)	Impact on existing infrastructure and services during the construction of the proposed road.	-+	😊
28)	The proposed PWV17 will improve regional	+	✨

	accessibility in the area.		
29)	The proposed PWV17 will divert traffic from existing road network links and thereby alleviate congestion on the existing road network system.	+	☀
30)	The construction phase of the proposed road will supply a number of temporary job opportunities.	+	☀
31)	The developer will deliver a large contribution to the infrastructure in the area	+	☀

- The crossing/intersection with existing and planned roads;
- Temporary and permanent impacts on accesses to properties;
- Disruption in municipal and other services;
- Servitudes registered across the area to be traversed by the route;
- The proposed alignments run underneath Eskom Powerlines. The impact of the proposed road on the high-voltage power lines must be determined and Eskom's inputs support for the preferred alignments will be required;
- Identification of additional authorisations required for the relocation, upgrading, disruption etc. of services (i.e. wayleaves, water licenses, EIA authorisations);
- Social impacts associated with the relocation of services or the disruption to services.
- Properties affected by services upgrading, interruptions, relocations etc. must be identified and the affected parties must be consulted regarding the anticipated impacts;
- Servitudes must be negotiated with land-owners and the involved local authority for the services upgrading, relocations etc.;

- Property accesses that will be affected by the proposed alignments must be identified and workable solutions for alternative accesses must be discussed with the relevant authorities, the land-owners etc.;
- Eskom's support for the preferred alignments; and
- Services to be upgraded, removed, relocated, disrupted, re-aligned etc. and accesses to properties that will be affected must be indicated on the Engineering drawings. Such drawings must also indicate the 1:100 year flood line.

**6.2.4.4.2 Discussion of issues identified, possible mitigation measures and significance of issue after mitigation**

**20) The construction of roads often requires the relocation of services and/or temporary disruptions to existing services such as access roads, electricity, water, Telkom services, sewage etc.**

**Table 41: Significance of Issue 27 (Impact on existing infrastructure and services during the construction of the proposed road) After Mitigation/ Addressing of the Issue**

<p><b>Mitigation Possibilities</b></p> <p>High 🟢 Medium 😊 Low 🟡</p> <p>Positive Impact/ Neutral - Not Necessary To Mitigate ⚡</p>	<p>Mitigation</p> <p>Already achieved ✓</p> <p>Must be implemented during planning phase, construction and/ or operational phase</p> <p><b>P / C / O</b></p>	<p>Significance of Issue after mitigation</p> <p>Low/ eliminated <b>L / E</b></p> <p>Medium <b>M</b></p> <p>High <b>H</b></p> <p>Not possible to mitigate, but not regarded as a fatal flaw <b>NP</b></p>
<p>High 🟢</p>	<p><b>P</b> – Servitudes must be indicated on Engineering drawings.</p>	<p><b>M</b> – To be included in the EMP</p>

	<p><b>P/ C</b> – Determine areas where services will be upgraded and relocated well in advance. Discuss possible disruptions with affected parties to determine most convenient times for service disruptions and warn affected parties well in advance of dates that service disruptions will take place.</p> <p><b>C</b> - It is important to erect proper signs indicating the operations of heavy vehicles in the vicinity of dangerous crossings and access roads.</p> <p><b>C</b> – Construction vehicles must avoid peak hour traffic, i.e. between 7am and 9am and again between 4pm and 6pm on weekdays. Where possible, routes should be planned to avoid construction vehicles travelling through residential areas.</p> <p><b>C</b> - It is important to erect warning signs on existing roads when impacted on by the construction of the PWV17 (i.e. construction of intersections/bridges).</p> <p><b>C</b> – Traffic on existing roads should be controlled during construction activities impacting on these roads (i.e. construction works at intersections, construction of bridges). At least one lane should be open for traffic or alternatively a detour route must be available at all times. A traffic points man should be appointed.</p>	<p><b>M</b> – To be included in the EMP</p> <p><b>M</b> – To be included in the EMP</p> <p><b>M</b> – To be included in the EMP</p> <p><b>M</b> – To be included in the EMP</p> <p><b>M</b> – To be included in the EMP</p> <p><b>M</b> – To be included in the EMP</p>
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**Result:** *Although issue can be mitigated, the significance of the impact should still be determined / confirmed assessed in the Significance Rating Table*

#### **6.2.4.5 Affected Properties**

The following properties are **directly affected** by the proposed alignments of the PWV17:

- Portions 19; 22; 174; and the remainder of Portion 45 of the Farm **Zwartkoppies 364**;
- Portions 44; 167; 169; 170; 171; 176; 229; 230; 232; 233; 234; 235; 236; 378; and 395 of the **Farm Mooiplaats 367**;
- Portions 30; 31; 32; 33; 36; 37; 61; 62; 63; 64; 65; 66; 67; 68; 87; 88; 91; 92; 94; 95; 97; 98; 156; 158; 159; 160; 162; 163; 165; 166; 167; 168; 170; 173; 175; 234; 296; 318; 326; 328; 352; as well as the remainder of portions 28; 65; 161; 164; and 235 of the **Farm Tiegerpoort 371**;
- Portions 11; 26; 27; 28; 29; 34; 35; 36; 37; 39; 42; 43; 188; 189; 200; 201; 220; 221; 226; 227; 228; 242; 251; 257; 317; 382; 383; 384; 385; 400; 409; 418; 419; 439; 550; 551; as well as remainder of portions 4; 40; 41; 207; and 258 of the **Farm Zwavelpoort 373**;
- Portions 5; 8; 25; 26; and 398 as well as the remainder of portions 1; 3 and 24 of the **Farm Grooffontein 394**;
- Portions 72; 73; 74; and 75 of the **Farm Elandsfontein 412**;
- Portions 59; 63; 75; 76; 77; 78; as well as the remainder of 112; 113; 129; and 134 of the **Farm Tweefontein 413**.
- Bashewa Holdings NO 1 and 2 on Portion 119 of the **Farm Tweefontein 413**.



The following properties may be directly or indirectly affected by the proposed PWV17:

- Portion 4 of the **Farm Tweefontein 19**;
- Portion 29 and Remainder of **Farm Hatherley 331**;
- Portions 50; 225; 239 and the Remainder of Portion 2 of the **Farm Zwartkoppies 364**;
- Portions 177; 469, and the Remainder of Portion 164, and 237 of the **Farm Mooiplaats 367**;
- Portions 2; 3; 29; 69; 90; 93; 161; 169; 376; 378; and the remainder of portions 162 and 172 of the **Farm Tiegerpoort 371**;
- Portions 219; 222; 243; 254; 283; 297; 299; 349; 398; 399; 404; 424; 518; 552; 928; 929; 930; 931; 941; 942; 943; 944 as well as the remainder of portions 219; 257 and 250 of the **Farm Zwavelpoort 373**;
- Portion 138 of the **Farm Elandsfontein 412**;
- Portions 19 of the **Farm Tweefontein 413**.

#### 6.2.4.5.1 Issues and Impacts – Affected Properties

**Table 42: Issues and Impacts – Affected Properties**

	Issue/ Impact	Positive/ Negative/	Mitigation Possibilities
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		Neutral ±	High 🟢 Medium 😊 Low 🟡 Positive Impact/ Neutral - Not Necessary To Mitigate 🌟
32)	Expropriation of properties	-	🟡
33)	Impact on property values	-/+	🟡/🌟
34)	Access to local roads and properties	-	😊
35)	Safety during construction	-	😊

**6.2.4.5.2 Discussion of issues identified, possible mitigation measures and significance of issue after mitigation**

**32) Expropriation of properties**

The construction of the PWV17 will require the expropriation of a number of properties.

**Table 43: Significance of Issue 32 (Expropriation of properties) After Mitigation/ Addressing of the Issue**

Mitigation Possibilities	Mitigation	Significance of Issue after mitigation
High 🟢 Medium 😊 Low 🟡 Positive Impact/ Neutral - Not Necessary To Mitigate 🌟	Already achieved ✓  Must be implemented during Planning phase, Construction and/ or Operational phase	Low/ eliminated L / E  Medium M  High H

	<b>P / C / O</b> Mitigation	Not possible to mitigate, but not regarded as a fatal flaw <b>NP</b>
<b>Low</b> 🟡	<b>P</b> - The expropriation of properties must be finalised prior to the construction of the various phases of the road.	<b>M</b> - To be included in EMP

**Result:** Although issue can be mitigated, the significance of the impact should still be determined / confirmed and assessed in the Significance Rating Table

### 33) Impact on property values

Although the proposed road could have negative impacts on the property values in the short and medium term, there is a possibility that the long-term impact of the PWV17 Route will be positive.

**Table 44: Significance of Issue 33 (Impact on property values) After Mitigation/ Addressing of the Issue**

Mitigation Possibilities	Mitigation	Significance of Issue after mitigation
<b>High</b> 🟢 <b>Medium</b> 😊 <b>Low</b> 🟡 <b>Positive Impact/ Neutral - Not Necessary To Mitigate</b> ✨	Already achieved ✓  Must be implemented during <b>P</b> lanning phase, <b>C</b> onstruction and/ or <b>O</b> perational phase  <b>P / C / O</b> Mitigation	Low/ eliminated <b>L / E</b>  Medium <b>M</b>  High <b>H</b>  Not possible to mitigate, but not regarded as a fatal flaw <b>NP</b>
<b>Low</b> 🟡	<b>P</b> - The properties affected by the proposed alignment must	High <b>H</b>

	be taken into consideration during the planning phases.	
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**Result:** *This issue could be negative in the short term but could turn positive in the long term, the significance of the impact should be determined / confirmed and assessed in the Significance Rating Table*

### 34) Access to local roads and properties

The proposed road could have an impact on access to local roads and properties during the construction and operational phase.

Mitigation measures must be implemented to ensure access to local roads and properties during the construction phase. The design of the PWV17 must make provision for access to local roads and properties as well as future roads.

**Table 45: Significance of Issue 34 (Access to local roads and properties) After Mitigation/ Addressing of the Issue**

Mitigation Possibilities High 🟢 Medium 😊 Low 🟡 Positive Impact/ Neutral - Not Necessary To Mitigate ✨	Mitigation	Significance of Issue after mitigation
	Already achieved ✓ Must be implemented during Planning phase, Construction and/ or Operational phase <b>P / C / O</b> Mitigation	Low/ eliminated <b>L / E</b> Medium <b>M</b> High <b>H</b> Not possible to mitigate, but not regarded as a fatal flaw <b>NP</b>
<b>Medium</b> 😊	<b>P</b> - The design of the PWV17 must make provision for access to local roads and properties as well as	<b>M</b> - To be included in EMP

	<p>future roads.</p> <p><b>P/C</b> – Mitigation measures must be implemented to ensure access to local roads and properties. If access is restricted, alternative access/routes must be provided.</p>	<p><b>M</b> - To be included in EMP</p>
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**Result:** *Although issue can be mitigated, the significance of the impact should still be determined / confirmed and assessed in the Significance Rating Table*

### 35) Safety during construction

Mitigation measures must be in place to ensure the safety of surrounding residents and businesses, pedestrians, motorists etc.

**Table 46: Significance of Issue 35 (Safety during construction) After Mitigation/ Addressing of the Issue**

<p><b>Mitigation Possibilities</b></p> <p><b>High</b> 🟢 <b>Medium</b> 😊 <b>Low</b> 🟡</p> <p><b>Positive Impact/ Neutral - Not Necessary To Mitigate</b> ✨</p>	<p>Mitigation</p> <p>Already achieved ✓</p> <p>Must be implemented during <b>P</b>lanning phase, <b>C</b>onstruction and/ or <b>O</b>perational phase</p> <p><b>P / C / O</b> Mitigation</p>	<p>Significance of Issue after mitigation</p> <p>Low/ eliminated <b>L / E</b></p> <p>Medium <b>M</b></p> <p>High <b>H</b></p> <p>Not possible to mitigate, but not regarded as a fatal flaw <b>NP</b></p>
<p><b>Medium</b> 😊</p>	<p><b>C</b> - Although regarded as a normal practice, it is important</p>	<p><b>M</b> - To be included in EMP</p>

	<p>to erect proper signs indicating the construction activities and affected areas.</p> <p><b>C</b> - Although regarded as a normal practice, it is important to erect proper signs indicating the operations of heavy vehicles in the vicinity of dangerous crossings and access roads</p> <p><b>C</b> - With the exception of the appointed security personnel, no other workers, friend or relatives will be allowed to sleep on the construction site (weekends included)</p> <p><b>C</b> - Construction vehicles and activities to avoid peak hour traffic times</p> <p><b>C</b> - Surrounding residents must be informed of blasting exercises one week in advance.</p> <p>Blasting operations should be carefully controlled and the necessary safety precautions must be implemented.</p>	
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**Result:** *Although issue can be mitigated, the significance of the impact should still be determined / confirmed and assessed in the Significance Rating Table*

### **6.2.5 Public Participation and Other Social Aspects**

#### **6.2.6.1 Public Participation**

**(Refer to Annexure G for Public Participation)**

Public Participation is a cornerstone of any environmental impact assessment. The principles of the National Environment Management Act, 1998 (Act No. 107 of 1998)

govern many aspects of environmental impact assessments, including public participation. These include provision of sufficient and transparent information on an on-going basis to the stakeholders to allow them to comment and ensuring the participation of previously disadvantaged people, women and youth.

Effective public involvement is an essential component of many decision-making structures, and effective community involvement is the only way in which the power given to communities can be used efficiently. The public participation process is designed to provide sufficient and accessible information to interested and affected parties (I&APs) in an objective manner to assist them to:

- Raise issues of concern and suggestions for enhanced benefits.
- Verify that their issues have been captured.
- Verify that their issues have been considered by the technical investigations.
- Comment on the findings of the EIA.

In terms of the Guideline Document for Environmental Impact Assessment (EIA) Regulations promulgated in terms of the National Environmental Management Act (Act No.107 of 1998), stakeholders (I&APs) were notified of the Environmental Evaluation Process during the EIA Phase through:

- 1)** A site notice that was erected (at prominent points on and around the study area) on 23 March 2017 for the EIA Phase. **(Annexure G (i)).**
- 2)** An advertisement was placed in 'Die Beeld' newspaper on 23 March 2017 for the EIA Phase. **(Annexure G (ii)).**
- 3)** On 23 March 2017 public notices/ flyers were distributed via email to the registered I&APs by the proposed PWV17 Freeway **(Annexure G (iii)& (viii)).**
- 4)** A public meeting will still be held in the EIA Phase. **(Annexure G (vi)).**

- 5) The Revised Draft Scoping Report was available for review by I & APs, including City of Tshwane Local Municipality and DWS from 18 November 2016 – 3 February 2017. **(Refer to Annexure G (iii) & (viii)).**

#### **6.2.6.2 Social impact Assessment**

From a social, institutional and economic point of view, the implementation of the proposed PWV17 will have significant positive and negative impacts. The construction phase will most likely create high positive impacts in the short term such as employment and business opportunities, skills development and training, whereas negative impacts (such as traffic and pollution from construction vehicles) are low and can be mitigated.

The possibility of increased business and employment opportunities will remain during the operational phase of the PWV17 Freeway. The Freeway will provide a number of other positive impacts, particularly for the local community. The operation phase will result in aesthetic and health impacts since traffic volumes will increase and a loss of urban green spaces is expected. Traffic noise is expected to be low, whereas the visual impact may be higher but can be mitigated to a certain extent.

The most significant impacts are towards families of properties that will either need to be demolished or split by the PWV17. The impact is considered as permanent and unavoidable unless the proposed development does not occur. The loss of property has been cited by I&AP's as a major concern since many of the properties either contain businesses or are earmarked for improvement of current facilities. A form of remuneration will need to be discussed with affected homeowners to enable the families to move to alternative properties and to minimise economic losses.

Although Alternatives have been created for the proposed development, the social impacts are expected to be the same for each route. The possibility of these impacts



benefitting the local community in the long term is high and therefore the PWV17 Freeway is considered as an essential development.

Planning and mitigation is necessary to ensure positive impacts and to minimise the extent of negative impacts. Economic growth in the area will be expected, but it is recommended to maintain urban green spaces as far as possible. Consultation with owners of properties that may be demolished or split by the development is of utmost importance in order to minimise the impact as far as possible.

## **7 THE IDENTIFICATION OF THE IMPACTS ON THE BIOPHYSICAL AND SOCIO-ECONOMICAL ENVIRONMENTS (FROM KM 62 340 (PWV5) to KM 86 900 (JUST SOUTH OF THE N4)) - ON A MORE DETAILED/ SITE SPECIFIC BASIS AND A COMPARATIVE ASSESSMENT BETWEEN THE ALTERNATIVES AS IDENTIFIED IN CHAPTER 5 (ITEM 5.2) ABOVE**

**Take Note:** Bokamoso perused the information as received during the PP process and indicated whether the directly affected I&APs registered during the EIA process/ supplied comments during the EIA process up to date in the table below. Many I&APs registered and there is a possibility that we could have accidentally excluded I&APs that already registered and who supplied comments and we apologise for this. Please inform Bokamoso if we omitted you from our lists and PP documentation. We will gladly add you to the list and add & address your comments as part of the Final EIA.

### **7.1 FROM APPROXIMATELY KM 62 340 TO KM 65 000**

Table 47: Km 62 340 – Km 65 000

PWV 17 IDENTIFICATION OF THE MOST SIGNIFICANT ISSUES (ORIGINAL ALIGNMENT)					
SOUTH OF THE BRONBERG (EXCLUDING THE BRONBERG) (62000 KM – 78000 KM)					
Approximate 1 (one) kilometre intervals	Farm Portions effected by Proposed PWV 17	Comment/ Issue Identified	I&AP supplied comment/ Registered	Yes	No
62000 Km to 63000 Km					
	75/412	<u>Social/Economical:</u> The proposed road will transect through a large house.  <u>Agricultural/Economical:</u> The proposed road will transect through cultivated land.			No
	74/412	<u>Social/Economical:</u> The proposed road will transect through a large structure.  <u>Agricultural/Economical:</u> The proposed road will transect through cultivated land.			No
63000 km to 64000 km					
	74/412	<u>Agricultural:</u> The proposed road will cross through cultivated land.			No
	73/412	<u>Environmental:</u> The proposed road will transect through indigenous/natural vegetation.			No

	72/412	The proposed road will transect through indigenous/natural vegetation.			
	4/19	<u>Agricultural/Economical:</u> The proposed road will transect through cultivated land.			
	59/413	<u>Agricultural/Economical:</u> The proposed road will cross through cultivated land.	Luis de Costa - All Seasons Farm (Pty) Ltd Portion 75, 59 & 19 of the Farm Tweefontein 413 JR Only registered		
64000 km to 65000 km					
	59/413	<u>Agricultural/Economical:</u> The proposed road will cross through cultivated land. The proposed road will also transect through irrigation pivot points.  <u>Environmental:</u> A farm dam will be affected on this farm – the dam is located to the east of km 65 000  <u>Services/Main Access Road/ Servitudes</u> Eskom Power Line	Luis de Costa - All Seasons Farm (Pty) Ltd Portion 75, 59 & 19 of the Farm Tweefontein 413 JR Only registered		

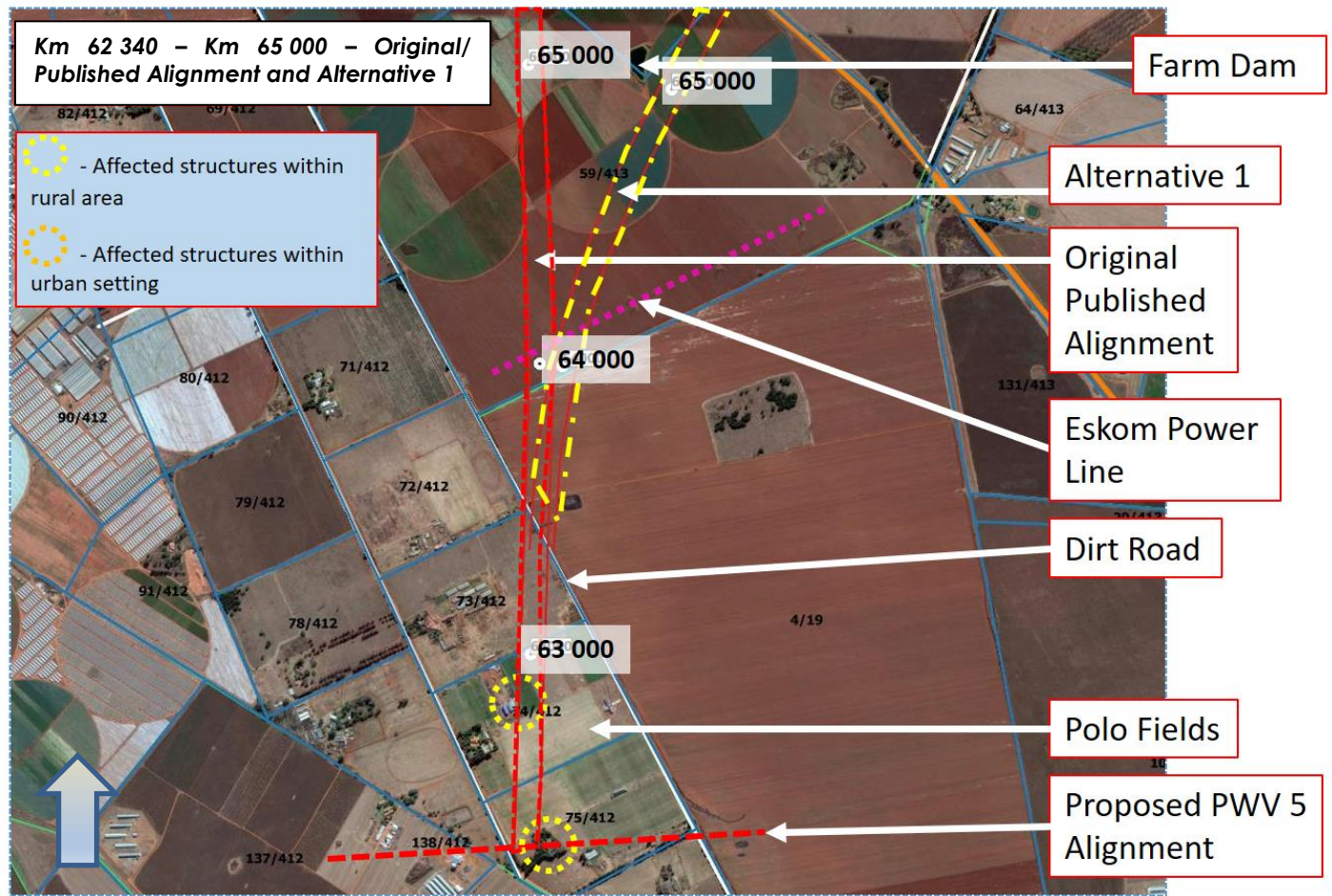


Figure 35: Km 62 340 – Km 65 000

7.1.1 Summary Most Significant Site-Specific Impacts Km 62 340 – Km 65 000 (Original/Published Alignment)

Table 48: Summary of Most Significant Site-Specific Impacts Km 62 340 – Km 65 000 (Original/Published Alignment)

Issue/ Impact	Traverse/ adjacent to feature identified	Area/ distance of impact/ number of structures to be demolished	Severity	Mitigation possibilities High- H, Medium – M, Low – L/ Apart from normal mitigation (i.e. erosion control etc.) Mitigation not specifically required (NSR)

<b>Summary Most Significant Impacts Km 62 340 – Km 65 000:</b>		
<b>Original Alignment</b>		
	<b>Number of structures/ distance/ area affected</b>	<b>Issue not addressed and mitigated under Chapter 6 above and must still be addressed</b>
- Natural areas affected	± 500m of land formerly cultivated	
- Very sensitive vegetation and flora % possible habitat for red data species		
- Red data species (fauna and flora)		
- Watercourses/ wetlands/ 1:100-year flood line areas affected		
- Geotechnical constraints (mainly associated with dolomitic land/ heave conditions/ blasting required)	Dolomitic	
- Steep slopes		
- Aesthetical Qualities and possible visual impacts	± Km 62 340 – 63 000 and impact on tranquil atmosphere of rural areas	Some screening will be required to mitigate visual and noise impacts between Km 62 340 and Km 63 000
- Accesses affected	X5	
- Services/ servitudes affected (i.e. Eskom servitude/ sewer lines)	Eskom line ± Km 64 100	
- Structures to be demolished	X2	Must be negotiated with land-owner
- Structures to remain but will be affected (i.e. visual, noise, economic	X 6 areas	

value)		
- Existing agricultural activities affected	± 1,6Km	Impacts to be discussed with land-owner
- Land previously cultivated and natural vegetation starting to re-establish	±500m	
- Land previously cultivated and no natural vegetation	± 600m soil preparation done	Impacts to be discussed with land-owner
- Possible conflict with planning policies/ frameworks etc.	Yes – Agricultural Hub	
- Social activities affected (i.e. recreational activities, conference venue, commercial, retail etc.)	Polo Fields	Impacts to be discussed with owner

### 7.1.2 Summary Most Significant Site-Specific Impacts Km 63 600 – Km 65 000 (Alternative 1)

**Table 49: Summary of Most Significant Site-Specific Impacts Km 63 600 – Km 65 000 (Alternative 1)**

Issue/ Impact	Traverse/ adjacent to feature identified	Area/ distance of impact/ number of structures to be demolished	Severity	Mitigation possibilities High- H, Medium – M, Low – L/ Apart from normal mitigation (i.e. erosion control etc.) Mitigation not specifically required (NSR)
<b>Summary Most Significant Impacts Km 63 600 – Km 65 000: Alternative 1</b>				
			<b>Number of structures/ distance/ area</b>	<b>Issue not addressed and mitigated</b>

	<b>affected</b>	<b>under Chapter 6 above and must still be addressed</b>
- Natural areas affected		
- Very sensitive vegetation and flora % possible habitat for red data species		
- Red data species (fauna and flora)		
- Watercourses/ wetlands/ 1:100-year flood line areas affected		
- Geotechnical constraints (mainly associated with dolomitic land/ heave conditions/ blasting required)	Dolomitic	
- Steep slopes		
- Aesthetical Qualities and possible visual impacts		
- Accesses affected		
- Services/ servitudes affected (i.e. Eskom servitude/ sewer lines)	Eskom line ± Km 64 100	<b>Yes</b>
- Structures to be demolished		
- Structures to remain but will be affected (i.e. visual, noise, economic value)		
- Existing agricultural activities affected	± 600m pivot points	<b>Yes,</b> but Impacts to be discussed with land-owner
- Land previously cultivated and natural vegetation starting to re-establish		
- Land previously cultivated and no natural vegetation	± 400m soil preparation done	<b>Yes,</b> but Impacts to be discussed with land-owner
- Possible conflict with planning policies/ frameworks etc.	Yes – Agricultural Hub	

- Social activities affected (i.e. recreational activities, conference venue, commercial, retail etc.)		
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## 7.2 FROM APPROXIMATELY KM 65 000 – KM 74 000

**Table 50: Km 65 000 – Km 74 000**

65000 km to 66000 km					
	<b>59/413</b>	<u>Agricultural/Economical:</u> The proposed road will traverse cultivated lands and at least x2 pivot points.	Luis de Costa - All Seasons Farm (Pty) Ltd Portion 75, 59 & 19 of the Farm Tweefontein 413 JR -Only registered		
	<b>75/413</b>	<u>Agricultural/Economical:</u> The proposed road will transect through cultivated land. The proposed road will also cross an irrigation pivot point.	Duncan Ellis – <a href="mailto:dmellis@mweb.co.za">dmellis@mweb.co.za</a> – On behalf of East Rand Polo Club Portion 75 of Portion 68. Only registered  Luis de Costa - All Seasons Farm (Pty) Ltd Portion 75, 59 & 19 of the Farm Tweefontein 413 JR -Only registered		
	<b>19/413</b>	<u>Agricultural/Economical:</u> The proposed road will transect through cultivated land. The proposed road will also cross an irrigation pivot point.	Luis de Costa - All Seasons Farm (Pty) Ltd Portion 75, 59 & 19 of the Farm Tweefontein 413 JR Only registered		
	<b>112/413</b>	<u>Agricultural/Economical:</u> The proposed road will transect through cultivated land.	Dries Venter – <del>Andries</del> Venter Trust Portion 112, 113 Tweefontein 413 JR Only registered		
66000 km to 67000 km					
	<b>113/413</b>	<u>Environmental:</u> The proposed road will cross indigenous/natural vegetation. From the aerial photograph, it is clear that the affected area was previously cultivated.	Dries Venter – <del>Andries</del> Venter Trust Portion 112, 113 Tweefontein 413 JR Only registered  Christiaan van der Vyver Portion 113 Tweefontein 413 JR Only registered		

		The proposed road will also require the removal of be large trees that form part of a boulevard adjacent to the affected farm roads.			
	<b>112/413</b>	<u>Agricultural/Economical:</u> The proposed road will transect through cultivated land.  <u>Environmental:</u> The proposed road will transect through indigenous/natural vegetation.	Dries Venter – <del>Andries</del> Venter Trust Portion 112, 113 Tweefontein 413 JR Only registered		
<b>67 000 km to 69 500 km</b>					
	<b>112/413</b>	<u>Agricultural/Economical:</u> Between Km66 100 and Km 76 700 the proposed freeway traverses agricultural.  <u>Environmental:</u> From approximately Km 67 800 to approximately Km 69 500 (Erf 3/394) the freeway traverses an area covered with natural vegetation (grassland characteristics)	Dries Venter – <del>Andries</del> Venter Trust Portion 112, 113 Tweefontein 413 JR Only registered		
	<b>5/394</b>	<u>Agricultural/Economical:</u> The proposed road will transect through cultivated land  <u>Environmental:</u>			
		The proposed road seems to transect through indigenous/natural vegetation.			

