
Appendix D
ENVIRONMENTAL SCREENING REPORT



South Africa





**PRELIMINARY ROUTE DETERMINATION
ENVIRONMENTAL SCREENING REPORT**

OCTOBER 2019

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Abbreviations / Acronyms / Definitions

CA	Competent Authority
CBA	Critical Biodiversity Area
CRITICALLY ENDANGERED	When used in the context of the International Union for Conservation of Nature (IUCN) Red List, a taxon is classified as Critically Endangered when there is a very high risk of extinction in the wild in the immediate future
DWS	Department of Water and Sanitation
EIA	Environmental Impact Assessment
ENDANGERED	When used in the context of the IUCN Red List, a taxon is classified as Endangered when there is a very high risk of extinction in the wild in the immediate future
ESA	Ecological Support Area
GDARD	Gauteng Department of Agriculture and Rural Development
GIBB	GIBB Pty Ltd
GMA	Gautrain Management Agency
GNR	General Notice Regulations
GTIA	Gauteng Transport Infrastructure Act, 2001 (Act No. 8 of 2001)
KM	Kilometer
MM	Millimeter
NEMA	National Environmental Management Act
NEMA:AQA	National Environmental Management Act: Air Quality Act, 2004 (Act No. 39 of 2004)
NFEPA	National Freshwater Ecosystem Priority Areas
RIDGES	A ridge is defined by a topographic feature characterised by a slope of 5° or more (i.e. $\geq 8.8\%$, ≥ 1 in 11 gradient). Ridges therefore loosely refers to hills, koppies, mountains, kloofs, gorges, etc. The slope is the main characteristic defining these topographic features. All ridges in Gauteng has been categorised into Class 1, 2, 3 and 4. Classes are based on the percentage of the ridge that has been transformed and based on the 1994 CSIR/ARC Landcover data.

Class	Percentage Transformed
1	0-5% transformed
2	5-35% transformed
3	35-65% transformed
4	65-100% transformed

Urbanisation is the biggest threat to ridges and is the main cause of transformation. Encroaching alien vegetation, agriculture and mines/quarries are also responsible for the permanent transformation of ridge habitat. The situation does however not seem to be severe until the conservation status of ridges within the urban environment is taken into account. In 1994, only 38% of ridges in Johannesburg remained in a natural state, with 53% urbanised. It is therefore of high concern to prevent any future transformation of other ridges in the Johannesburg area since at least partial functioning of the ridges could be retained.

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Critical Biodiversity Areas are areas required to meet biodiversity targets for ecosystems, species and ecological processes, as identified in a systematic biodiversity plan. Ecological Support Areas are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of Critical Biodiversity Areas and/or in delivering ecosystem services. Critical Biodiversity Areas and Ecological Support Areas may be terrestrial or aquatic.

The primary purpose of a map of Critical Biodiversity Areas and Ecological Support Areas is to guide decision-making about where best to locate development. It should inform land-use planning, environmental assessment and authorisations, and natural resource management, by a range of sectors whose policies and decisions impact on biodiversity. It is the biodiversity sector's input into multi-sectoral planning and decision-making processes

VULNERABLE

When used in the context of the IUCN Red List, a taxon is classified as Vulnerable when facing a high risk of extinction in the wild in the immediate future

WATERCOURSE

Watercourse according to the National Environmental Management Act means:

- a) a river or spring;
 - b) a natural channel in which water flows regularly or intermittently;
 - c) a wetland, pan, lake or dam into which, or from which, water flows;
- and

- d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse as defined in the National Water Act, 1998 (Act No. 36 of 1998); and a reference to a watercourse includes where relevant, its bed and banks.

WULA

Water Use License Application

1 Introduction

GIBB Pty Ltd (GIBB) has been appointed by the Gautrain Management Agency (GMA) to conduct an environmental screening report for potential rail corridor routes in terms of the future expansion of rapid rail development in the Gauteng Province. i.e. The Gauteng Rapid Rail Integrated Network Extension.

The GMA's route determination and subsequent development (including Preliminary Design) of rail corridors is governed by the Gauteng Transport Infrastructure Act (Act 8 of 2001), as amended in 2003 (the GTIA). The GMA's overall vision for future rail development consists of various rail route options for consideration.