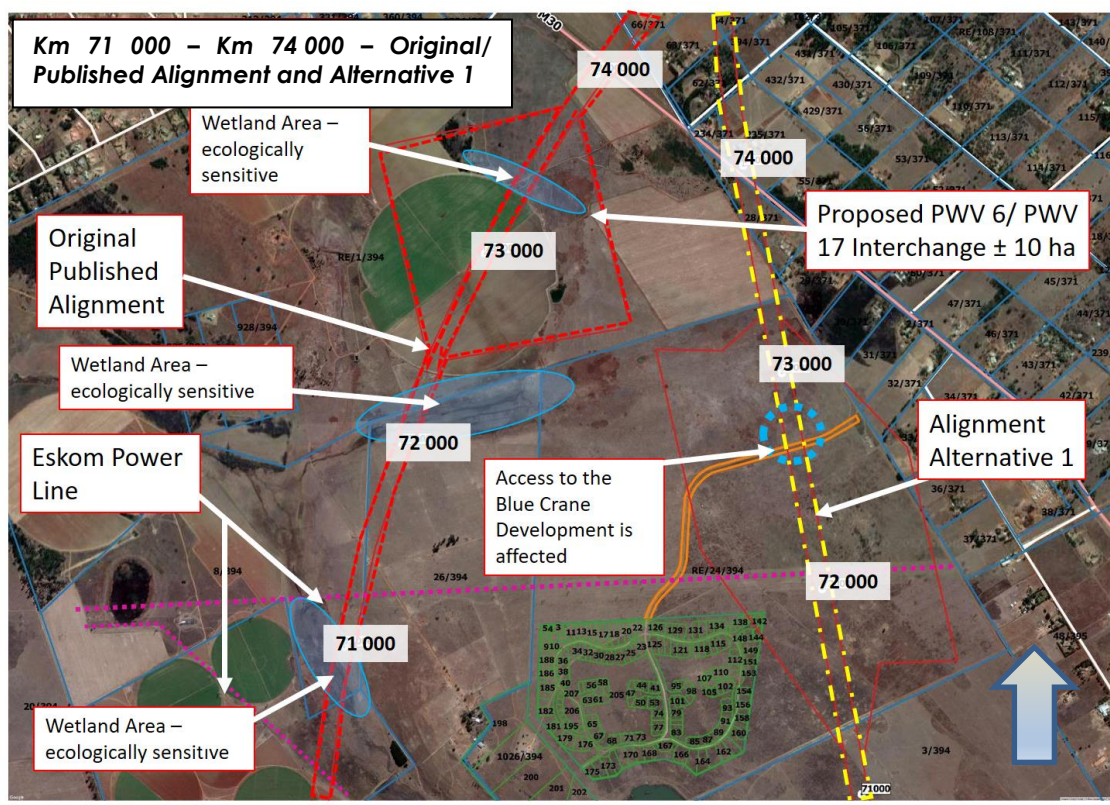


68000 km to 69000 km					
	5/394	<u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation.			
	3/394	<u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation.	Francois Viljoen – Sarie & Elita (Pty) Ltd Portion 3 Grootfontein 394 JR Only registered		
69000 km to 70000 km					
	3/394	<u>Agricultural/Economical:</u> From Km 69 500 to approximately Km 70 300 the freeway traverses cultivated lands, including x2 pivot points.  <u>Environmental:</u> Between Km 70 300 and Km 70 900 (Portion 25/394) the freeway traverses a wetland/ watercourse area which is regarded as ecologically sensitive.	Francois Viljoen – Sarie & Elita (Pty) Ltd Portion 3 Grootfontein 394 JR Only registered		
70000 km to 71000 km					
	3/394	<u>Agricultural/Economical:</u> From Km 69 500 to approximately Km 70 300 the	Francois Viljoen – Sarie & Elita (Pty) Ltd Portion 3 Grootfontein 394 JR		

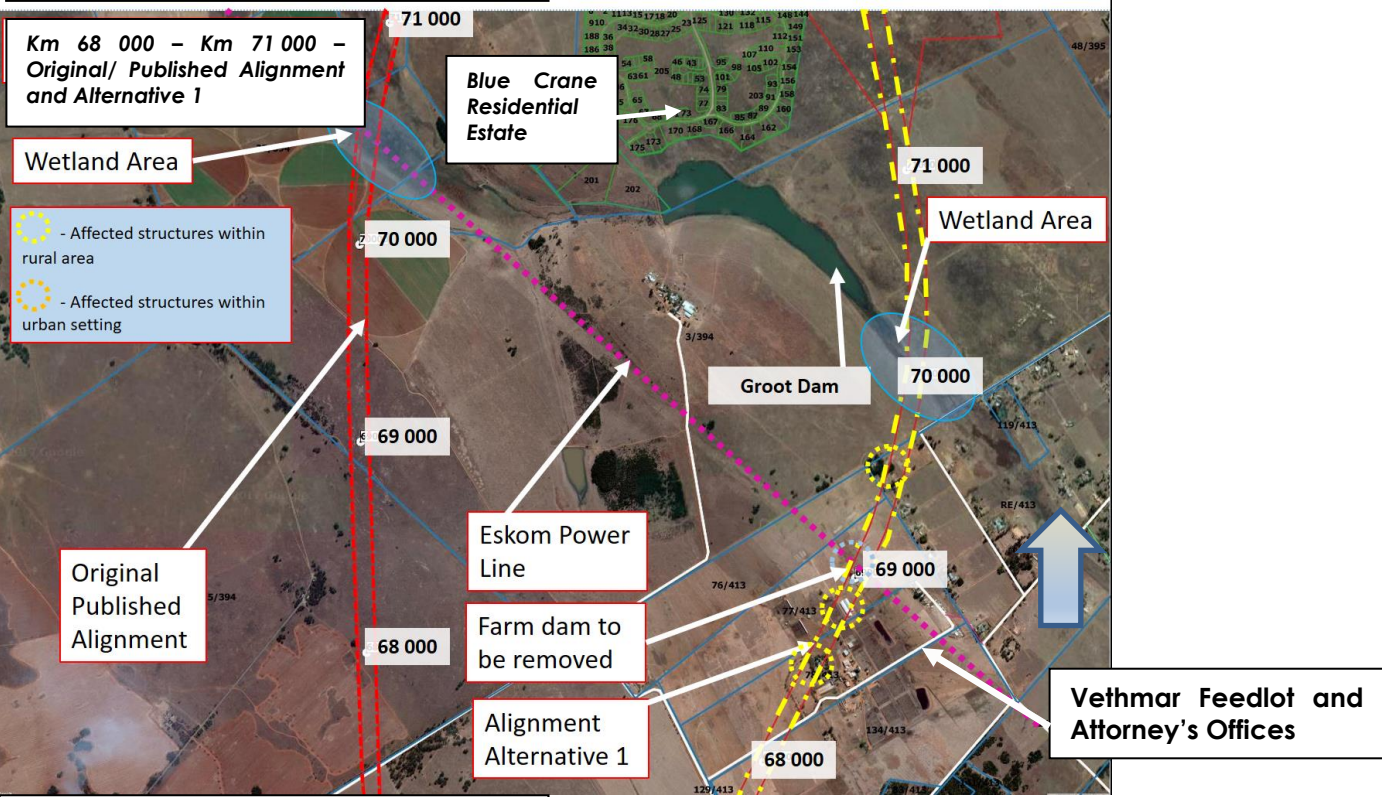
		freeway traverses cultivated lands, including x2 pivot points.  <u>Environmental:</u> Between Km 70 300 and Km 70 900 (Portion 25/394) the freeway traverses a wetland/ watercourse area which is regarded as ecologically sensitive.	Only registered		
	25/394	<u>Agricultural/Economical:</u> The proposed road seems to transect through cultivated land. The proposed road also seems to transect through an irrigation pivot point.  <u>Ecological:</u> Between Km 70 300 and Km 70 900 (Portion 25/394) the freeway traverses a wetland/ watercourse area which is regarded as ecologically sensitive.  <u>Services/Main Access Road/ Servitudes</u> Overhead Eskom Power Line at approximately Km 70 400	Hannes Erasmus – <a href="mailto:erasumat@netactive.co.za">erasumat@netactive.co.za</a> Portion 25 Grootfontein 394 JR Only registered		

	<b>8/394</b>	<u>Environmental:</u> The proposed road traverse indigenous/natural vegetation – between Km 70 900 and Km 72 000.	Conrad Wiehahn – <a href="mailto:Conrad@praticegroup.co.za">Conrad@praticegroup.co.za</a> Remainder of Portion 1 and 8 Grootfontein, 394 JR Only registered  Danie Erasmus – <a href="mailto:Erasmus1@mweb.co.za">Erasmus1@mweb.co.za</a> Portion 1, 8 and 11 Grootfontein, 394 JR Only registered		
<b>71000 km to 72000 km</b>					
	<b>8/394 &amp; 26/394</b>	<u>Ecological:</u> The proposed road seems to transect through indigenous/natural vegetation – between Km 70 900 and Km 72 000.  <u>Services/Main Access Road/ Servitudes</u> Overhead Eskom Power Line is affected at approximately Km 71 200	Conrad Wiehahn – <a href="mailto:Conrad@praticegroup.co.za">Conrad@praticegroup.co.za</a> Remainder of Portion 1 and 8 Grootfontein, 394 JR Only registered  Danie Erasmus – <a href="mailto:Erasmus1@mweb.co.za">Erasmus1@mweb.co.za</a> Portion 1, 8 and 11 Grootfontein, 394 JR Only registered		
	<b>26/394 &amp; Re/1/394</b>	<u>Agricultural/Economical:</u> Between Km 71 000 and 72 000 the road traverse formerly cultivated lands that are now covered with some natural vegetation.			

		<u>Ecological</u> A wetland/ watercourse area is crossed between Km 72 000 and Km 72 300			
<b>Km 72 000 to Km 73 500</b>					
	<b>26/394 &amp; Re/1/394</b>	<u>Agricultural/Economical:</u> Between Km 72 300 and approximately Km 73 300 the road traverses agricultural land and this area also includes a large pivot point currently in use.			
	<b>RE/1/394</b>	<u>Agricultural/Economical:</u> Between Km 72 300 and approximately Km 73 300 the road traverses agricultural land and this area also includes a large pivot point currently in use  <u>Ecological</u> A wetland/ watercourse area is crossed between Km 73 300 and Km 73 500	Peet Erasmus Portion 1 Grootfontein 394 JR Only registered		
<b>Km 73 500 km to Km 74 000</b>					
	<b>RE/1/394</b>	<u>Agricultural/Economical:</u>	Peet Erasmus Portion 1 Grootfontein 394 JR Only registered		

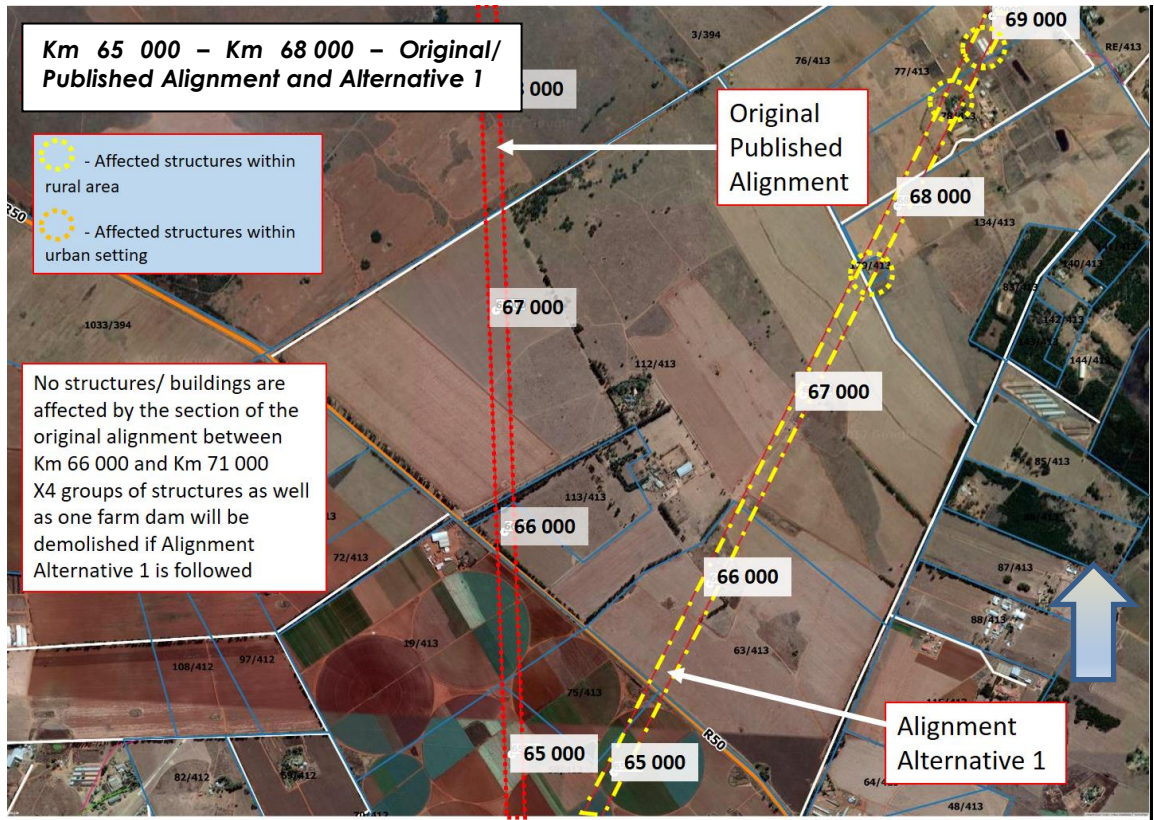


**Figure 36: Km 71 000 – 74 000**

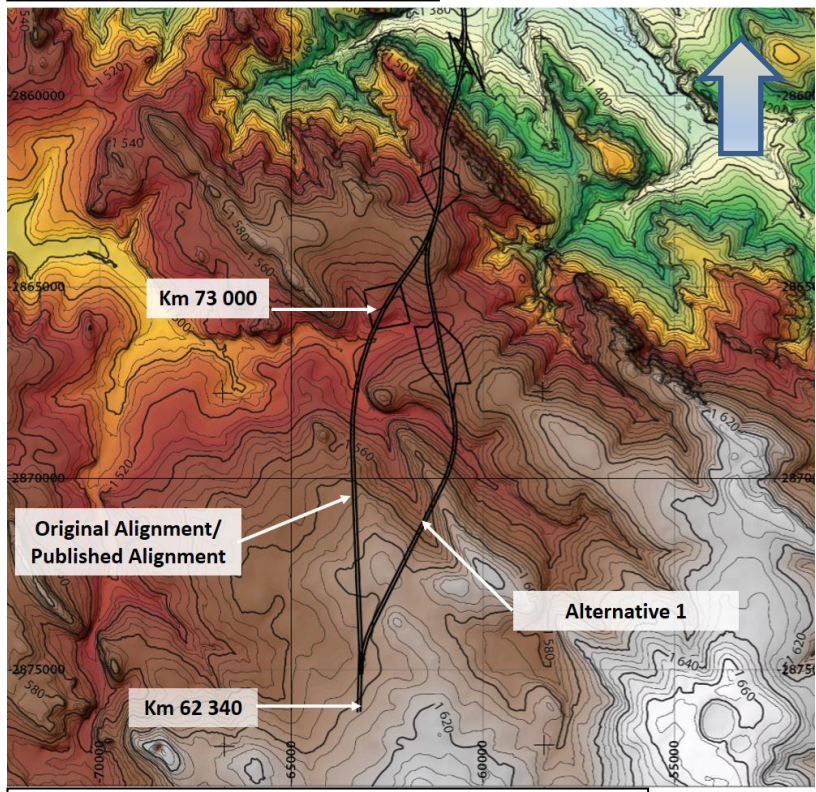


**Figure 37: Km 68 000 – Km 71 000**





**Figure 38: Km 65 000 – 68 000**



**Figure 39: Topography Km 62340 – Km 74 000**

### 7.2.1 Summary Most Significant Site-Specific Impacts Km 65 000 – Km 74 000

**Table 51: Summary of Most Significant Site-Specific Impacts Km 65 000 – Km 74 000 (Original Alignment/ Published Alignment)**

Issue/ Impact	Traverse/ adjacent to feature identified	Area/ distance of impact/ number of structures to be demolished	Severity	Mitigation possibilities High- H, Medium - M, Low - L/ Apart from normal mitigation (i.e. erosion control etc.) Mitigation not specifically required (NSR)
<b>Summary Most Significant Impacts Km 65 000 – Km 74 000:</b>				
			<b>Number of structures/ distance/ area affected</b>	<b>Issue not addressed and mitigated under Chapter 6 above and must still be addressed</b>
<ul style="list-style-type: none"> <li>- <b>Natural areas affected</b> <b>Grassland</b> – Mainly formerly disturbed by agricultural activities: Km 68 000 – Km 69 500, Km 71 200 – Km 72 000, Km 73 000 – Km 73 800</li> <li><b>Wetland / Watercourse Areas</b> Km 70 400 – Km 71 200, Km 72 000 – Km 72 250, Km 73 500 – Km 73 800</li> </ul>			± 3,1Km of land formerly cultivated ± 1,350 Km	
Very sensitive vegetation and flora and possible habitat for red data species: Km 70 400 – Km 71 200, Km 72 000 – Km 72 250, Km 73 500 – Km 73 800			<b>Yes,</b> wetland areas	
<ul style="list-style-type: none"> <li>- Red data species (fauna and flora)</li> </ul>			<b>Yes,</b> possible red data species in wetland areas	
<ul style="list-style-type: none"> <li>- Watercourses/ wetlands/ 1:100-year flood line areas affected</li> </ul>			<b>Yes</b>	

<ul style="list-style-type: none"> <li>- Geotechnical constraints (mainly associated with dolomitic land/ heave conditions/ blasting required) Area between Km 65 000 and approximately 73 500 is underlain by dolomite</li> </ul>	<p><b>Yes Dolomitic</b></p>	
<ul style="list-style-type: none"> <li>- Steep slopes</li> </ul>	<p><b>Yes</b> – a ridge is situated to the immediate east of ± Km 71 000, but the freeway is aligned to avoid the ridge – the proposed freeway will have an impact on the views as experienced from the ridge= farm houses and other structures are situated on the ridge and will have a negative impact on “Sense of Place” and tranquil atmosphere</p>	
<ul style="list-style-type: none"> <li>- Aesthetical Qualities and possible visual impacts</li> </ul>	<p>Impact on tranquil atmosphere of rural areas, especially where the freeway is aligned in close proximity of existing structures and in close proximity of the ridge and across watercourses</p>	
<ul style="list-style-type: none"> <li>- Accesses affected</li> </ul>	<p>X6 internal farm roads</p>	

Km 66 500, Km 69 500, Km 70 100, Km 71 500, Km 72 200, Km 73 500	affected	
- Services/ servitudes affected (i.e. Eskom servitude/ sewer lines)	Eskom lines $\pm$ Km 70 400 and $\pm$ Km 71 200	
- Structures to be demolished	None	
- Structures to remain but will be affected (i.e. visual, noise, economic value)	Structures Theron Boerdery – just west of Km 66 000 – along Delmas Road	
- Existing agricultural activities affected	Approximately 5,5 Km	Impacts to be discussed with land-owner/ farmer
- Land previously cultivated and natural vegetation starting to re-establish	$\pm$ 4 Km	
- Land previously cultivated and no natural vegetation	$\pm$ 2 Km soil preparation done	Impacts to be discussed with land-owner
- Possible conflict with planning policies/ frameworks etc.	Yes – Agricultural Hub & Ridges Policy, but freeway aligned to avoid the ridge	

**Table 52: Summary of Most Significant Site-Specific Impacts Km 65 000 – Km 74 000 (Alternative 1)**

Issue/ Impact	Traverse/ adjacent to feature identified	Area/ distance of impact/ number of structures to be demolished	Severity	Mitigation possibilities High- H, Medium – M, Low – L/ Apart from normal mitigation (i.e. erosion control etc.) Mitigation not specifically

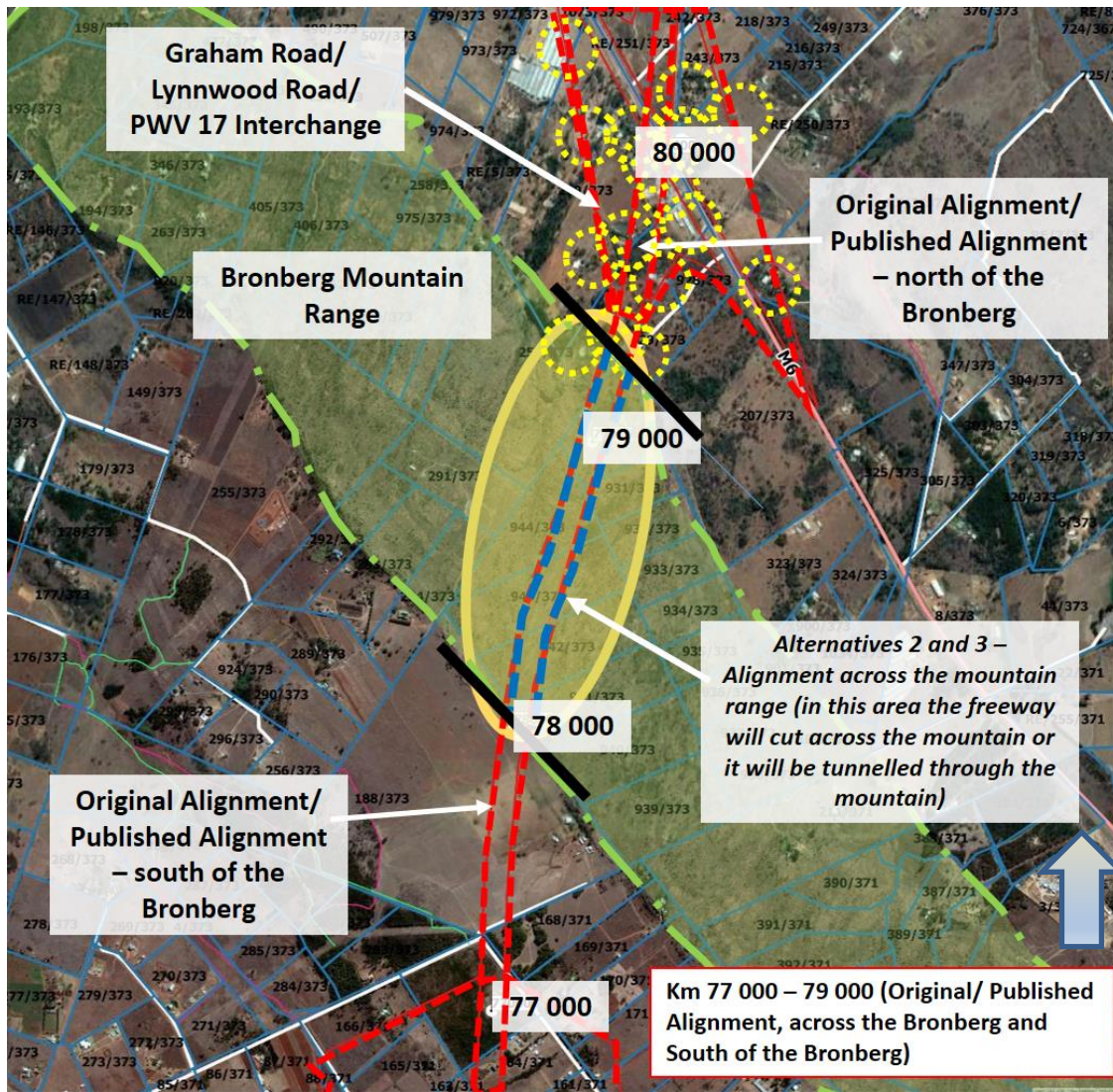
			required (NSR)
<b>Summary Most Significant Impacts Km 65 000 – Km 74 000:</b>			
	<b>Number of structures/ distance/ area affected</b>	<b>Issue not addressed and mitigated under Chapter 6 above and must still be addressed</b>	
<ul style="list-style-type: none"> <li>- <b>Natural areas affected</b> <b>Grassland</b> – Mainly formerly disturbed by agricultural activities: Km 70 000 - Km 73 200</li> <li><b>Wetland / Watercourse Areas</b> <b>Km 69 800 – Km 70 100</b></li> </ul>	<p>± 3,6Km of land formerly cultivated</p> <p>± 300m</p>		
Very sensitive vegetation and flora and possible habitat for red data species: Km 69 800 – Km 70 100 and to the immediate north and south of this watercourse crossing in the grassland areas (approximately Km 70 00 – Km 73 000). Red data mammals recorded on Blue Crane development site in grassland areas.	<b>Yes</b> , wetland areas and grassland areas as habitat connected to grassland		
<ul style="list-style-type: none"> <li>- Red data species (fauna and flora)</li> </ul>	<b>Yes</b> , possible red data species in wetland areas		
<ul style="list-style-type: none"> <li>- Watercourses/ wetlands/ 1:100-year flood line areas affected</li> </ul>	<b>Yes</b>		
<ul style="list-style-type: none"> <li>- Geotechnical constraints (mainly associated with dolomitic land/ heave conditions/ blasting required) Area between Km 65 000 and approximately 73 500 is underlain by dolomite</li> </ul>	<b>Yes Dolomitic</b>		
<ul style="list-style-type: none"> <li>- Steep slopes</li> </ul>			
<ul style="list-style-type: none"> <li>- Aesthetical Qualities and possible visual impacts</li> </ul>	Impact on tranquil atmosphere of rural areas, especially where the freeway is aligned in close		



	proximity of existing structures and in close proximity of the ridge and across watercourses	
- Accesses affected Vethmar Feedlots – main impact between approximately Km 68 000 and Km 69 000 Access road of the Blue Crane development between Km 72 000 and Km 73 000 – regarded as major issue by developer and confirmed that they went through a full EIA Process and Town Planning application process to obtain the land-use rights – construction already commenced	X8 internal farm roads and access roads affected	
- Services/ servitudes affected (i.e. Eskom servitude/ sewer lines)	Eskom lines ± Km 69 000 and Km 72 000	
- Structures to be demolished	X6, including x1 dam on the Vethmar Farm	
- Structures to remain but will be affected (i.e. visual, noise, economic value) Between Km 69 000 and Km 70 000 (Bashewa Agricultural Holdings and Vethmar Feedlot) – mainly to the east of the freeway Between 71 000 and Km 74 000 – Bashewa Agricultural Holdings and the Tierpoort Agricultural Holdings – many properties affected, major socio-economical impact – to the east and west of the freeway	Many houses and other structures associated with houses and other uses will be affected by the portion of the freeway between Km 69 000 and Km 74 000	
- Existing agricultural activities affected	Approximately 7,5 Km	Impacts to be discussed with land-owners/farmers
- Land previously cultivated and natural vegetation starting to re-establish	± 3,6Km	
- Land previously cultivated and no natural vegetation	± 1Km	Impacts to be discussed with land-

		owner
- Possible conflict with planning policies/ frameworks etc.	Yes – Agricultural Hub & Ridges Policy, but freeway aligned to avoid the ridge	

**7.3 FROM APPROXIMATELY KM 74 000 – KM 79 000**



**Figure 40: Km 77 000 – Km 79 000**



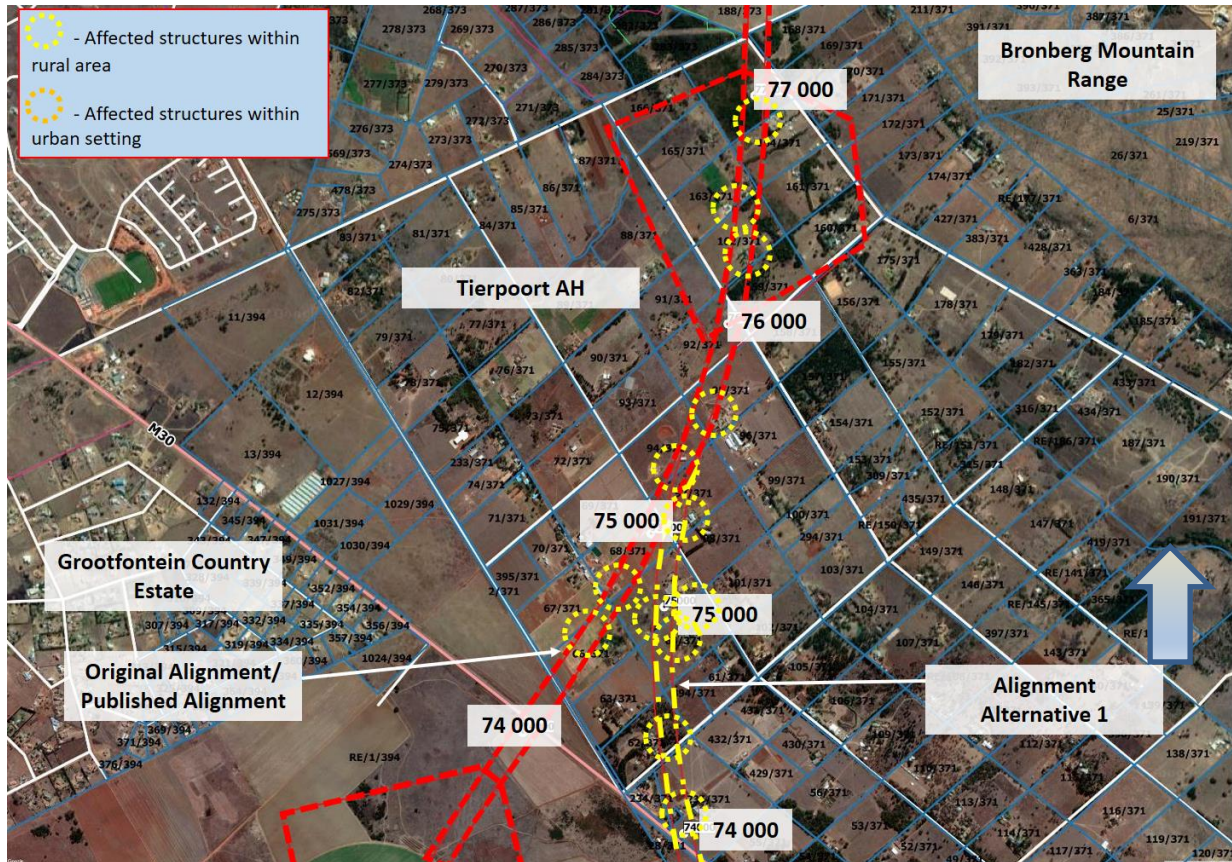


Figure 41: Km 74 000 – Km 77 000

Table 53: Km 74 000 – Km 79 000

74000 km to 75000 km					
	RE/1/394	<u>Agricultural/Economical:</u> The proposed road seems to transect through cultivated	Peet Erasmus Portion 1 Grootfontein 394 JR Only registered		

		land. <u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation.			
	66/371	<u>Social/Economical:</u> The proposed road's footprint seems to transect through a large part of the farm portion. The proposed road also seems to be transecting through a structure/building.  <u>Agricultural/Economical:</u> The proposed road seems to transect through cultivated land.  <u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation.			
	67/371	<u>Social/Economical:</u> The proposed road also seems to be transecting through a structure/building.			