At this stage, the GMA will focus only on Phase 1 of the future rail development, which has been defined as the route linking the areas of Little Falls with Cosmo City, Randburg, Sandton and Marlboro. Phase 1 comprises a route length of approximately thirty-one (31) kilometres (km), five (5) stations as well as a train and bus maintenance depot located near Little Falls (Figure 1 and Figure 2: Locality Map). This screening report, therefore, focusses on the route from the Marlboro Station up to and including the Little Falls Station.

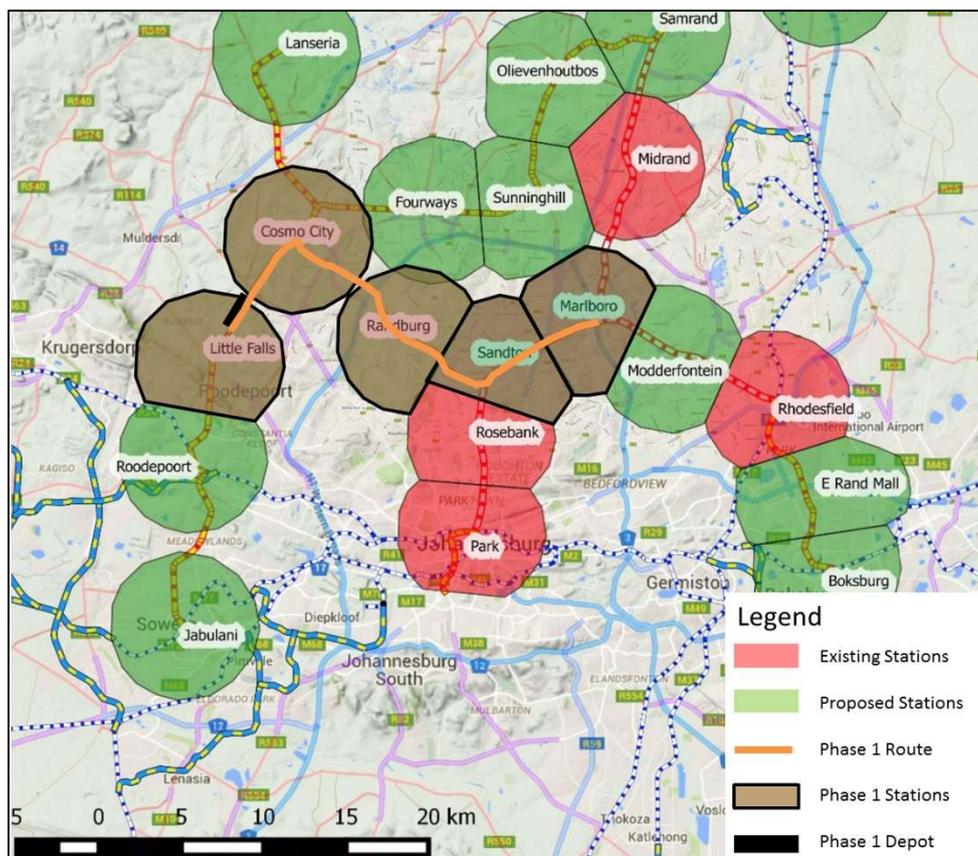


Figure 1: Phase 1 Route and Station Locations

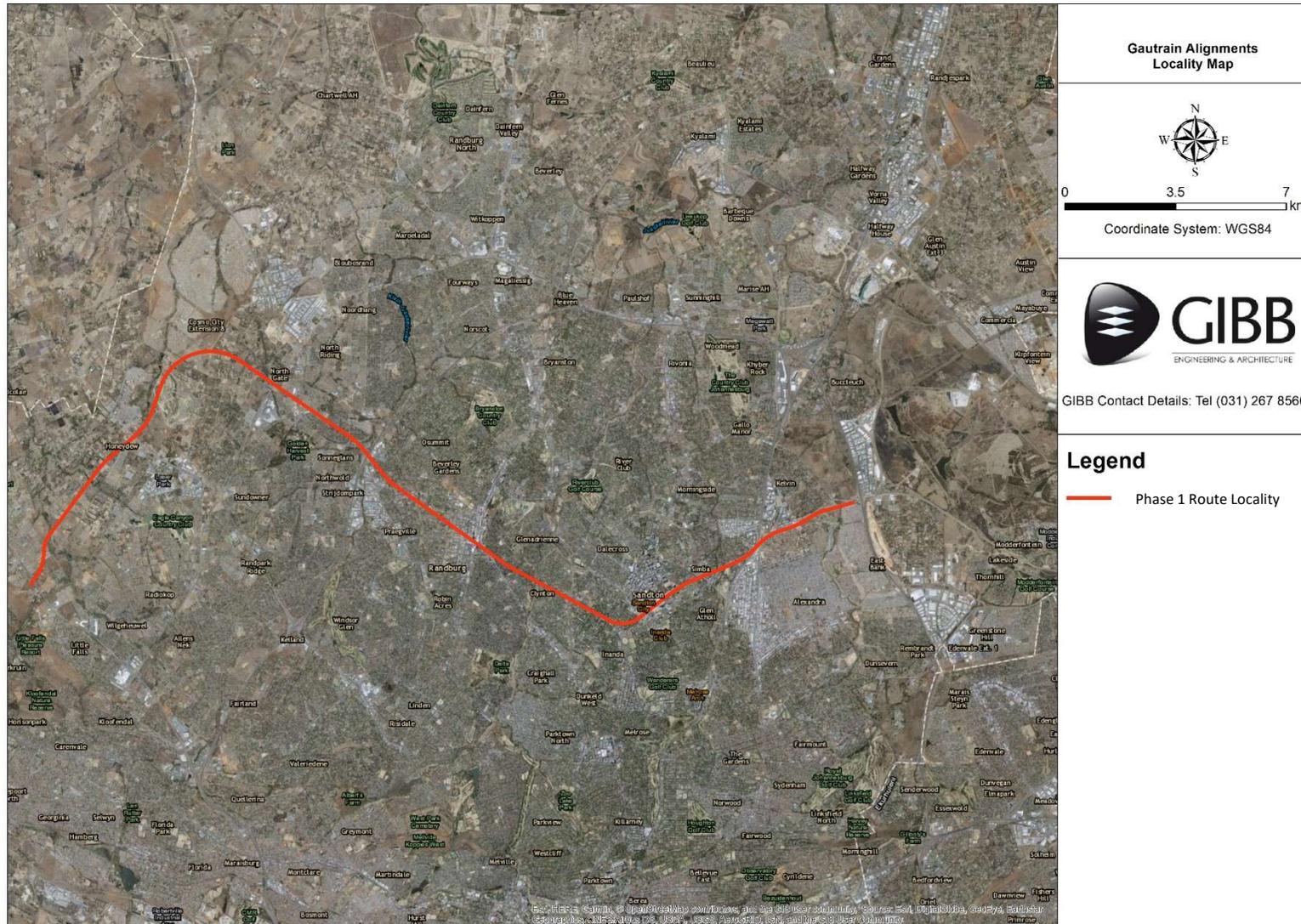


Figure 2: Locality Map

It is in terms of this route determination study, that participation and input from the Gauteng Department of Agriculture and Rural Development (the GDARD) will be subsequently sought. The motivation for the involvement of the GDARD is therefore not only due to the provisions made in the GTIA for the future involvement of a Competent Authority (CA), as identified in terms of section 22 of the Environmental Conservation Action Act or its corresponding section in the National Environmental Management Act 107 of 1998 (NEMA), but also by the application of the 'Duty of Care Principle' to the screening process.

1.1 National Development and the Gauteng Rapid Rail Integrated Network Extensions

The Gauteng Rapid Rail Integrated Network Extension needs to be contextualised within both national and international policies, as it provides insights into the South African Government's vision from a sustainable development perspective and provides insights into the importance that the South African Government places on environmental issues. An outcome of the Government's mandate in this regard is the National Development Plan: Vision for 2030 (NDP). The plan stipulates twelve (12) priority areas to eliminate poverty, create jobs and reduce inequality by 2030. Further to these twelve (12) priority areas, the NDP also acknowledges the need for "building environmental sustainability and resilience" and that change is needed to ensure the protection of the natural environment whilst enabling benefits for humans from natural resources (NPC, 2012¹).

In addition to the NDP, the South African Government has decided on fourteen (14) Outcomes, based on the Medium Term Strategic Framework (MTSF), as focus policy priority areas (RSA, 2014). A number of the Outcomes of the MTSF are of consequence in terms of the Gauteng Rapid Rail Integrated Network Extension E.g. Outcome 4: Economy, Outcome 6: Infrastructure, Outcome 8: Human Settlements, Outcome 10: Environment and Outcome 12: Public Service. Of particular interest to the context of this report is Outcome 10, which talks about: "Environmental assets and natural resources that are well protected and continually enhanced."