		<u>Agricultural/Economical:</u> The proposed road seems to transect through cultivated land.  <u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation.			
	65/371	<u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation.			
	68/371	<u>Social/Economical:</u> The proposed road also seems to be transecting through a structure/building. The proposed also seems to transect through several commercial activities. The proposed road's footprint seems to transect through a large part of the farm portion.  <u>Agricultural/Economical:</u> The proposed road seems to transect through semi-cultivated land.			

		<p><u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation.</p>			
<b>75000 km to 76000 km</b>					
	68/371	<p><u>Agricultural/Economical:</u> The proposed road seems to transect through semi-cultivated land.</p> <p><u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation.</p>			
	97/371	<p><u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation.</p>			
	94/371	<p><u>Social/Economical:</u> The proposed road also seems to be transecting through a structure/building.</p> <p><u>Environmental:</u> The proposed road seems to</p>	Ilane Huyser – Metropolitan Town Planners and Urban Designers Portion 94 Tiegervoorst 371 JR Only registered		
		transect through indigenous/natural vegetation.			
	95/371	<p><u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation.</p>	Lucy Ramasodi Plot 95 Tiegervoorst 371 JR Only registered		
	92/371	<p><u>Social/Economical:</u> The proposed road's footprint seems to transect through a large part of the farm portion.</p> <p><u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation.</p>			
<b>76000 km to 77000 km</b>					
	92/371	<p><u>Social/Economical:</u> The proposed road also seems to be transecting through several structures/buildings.</p> <p><u>Environmental:</u> The proposed road seems to transect through indigenous/natural</p>			

	<b>159/371</b>	vegetation. <u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed road also seems to transect through a woodland area.	Barry Joubert – <a href="mailto:barry@businessure.co.za">barry@businessure.co.za</a> Plot 59 Tjegerpoort 371 JR Only registered		
	<b>162/371</b>	<u>Social/Economical:</u> The proposed road also seems to be transecting through several structures/buildings including a large house. The proposed road's footprint seems to transect through a large part of the farm portion.  <u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed road seems to transect through two small woodland areas.	Melissa Lintvelt – <a href="mailto:lintveltlegal@teikomsa.net">lintveltlegal@teikomsa.net</a> Portion 162 Tjegerpoort 371 JR Only registered		
	<b>163/371</b>	<u>Social/Economical:</u> The proposed road also seems to be transecting through several			

		structures/buildings.  <u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation.			
	<b>161/371</b>	<u>Environmental:</u> The proposed road seems to transect through a very small portion of the property's indigenous/natural vegetation.	Carl Dietzsch – <a href="mailto:Carl.dietzsch@gmail.com">Carl.dietzsch@gmail.com</a> – Abriga 3900 NPC Portion 61 (a portion of Portion 2) of the Farm Tjegerpoort 371 JR Only registered		
	<b>164/371</b>	<u>Social/Economical:</u> The proposed road also seems to be transecting through several structures/buildings.  <u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation.	Mandre Nortje – <a href="mailto:mn@hydramark.co.za">mn@hydramark.co.za</a> Plot 164 Tjegerpoort 371 JR Only registered		
	<b>167/371</b>	<u>Social/Economical:</u> The proposed road's footprint seems to cover a large portion of the property.			

		<u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed road seems to transect through a large woodland area.			
	158/371	<u>Agricultural/Economical:</u> The proposed road seems to transect through cultivated land.  <u>Environmental:</u> The proposed road seems to transect through a small portion of the property's indigenous/natural vegetation.			
	156/371	<u>Social/Economical:</u> The proposed road also seems to be transecting through several structures/buildings.  <u>Environmental:</u> The proposed road seems to transect through a small portion of the property's indigenous/natural	<del>Etienne Stieger</del> <a href="mailto:Etienne.Stieger@standardbank.co.za">Etienne.Stieger@standardbank.co.za</a> <del>ZA</del> Portion 156, Tiegervpoort 371 JR Only registered		
		vegetation. The proposed road will also transect through several medium to large trees.			
	160/371	<u>Social/Economical:</u> The proposed road may transect through several structures/buildings.  <u>Environmental:</u> The proposed road seems to transect through a small portion of the property's indigenous/natural vegetation. The proposed road will also transect through several medium to large trees.	Pieter de Jager – <a href="mailto:pieter@imperfectperfection.co.za">pieter@imperfectperfection.co.za</a> Plot 160 Cheetah Street Only registered  <del>LEDA</del> Plot 160 Tiegervpoort 371 JR Only registered		
	175/371	<u>Social/Economical:</u> The proposed road may transect through several structures/buildings.  <u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed road will also transect through several medium to	Danie Crouse <del>Tiegervpoort</del> The map is unclear. I spent million on a wedding venue which includes a restaurant, chapel and rooms, it is imperative for me to know what the impact would be. Approval had been received and before long we will commence with construction.		



	173/371	<p>large trees. <b>DAMS</b></p> <p><u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation.</p>	<p>Brian Hayes – <a href="mailto:brian@shangoni.co.za">brian@shangoni.co.za</a> Plot 173 Tjegerpoort 371 JR Only registered and concerned if everybody was notified.</p> <p>Janel Hayes Plot 173 Tjegerpoort Should the application for this activity not be lodged with the Department of Mineral Resources? Please supply the extent of the borrow pits and locations thereof to assess any further listed activities that might be triggered. The quality of maps <u>are</u> poor. Will affect ecologically sensitive areas. Social and economic development must be justifiable. There are therefore specific "trade-off rules that apply". Disregarding the environmental integrity. The alternatives included in the DSR does not recognise the sensitive ecological area. Will put pressure on the roads in the network and the system will not function as originally planned. The EIA clearly</p>		
			<p>needs to take into consideration the recommendations made by specialist. Please supply reasons why portion 171 and 172 of Tjegerpoort, 371 is not affected by the freeway and off-ramp, but 173 is listed as affected (page 62). The public participation process are detailed is flawed.</p>		
	172/371	<p><u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation.</p>			
	171/371	<p><u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation.</p>			
	170/371	<p><u>Social/Economical:</u> The proposed road may transect through several structures/buildings.</p> <p><u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation.</p>			
	169/371	<p><u>Environmental:</u></p>			



		The proposed road seems to transect through indigenous/natural vegetation.			
	91/371	<u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation.	Susan Kotze – <a href="mailto:Susan.Kotze33@gmail.com">Susan.Kotze33@gmail.com</a> Portion 91 Tjegerpoort 371 JR Only registered		
	88/371	<u>Social/Economical:</u> The proposed road may transect through several structures/buildings.  <u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation.			
	87/371	<u>Agricultural/Economical:</u> The proposed road seems to transect through cultivated land.  <u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation.	Mark Hill – <a href="mailto:smurfyhill@gmail.com">smurfyhill@gmail.com</a> Plot 87 Tjegerpoort 371 JR Only registered		
	165/371	<u>Social/Economical:</u>	Connie Jonker –		
		The proposed road may transect through several structures/buildings.  <u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation.	<a href="mailto:Connie.jonker@gmail.com">Connie.jonker@gmail.com</a> Plot 165 Tjegerpoort 371 JR Only registered		
	166/371	<u>Social/Economical:</u> The proposed road may transect through several structures/buildings including houses. The proposed road's footprint seems to transect through a large part of the farm portion  <u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed road will transect through several medium to large trees.	Marinus Lindhout – <a href="mailto:Marinus.lindhout@sabs.co.za">Marinus.lindhout@sabs.co.za</a> Plot 93 and Plot 166 Tjegerpoort 371 JR Only registered		
77000 km to 78000 km					
	167/371	<u>Social/Economic:</u> The proposed road also			

		seems to be transecting through several structures/buildings including a house. The proposed road's footprint seems to transect through a large part of the farm portion.  <u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed road seems to transect through a large woodland area.			
	168/371	<u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed road seems to transect through a woodland area.	Gitte Theron – <a href="mailto:gittet@vodamail.co.za">gittet@vodamail.co.za</a> Plot 168 <del>Tegernpoort</del> 371 JR Only registered		
	188/373	<u>Agricultural/Economical:</u> The proposed road seems to transect through cultivated land. Organic Farm – high economical value  <u>Environmental:</u>	Danie Schutte – <a href="mailto:danie@bronbergorganic.co.za">danie@bronbergorganic.co.za</a> Plot 188 <del>Zwavelpoort</del> Only registered		

		The proposed road seems to transect through indigenous/natural vegetation.			
<b>NORTH OF THE BRONBERG (INCLUDING THE BRONBERG) (78000 KM – 89000 KM) ALSO REFER TO FIGURES ? - ?</b>					
78000 km to 79000 km					
	188/373	<u>Agricultural/Economical:</u> The proposed road seems to transect through cultivated land. Organic Farm  <u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation.	Danie Schutte – <a href="mailto:danie@bronbergorganic.co.za">danie@bronbergorganic.co.za</a> Plot 188 <del>Zwavelpoort</del> Only registered		
	941/373	<del>Bronberg</del> <u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation.			
	942/373	<del>Bronberg</del> <u>Environmental:</u> The proposed road seems to transect through indigenous/natural			

		vegetation.			
	943/373	<u>Bronberg</u> <u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation.			
	944/373	<u>Bronberg</u> <u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation.			
	931/373	<u>Bronberg</u> <u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation.			
	930/373	<u>Bronberg</u> <u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. There is also a nearby water source/dam on the Farm Portion.			
79000 km to 80000 km					
	930/373	<u>Social/Economic:</u>			
		The proposed road also seems to be transecting through several structures/buildings including a house. The proposed road's footprint seems to transect through a large part of the farm portion.			
	257/373	<u>Social/Economic:</u> The proposed road also seems to be transecting through several structures/buildings including a house.  <u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed road transects through several medium to large trees.			

	<b>929/373</b>	<u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation.			
	<b>299/373</b>	<u>Social/Economic:</u> The proposed road also seems to be transecting through several structures/buildings including a house. The proposed road may also transect through several commercial structures.  <u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation.	Andre Botha Portion 299 <del>Zwaveloort</del> 373 JR Only registered		
	<b>928/373</b>	<u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed road will transect through a woodland area.			
	<b>207/373</b>	<u>Environmental:</u> The proposed road seems to transect through	Piet <del>Calyn</del> Portion 207 <del>Zwaveloort</del> 373 JR Only registered		
		indigenous/natural vegetation. The proposed road will transect through a woodland area.			
	<b>RE/3/373</b>	<u>Social/Economic:</u> The proposed road also seems to be transecting through several structures/buildings. The proposed road may also transect through several commercial structures.  <u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed road transect over a water source/dam.]			
	<b>RE/250/373</b>	<u>Social/Economic:</u> The proposed road also seems to be transecting through several structures/buildings including houses. The proposed road may also transect through several commercial structures.	Danie Viljoen Remainder of Portion 250 <del>Zwaveloort</del> Only registered		

		Environmental: The proposed road seems to transect through indigenous/natural vegetation. The proposed road transects through several medium to large trees.			
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### 7.3.1 Summary Most Significant Site-Specific Impacts Km 74 000 – Km 75 000 (Where Original Alignment and Alternative 1 merges)

**Table 54: Summary of Most Significant Site-Specific Impacts Km 74 000 – Km 75 000 (Original Alignment/ Published Alignment)**

Issue/ Impact	Traverse/ adjacent to feature identified	Area/ distance of impact/ number of structures to be demolished	Severity	Mitigation possibilities  High- H, Medium – M, Low – L/ Apart from normal mitigation (i.e. erosion control etc.) Mitigation not specifically required (NSR)
<b>Summary Most Significant Impacts Km 74 000 – Km 75 000:</b>				
			<b>Number of structures/ distance/ area affected</b>	<b>Issue not addressed and mitigated under Chapter 6 above and must still be addressed</b>
- <b>Natural areas affected</b> <b>Grassland</b> – Not regarded as ecologically sensitive <b>Wetland / Watercourse Areas</b> None			± 500m	
Very sensitive vegetation and flora and possible habitat for red data species:				
- Red data species (fauna and flora)				
- Watercourses/ wetlands/ 1:100-year flood line areas affected				

- Geotechnical constraints (mainly associated with dolomitic land/ heave conditions/ blasting required)		
- Steep slopes		
- Aesthetical qualities and possible visual impacts	Significant impact on tranquil atmosphere of agricultural holdings	
- Accesses affected		
- Services/ servitudes affected (i.e. Eskom servitude/ sewer lines)		
- Structures to be demolished	X1	
- Structures to remain but will be affected (i.e. visual, noise, economic value)	X2	
- Existing agricultural activities affected	± 600m	Impacts to be discussed with land-owner/ farmer
- Land previously cultivated and natural vegetation starting to re-establish	± 300m	
- Land previously cultivated and no natural vegetation	± 400m soil preparation done	Impacts to be discussed with land-owner
- Possible conflict with planning policies/ frameworks etc.		

**Table 55: Summary of Most Significant Site-Specific Impacts Km 74 000 – Km 75 000 (Alternative 1)**

Issue/ Impact	Traverse/ adjacent to feature identified	Area/ distance of impact/ number of structures to be demolished	Severity	Mitigation possibilities High- H, Medium – M, Low – L/ Apart from normal mitigation (i.e. erosion control etc.)

			Mitigation not specifically required (NSR)
<b>Summary Most Significant Impacts Km 74 000 – Km 75 000:</b>			
		<b>Number of structures/ distance/ area affected</b>	<b>Issue not addressed and mitigated under Chapter 6 above and must still be addressed</b>
<ul style="list-style-type: none"> <li>- <b>Natural areas affected</b> <b>Grassland</b> – Mainly formerly disturbed by agricultural activities: Not regarded as sensitive</li> <li>- <b>Wetland / Watercourse Areas</b> None</li> </ul>		± 700m  ± 300m	
Very sensitive vegetation and flora and possible habitat for red data species:			
- Red data species (fauna and flora)			
- Watercourses/ wetlands/ 1:100-year flood line areas affected			
- Geotechnical constraints (mainly associated with dolomitic land/ heave conditions/ blasting required) Area between Km 65 000 and approximately 73 500 is underlain by dolomite			
- Steep slopes			
- Aesthetical Qualities and possible visual impacts		Significant impact on tranquil atmosphere of agricultural holdings	
- Accesses affected		X3	
- Services/ servitudes affected (i.e. Eskom servitude/ sewer lines)			
- Structures to be demolished		±5	

- Structures to remain but will be affected (i.e. visual, noise, economic value) Various structures at Km 74 200 and at Km 74 800	Houses and other structures associated with houses	
- Existing agricultural activities affected	± 400m	Impacts to be discussed with land-owners/farmers
- Land previously cultivated and natural vegetation starting to re-establish	± 300m	
- Land previously cultivated and no natural vegetation	± 50m	Impacts to be discussed with land-owner
- Possible conflict with planning policies/ frameworks etc.		

### 7.3.2 Summary Most Significant Site-Specific Impacts Km 75 000 – Km 80 000

**Table 56: Summary of Most Significant Site-Specific Impacts Km 75 000 – Km 80 000 (Published Alignment)**

Issue/ Impact	Traverse/ adjacent to feature identified	Area/ distance of impact/ number of structures to be demolished	Severity	Mitigation possibilities High- H, Medium – M, Low – L/ Apart from normal mitigation (i.e. erosion control etc.) Mitigation not specifically required (NSR)
<b>Summary Most Significant Impacts Km 75 000 – Km 80 000:</b>				
			Number of structures/ distance/ area affected	Issue not addressed and mitigated under Chapter 6 above and



		<b>must still be addressed</b>
<ul style="list-style-type: none"> <li>- <b>Natural areas affected</b> <b>Grassland</b> – Mainly formerly disturbed by agricultural activities: Not regarded as sensitive  Bronberg – Very sensitive natural area – between ± Km 78 000 and 79 000</li> <li>- <b>Wetland / Watercourse Areas</b> A man-made channel at approximately Km 77 800 (on organic farm)</li> </ul>	± 3,5Km – also includes a woodland at approximately Km 76 800 – Km 77 000	
Very sensitive vegetation and flora and possible habitat for red data species:	<b>Yes</b> – Bronberg	
<ul style="list-style-type: none"> <li>- Red data species (fauna and flora)</li> </ul>	<b>Yes</b> – Habitat exists – none confirm during site visit, according to mammal specialist he did not identify any Juliana Golden Mole on this section of the mountain	
<ul style="list-style-type: none"> <li>- Watercourses/ wetlands/ 1:100-year flood line areas affected</li> </ul>		
<ul style="list-style-type: none"> <li>- Geotechnical constraints (mainly associated with dolomitic land/ heave conditions/ blasting required)</li> </ul>	Ridge area- some blasting will be required for tunnelling and for road across mountain	
<ul style="list-style-type: none"> <li>- Steep slopes</li> </ul>	Yes – some major cut and fill exercises required	
<ul style="list-style-type: none"> <li>- Aesthetical Qualities and possible visual impacts</li> </ul>	Significant impact on tranquil atmosphere	

	and views towards the mountain and from the mountain	
- Accesses affected	± 15	
- Services/ servitudes affected (i.e. Eskom servitude/ sewer lines)		
- Structures to be demolished	± 17	
- Structures to remain but will be affected (i.e. visual, noise, economic value)	More than 45	
- Existing agricultural activities affected Will have a significant impact on the organic farm between approximately Km 77 300 and Km 78 000	± 900m	Impacts to be discussed with land-owners/ farmers
- Land previously cultivated and natural vegetation starting to re-establish		
- Land previously cultivated and no natural vegetation		

#### **7.4 FROM APPROXIMATELY KM 80 000 – ±KM 86 900 (End of Section of Freeway applied for in this EIA Application)**

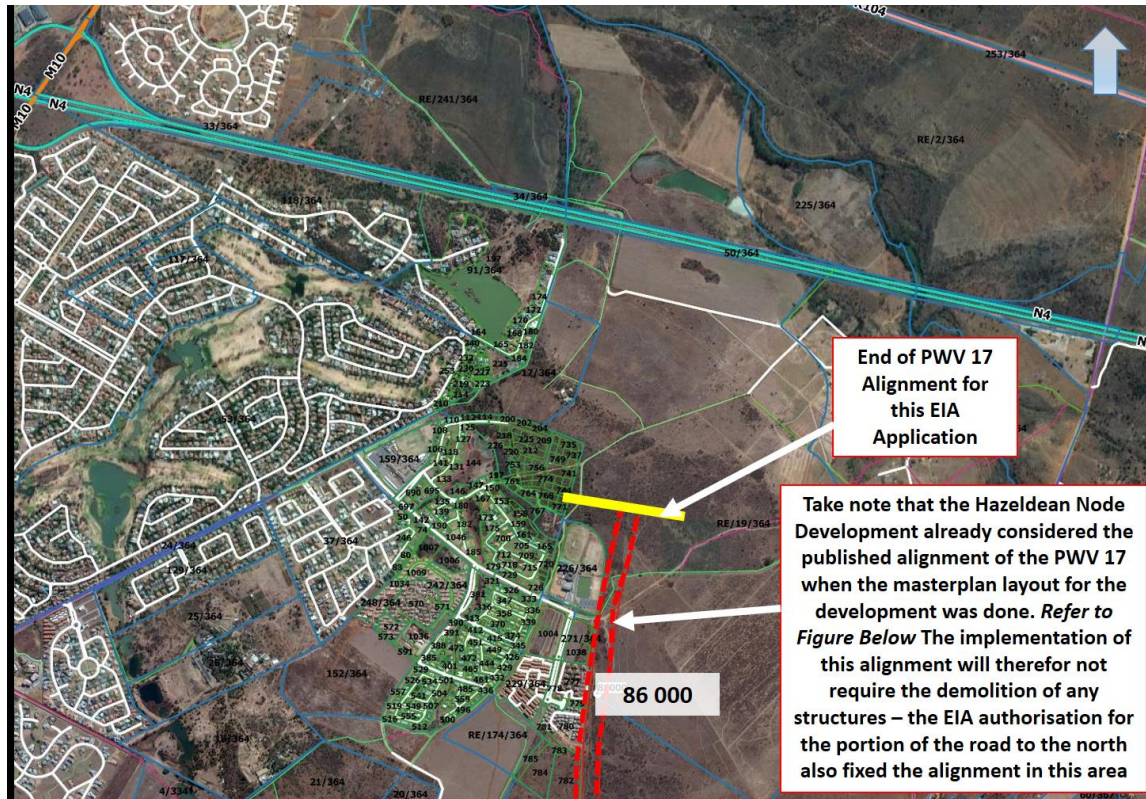
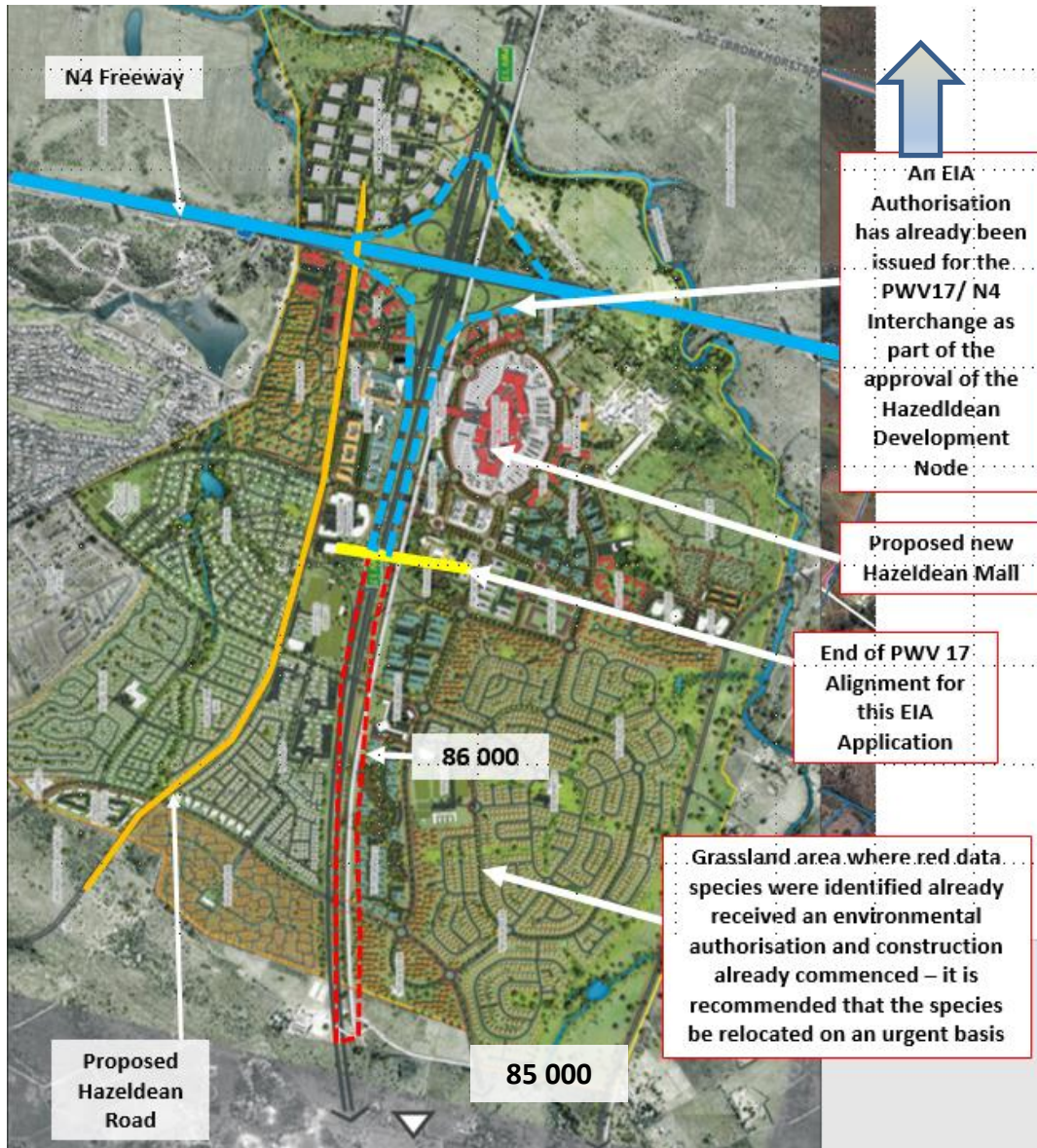
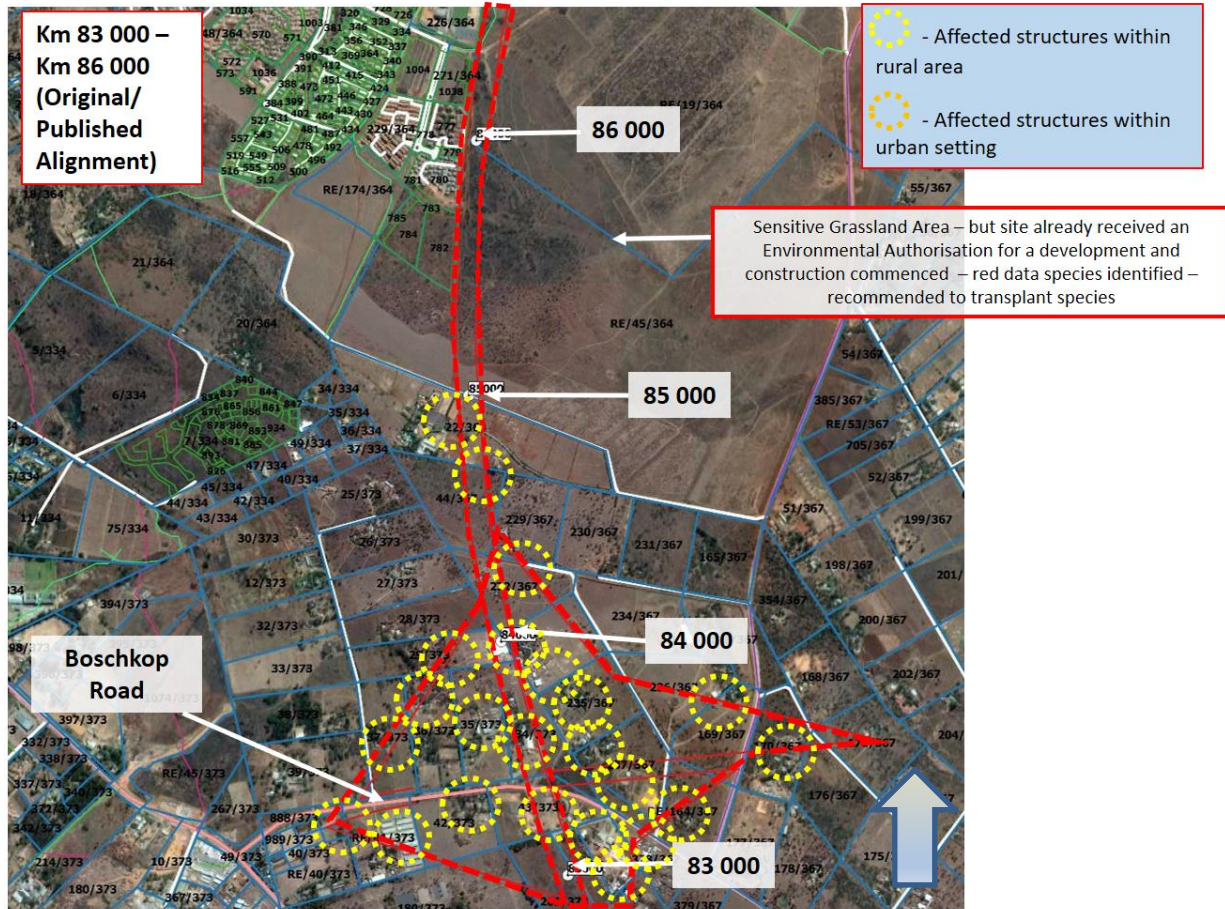


Figure 42: Km 86 000 – Km 86 900



**Figure 43: Km 85 000 – Km 86 900 – Hazeldean Development Masterplan superimposed over aerial photograph in order to illustrate the future development around the freeway – the development already received an Environmental Authorisation**





**Figure 44: Km 83 000 – Km 86 000**

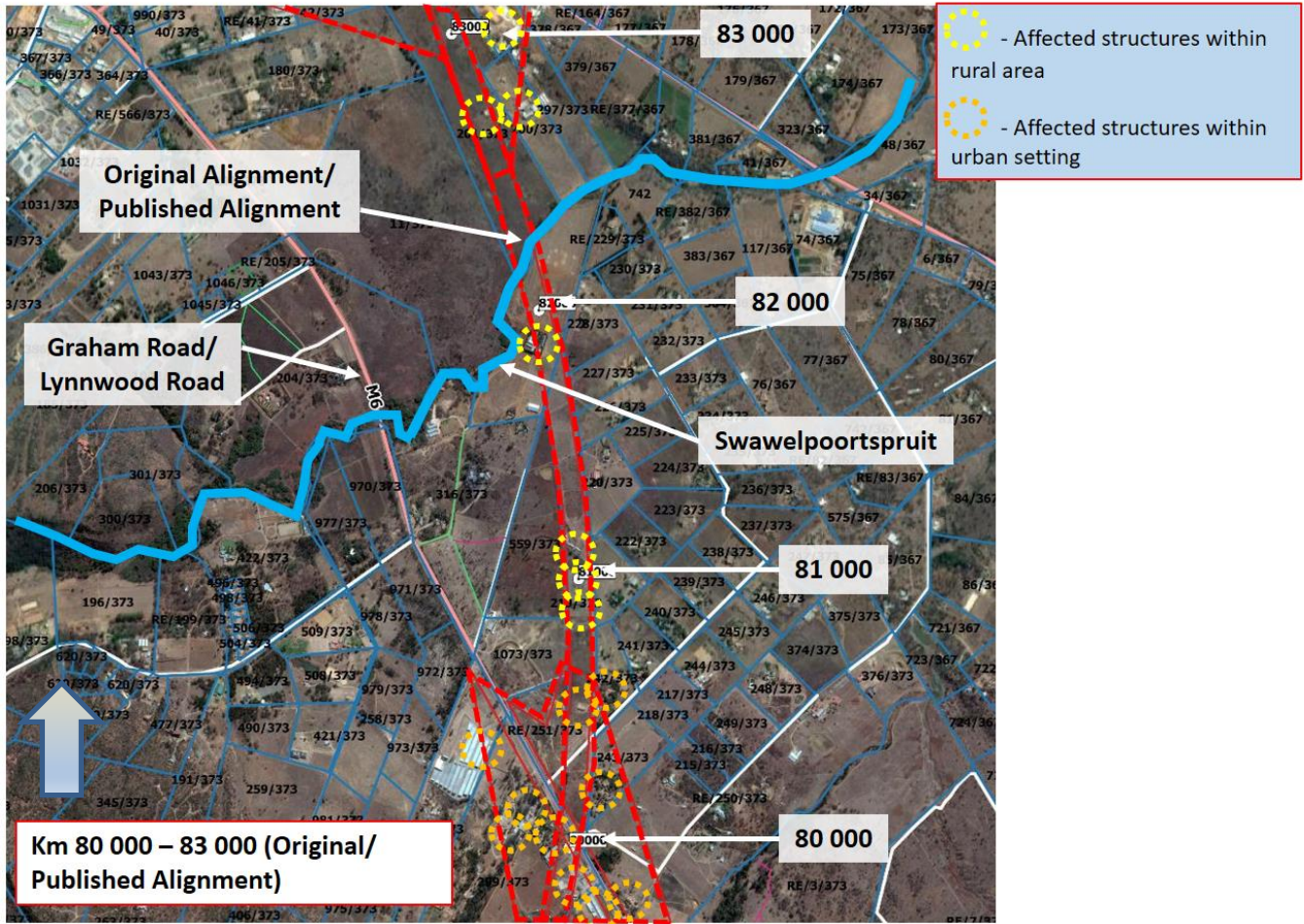


Figure 45: Km 80 000 – Km 83 000



Table 57: Km 80 000 – Km 86 900

80000 km to 81000 km					
	219/373	<p><u>Social/Economic:</u> The proposed road also seems to be transecting through several structures/buildings including houses. The proposed road may also transect through several commercial structures. The proposed road's footprint seems to transect through a large part of the farm portion.</p> <p><u>Agricultural/Economical:</u> The proposed road seems to transect through semi-cultivated land.</p> <p><u>Environmental:</u></p>	<p>Johan Liebenberg Plot 219 Graham Road</p> <p>Since we bought the shares in the "Closed Corporations" during 2002 we were aware of the proposed PWV17. We were also aware of the proposed upgrading of Graham Road (K34). Plot 219 was from the planning stages of the Agriculture small holdings earmarked for the proposed PWV17. According to the most recent plans for the proposed highway it seems as if the actual road has moved to the west and therefore closer to our eastern boundary. I would like to place on record that I would object if that was the case since our building restriction line would likely increase</p>		
		<p>The proposed road seems to transect through indigenous/natural vegetation.</p>	<p>from 30m to a higher number. We have spent a lot of time, money and energy to get the subdivision approved. Since the approval we built <del>stormwater</del> containment dams with proper walls and overflows together with cannels, roads and other infrastructure.</p>		
	243/373	<p><u>Social/Economic:</u> The proposed road also seems to be transecting through several structures/buildings including houses. The proposed road may also transect through several commercial structures.</p>			
		<p><u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed road transects through several medium to large trees.</p>			
	242/373	<p><u>Social/Economic:</u> The proposed road also seems to be transecting through several</p>	<p>Karl le Roux Plot 242 <del>Zwaetjie</del> Only registered It will be hopeless situation if ls end</p>		

		<p>structures/buildings including houses. The proposed road may also transect through several commercial structures. The proposed road will transect through a recreational or sporting area.</p> <p><u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed road transects through several medium to large trees.</p>	<p>huge amounts on the holding and maybe next year I have to move.</p>		
	299/373	<p><u>Social/Economic:</u> The proposed road also seems to be transecting through several structures/buildings, these structures may include houses. The proposed road may also transect through several commercial structures.</p> <p><u>Environmental:</u></p>	<p>Andre Botha Portion 299 <del>Zwavelaarspoort</del> 373 JR Only registered</p>		

		<p>The proposed road seems to transect through indigenous/natural vegetation. The proposed road transects through several medium to large trees.</p>			
	RE/5/373	<p><u>Social/Economic:</u> The proposed road also seems to be transecting through several structures/buildings. The proposed road may also transect through several commercial structures.</p> <p><u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed road transects through several medium to large trees.</p>			
	258/373	<p><u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed road transects through</p>			



		several medium to large trees.			
	<b>RE/251/373</b>	<u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed road transects through several medium to large trees. The proposed road transect over a watercourse/river/dam.	JWJ Van Wyk Attorneys Portion 251 <del>Zwavelpoort</del> , 373 JR Only registered		
	<b>1073/373</b>	<u>Environmental:</u> The proposed road seems to transect through indigenous/natural			

		vegetation.			
<b>81000 km to 82000 km</b>					
	<b>219/373</b>	<u>Social/Economic:</u> The proposed road also seems to be transecting through several structures/buildings, these structures may include houses. The proposed road may also transect through several commercial structures. The proposed road's footprint	Johan Liebenberg Plot 219 Graham Road  Since we bought the shares in the "Closed Corporations" during 2002 we were aware of the proposed PWV17. We were also aware of the proposed upgrading of Graham Road (K34). Plot 219 was from the planning stages of the Agriculture small holdings earmarked for the		

		<p>seems to transect through a large part of the farm portion.</p> <p><u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed road transects through several medium to large trees.</p>	<p>proposed PWV17. According to the most recent plans for the proposed highway it seems as if the actual road has moved to the west and therefore closer to our eastern boundary. I would like to place on record that I would object if that was the case since our building restriction line would likely increase from 30m to a higher number. We have spent a lot of time, money and energy to get the subdivision approved. Since the approval we built <del>stormwater</del> containment dams with proper walls and overflows together with cannels, roads and other infrastructure.</p>		
	317/373	<p><u>Social/Economic:</u> The proposed road also seems to be transecting through several structures/buildings, these structures may include houses. The proposed road may also transect through several commercial structures.</p> <p><u>Wetland Environmental:</u></p>			

		The proposed road seems to transect through indigenous/natural vegetation. The proposed road transects through several medium to large trees. The proposed road stretches alongside a water source/dam.			
82000 km to 83000 km					
	317/373	Wetland <u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed road transects through several medium to large trees. The proposed road stretches alongside a watercourse/river and a dam/water source where the proposed road eventually transects over the watercourse/river.			
	201/373	<u>Social/Economic:</u> The proposed road also seems to be transecting through several			
		structures/buildings, these structures may include houses. The proposed road may also transect through several commercial structures. The proposed road's footprint seems to transect through a large part of the farm portion.  <u>Environmental:</u> The proposed road seems to transect through indigenous/natural			

		several medium to large trees.			
	<b>200/373</b>	<p><u>Social/Economic:</u> The proposed road also seems to be transecting through several structures/buildings, these structures may include houses. The proposed road may also transect through several commercial structures.</p> <p><u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed road transects through several medium to large trees.</p>			
	<b>297/373</b>	<p><u>Social/Economic:</u> The proposed road also seems to be transecting through several structures/buildings, these structures may include houses. The proposed road may also transect through several</p>			
		<p>commercial structures.</p> <p><u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed road transects through several medium to large trees.</p>			
	<b>254/373</b>	<p><u>Social/Economic:</u> The proposed road also seems to be transecting through several structures/buildings. The proposed road may also transect through several commercial structures.</p> <p><u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation.</p>	<p>Andre de Bruyn – <a href="mailto:buildersyard@fby.co.za">buildersyard@fby.co.za</a> – Ryckar Shopping Centre Plot 254 a remainder of plot 200 <del>Zwavelaard</del> Only registered</p>		
	<b>180/373</b>	<p><u>Agricultural/Economical:</u> The proposed road seems to transect through semi-cultivated land.</p>			

		<p><u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed road transects through several medium to large trees.</p>			
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83000 km to 84000 km					
	201/373	<p><u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed road transects through several medium to large trees.</p>			
	349/373	<p><u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed road transects through several medium to large trees.</p>	<p>Liza van Jaarsveld – <a href="mailto:info@lizavanjaarsveld.co.za">info@lizavanjaarsveld.co.za</a> Portion 349 Zwavelpoort, 373 JR Portion 439 Zwavelpoort, 373 JR Wetland area will be affected, job losses</p>		
	43/373	<p><u>Social/Economic:</u> The proposed road also seems to be transecting through several</p>	<p>Stef Botha – <a href="mailto:stef@quicksand.org.za">stef@quicksand.org.za</a> Portion 43 Zwavelpoort</p>		

		<p>structures/buildings. The proposed road may also transect through several commercial structures.</p> <p><u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation.</p>			
	34/373	<p><u>Social/Economic:</u> The proposed road also seems to be transecting through several structures/buildings, these structures may include houses. The proposed road may also transect through several commercial structures. The proposed road's footprint seems to transect through a large part of the farm</p>			

	34/373	<p><u>Social/Economic:</u> The proposed road also seems to be transecting through several structures/buildings, these structures may include houses. The proposed road may also transect through several commercial structures. The proposed road's footprint seems to transect through a large part of the farm portion.</p> <p><u>Environmental:</u> The proposed road seems to transect through indigenous/natural</p>			
		<p>vegetation. The proposed road transects through several medium to large trees.</p>			
	35/373	<p><u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation.</p>			
	29/373	<p><u>Social/Economic:</u> The proposed road also seems to be transecting through several structures/buildings. The proposed road may also transect through several commercial structures.</p> <p><u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation.</p>			
	233/367	<p><u>Social/Economic:</u> The proposed road also seems to be transecting through several structures/buildings, these structures may include</p>			

		houses. The proposed road may also transect through several commercial structures.  <u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed road transects through several medium to large trees.			
	378/367	<u>Social/Economic:</u> The proposed road also seems to be transecting through several structures/buildings. The proposed road may also transect through several commercial structures.	Frikkie Du Plessis Portion 378 Mooiplaats 367 JR Only registered		
	RE/164/367	<u>Social/Economic:</u> The proposed road also seems to be transecting through several structures/buildings, these structures may include houses. The proposed road may also transect	<del>Wynood</del> Fourie – <a href="mailto:wdfourie@gmail.com">wdfourie@gmail.com</a> Plot 164 Mooiplaats Only registered		

		through several commercial structures.  <u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed road transects through several medium to large trees.			
	169/367	<u>Social/Economic:</u> The proposed road also seems to be transecting through several structures/buildings, these structures may include houses. The proposed road may also transect through several commercial structures.  <u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed road transects through several medium to large trees.			

	<b>237/367</b>	<p><u>Social/Economic:</u> The proposed road also seems to be transecting through several structures/buildings, these structures may include houses. The proposed road may also transect through several commercial structures.</p> <p><u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed</p>			
		<p>vegetation. The proposed road transects through several medium to large trees.</p>			
	<b>176/367</b>	<p><u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed road transects through several medium to large trees.</p>			
	<b>171/367</b>	<p><u>Social/Economic:</u> The proposed road also seems to be transecting</p>			
		<p>through several structures/buildings, these structures may include houses. The proposed road may also transect through several commercial structures.</p> <p><u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed road transects through several medium to large trees.</p>			
	<b>168/367</b>	<p><u>Social/Economic:</u> The proposed road also seems to be transecting through several structures/buildings, these structures may include houses. The proposed road may also transect through several commercial structures.</p>			
		<p><u>Environmental:</u> The proposed road seems to transect through</p>			



		indigenous/natural vegetation. The proposed road transects through several medium to large trees.			
	236/367	<p><u>Social/Economic:</u> The proposed road also seems to be transecting through several structures/buildings, these structures may include houses. The proposed road may also transect through several commercial structures.</p> <p><u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed road transects through several medium to large trees.</p>			
	235/367	<p><u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed road transects through</p>	Glynis Chapman Plot 235 Mooiplaats Only registered		

	180/373	<p>trees.</p> <p><u>Agricultural/Economical:</u> The proposed road seems to transect through semi-cultivated land.</p> <p><u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed road transects through several medium to large trees.</p>			
	42/373	<p><u>Social/Economic:</u> The proposed road also seems to be transecting through several structures/buildings, these structures may include houses. The proposed road may also transect through several commercial structures.</p> <p><u>Environmental:</u> The proposed road seems to transect through indigenous/natural</p>	Arne Haartsen Portion 42 Zwavelpoort 373 Only registered		

		vegetation. The proposed road transects through several medium to large trees.			
	RE/41/373	<u>Social/Economic:</u> The proposed road also seems to be transecting through several structures/buildings, these structures may include houses. The proposed road may also transect through several commercial structures.			
		<u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed road transects through several medium to large trees. The proposed road stretches alongside a small water source/dam.			
	40/373	<u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed			
		road transects through several medium to large trees.			
	39/373	<u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed road transects through several medium to large trees.			
	37/373	<u>Social/Economic:</u> The proposed road also seems to be transecting through several structures/buildings, these structures may include houses. The proposed road may also transect through several commercial structures.  <u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed road transects through several medium to large trees.			
	236/367	<u>Social/Economic:</u> The proposed road transects the southern corner of the property. The owner has	Francois Du Toit Civil Tech Construction Cel : 082 337 9699 Fax: 086 218 7788		

		<p>knowledge of the road and has planned construction accordingly. A Helipad has been built in the northern portion of the property and will most likely not be affected by the proposed road.</p> <p><u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed road transects through several medium to large trees.</p>	Email: civiltech@vodamail.co.za		
	36/373	<p><u>Social/Economic:</u> The proposed road also seems to be transecting through several structures/buildings, these structures may include houses. The proposed road may also transect through several commercial structures.</p> <p><u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed road transects through several medium to large trees.</p>			
84000 km to 85000 km					
	29/373	<p><u>Social/Economic:</u> The proposed road also seems to be transecting through several structures/buildings, these structures may include houses. The proposed road may also transect through several</p>			
		<p>commercial structures.</p> <p><u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation.</p>			
	233/367	<p><u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation.</p>			

	<b>28/373</b>	<u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed road transects through several medium to large trees.			
	<b>232/367</b>	<u>Social/Economic:</u> The proposed road also seems to be transecting through several structures/buildings, these structures may include houses. The proposed road may also transect through several commercial structures.	Sophie Breytenbach – <a href="mailto:sophie@breytenbach.co.za">sophie@breytenbach.co.za</a> Plot 232 on the Farm Mooiplaats 367 JR Only registered  Breytie Breytenbach Plot 232 Mooiplaats 367 JR Only registered		
		<u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed road transects through several medium to large trees.			
	<b>229/367</b>	<u>Social/Economic:</u> The proposed road also seems to be transecting through several structures/buildings, these structures may include houses. The proposed road may also transect through several commercial structures.  <u>Environmental:</u> The proposed road seems			
		to transect through indigenous/natural vegetation. The proposed road transects through several medium to large trees.			
	<b>44/367</b>	<u>Environmental:</u> The proposed road seems	Ola Schumacher-Malan – J Paul van Wyk Urban – Economic & Planners		

		to transect through indigenous/natural vegetation. The proposed road transects through several medium to large trees.	CC Portion of Remainder 44 Mooiplaats 367 JR Investigate the alignment of the PWV17 over their client's property		
	22/364	<u>Agricultural/Economical:</u> The proposed road seems to transect through cultivated land.  <u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed road transects through several medium to large trees.	David Georgiades – Chez Charlene Wedding Venue Plot 22 Swartkoppies 364 Wedding venue almost 10 years, existing roads must be upgraded		
85000 km to 86000 km					
	RE/45/364	<u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed road transects through several medium to large trees.			
	RE/19/364	<u>Environmental:</u>			
		The proposed road seems to transect through indigenous/natural vegetation. The proposed road transects through several medium to large trees.			
86000 km to 89000 km					
	RE/19/364	<u>Environmental:</u> The proposed road seems to transect through indigenous/natural vegetation. The proposed road transects through several medium to large trees.			

#### 7.4.1 Summary Most Significant Site-Specific Impacts Km 80 000 – Km 83 000

**Table 58: Summary of Most Significant Site-Specific Impacts Km 80 000 – Km 83 000 (Published Alignment)**

Issue/ Impact	Traverse/ adjacent to feature identified	Area/ distance of impact/ number of structures to be demolished	Severity	Mitigation possibilities
				High- H, Medium – M, Low – L/ Apart from normal mitigation (i.e.

				erosion control etc.) Mitigation not specifically required (NSR)
<b>Summary Most Significant Impacts Km 80 000 – Km 83 000:</b>				
			<b>Number of structures/ distance/ area affected</b>	<b>Issue not addressed and mitigated under Chapter 6 above and must still be addressed</b>
<ul style="list-style-type: none"> <li>- <b>Natural areas affected</b> <b>Grassland</b> – Mainly formerly disturbed by agricultural activities: Not regarded as sensitive</li> <li>- <b>Wetland / Watercourse Areas</b> A watercourse crossing at approximately Km 82 150 (Swawelpoortspruit) -not very sensitive riparian zone -area to the south of the spruit has been used for agriculture and natural vegetation to north of spruit is disturbed</li> </ul>			± 2,5Km – not regarded as sensitive	
Very sensitive vegetation and flora and possible habitat for red data species:				
- Red data species (fauna and flora)				
- Watercourses/ wetlands/ 1:100-year flood line areas affected			<b>Yes-</b> ± Km 82 150	
- Geotechnical constraints (mainly associated with dolomitic land/ heave conditions/ blasting required)				
- Steep slopes				
- Aesthetical Qualities and possible visual impacts			Significant impact on tranquil atmosphere	
- Accesses affected			± 15	
- Services/ servitudes affected (i.e. Eskom servitude/ sewer lines)				

- Structures to be demolished	More than 20	
- Structures to remain but will be affected (i.e. visual, noise, economic value)	More than 45	
- Existing agricultural activities affected	± 500m	Impacts to be discussed with land-owners/farmers
- Land previously cultivated and natural vegetation starting to re-establish		
- Land previously cultivated and no natural vegetation		

#### 7.4.2 Summary Most Significant Site-Specific Impacts Km 83 000 – ±Km 86 900

**Table 59: Summary of Most Significant Site-Specific Impacts Km 83 000 – ±Km 86 900 (Published Alignment)**








Issue/ Impact	Traverse/ adjacent to feature identified	Area/ distance of impact/ number of structures to be demolished	Severity	Mitigation possibilities High- H, Medium – M, Low – L/ Apart from normal mitigation (i.e. erosion control etc.) Mitigation not specifically required (NSR)
<b>Summary Most Significant Impacts Km 83 000 – Km 86 900:</b>				
			<b>Number of structures/ distance/ area affected</b>	<b>Issue not addressed and mitigated under Chapter 6 above and must still be addressed</b>
-	<b>Natural areas affected</b>			








<p><b>Grassland</b> – Mainly formerly disturbed by agricultural activities: Not regarded as sensitive</p> <p>- <b>Wetland / Watercourse Areas</b> A watercourse crossing at approximately Km 82 150 (Swawelpoortspruit) -not very sensitive riparian zone -area to the south of the spruit has been used for agriculture and natural vegetation to north of spruit is disturbed</p>	<p>± 3,7, but development already approved on approximately 1,9 Km of natural grassland area – Hazeldean development Refer to figure 43 above (area between approximately Km 85 000 and Km 86 900 (end of route)</p>	
<p>Very sensitive vegetation and flora and possible habitat for red data species:</p>	<p><b>Yes,</b> a red data plant species recorded between Km 85 000 and Km 86 900 – an EA for a development has already been issued for this property and construction already commenced – it is proposed that this species be relocated even though the GDARD rd data species policy requires that species remain in situ</p>	
<p>- Red data species (fauna and flora)</p>	<p><b>Yes,</b> flora</p>	
<p>- Watercourses/ wetlands/ 1:100-year flood line areas affected</p>		
<p>- Geotechnical constraints (mainly associated with dolomitic land/ heave conditions/ blasting required)</p>		













- Steep slopes		
- Aesthetical Qualities and possible visual impacts	Main impacts between Km 83 000 and Km 85 000 – the Hazeldean masterplan which guides development from Km 85 000 until the N4 Freeway already took the PWV 17 into consideration when the layout was finalised	
- Accesses affected	± 8	
- Services/ servitudes affected (i.e. Eskom servitude/ sewer lines)		
- Structures to be demolished	More than 20	
- Structures to remain but will be affected (i.e. visual, noise, economic value)	More than 20	
- Existing agricultural activities affected	± 200	Impacts to be discussed with land-owners/ farmers
- Land previously cultivated and natural vegetation starting to re-establish		
- Land previously cultivated and no natural vegetation		









8. Comparative Assessment between the Original/Published Alignment and Alternative 1

















<b>PROPOSED PWV 17 ALTERNATIVES: Comparative Assessment</b>	
	<p><b><u>Explanatory Note:</u></b></p> <p><b><u>These blocks only provide an indication to what physical impacts the proposed PWV 17 may have on the identified farm portions.</u></b></p> <ul style="list-style-type: none"> <li>  <b>Transecting across STRUCTURES (These structures may include, but not limited to, the following: Houses, informal settlements, commercial buildings, industrial buildings and offices.</b> </li> <li>  <b>Transecting through CULTIVATED LAND AND OTHER AGRICULTURAL ACTIVITIES</b> </li> <li>  <b>Transecting through NATURAL AREAS</b> </li> <li>  <b>Transecting through MEDIUM TO LARGE TREES</b> </li> <li>  <b>Transecting through a WETLAND</b> </li> <li>  <b>Transecting through a WATERCOURSE (Such as a Perennial or non-Perennial River)</b> </li> <li>  <b>Transecting through a WATERBODY</b> </li> </ul>









	Alternative 1			Alternative 2		
1 km Intervals from the 63000 km interval up until the 76000 km	Farm Portions	ISSUES	Comments from I&APs	Farm Portions	ISSUES	Comments from I&APs
63000 Km to 64000 Km						
	74/412			73/412	 	
	73/412			4/19		
	72/412			59/413		

	4/19					
	59/413	 	Luis de Costa - All Seasons Farm (Pty) Ltd Portion 75, 59 & 19 of the Farm Tweefontein 413 JR Only registered			
64000 km to 65000 km						
	59/413		Luis de Costa - All Seasons Farm (Pty) Ltd Portion 75, 59 & 19 of the Farm Tweefontein 413 JR Only registered	59/413		Luis de Costa - All Seasons Farm (Pty) Ltd Portion 75, 59 & 19 of the Farm Tweefontein 413 JR Only registered
65000 km to 66000 km						
	59/413		Luis de Costa - All Seasons Farm (Pty) Ltd	59/413		Luis de Costa - All Seasons Farm (Pty) Ltd








		<p>The proposed road will also transect through irrigation pivot points.</p>	<p>Portion 75, 59 &amp; 19 of the Farm Tweefontein 413 JR Only registered</p>		<p>The proposed will transect through irrigation pivot points.</p>  <p>The proposed road will transect within a close proximity of the dam.</p>	<p>Portion 75, 59 &amp; 19 of the Farm Tweefontein 413 JR Only registered</p>
<p><b>75/413</b></p>		<p>The proposed road will also cross an irrigation pivot point.</p>	<p>Duncan Ellis – <a href="mailto:dmellis@mweb.co.za">dmellis@mweb.co.za</a> – On behalf of East Rand Polo Club Portion 75 of Portion 68. Only registered  Luis de Costa - All Seasons Farm (Pty) Ltd Portion 75, 59 &amp; 19 of the Farm Tweefontein 413 JR Only registered</p>	<p><b>75/413</b></p>	 <p>The proposed road also seems to transect an irrigation pivot point.</p> <p><u>Environmental:</u> The proposed road seems to transect</p>	<p>Luis de Costa - All Seasons Farm (Pty) Ltd Portion 75, 59 &amp; 19 of the Farm Tweefontein 413 JR Only registered</p>







					through indigenous/natural vegetation. There is also a nearby water source/dam on the Farm Portion.	
	<b>19/413</b>	  The proposed road will also cross an irrigation pivot point.	Luis de Costa - All Seasons Farm (Pty) Ltd  Portion 75, 59 & 19 of the Farm Tweefontein 413 JR  Only registered	<b>63/413</b>	 	
	<b>112/413</b>		Dries Venter – Andries Venter Trust  Portion 112, 113 Tweefontein 413 JR  Only registered			
<b>66000 km to 67000 km</b>						
	<b>113/413</b>	 	Dries Venter – Andries Venter Trust  Portion 112, 113 Tweefontein 413 JR	<b>63/413</b>	 	






			Only registered  Christiaan van der Vyver Portion 113 Tweefontein 413 JR  Only registered			
	<b>112/413</b>	 	Dries Venter – Andries Venter Trust  Portion 112, 113 Tweefontein 413 JR  Only registered	<b>112/413</b>	   	Dries Venter – Andries Venter Trust  Portion 112, 113 Tweefontein 413 JR  Only registered
<b>67000 km to 68000 km</b>						
	<b>112/413</b>	 	Dries Venter – Andries Venter Trust  Portion 112, 113 Tweefontein 413 JR  Only registered	<b>112/413</b>	   	Dries Venter – Andries Venter Trust  Portion 112, 113 Tweefontein 413 JR  Only registered
	<b>5/394</b>	 		<b>129/413</b>	   	Liesel Wethmar – Wethmar Attorneys – Chalmar Beef (Pty) Ltd  Portion 129, 134, 77, 76, 78 of the Farm Tweefontein 413 JR




						Only registered
				134/413		Liezel Wethmar – Wethmar Attorneys – Chalmar Beef (Pty) Ltd Portion 129, 134, 77, 76, 78 of the Farm Tweefontein 413 JR Only registered
68000 km to 69000 km						
	5/394	 		134/413		Liezel Wethmar – Wethmar Attorneys – Chalmar Beed (Pty) Ltd Portion 129, 134, 77, 76, 78 of the Farm Tweefontein 413 JR Only registered
	3/394	 	Francois Viljoen – Sarie & Elta (Pty) Ltd Portion 3 Grootfontein 394 JR Only registered	78/413	   The proposed road will transect through a large feedlot.	Liezel Wethmar – Wethmar Attorneys – Chalmar Beef (Pty) Ltd Portion 129, 134, 77, 76, 78 of the Farm Tweefontein 413 JR Only registered








					There is also a nearby water source/dam on the Farm Portion.	
				77/413	  The proposed road will transect through a large feedlot.  	Liezel Wethmar – Wethmar Attorneys – Chalmar Beef (Pty) Ltd Portion 129, 134, 77, 76, 78 of the Farm Tweefontein 413 JR Only registered
69000 km to 70000 km						
	3/394		Francois Viljoen – Sarie & Elta (Pty) Ltd Portion 3 Grootfontein 394 JR Only registered	77/413	 	

		<p>The proposed road also seems to cross an irrigation pivot point.</p> 			<p>The proposed road will transect through a large feedlot.</p>  	
				<b>76/413</b>	 	<p>Liezel Wethmar – Wethmar Attorneys – Chalmar Beef (Pty) Ltd</p> <p>Portion 129, 134, 77, 76, 78 of the Farm Tweefontein 413 JR</p> <p>Only registered</p>
				<b>RE/413</b>	  	
				<b>3/394</b>		<p>Francois Viljoen – Sarie &amp; Elta (Pty) Ltd</p> <p>Portion 3 Grootfontein 394 JR</p> <p>Only registered</p>

					<p><u>Wetland</u></p> <p>There is also a nearby water source/dam on the Farm Portion.</p>	
70000 km to 71000 km						
	<p>3/394</p>  <p>The proposed road also seems to transect through an irrigation pivot point.</p> 		<p>3/394</p>   <p><u>Wetland</u></p>	<p>Francois Viljoen – Sarie &amp; Elta (Pty) Ltd</p> <p>Portion 3 Grootfontein 394 JR</p> <p>Only registered</p>		
	<p>25/394</p>  <p>The proposed road also seems to</p>	<p>Hannes Erasmus – <a href="mailto:erasumat@netactive.co.za">erasumat@netactive.co.za</a></p> <p>Portion 25 Grootfontein 394 JR</p> <p>Only registered</p>				

		<p>transect through an irrigation pivot point.</p> <p><u>Wetland:</u></p> 				
	8/394	<p><u>Wetland:</u></p> 	<p>Conrad Wiehahn –  <a href="mailto:Conrad@practicegroup.co.za">Conrad@practicegroup.co.za</a>                      Remainder of Portion 1 and 8 Grootfontein 394 JR                      Only registered</p> <p>Danie Erasmus –  <a href="mailto:Erasmus1@mweb.co.za">Erasmus1@mweb.co.za</a>                      Portion 1, 8 and 11 Grootfontein 394 JR                      Only registered</p>			
71000 km to 72000 km						
	8/394		<p>Conrad Wiehahn –  <a href="mailto:Conrad@practicegroup.co.za">Conrad@practicegroup.co.za</a>                      Remainder of Portion 1 and</p>	3/394	<u>Wetland</u>	<p>Francois Viljoen – Sarie &amp; Elta (Pty) Ltd                      Portion 3 Grootfontein 394 JR</p>