Outcome 10 makes specific reference to the obligation placed on the Government to give effect to the environmental right in the Constitution. The Constitution has entrenched environmental governance strongly in Section 24, which states that "Everyone has the right to an environment that is not harmful to their health or wellbeing and to have the environment protected through reasonable legislative measures". Five sub-outcomes have been identified in Outcome 10 (RSA, 2014²); all of which are relevant to this report:

- Sub-outcome 1: Ecosystems are sustained and natural resources are used efficiently;
- Sub-outcome 2: An effective climate change mitigation and adaptation response;
- Sub-outcome 3: An environmentally sustainable, low-carbon economy resulting from a well-managed just transition;
- Sub-outcome 4: Enhanced governance systems and capacity; and
- Sub-outcome 5: Sustainable human communities.

¹ NPC (National Planning Commission) (2012). National development plan 2030: Our future-make it work. Government of South Africa, South Africa

² RSA (Republic of South Africa) (2014). Medium-term strategic framework 2014-2019. South Africa



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It is clear from the above that the Gauteng Rapid Rail Integrated Network Extensions, therefore, has to, at its core, aim to help create sustainable connected human communities, prescribe to the principles of Duty of Care by sustaining ecosystems and ecosystem services and implement effective climate change mitigation and adaptation response within the framework of effective governance systems.

1.2 Other influences on Gauteng Rapid Rail Integrated Network Extensions

In 1987, the World Commission on Environment and Development defined sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their needs”; this statement immediately linked economic growth and development to environmental protection (UNCTAD, 1993)³ and therefore laid down the trajectory for a commitment towards sustainable development and led to the Millennium Development Goals (MDGs).

The Millennium Development Goals were an outcome of the Millennium Summit of the UN and sought to achieve eight goals by 2015, namely to eradicate extreme poverty and hunger; achieve universal primary education; promote gender equality and empower women; reduce child mortality, improve maternal health, combat HIV/AIDS, malaria and other communicable diseases; ensure environmental sustainability; and, to develop a global partnership for development. Thus, between 2000 and 2015, the MDGs were used as a framework for developing countries in trying to alleviate poverty. However, by the end of 2015, at least four (4) goals, namely reducing hunger, reducing child mortality, combating diseases and ensuring environmental sustainability; of the eight (8) MDGs were not met in the Southern African region (DEADP, 2017).

Continuing from the MDGs, an outcome of the RIO+20 summit held in Rio De Janeiro in 2012, was the establishment of the Sustainable Development Goals for the period 2015-2030. As such, the UN Sustainable Development Summit was instrumental in developing the “2030 Agenda for Sustainable Development” which includes a set of seventeen (17) Sustainable Development Goals (SDGs) (Figure 3) to end poverty, fight inequality and injustice and tackle climate change by 2030 (UN General Assembly, 2015)⁴.

The SDGs are much broader than the MDGs in scope. While recognising that poverty and hunger is still a major concern across the world, with an estimated 800 million still suffering from hunger world-wide (UN, 2015), the SDGs have expanded their area of impact. The SDGs, therefore, seek to include issues that can provide a more integrated approach to sustainable development.

Related to the Agenda 2030 and its associated SDGs is the concept of ‘green’ economy which has appeared increasingly in discourse particularly since the United Nations Conference on Sustainable

³ UNCTAD (United Nations Conference on Trade and Development) (1993). Sustainable Development for Ports, Standing Committee on developing Service Sectors Intergovernmental Groups of Experts on Ports, Geneva, Switzerland

⁴ UN General Assembly (2015). Transforming our world: The 2030 agenda for sustainable development. New York: UN General Assembly. Available from: www.un.org/ga/search/view_doc.asp?symbol=A/70/L.1&Lang=E



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Development in Rio de Janeiro (RIO+20) (Benson and Greenfield, 2012)⁵. According to the United Nations Environment Programme (UNEP, 2012)⁶ a green economy is “one that results in human well-being and spatial equity, while significantly reducing environmental risks and ecological scarcities”. Spatial equity and the creation of a connected and integrated society is of particular interest in terms of this project.



Figure 3: Sustainable Development Goals (Image: UNDP)

Within the African continent sustainable development is enshrined within Agenda 2063 which is a strategic framework promoting socio-economic transformation for the African continent up to 2063. Agenda 2063 envisions: “a prosperous continent where the citizens have a high standard of living, are well educated with a skilled labour force, transformed economies, productive agriculture and healthy ecosystems, with the well-preserved environment and a continent resilient to climate change” (African Union Commission, 2015)⁷.