			<p>8 Grootfontein 394 JR Only registered</p> <p>Danie Erasmus – <a href="mailto:Erasmus1@mweb.co.za">Erasmus1@mweb.co.za</a></p> <p>Portion 1, 8 and 11 Grootfontein 394 JR Only registered</p>		<p></p> <p>There is also a nearby water source/dam on the Farm Portion.</p>	<p>Only registered</p>
<p>26/394</p>	<p> <u>Wetland</u> </p>			<p>RE/24/394</p>	<p></p> <p><u>Social/Economical:</u> The proposed road will transect through a Proposed Development located on the Farm Portion.</p> <p><u>Wetland</u> </p>	<p>Helga Hirst – <a href="mailto:Helga@edseng.co.za">Helga@edseng.co.za</a> - Garnet van der Walt Jnr – EDS Engineering Design Services (Pty) Ltd – Blue Crane Country Estate (Pty) Ltd</p> <p>Portion 24 Grootfontein 394 JR Only registered</p> <p>Garnet van der Walt – EDS Engineering Design Services (Pty)Ltd</p> <p>Remainder of Portion 24 Grootfontein 394 JR</p> <p>Represents the registered owner of the Remainder of Portion 24</p>






					<p>There is also a nearby water source/dam on the Farm Portion.</p>	<p>Grootfontein 394 JR. Affected the decision to purchase the property. The owner has also endeavoured to obtain approval to establish a township on the subject property since 2001. The township has been approved by the City of Tshwane Metropolitan Municipality and is known as the Blue Crane Country Estate. The planned alignment of PWV17 as included in the Gauteng Strategic Road Network and as protected by the Gauteng Transport Infrastructure Act does not affect the abovementioned township. The alternative included in the Draft Scoping Report has a significant impact on the Remainder of Portion 24 of the Farm Grootfontein 394 JR and is not acceptable to our client. The proposed alignment is longer than the published alignment which would not only require additional capital cost to construct but would increase road user and maintenance cost over the life span of the road. No vertical alignment was provided for the alternative alignment to ensure the technical feasibility and to establish the impact of the alignment on other infrastructure. The system interchange between the PWV6 and PWV17 will require significant additional land if the</p>
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						<p>alternative alignment is adopted. The bridge structures associated with the above systems interchange will be significantly longer as a result of the angle of intersection between the PWV17 and PWV6 is the alternative alignment is accepted. The proposed alignment is more than 200m from the centre line of the published PWV17 alignment which would require GDRT to redo the Route Determination phase for the PWV17 in accordance with the provisions of the Gauteng Transport Infrastructure Act. Does not avoid environmentally sensitive areas. The alternative alignment completely avoiding the sensitive areas. At the public participation meeting held in March that the <i>Trachyandra</i> vegetation is no longer on the red data list. The alignment of the planned PWV17 and the existing electrical overhead lines of the 275/400kV Apollo substation corridor clashes with each other on the remainder of portion 24 of the Farm Grootfontein 394 JR to the east of Pretoria.</p>
72000 km to 73000 km						

	26/394	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="width: 20px; height: 20px; background-color: orange; border: 1px solid black;"></div> <div style="width: 20px; height: 20px; background-color: green; border: 1px solid black;"></div> </div> <p style="margin-top: 20px;"><u>Wetland</u></p>		RE/24/394	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="width: 20px; height: 20px; background-color: green; border: 1px solid black;"></div> </div> <p style="margin-top: 20px;">There is also a nearby water source/dam on the Farm Portion.</p>	<p>Helga Hirst – <a href="mailto:Helga@edseng.co.za">Helga@edseng.co.za</a> - Garnet van der Walt Jnr – EDS Engineering Design Services (Pty) Ltd – Blue Crane Country Estate (Pty) Ltd</p> <p>Portion 24 Grootfontein 394 JR Only registered</p> <p>Garnet van der Walt – EDS Engineering Design Services (Pty)Ltd</p> <p>Remainder of Portion 24 Grootfontein 394 JR</p> <p>Represents the registered owner of the Remainder of Portion 24 Grootfontein 394 JR. Affected the decision to purchase the property. The owner has also endeavoured to obtain approval to establish a township on the subject property since 2001. The township has been approved by the City of Tshwane Metropolitan Municipality and is known as the Blue Crane Country Estate. The planned alignment of PWV17 as included in the Gauteng Strategic Road Network and as protected by the Gauteng Transport</p>
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						<p>Infrastructure Act does not affect the abovementioned township. The alternative included in the Draft Scoping Report has a significant impact on the Remainder of Portion 24 of the Farm Grootfontein 394 JR and is not acceptable to our client. The proposed alignment is longer than the published alignment which would not only require additional capital cost to construct but would increase road user and maintenance cost over the life span of the road. No vertical alignment was provided for the alternative alignment to ensure the technical feasibility and to establish the impact of the alignment on other infrastructure. The system interchange between the PWV6 and PWV17 will require significant additional land if the alternative alignment is adopted. The bridge structures associated with the above systems interchange will be significantly longer as a result of the angle of intersection between the PWV17 and PWV6 if the alternative alignment is accepted. The proposed alignment is more than 200m from the centre line of the published PWV17 alignment which would require GDRT to redo the Route Determination phase for the PWV17 in accordance with</p>
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						the provisions of the Gauteng Transport Infrastructure Act. Does not avoid environmentally sensitive areas. The alternative alignment completely avoiding the sensitive areas. At the public participation meeting held in March that the <i>Trachyandra</i> vegetation is no longer on the red data list. The alignment of the planned PWV17 and the existing electrical overhead lines of the 275/400kV Apollo substation corridor clashes with each other on the remainder of portion 24 of the Farm Grootfontein 394 JR to the east of Pretoria.
	<b>RE/1/394</b>	  The proposed road also seems to transect through an irrigation pivot point.  <u>Wetland</u>  	Peet Erasmus Portion 1 Grootfontein 394 JR Only registered	<b>36/371</b>	   	













				33/371	   	
				32/371	  	<p>Jaco Pretorius –  <a href="mailto:Pretorius.aj@gmail.com">Pretorius.aj@gmail.com</a>                  Plot 32 Tiegerpoort                  Only registered</p>
				31/371		
73000 km to 74000 km						
	RE/1/394	 The proposed road	Peet Erasmus Portion 1 Grootfontein 394 JR Only registered	RE/24/394	 There is also a	Helga Hirst – <a href="mailto:Helga@edseng.co.za">Helga@edseng.co.za</a> - Garnet van der Walt Jnr – EDS Engineering Design Services (Pty) Ltd – Blue Crane Country

		<p>also seems to transect through an irrigation pivot point.</p> <p><u>Wetland</u></p> 			<p>nearby water source/dam on the Farm Portion.</p>	<p>Estate (Pty) Ltd                  Portion 24 Grootfontein 394 JR                  Only registered</p> <p>Garnet van der Walt – EDS Engineering Design Services (Pty)Ltd</p> <p>Remainder of Portion 24 Grootfontein 394 JR</p> <p>Represents the registered owner of the Remainder of Portion 24 Grootfontein 394 JR. Affected the decision to purchase the property. The owner has also endeavoured to obtain approval to establish a township on the subject property since 2001. The township has been approved by the City of Tshwane Metropolitan Municipality and is known as the Blue Crane Country Estate. The planned alignment of PWV17 as included in the Gauteng Strategic Road Network and as protected by the Gauteng Transport Infrastructure Act does not affect the abovementioned township. The alternative included in the Draft Scoping Report has a significant impact on the Remainder of Portion 24 of the Farm Grootfontein 394 JR and is</p>
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						<p>not acceptable to our client. The proposed alignment is longer than the published alignment which would not only require additional capital cost to construct but would increase road user and maintenance cost over the life span of the road. No vertical alignment was provided for the alternative alignment to ensure the technical feasibility and to establish the impact of the alignment on other infrastructure. The system interchange between the PWV6 and PWV17 will require significant additional land if the alternative alignment is adopted. The bridge structures associated with the above systems interchange will be significantly longer as a result of the angle of intersection between the PWV17 and PWV6 if the alternative alignment is accepted. The proposed alignment is more than 200m from the centre line of the published PWV17 alignment which would require Gautrans to redo the Route Determination phase for the PWV17 in accordance with the provisions of the Gauteng Transport Infrastructure Act. Does not avoid environmentally sensitive areas. The alternative alignment completely avoids the sensitive areas. At the public participation meeting held in</p>
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						March that the Trachyandra vegetation is no longer on the red data list. The alignment of the planned PWV17 and the existing electrical overhead lines of the 275/400kV Apollo substation corridor clashes with each other on the remainder of portion 24 of the Farm Grootfontein 394 JR to the east of Pretoria.
				30/371	  	
				RE/1/394		Peet Erasmus Portion 1 Grootfontein 394 JR Only registered
				28/371	 	N van Heerden – <a href="mailto:info@whitealoe.co.za">info@whitealoe.co.za</a> Plot 58 and 28 Tiegerpoort 371 JR Only registered  Karin Saffy – <a href="mailto:Karin@journeysworldwide.co.za">Karin@journeysworldwide.co.za</a> Portion 28, 29 Tiegerpoort 371










						JR Only registered
				2/371	 	
				235/371	  	Gerhard van der Merwe – <a href="mailto:Gerhard@gpconsultants.co.za">Gerhard@gpconsultants.co.za</a> – GP Consultants Portion 235 Tiegpoort 371 JR Only registered
74000 km to 75000 km						
	RE/1/394	 	Peet Erasmus Portion 1 Grootfontein 394 JR Only registered	235/371	   	Gerhard van der Merwe – <a href="mailto:Gerhard@gpconsultants.co.za">Gerhard@gpconsultants.co.za</a> – GP Consultants Portion 235 Tiegpoort 371 JR Only registered

	<p><b>66/371</b></p>	<p></p> <p><u>Social/Economical:</u> The proposed road's footprint seems to transect through a large part of the farm portion.</p> <p> </p>		<p><b>245/371</b></p>	<p> </p> <p></p>	
	<p><b>67/371</b></p>	<p> </p> <p></p>		<p><b>62/371</b></p>	<p> </p> <p></p> <p>The proposed road transects through a woodland area located on the Farm Portion.</p>	<p>Andries Bruyns <a href="mailto:andries@klitsgras.co.za">andries@klitsgras.co.za</a> – Plot 62 Tiegerpoort 371 JR Only registered</p>























	<b>65/371</b>			<b>394/371</b>	 	
	<b>68/371</b>		<p>The proposed road's footprint seems to transect through a large part of the farm portion.</p>	<b>63/371</b>	 	
				<b>64/371</b>	 	













						
				65/371	  	
75000 km to 76000 km						
	68/371	 		65/371	   	
	97/371			68/371		
	94/371	 	Ilane Huyser – Metroplan Town Planners and Urban Designers Portion 94 Tiegerpoort 371 JR	98/371	  	

			Only registered			
	<b>95/371</b>		Lucy Ramasodi Plot 95 Tiegerpoort 371 JR Only registered	<b>97/371</b>	  	Johan van Heerden – <a href="mailto:atslab@telkomsa.net">atslab@telkomsa.net</a> Plot 97 Tiegerpoort 371 JR Only registered
	<b>92/371</b>	<u>Social/Economical:</u> The proposed road's footprint seems to transect through a large part of the farm portion. 		<b>94/371</b>	 	Ilane Huyser – Metroplan Town Planners and Urban Designers Portion 94 Tiegerpoort 371 JR Only registered
				<b>95/371</b>	 	Lucy Ramasodi Plot 95 Tiegerpoort 371 JR Only registered

**Table 60: Summary of Comparative Assessment between Original/ Published Alignment and Alternative 1 (± Km 63 500 – Km 75 000)**

 Impacts Similar	 Impacts lower	 Impacts higher	<b>Original Alignment</b>	<b>Alternative 1 (Preferred Alignment)</b>
			 Possible positive impact/ Opportunity	 Possible positive impact/ Opportunity
<b>Bio-Physical Environment:</b>				
Geology and Soils				
Hydrology			The original alignment crosses a wetland and the Sesmyspruit at 2 positions.	 Less watercourse crossings than the original alignment. This alignment crosses the Sesmyspruit at one position. If well planned and managed, the culvert/ bridge structures could be designed to limit the impacts on watercourses and wetlands.
Topography			Topography is relatively flat with farms and housing.	 Topography is relatively flat with farms and housing.
Fauna			The drainage line and riverine habitat have the potential to support sensitive species and/or species with conservation concerns (Vlei Rats and Otters). The wetland and watercourse crossings will be impacted at multiple points by the original alignment.	 The presence of wetland species provides immediate evidence for the existence of the wetland and its necessary preservation. Alternative 1 will avoid impacts to the wetland and cross the Sesmyspruit at a single point.
Flora				

	Wetland areas are generally considered ecologically sensitive and should be conserved. The proposed road development will affect large areas of wetland, while the proposed alternative road would have a lower impact.	The alternative avoids most of the wetlands and crosses a greater proportion of cultivated land.
<b>Social Environment:</b>		
Cultural and Historical	 No significant heritage items were identified in the study area	 No significant heritage items were identified in the study area
Infrastructure	 This alignment alternative will require the construction of very expensive bridge/ culvert structures across the watercourse and wetlands at multiple points.	 This alignment alternative will require the construction of very expensive bridge/ culvert structures across the watercourse at a single point.
Impacts on developments and development layouts	  The original alignment will divide a number of properties used for agriculture. There exists potential to subdivide properties and sell portions.	  The alternative alignment will impact on agricultural properties, dams and small holdings. There exists potential to subdivide properties and sell portions.
<b>Qualitative Environment:</b>		
Noise		
Visual		
"Sense of Place"		
<b>Economic Environment:</b>		
Cost of road construction	 Multiple expensive culverts and bridges are required for wetland and watercourse crossings.	 Less culverts and bridges are required for crossing watercourses and wetlands.
Impacts on property values	 	 

Length of road/ fuel consumption	 	 
Mitigation measures		
<b>Institutional Environment:</b>		
Legislation		
Policies		
Planning on national, provincial and local level		

Even though the ecological impacts associated with the original alignment and Alternative 1 (the original alignment cuts across two sensitive wetland and watercourse areas and Alternative 1 cuts across a sensitive wetland/ watercourse and a sensitive grassland area, which is a confirmed habitat for red data fauna species) the socio-economic impacts associated with Alternative 1 is more significant.

The original alignment has been on the Gauteng road planning maps for more than 40 years and most of the affected land-owners are aware of the proposed freeway which will affect their properties. The original alignment also affects fewer properties.

Alignment Alternative 1 is a new alignment, which did not form part of the Gauteng road planning maps and the proposed alignment alternative came as a surprise to many of the land-owners who purchased properties for the tranquil atmosphere and who operate agricultural activities on land that was not earmarked for a freeway. It will therefore be unfair to re-align the freeway to follow the proposed route of Alignment Alternative 1 if such re-alignment is based on socio-economic impacts.












We regard it as possible to mitigate the impacts of the proposed freeway on the wetland watercourse areas to more acceptable levels through the implementation of













suitable culverts/ span bridges. The aquatic links and sub-surface and surface hydrology must be considered and the impacts on such environments must be limited.

The impact on the grassland area affected by Alternative 1 is more difficult to mitigate, because the freeway will fragment the grassland area and edge effects will cause even more fragmentation.





















Based on the above, the original alignment is regarded as the preferred alternative and it is recommended that the delegated authority approve the Original Alternative between approximately Km 63 500 and Km 75 000.

**Table 61: Comparative assessment between alignment 2 and 3**

 Impacts Similar	 Impacts lower	 Impacts higher	<b>Alternative 2 (Preferred Alignment)</b>  Possible positive impact/ Opportunity	<b>Alternative 3 (Preferred Alignment)</b>  Possible positive impact/ Opportunity
<b>Bio-Physical Environment:</b>				
Geology and Soils			 Alternative 2 represents an alignment across the ridge and such alignment will require the removal of vegetation and soils and some extensive cut and fill exercises.	 Alignment 3 represents a "tunneling" alternative. The proposed tunnel will require some major blasting and drilling exercises, but it will avoid the removal and disturbance of the ecological systems associated with this sensitive ridge series and it will also prevent the fragmentation of a continuous open space system.
Hydrology			 No watercourse crossings.	 No watercourse crossings.
Topography				

	<p>The removal of Alternative 2 represents an alignment across the ridge and such alignment will require the removal of vegetation and soils and some extensive cut and fill exercises.</p>	<p>Alignment 3 represents a “tunneling” alternative. The proposed tunnel will require some major blasting and drilling exercises, but it will avoid the removal and disturbance of the ecological systems associated with this sensitive ridge series and it will also prevent the fragmentation of a continuous open space system.</p>
Fauna	 <p>Some sensitive fauna and flora species were identified on the ridge area. Cutting and removal of vegetation will result in the destruction of natural habitat for sensitive species.</p>	 <p>Some sensitive fauna and flora species were identified on the ridge area. Tunneling will prevent the fragmentation of ecological corridors and spaces.</p>
Flora	  <p>Some sensitive fauna and flora species were identified on the ridge area. Cutting and removal of vegetation will result in the destruction of natural habitat for sensitive species. A possible positive impact is the removal of alien and invasive vegetation.</p>	 <p>The rocky ridge is considered as extremely sensitive. Tunnelling will prevent the fragmentation of ecological corridors and habitats by keeping such areas intact.</p>
<b>Social Environment:</b>		
Cultural and Historical	 <p>No significant heritage items were identified in the study area</p>	 <p>No significant heritage items were identified in the study area</p>
Infrastructure	 <p>This alignment alternative will require cut and fill exercises across the ridge.</p>	 <p>Alignment 3 represents a “tunneling” alternative. The proposed tunnel will require some major blasting and drilling exercises, which can be more expensive.</p>
Impacts on developments and	 <p>The alternative will impact on the</p>	  <p>The alternative will impact on the</p>



development layouts	Bronberg Ridge which has low development potential due to the ecological sensitivity of the area.	Bronberg Ridge which has low development potential due to the ecological sensitivity of the area. Tunneling will lower the impact on current properties in the ridge area.
<b>Qualitative Environment:</b>		
Noise		
Visual		
"Sense of Place"		
<b>Economical Environment:</b>		
Cost of road construction		  Alignment 3 represents a "tunneling" alternative. The proposed tunnel will require some major blasting and drilling exercises, which can be more expensive.
Impacts on property values		
Length of road/ fuel consumption		
Mitigation measures		  Tunneling will avoid the destruction of important environmental habit and corridors.
<b>Institutional Environment:</b>		
Legislation		
Policies		
Planning on national, provincial and local level		

From the comparison of the two alternatives it can be concluded that the tunnelling option (**Alternative 3**) is the preferred alternative. The impacts on sensitive ecological areas, namely the Bronberg Ridge, will be lower than Alternative 2 where cutting into the ridge is needed. Tunneling will allow for the conservation of ecological corridors and habitat, whereas the cut and fill alternative will fragment these areas.

The socio-economic impacts are similar for the alternative 2 and 3. The number of affected properties is expected to be low.

To conclude, **Alternative 3** is the preferred alternative from an environmental point of view.

## Summary

From the comparison of the four alignments, it can be concluded that the **Original Alignment** is the preferred alternative for the southern portion of the PWV17, whereas **Alternative 3** (the tunnelling option) is the preferred alignment for the Bronberg crossing.

## 7 SIGNIFICANCE ASSESSMENT

### 7.2 Description of Significance Assessment Methodology

The significance of Environmental Impacts was assessed in accordance with the following method:

**Significance** is the product of probability and severity. Probability describes the likelihood of the impact actually occurring, and is rated as follows:

- Improbable - Low possibility of impact to occur either because of design or historic experience.  
Rating = 2
- Probable - Distinct possibility that impact will occur.  
Rating = 3
- Highly probable - Most likely that impact will occur.  
Rating = 4
- Definite - Impact will occur, in the case of adverse impacts regardless of any prevention measures.  
Rating = 5

The **severity factor** is calculated from the factors given to “intensity” and “duration”. Intensity and duration factors are awarded to each impact, as described below.

The **Intensity factor** is awarded to each impact according to the following method:

- Low intensity - natural and man-made functions not affected – Factor 1
- Medium intensity - environment affected but natural and man-made functions and processes continue - Factor 2
- High intensity - environment affected to the extent that natural or man-made functions are altered to the extent that it will temporarily or permanently cease or become dysfunctional - Factor 4

**Duration** is assessed and a factor awarded in accordance with the following:

- ❑ Short term - <1 to 5 years - Factor 2
- ❑ Medium term - 5 to 15 years - Factor 3
- ❑ Long term - impact will only cease after the operational life of the activity, either because of natural process or by human intervention - factor 4.
- ❑ Permanent - mitigation, either by natural process or by human intervention, will not occur in such a way or in such a time span that the impact can be considered transient – Factor 4.

The **severity rating** is obtained from calculating a severity factor, and comparing the severity factor to the rating in the table below. For example:

$$\begin{aligned}
 \text{The Severity factor} &= \text{Intensity factor X Duration factor} \\
 &= 2 \times 3 \\
 &= 6
 \end{aligned}$$

A **Severity factor** of six (6) equals a Severity Rating of Medium severity (Rating 3) as per table below:

**Table 62: Severity ratings**

<b>RATING</b>	<b>FACTOR</b>
Low Severity (Rating 2)	Calculated values 2 to 4
Medium Severity (Rating 3)	Calculated values 5 to 8
High Severity (Rating 4)	Calculated values 9 to 12
Very High severity (Rating 5)	Calculated values 13 to 16
Severity factors below 3 indicate no impact	

**A Significance Rating is calculated by multiplying the Severity Rating with the Probability Rating.**

The **significance rating** should influence the development project as described below:

- ❑ Low significance (calculated Significance Rating 4 to 6)
  - Positive impact and negative impacts of low significance should have no influence on the proposed development project.
  
- ❑ Medium significance (calculated Significance Rating >6 to 15)
  - Positive impact:  
Should weigh towards a decision to continue
  - Negative impact:  
Should be mitigated to a level where the impact would be of medium significance before project

can be approved.

- ❑ High significance (calculated Significance Rating 16 and more)
  - Positive impact:  
Should weigh towards a decision to continue, should be enhanced in final design.
  - Negative impact:  
Should weigh towards a decision to terminate proposal, or mitigation should be performed to reduce significance to at least medium significance rating.

In correspondence received from GDARD some officials were of the opinion that the significance methodology used by Bokamoso applies a simple mathematical formula to environmental aspects with significantly different sensitivity values, which might or might not give an inaccurate final significance value.

The significance methodology used by Bokamoso was prescribed to environmental consultants in courses in impact assessments. No methodology can be accurate to a numerical value where the environment is concerned, because it cannot be measured. Numerical values are only an indication of the significance or severance of impacts. If we do not agree with the outcome of the assessment, we will adjust the numerical value to reflect a more realistic significance. The methodology only acts as an aid to the environmental consultant and the consultant needs to use his/her experience in the field together with the methods in order to reach a realistic significance of impacts. Bokamoso, in particular Ms. Lizelle Gregory, has extensive experience in the field of impact assessments.

### **7.3 Significance Assessment of Anticipated Impacts**

Impacts indicated under each section of the environment were each assessed according to the above methodology.

### **7.4 Discussion of Significance Assessment**

The implementation of the PWV 17 Freeway will have significant adverse impacts on the construction and operational phases. The impacts associated with the construction phase are shorter term impacts and are easier to mitigate. The adverse impacts associated with the operational phase are longer term impacts and are more difficult to mitigate.

The potential cutting through the Bronberg mountain range is regarded as a potential "fatal flaw" and it is therefore recommended that the tunnelling alternative be investigated in more detail.

Obviously the financial implications will also play an important role and if the tunnelling exercise proves to be too expensive, the financial implication of the tunnelling option can be regarded as a "fatal flaw". It is recommended that GDRT conduct an exercise and confirm whether it will be possible to tunnel the section of the freeway which cuts across the Bronberg from a financial point of view. If not possible the cutting of the freeway through the Bronberg Mountain range must be investigated in more detail and planned in collaboration with GDARD and the GDARD conservation department. The mammal specialist could not identify any traces of the Juliana Golden Mole on the affected section of the ridge, but from an ecological point of view the area is regarded as suitable for red data plant species. The ridge furthermore has a high biodiversity and is also regarded as suitable habitat for various fauna species.

The financial implications of the bridges across the wetlands/ watercourse areas must also be taken into consideration, because the preferred watercourse crossing between Km 63 500 and Km 75 000 will be by means of span bridges/ culvert structures that will have a minimal impact on the hydrology, ecological and aquatic systems associated with the wetlands and watercourses.

The social and economic impacts of the proposed freeway will also be significant and this such impacts are also regarded as a long term impact, which is almost impossible to mitigate, especially where the road cuts straight across structures and features on properties (mainly to the north of the Bronberg and between Km 63 500 and Km 79 000).

Bokamoso tried to capture and maps all the comments and potential impacts supplied by the I&APs and it is requested that the I&APs confirm the accurateness of the information as reflected in this draft report. Bokamoso will amend the maps and information that are incorrect for purpose of the Final EIA.

The impacts as indicated on the maps and in the report will be used by GDRT and the appointed engineers when doing the detail designs for the interchanges and the owners of the affected properties will be approached on an individual basis to discuss and address the impacts on access roads, services, activities on affected properties and the remuneration involved.

The significance rating and impacts involved will be reviewed and finalised for purpose of the Final EIA.

The Environmental Management Plan (**Refer to Annexure H**) contains measures to mitigate (where possible) the adverse impacts associated with the development



phases and it also contains guidelines to achieve maximum gain from the beneficial impacts.

### **7.5 Findings of the Draft EIA Report:**

It is the responsibility of an EAP appointed to conduct an EIA to apply the principle of sustainable development when determining the impacts of a proposed development/ infrastructure. This means that it is necessary for an EAP to consider all environmental (bio-physical, economic, social and institutional) and the EAP must furthermore ensure that such environments are equally addressed.

In the case of the involved section of the PWV 17, which is assessed in this report, all the alignment alternatives will have some significant social, economic and ecological impacts. Some of the impacts can be mitigated to more acceptable levels, but there are also impacts that are difficult/ impossible to mitigate (i.e. the demolition of structures).

In such cases it becomes necessary to also consider the “no-go” alternative, in other words, to remove the PWV 17 Freeway from the provincial and national road network systems. This option was however already considered on various occasions throughout the years, but the need for this section of the PWV 17 only increased.

During the EIA process Bokamoso also investigated the institutional environment and such investigation confirmed that the proposed PWV 17 Freeway is regarded as very important in various development frameworks and plans on local, provincial and national level. The proposed freeway is thus in line with the planning frameworks for the area and in most cases provincial and local government planning is done around the original/ published alignment, which has been on all the provincial planning maps for more than 40 years.

In terms of the planning frameworks and according to GDRT the section of the freeway between approximately Km 74 000 and km 86 900 is the priority area and the plan is to commence with the construction of sections between Km 74 000 and Km 86 900 within the next 3 – 10 years. The section of the road between approximately Km 62 340 and Km 74 000 is lower on the priority list and it is not foreseen this this section of the freeway will become a priority within the next 10-15 years.

The comparative assessment between the alternative alignments considered on portions of the freeway confirmed that the original/ published alignment is the preferred alternative between approximately Km 63 000 – km 75 000 and it also confirmed that the tunnelling alternative (Alternative 3) is the preferred option between approximately Km 78 000 and Km 80 000, where the road traverses the sensitive Bronberg Mountain range.

The most significant issues associated with the involved section of the proposed freeway are as follows:

### **The Section of the Freeway to the south of the Bronberg:**

#### **Original/ Published Alignment:**

- Power lines (at x2 points the freeway runs underneath power lines);
- Impacts on Polo Fields;
- Impacts on agricultural activities (some pivot points also involved);
- Impacts on views from the small ridge to the east of approximately Km 71 000;
- Social impacts less significant, because most of the affected land-owners were aware of the proposed freeway across their properties and some parties already did some future land-use planning which accomodates the freeway;
- Crossing of sensitive wetlands at x2 points. The wetland areas are regarded as suitable habitats for red data species;

- Impacts on organic vegetable farm (fragments the farm and has impacts on access to farm) just before the freeway enters the natural strip associated with the Bronberg Mountain Range.

**Alternative 1:**

- Power lines (at x2 points the freeway runs underneath power lines);
- Impacts on agricultural activities and a feedlot – significant social mobilisation against the road;
- Impacts on already approved Blue Crane Residential Development – will also cut off the access to the development;
- Parties affected were not aware of the alternative alignment;
- Social impacts more significant than original alignment;
- Crossing of sensitive wetlands area and sensitive grassland areas with some red data fauna species.

**The Bronberg Area:**

**Alternative 2:**

- Visual impacts;
- Fragmentation of continuous open space system;
- Red data species confirmed on the mountain range; and
- Severe cut and fill exercises.

**Alternative 3 (Tunnelling Alternative):**

- Costly;
- Blasting exercises.

### **The Section of the Freeway to the north of the Bronberg:**

- High social impact, especially between Km 79 000 and 84 000. Take note that the alignment was on the planning maps for more than 40 years and I&APs were aware of the proposed freeway;
- It will be necessary to demolish many structures and this will have significant cost implications;
- Visual and noise impacts;
- Impacts on services and accesses to properties;
- Red data plant species identified on land which already received an environmental authorisation for development. Construction already commenced and it is suggested that the plant species be removed and relocated by a suitably qualified specialist on an urgent basis.

## **8 CONCLUSION**

The purpose of the EIA (Environmental Impact Assessment) process was to investigate the Biophysical and Socio-economic environments further by means of specialist studies to identify additional issues/impacts of the proposed PWV17 on these environments.

Further, to provide mitigation measures for adverse impacts and to assess the significance of these impacts over the short and long term.

As environmental consultants we feel satisfied that all site sensitivities were taken into consideration when the alignment was finalised and it is recommended that the delegated authority approved the proposed alignment/ published alignment between Km 62 340 – Km 78 000 and Km 79 500 – Km 86 900. Alignment 2, which represents the “tunnelling” underneath the Bronberg Mountain Range is the preferred alignment between Km 78 000 and Km 79 500.

Unfortunately roads are linear infrastructures that often have to traverse sensitive areas such as watercourses and ridges. Roads are constructed for people and without roads people will not be able to reach their daily destinations.

Fact is, everyone expects government to provide high standard roads and infrastructure, but the general outlook of people is that such infrastructures are not allowed to cut through ecologically sensitive areas or the valuable properties of people. The NIMBY (not in my backyard) syndrome is a common phenomenon during road planning phases and therefore government is often forced to make political decisions regarding roads that are not only focussed on local impacts but rather on the larger regional, provincial and national economic and social benefits and opportunities that will be unlocked.

The proposed PWV17 is one example of a provincial road that is regarded as a crucial link in the Gauteng Road Network System, but due to socio-economic and ecological issues the finalisation of the planning of this section of the road has taken more than a decade of specialist investigations and negotiations with the various I&APs and role players.

We feel that we investigated and addressed all of the issues that were listed throughout the last 10-15 years and we are convinced the proposed road cannot be removed from the alignment.

It is therefore requested that the various organs of state as well as the I&APs take cognisance of all the effort that went into the finalisation of this alignment. It is also requested that GDARD and the other organs of state (i.e. the City of Tshwane Metropolitan Municipality) support the preferred alignment as described in this EIA and that such government departments supply guidelines and recommendation that could assist in the design and implementation of a road that will not only take the bio-physical environment into consideration, but the proposed road must also be acceptable from a social, economic and institutional point of view.

## 9 RECOMMENDATIONS

It is believed that the impacts identified have not been of such a nature that short and long term mitigation cannot occur and therefore it is recommended that the preferred alignment as identified in this report be approved subject to:

- 1) The implementation of the mitigation measures contained in the Environmental Management Plan (**Annexure H**) to achieve maximum advantage from beneficial impacts, and sufficient mitigation of adverse impacts;
- 2) The preparation of a plan, which reflects the various phases of the involved sections of the road. Detail design drawings must be submitted to GDARD for the intersections, interchanges and the various access points to developments (the priority areas as indicated in this report) for approval, prior to the construction of such priority sections;
- 3) Sections of the road will cross the 1:100 year flood line areas and it is very important that the road designs in these flood areas be done to prevent changes to the flood lines. The engineers appointed for the detail designs must confirm that the implementation of the proposed road will not alter the flood line. A drawing which indicates the pre-construction and post-construction flood lines must also be prepared and made available to GDARD, DWS and the affected land-owners;
- 4) The finalization of the expropriation of properties during the preliminary and detail design phase of the road;
- 5) In areas where high noise levels will affect residential areas (noise levels higher than 55 dBA in urban areas and higher than 45 dBA in rural areas) when the freeway reaches its full capacity. Mitigation measures to reduce noise levels must be applied. The measures to be applied and the after mitigation noise levels must be provided to GDARD as part of the designs for the affected sections of the freeway;
- 6) The visual impacts of the proposed freeway will be high in certain areas, but due to the fact that the road will be a freeway, the impacts will be difficult to mitigate. Berms next to the freeway or the cutting-in of the freeway in certain areas could assist

with the mitigation of noise and visual impacts. Landscaping adjacent to the freeway could also contribute to an improved visual environment and it is therefore recommended that landscaping guidelines be compiled for each section of the freeway once alignment of the freeway has been finalised. If the tunnelling option is not approved for the section of the freeway that traverses the Bronberg, the cutting and filling exercises must be done in such a way that the visual impacts towards the mountain range is reduced. Plans which illustrate the mitigation measures for noise and visual impacts in the Bronberg area must be submitted to GDARD and the local authority for approval;

- 7) The finalization of culvert/bridge details during the preliminary and detail design phases of the lower priority sections of the road;
- 8) A detailed geotechnical study and the comments from the Council for Geosciences during the detail design phase of the road;
- 9) The submission of the Storm Water Management Plan to the Local Authority for approval; and
- 10) Obtaining Section 21 Water Use Licenses for the river crossings, impacts on wetlands and for development within 500m from a wetland.

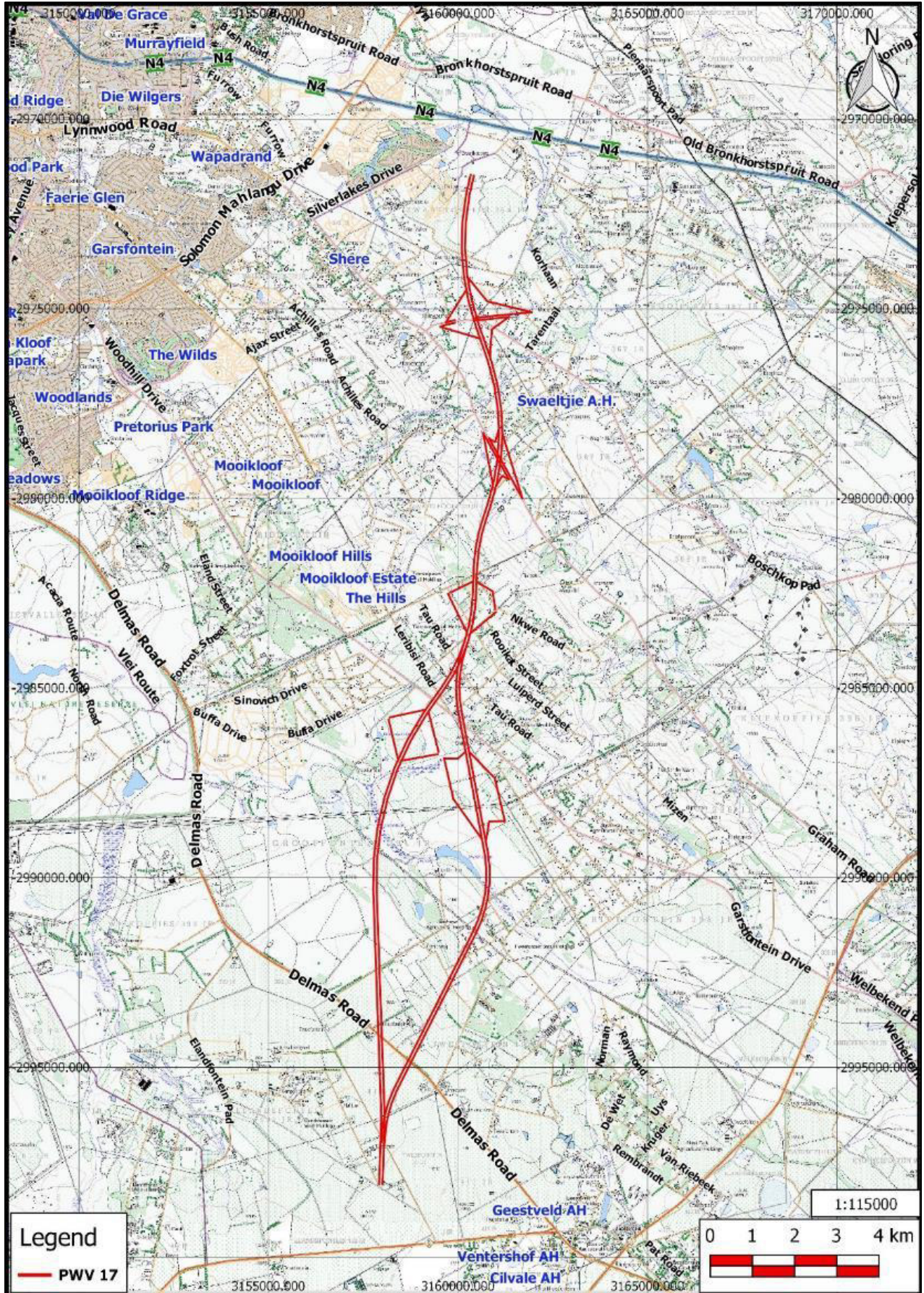


# Annexure A

Enlarged Figures

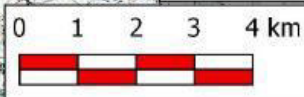


# Locality Map



**Legend**  
— PWV 17

1:115000





# Alignments

PWV17 extending north  
(does not form part of this application)

N4 Freeway

Alternative 2 and 3  
(Route crossing the Bronberg)

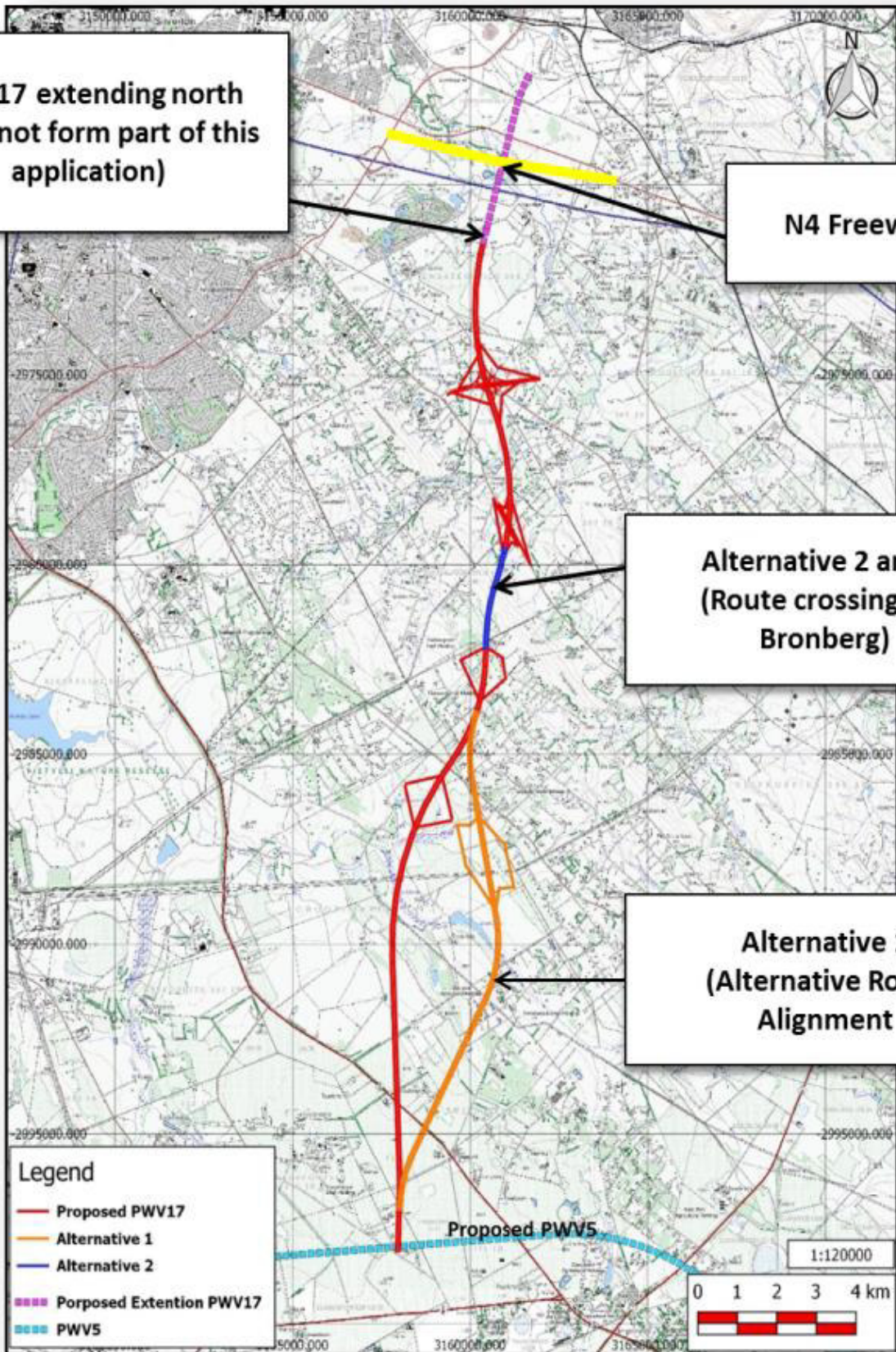
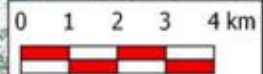
Alternative 1  
(Alternative Route Alignment)

## Legend

- Proposed PWV17
- Alternative 1
- Alternative 2
- Proposed Extension PWV17
- PWV5

Proposed PWV5

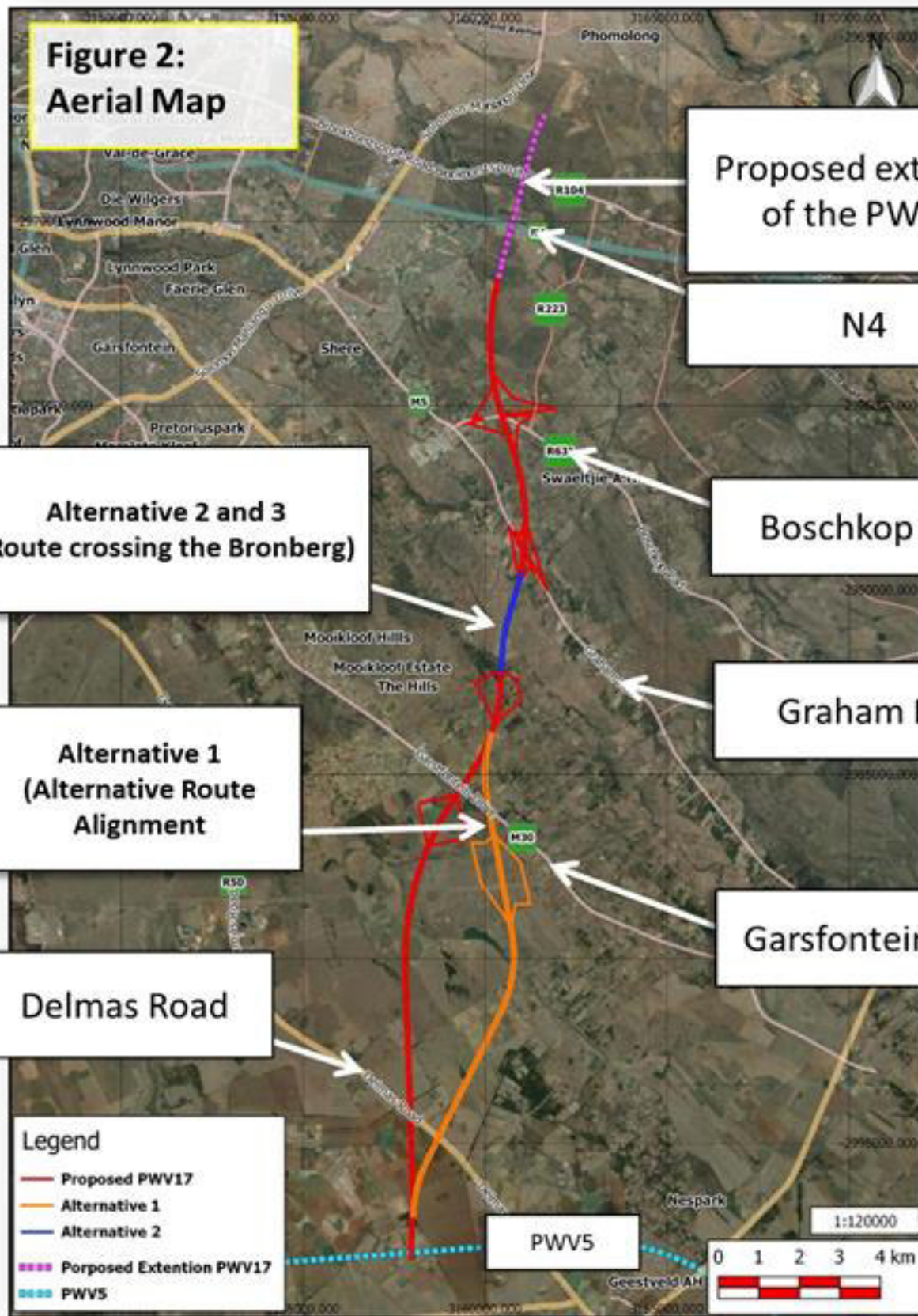
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# Aerial Map

**Figure 2:  
Aerial Map**



Proposed extension of the PWV17

N4

Alternative 2 and 3  
(Route crossing the Bronberg)

Boschkop Road

Alternative 1  
(Alternative Route Alignment)

Graham Road

Delmas Road

Garsfontein Road

PWV5

1:120000

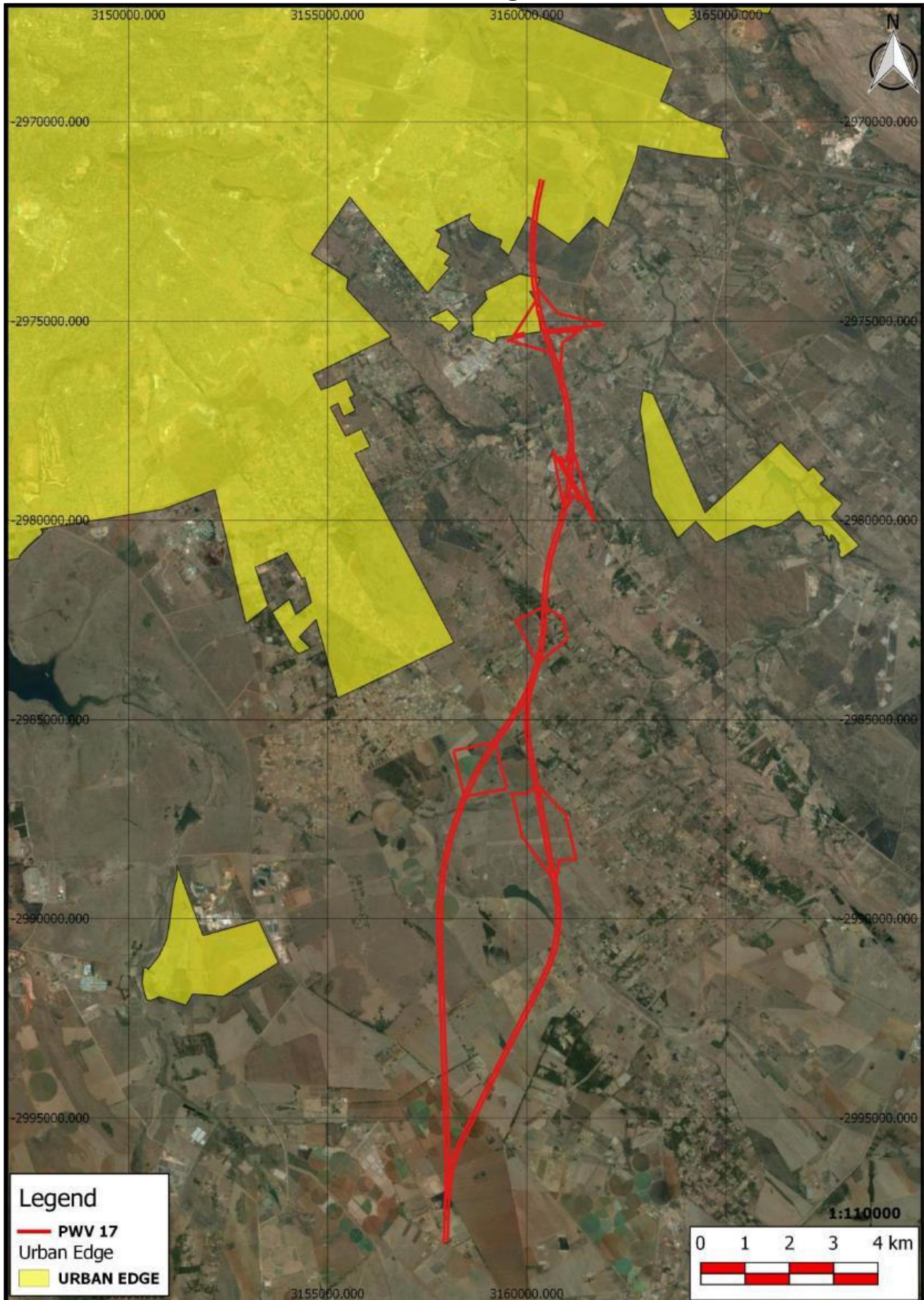






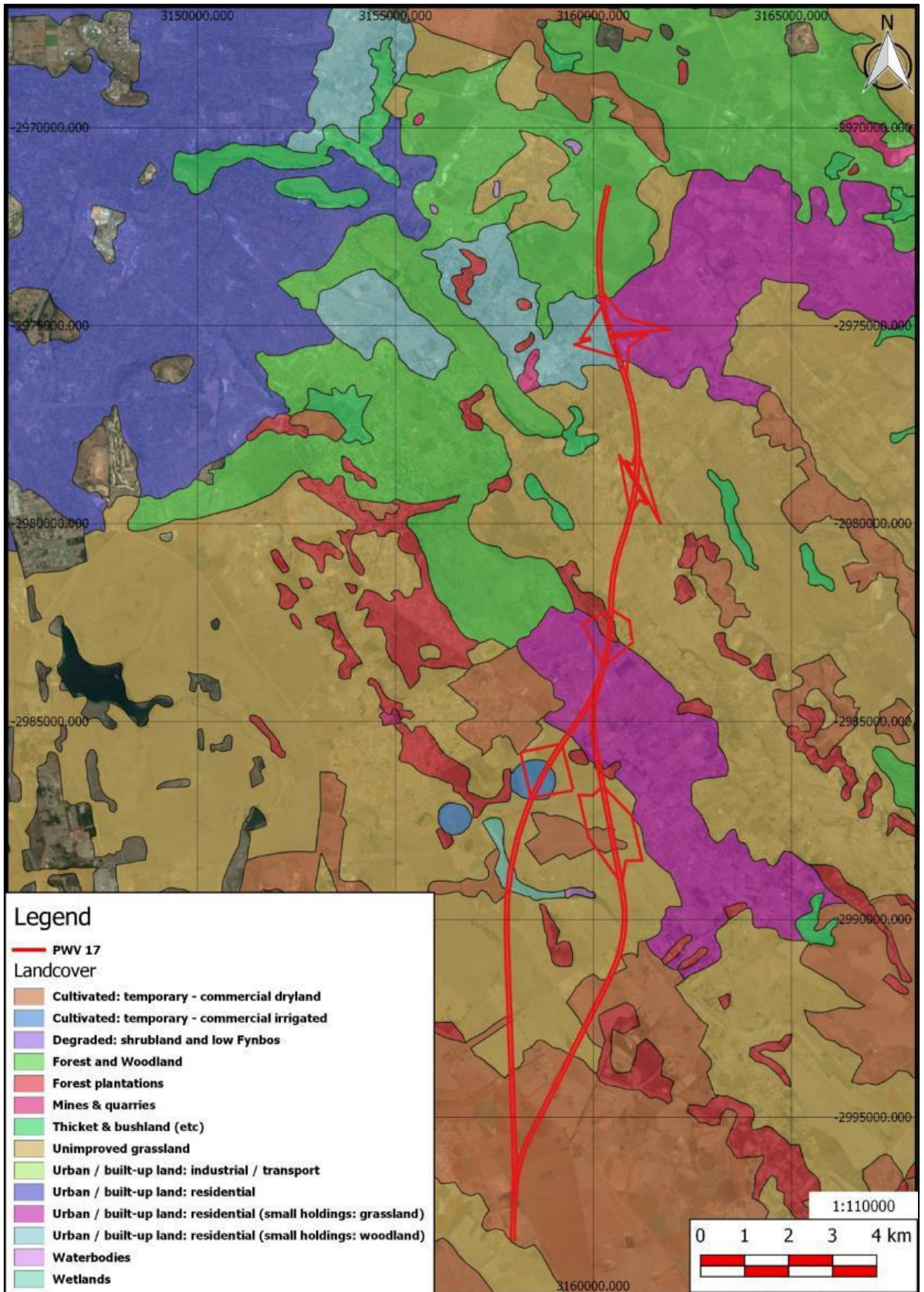


# Urban Edge



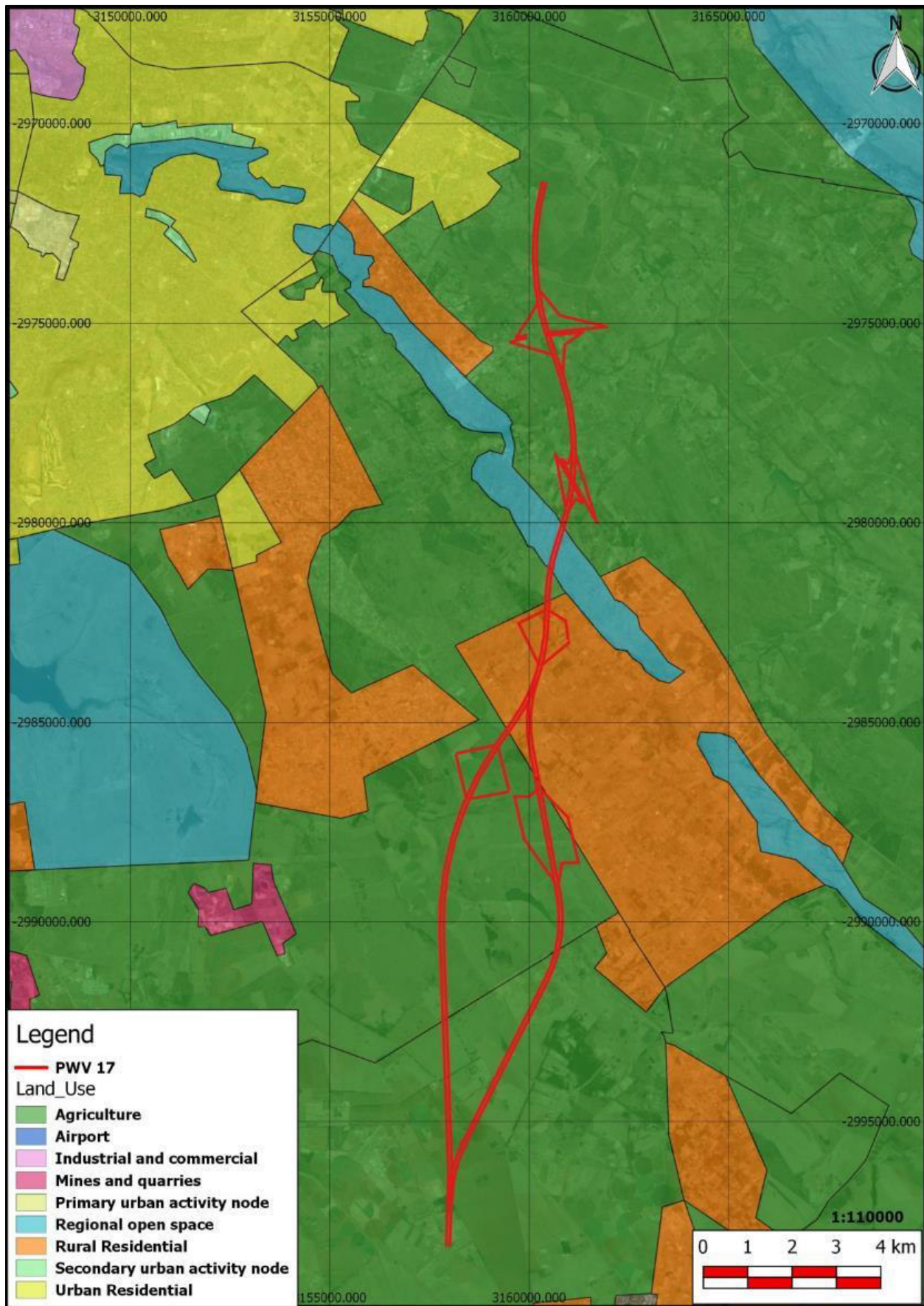


# Landcover



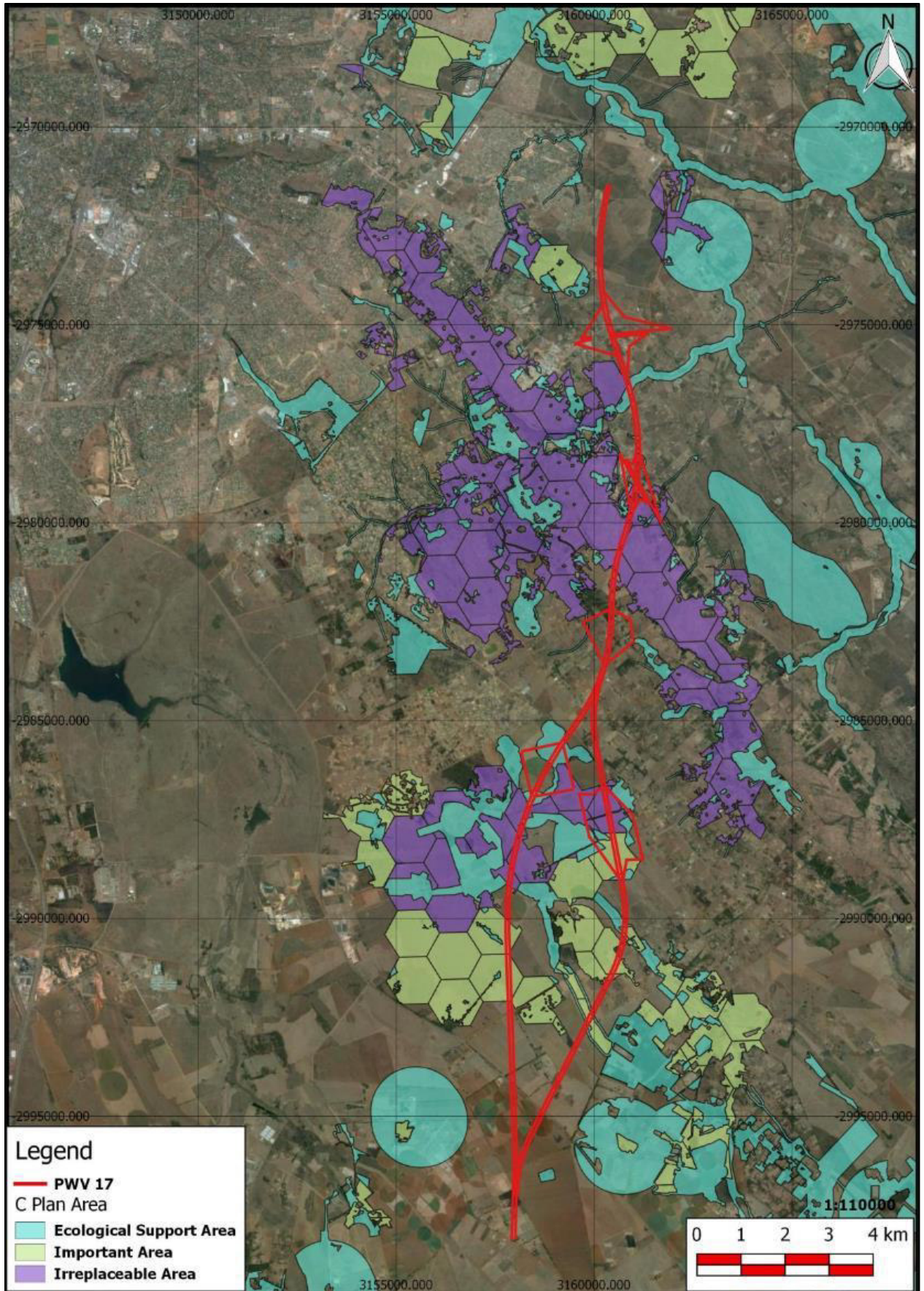


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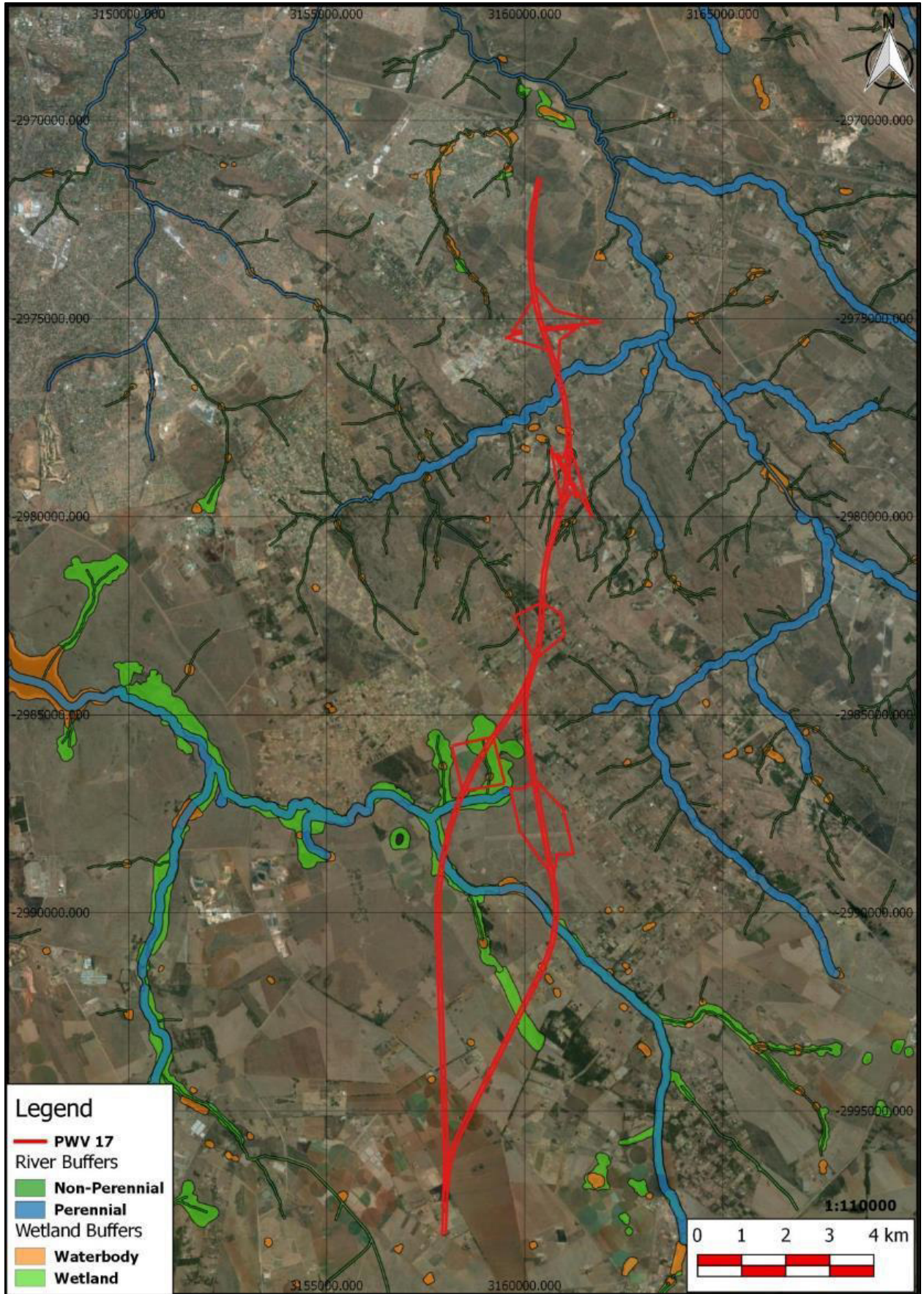


# C Plan Sensitivity



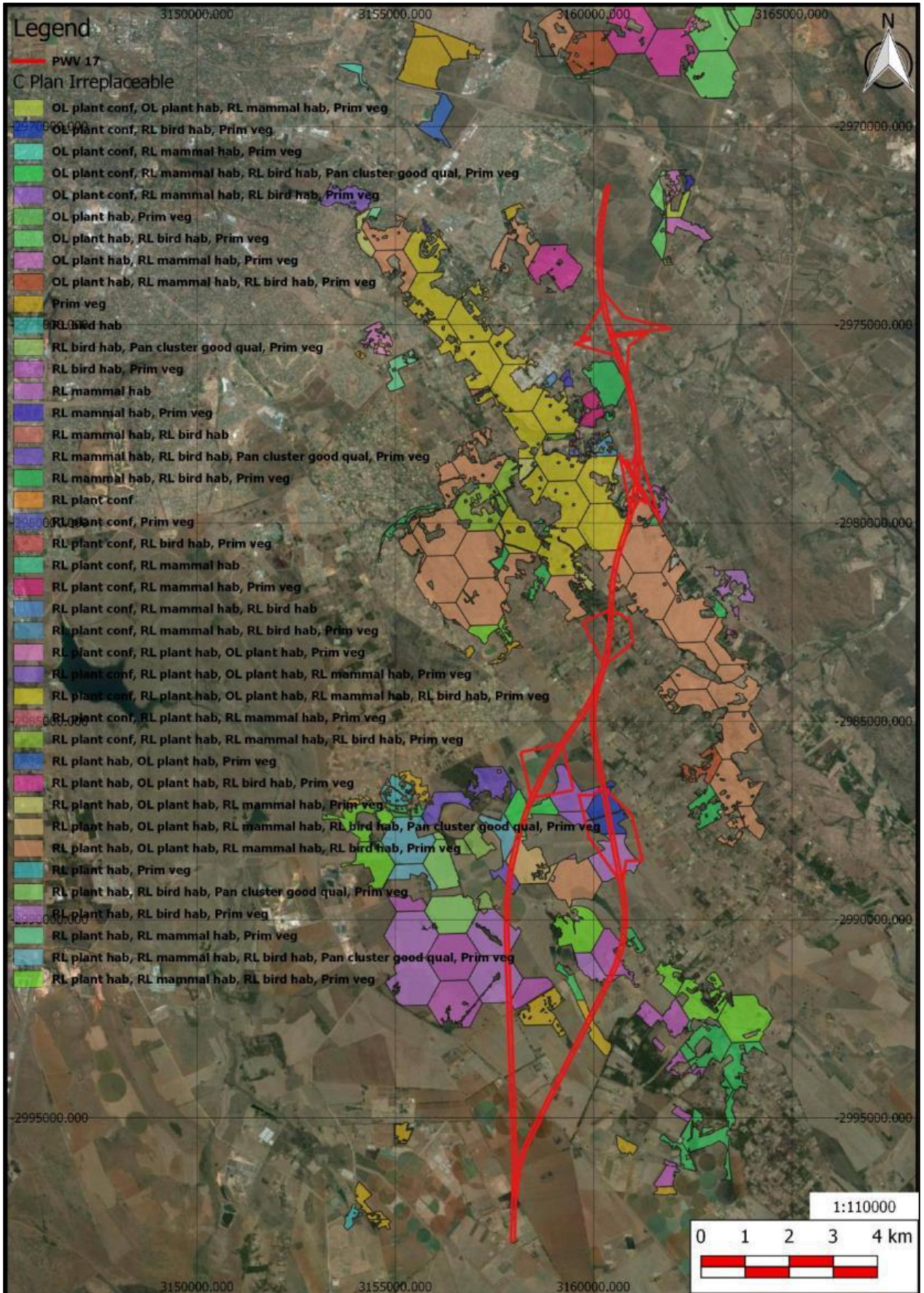


# Rivers and Wetlands



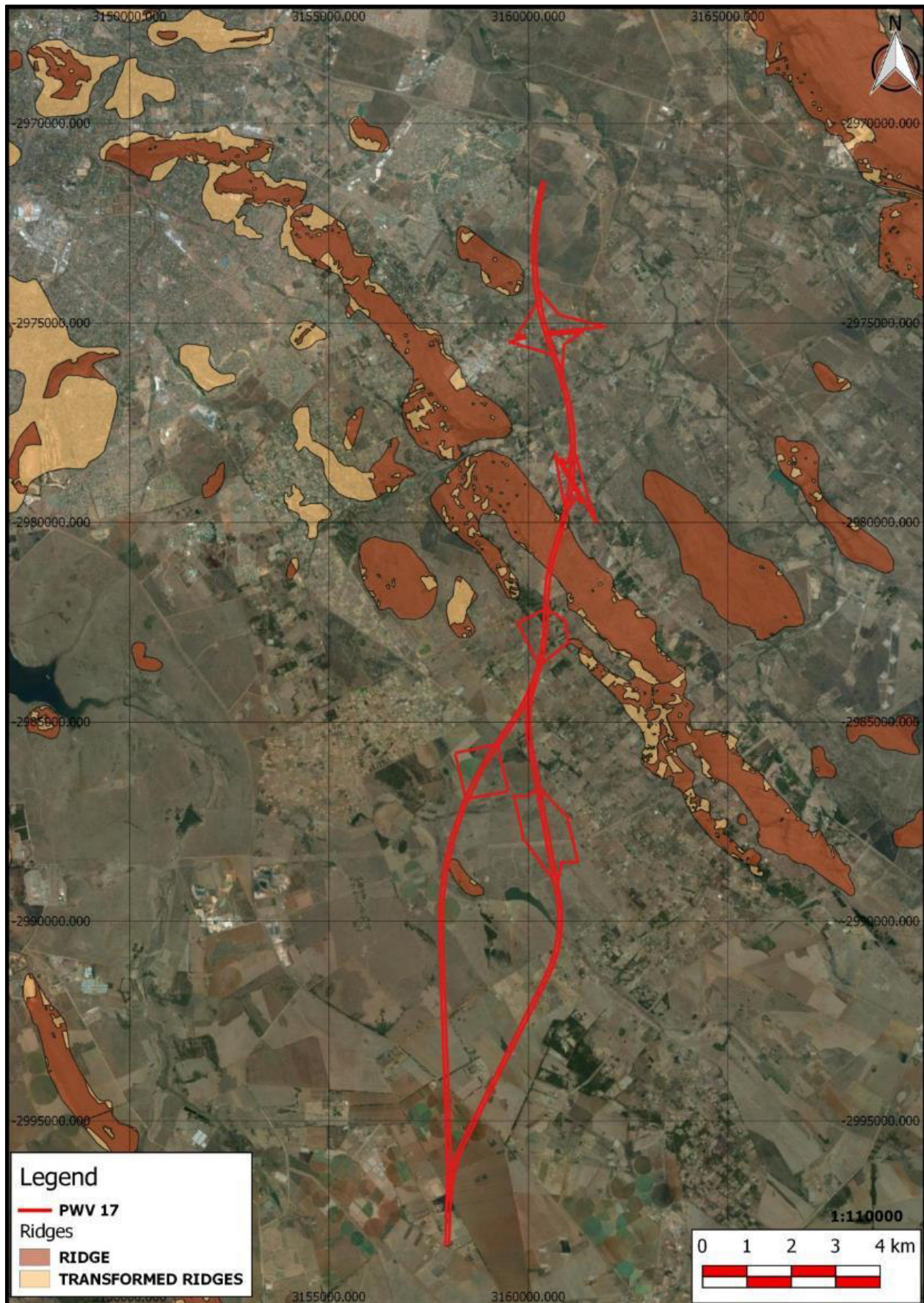


# C Plan Irreplaceable



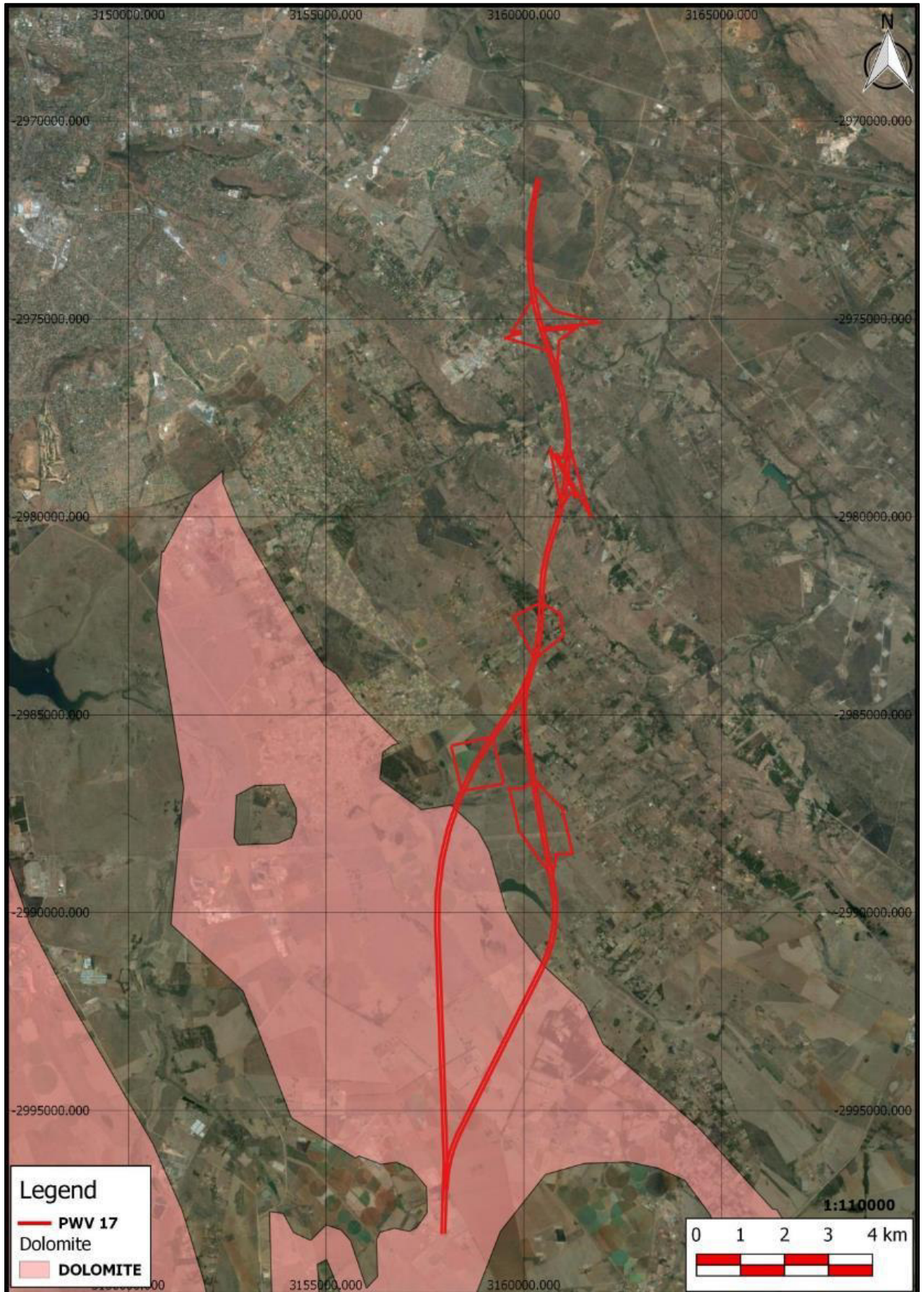


# Ridges





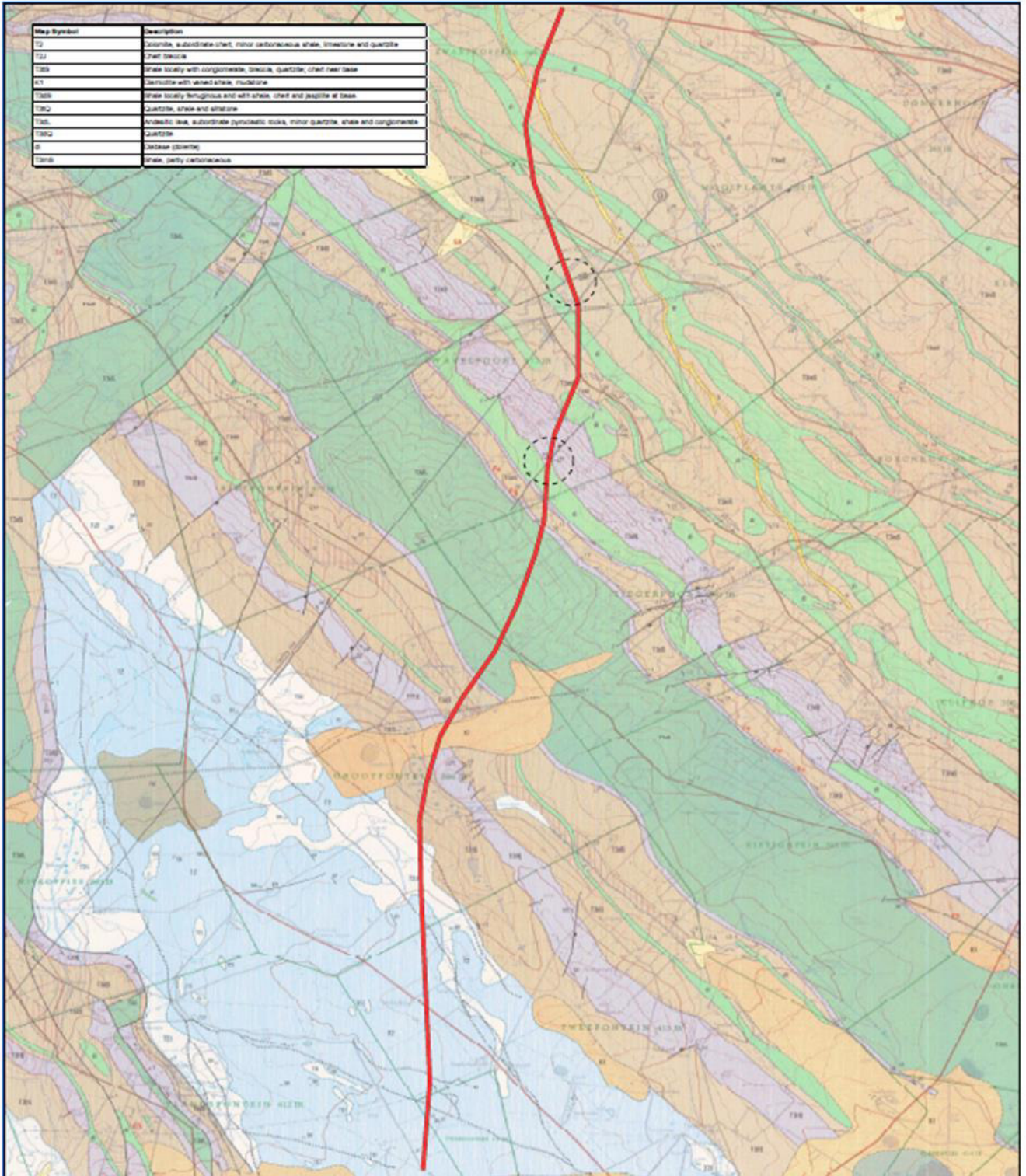
# Dolomite





# Geology

Map Symbol	Description
T2	Sandstone, subordinate chert, minor carbonaceous shale, limestone and quartzite
T2a	Chert lenses
T2b	Shale locally with conglomerate, sandstone, quartzite, chert near base
T1	Sandstone with shaly shale, mudstone
T2b1	Shale locally ferruginous and with shales, chert and quartzite at base
T2c	Quartzite, shale and siltstone
T2d	Andesitic lava, subordinate pyroclastic rocks, minor quartzite, shale and conglomerate
T2c2	Quartzite
D	Dike (granite)
T2b2	Shale, partly carbonaceous




Department of Public Transport, Roads and Works



Preliminary Design and Full Environmental Impact Assessment of PWV17

 PWV17 Alignment



 Geological Fault



10 Projection: WGS 84 AU

Disclaimer:

Data Source: Council for Geoscience, 1:50 000 Geological Map (GRCO, Revisited)

REVISION	DATE	DESCRIPTION	BY	CHECKED	DATE	APPROVED	DATE
001	2024-08-20	Initial Issue	ASL	ASL	2024-08-20	ASL	2024-08-20
002	2024-08-20	Revised	ASL	ASL	2024-08-20	ASL	2024-08-20
003	2024-08-20	Revised	ASL	ASL	2024-08-20	ASL	2024-08-20
004	2024-08-20	Revised	ASL	ASL	2024-08-20	ASL	2024-08-20
005	2024-08-20	Revised	ASL	ASL	2024-08-20	ASL	2024-08-20
006	2024-08-20	Revised	ASL	ASL	2024-08-20	ASL	2024-08-20
007	2024-08-20	Revised	ASL	ASL	2024-08-20	ASL	2024-08-20
008	2024-08-20	Revised	ASL	ASL	2024-08-20	ASL	2024-08-20
009	2024-08-20	Revised	ASL	ASL	2024-08-20	ASL	2024-08-20
010	2024-08-20	Revised	ASL	ASL	2024-08-20	ASL	2024-08-20

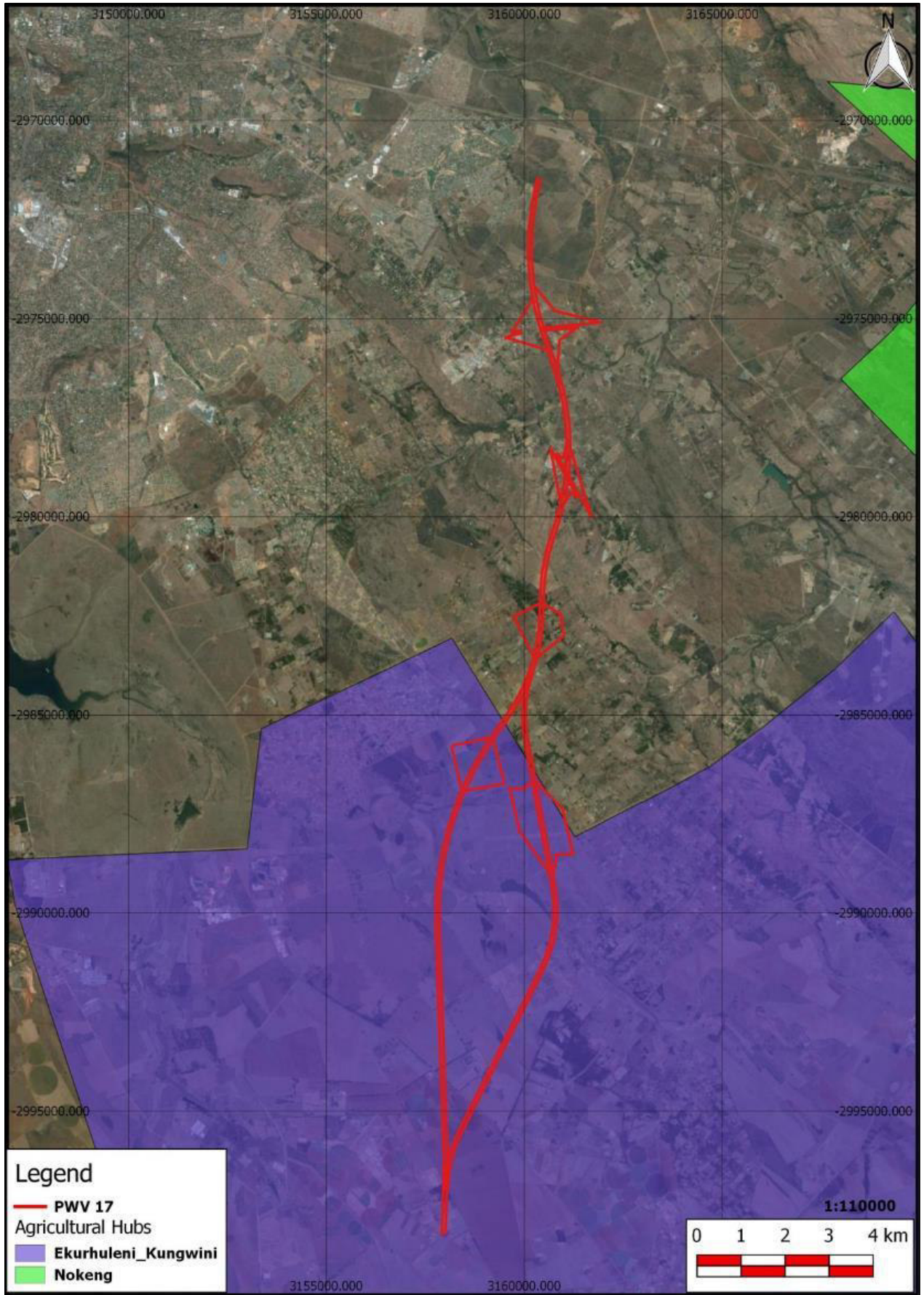
STATUS: FINAL

Figure No: 1

REVISION: A

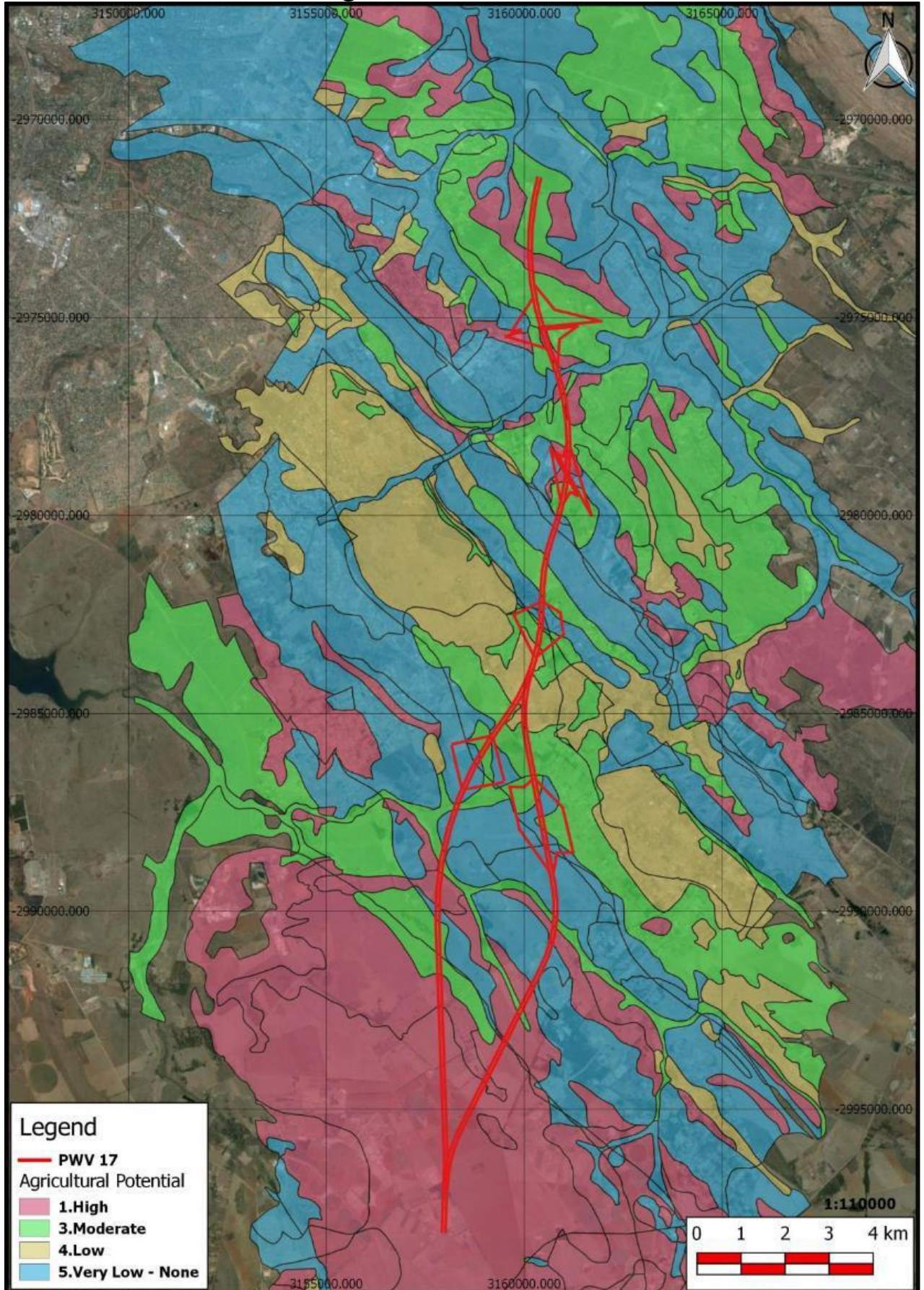


# Agricultural Hubs



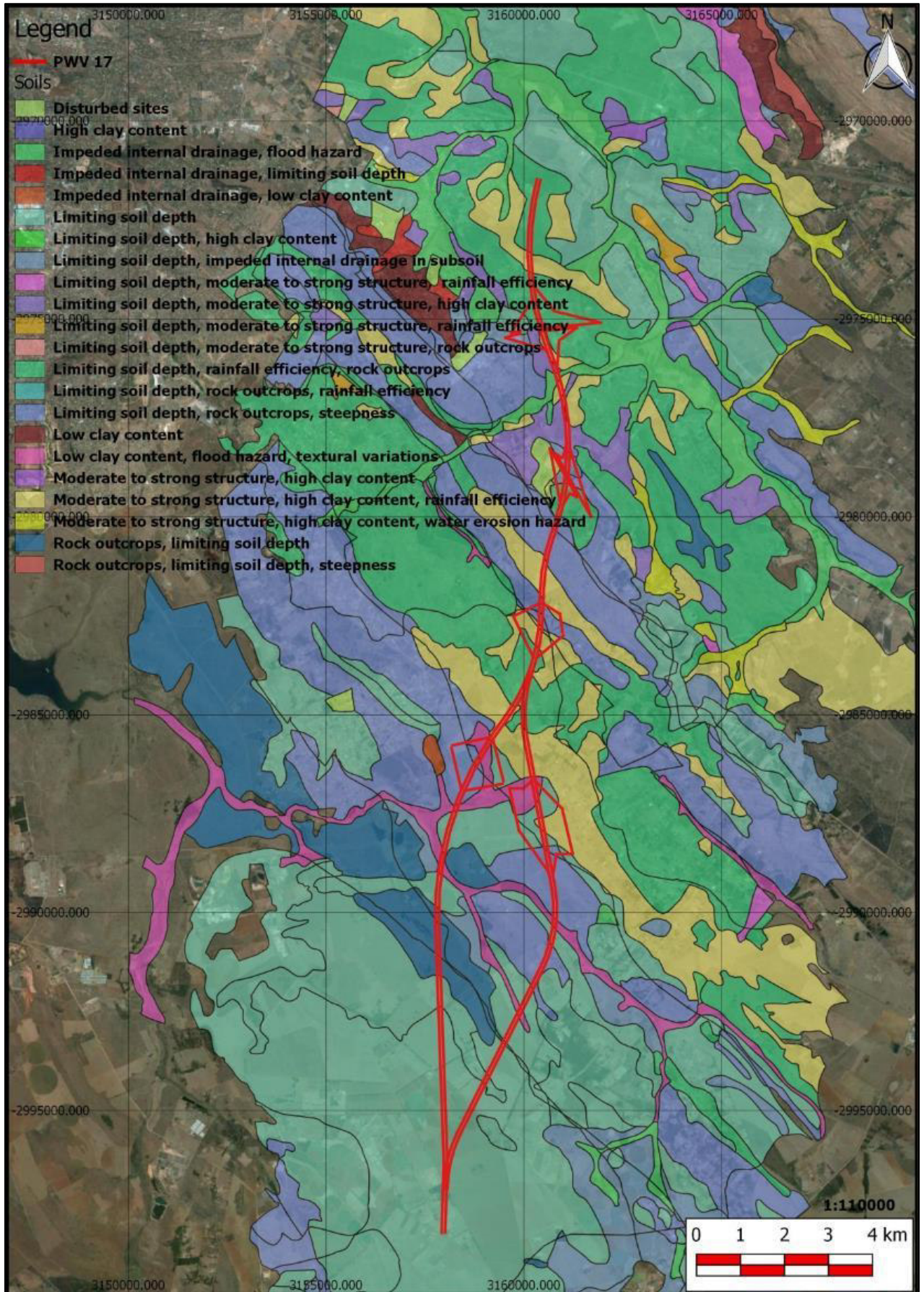


# Agricultural Potential



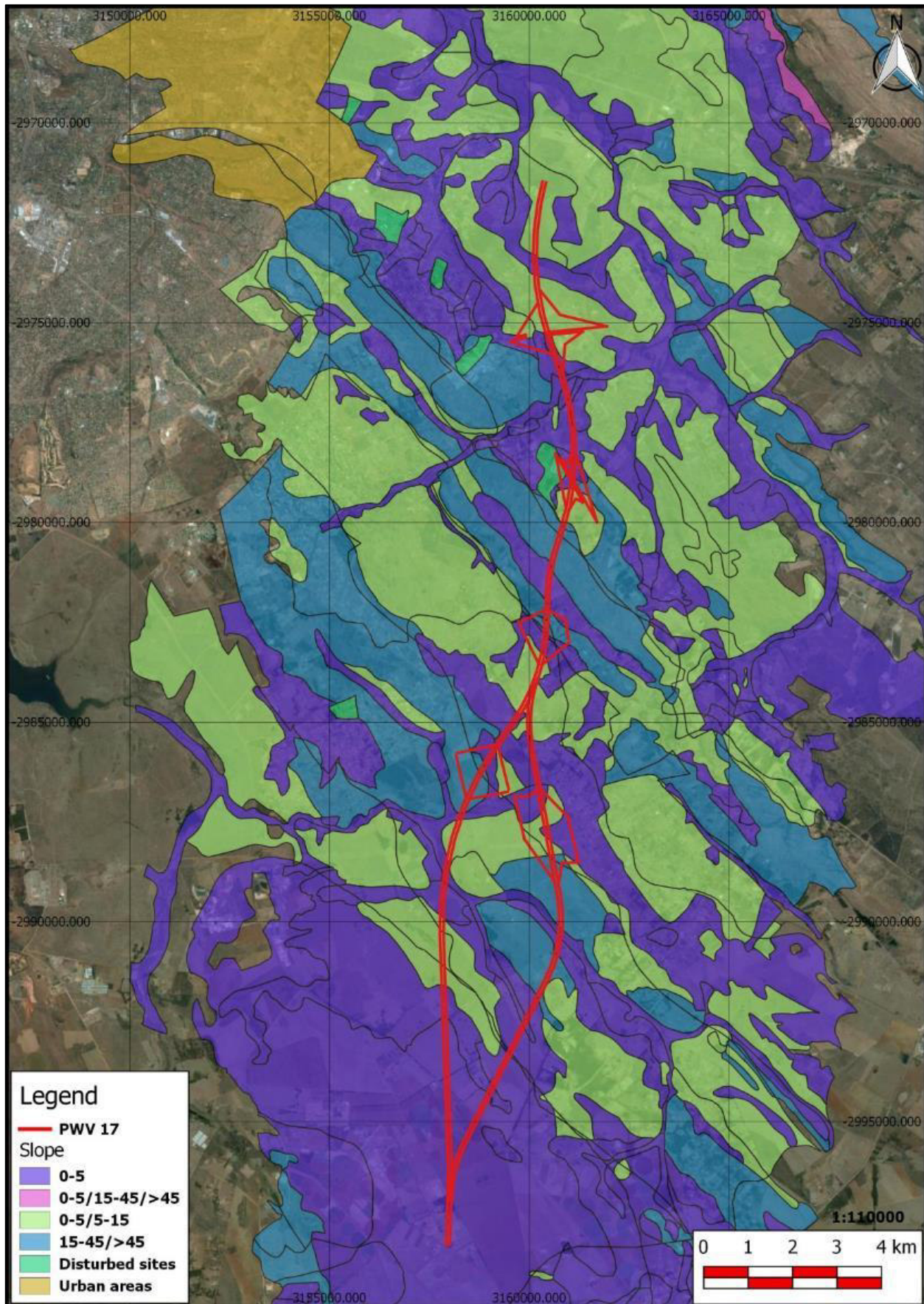


# Soils





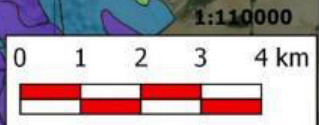


# Slope



## Legend

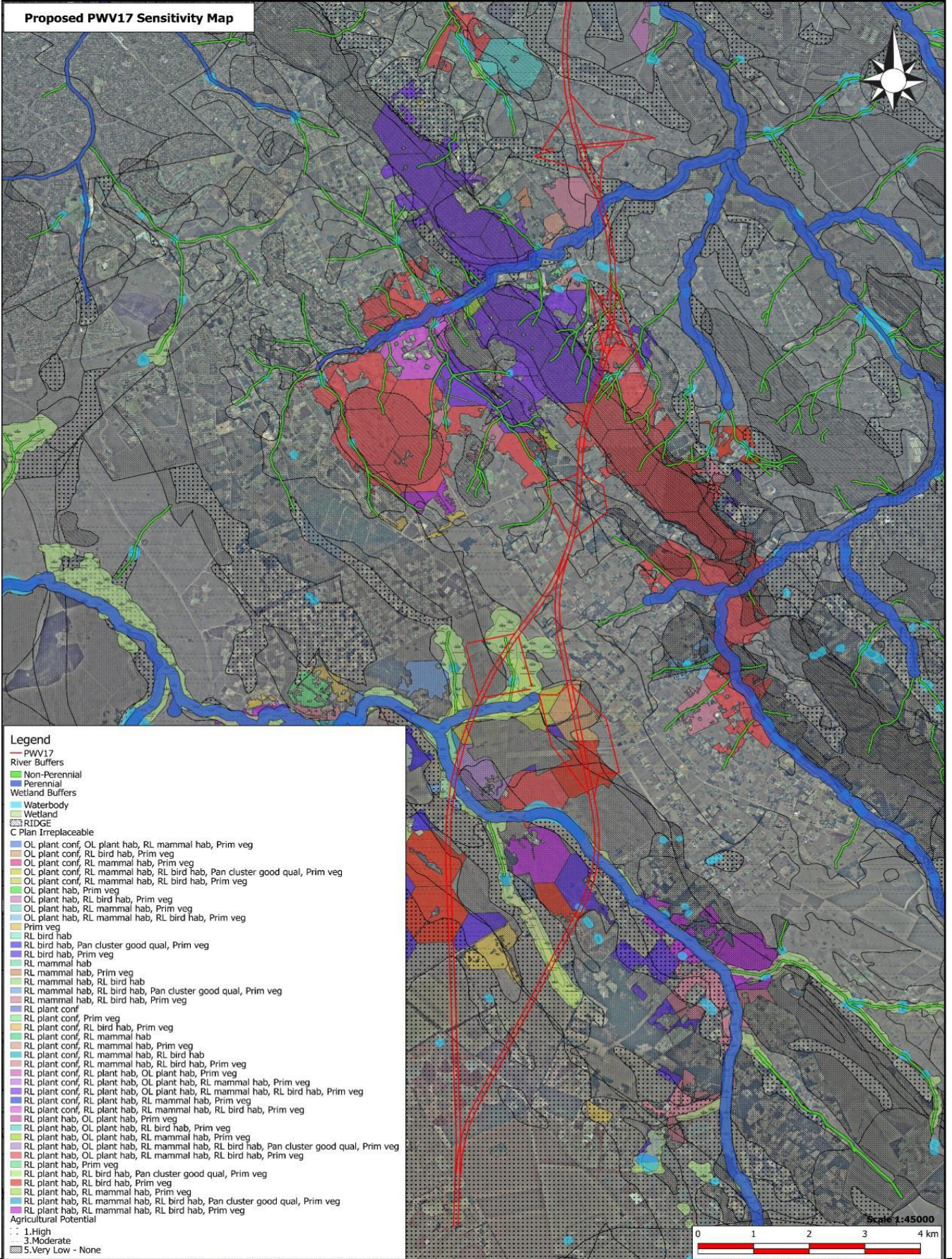
-  PWV 17
- Slope**
-  0-5
-  0-5/15-45/>45
-  0-5/5-15
-  15-45/>45
-  Disturbed sites
-  Urban areas





# Sensitivity Map

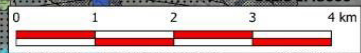
Proposed PWV17 Sensitivity Map



**Legend**

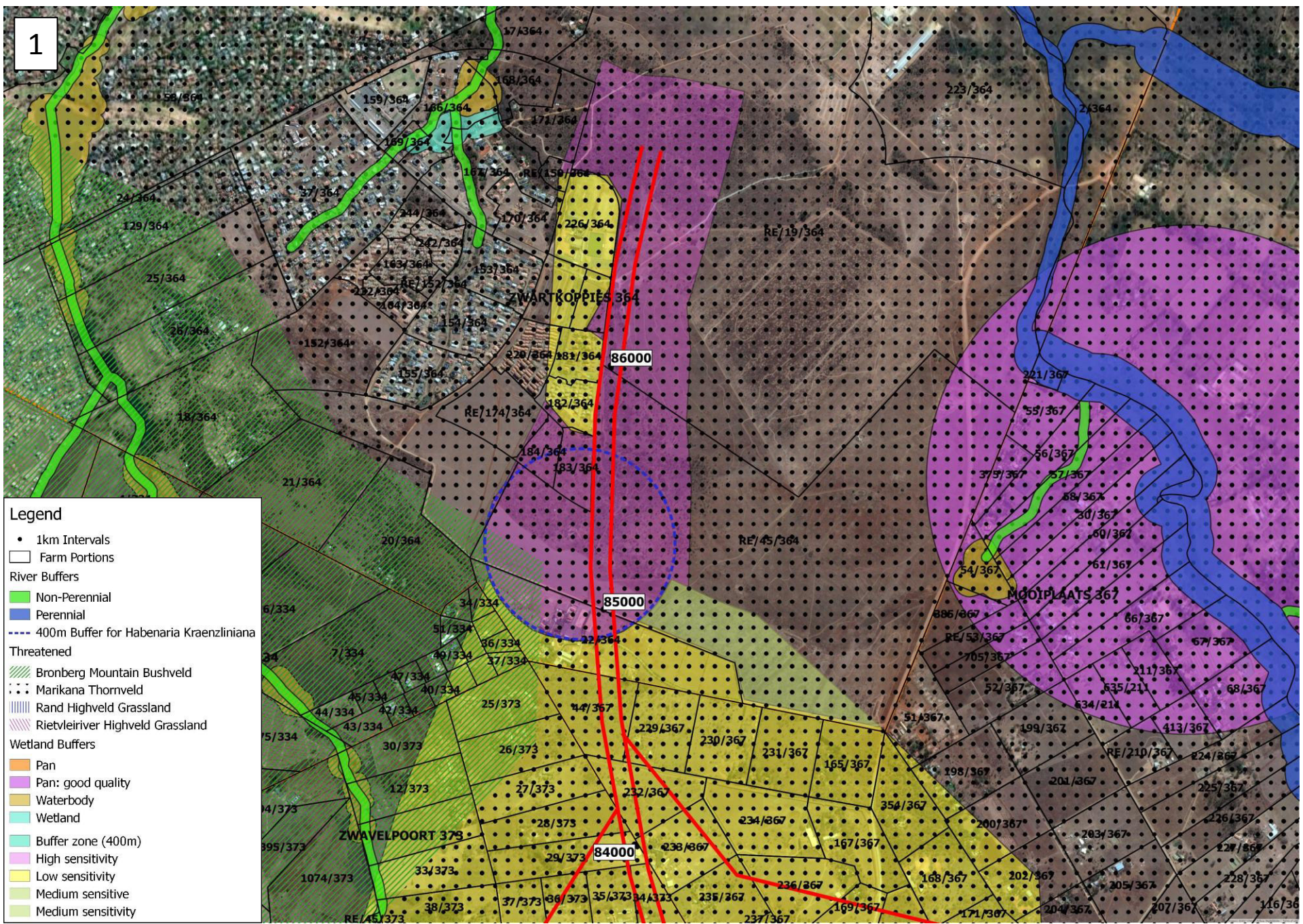
- PWV17
- River Buffers
- Non-Perennial
- Perennial
- Wetland Buffers
- Waterbody
- Wetland
- RIDGE
- Plan Irreplaceable
- OL plant conf, OL plant hab, RL mammal hab, Prim veg
- OL plant conf, RL bird hab, Prim veg
- OL plant conf, RL mammal hab, Prim veg
- OL plant conf, RL mammal hab, RL bird hab, Pan cluster good qual, Prim veg
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- Prim veg
- RL bird hab
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- RL plant hab, RL mammal hab, Prim veg
- RL plant hab, RL mammal hab, RL bird hab, Pan cluster good qual, Prim veg
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- Agricultural Potential
- 1.High
- 3.Moderate
- 5.Very Low - None

Scale 1:45000





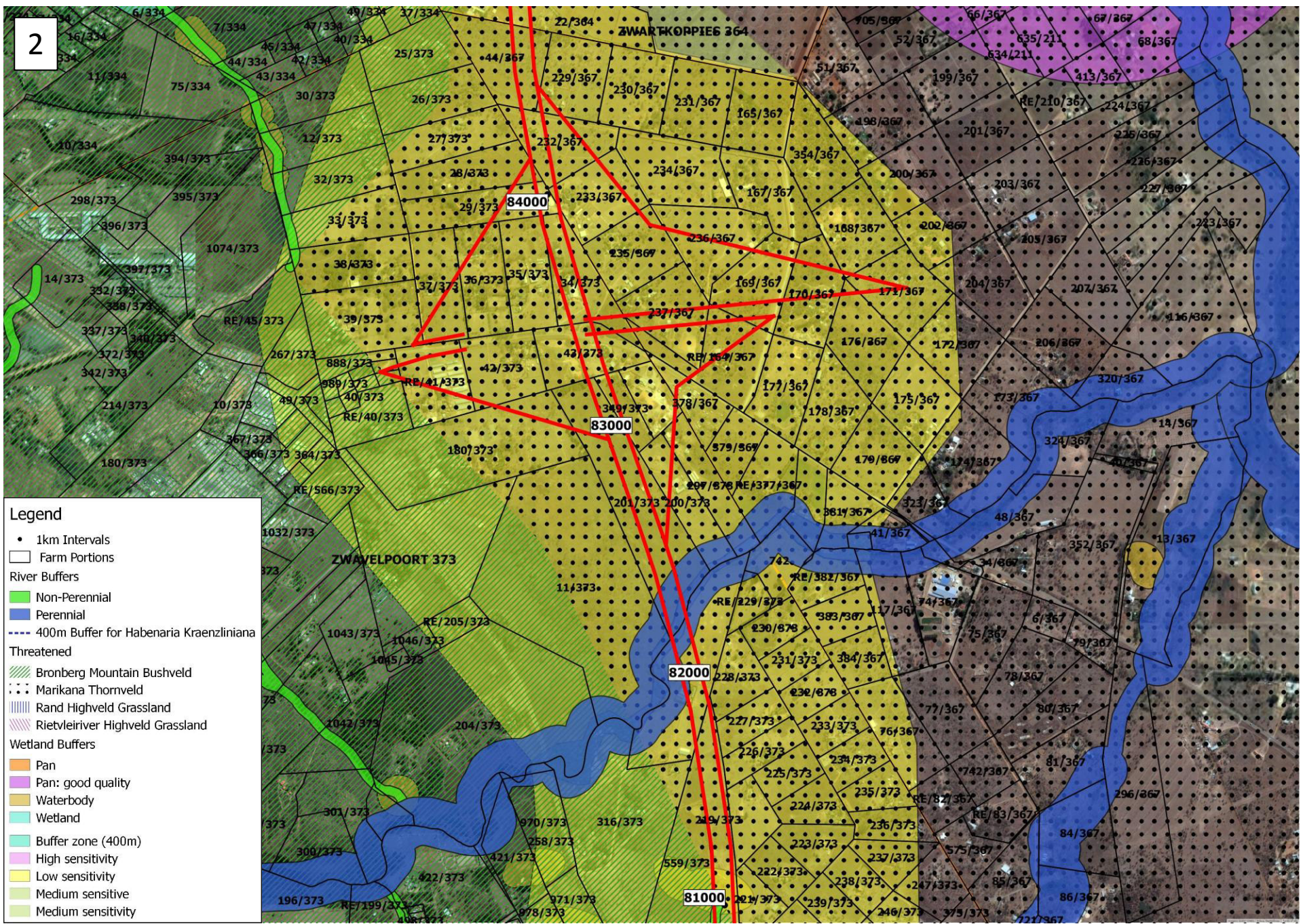
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**Legend**

- 1km Intervals
- Farm Portions
- River Buffers**
  - Non-Perennial
  - Perennial
  - 400m Buffer for *Habenaria Kraenzliniana*
- Threatened**
  - Bronberg Mountain Bushveld
  - Marikana Thornveld
  - Rand Highveld Grassland
  - Rietvleiriver Highveld Grassland
- Wetland Buffers**
  - Pan
  - Pan: good quality
  - Waterbody
  - Wetland
  - Buffer zone (400m)
  - High sensitivity
  - Low sensitivity
  - Medium sensitive
  - Medium sensitivity

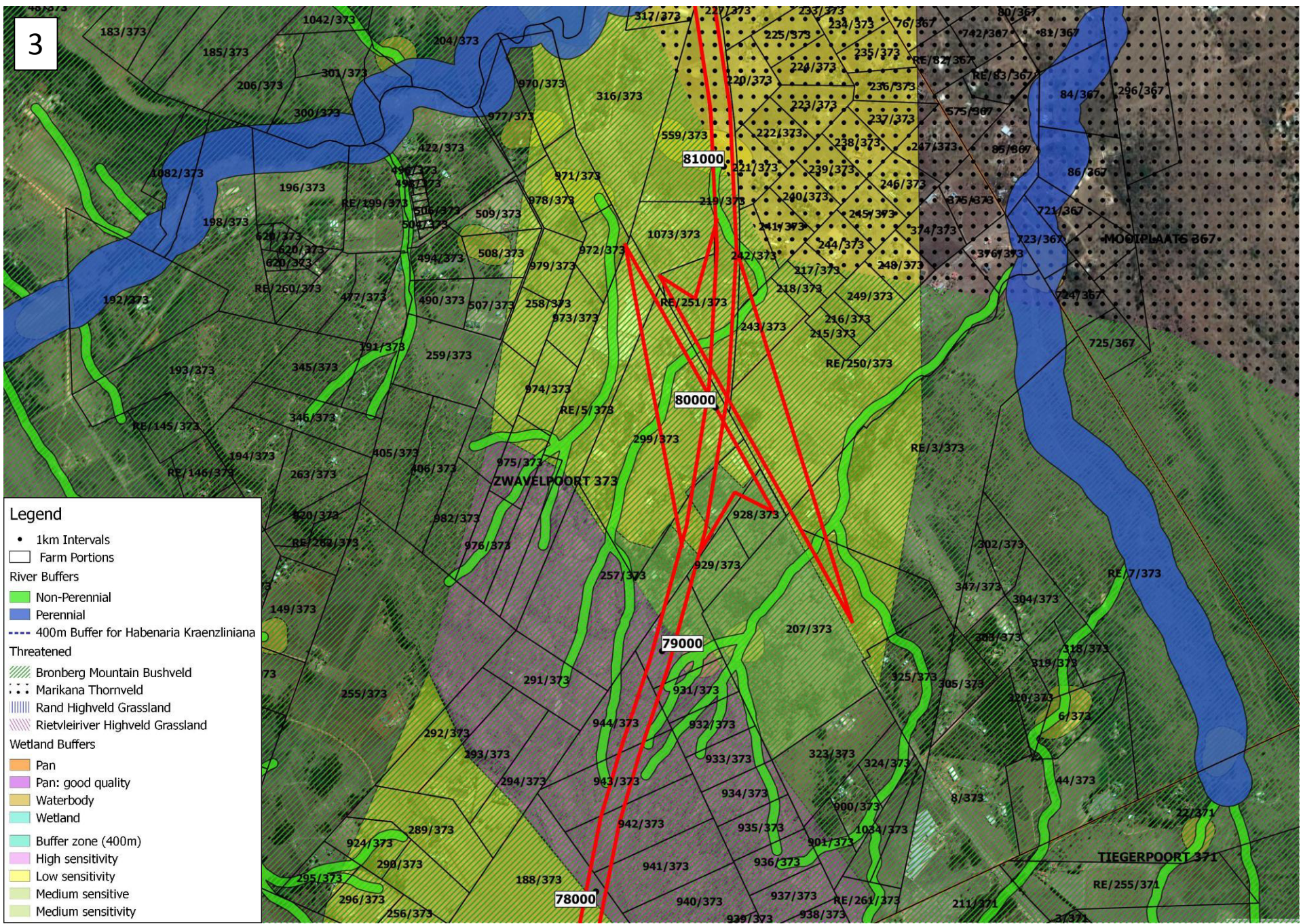




**Legend**

- 1km Intervals
- Farm Portions
- River Buffers**
  - Non-Perennial
  - Perennial
  - 400m Buffer for *Habenaria Kraenzliniana*
- Threatened**
  - ▨ Bronberg Mountain Bushveld
  - ▨ Marikana Thornveld
  - ▨ Rand Highveld Grassland
  - ▨ Rietvleiriver Highveld Grassland
- Wetland Buffers**
  - Pan
  - Pan: good quality
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  - Buffer zone (400m)
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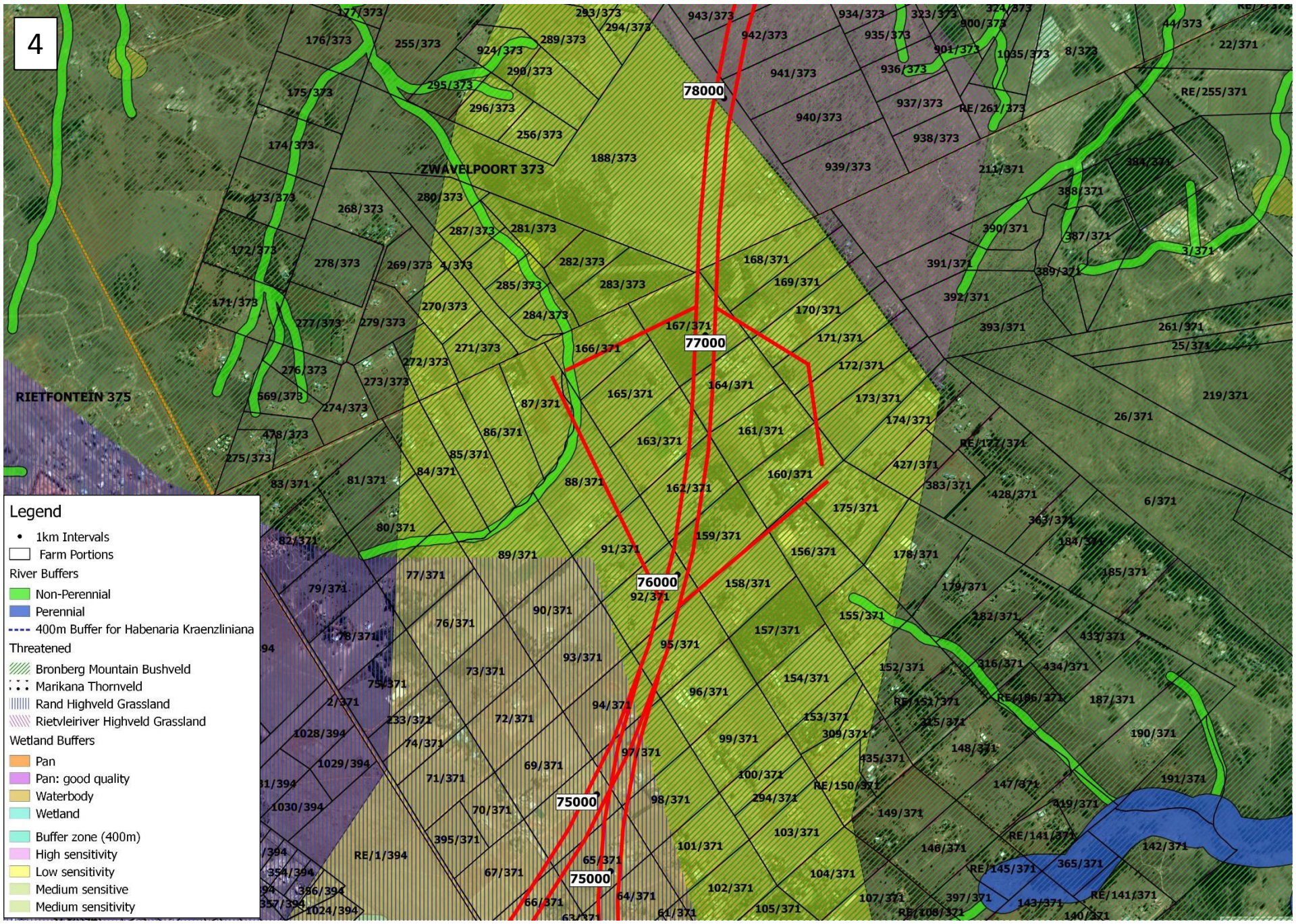




**Legend**

- 1km Intervals
- Farm Portions
- River Buffers**
  - Non-Perennial
  - Perennial
  - 400m Buffer for *Habenaria Kraenzliniana*
- Threatened**
  - ▨ Bronberg Mountain Bushveld
  - ▨ Marikana Thornveld
  - ▨ Rand Highveld Grassland
  - ▨ Rietvleiriver Highveld Grassland
- Wetland Buffers**
  - Pan
  - Pan: good quality
  - Waterbody
  - Wetland
  - Buffer zone (400m)
  - High sensitivity
  - Low sensitivity
  - Medium sensitive
  - Medium sensitivity





- Legend**
- 1km Intervals
  - Farm Portions
  - River Buffers**
    - Non-Perennial
    - Perennial
    - 400m Buffer for *Habenaria kraenzliniana*
  - Threatened**
    - ▨ Bronberg Mountain Bushveld
    - ▨ Marikana Thornveld
    - ▨ Rand Highveld Grassland
    - ▨ Rietvleiriver Highveld Grassland
  - Wetland Buffers**
    - Pan
    - Pan: good quality
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    - Wetland
    - Buffer zone (400m)
    - High sensitivity
    - Low sensitivity
    - Medium sensitive
    - Medium sensitivity