The NDP, further recognises that South Africa needs to move away from unsustainable use of resources. In this regard, the NDP aims at transitioning to a low carbon economy in a cost-effective manner which remains consistent with current policies. Being a key national policy, the NDP has a target timeframe period similar to that of the SDG’s, which is 2030 (this 2030 timeframe of the NDP is reflected within other influential policy timeframes).

The Southern African Development Community (SADC) also recognises the importance of sustainable development, especially in the fight against poverty and food insecurity. A significant realisation is that economic development is interlinked with the concerns of the people as well as

⁵ Benson, E. and Greenfield, O. (2012). Surveying the ‘Green Economy’ and ‘Green Growth’ landscape. Green Economy Coalition, International Institute for Environment and Development

⁶ UNEP (United Nations Environmental Programme) (2012). Towards a Green Economy: Pathways to Sustainable Development and poverty eradication. available at: <https://sustainabledevelopment.un.org/index.php?page=view&type=400&nr=126&menu=35>

⁷ African Union Commission (2015). Agenda 2063: The Africa we want: A shared strategic framework for inclusive growth and development, first ten-year implementation plan 2014-2023



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the environment that people depend on. To address sustainable development, the SADC has thus identified three main goals (SADC, 2012)⁸:

- Protect and improve the health, environment and livelihoods of the people of southern Africa with priority to the poor majority;
- Reserve the natural heritage, biodiversity and life-supporting ecosystems in southern Africa; and
- Support regional economic development on an equitable and sustainable basis for the benefit of present and future generations.

South Africa's NDP is broadly aligned to the SDG's however there are areas that require capacity-building (WITS, 2016). These include food security and sustainable agriculture, gender equality, green industrialisation, labour rights and working conditions, and other issues related to social, political, economic inclusion and equality of access to opportunities (WITS, 2016).

It should be noted that researchers such as Lorek *et al.* (2013) are of the view that "In 1992, one unambiguous result of the UNCED conference was the need for changing consumption and production patterns, with affluent countries taking the lead. Twenty years later, at the 2012 UNCS, little is left over and instead the 'green economy' has been the theme pursued by the OECD, the EU and other countries. So the question needs to be answered if this is finally an attempt to put into practice what was promised twenty years ago, or another diversion from what needs to be accomplished. Sustainable development is still a convincing concept, if the original definition is taken, avoiding the confusion caused by partisan interests reinterpreting the concept. Focussing on human needs fulfilment and respecting environmental limits, it can still guide strong sustainable consumption. Green economy/green growth, on the other hand, is new terminology for what has been known for forty (40) years as ecological modernisation. It is indeed overdue, but with its focus on efficiency and innovation it cannot guarantee to fulfil the Brundtland sustainability criteria."

It is however also useful to consider that where the SDGs are the elements to be achieved towards sustainable development, the majority consensus is that the green economy is a means by which to do it. As such the green economy has identified a number of priorities that demands an economy that is low-carbon, resource-efficient and socially inclusive, reduces pollution and waste, enhances energy and resource use efficiency, and prevents biodiversity degradation and the loss of ecosystem services (UNEP, 2012).

Lastly, in The Green Book compiled by the Centre for Scientific and Industrial Research (CSIR)(CSIR, 2019)⁹, the CSIR and its partners investigated the anticipated impact that a changing climate and growing urban population will have on the settlements and key resources of South Africa. The research predicts that in Africa, whilst the urban population grew from 15% of the total population in 1960 to over 40% in 2010, it is predicted to exceed 60% by 2050. South Africa is expected to

⁸ SADC (Southern African Development Community) (2012). Environment and sustainable development. Available from: <https://www.sadc.int/issues/environment-sustainable-development/>

⁹ Le Roux, A., Arnold, K., Makhanya, S. & Mans, G. 2019. Green Book. South Africa's urban future: Growth projections for 2050. Pretoria: CSIR. Available at: <https://pta-gis-2-web1.csir.co.za/portal/apps/GBCascade/index.html>



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follow this trend and experience high population growth and urbanisation as illustrated in Figure 4 below.

Five (5) of South Africa's eight (8) Metropolitan Municipalities are thus expected to experience high population growth and increases in population pressure, these include:

- City of Cape Town;
- City of Johannesburg;
- City of Tshwane (Pretoria);
- Nelson Mandela Bay (Port Elizabeth); and
- City of Ekurhuleni (CSIR, 2019).

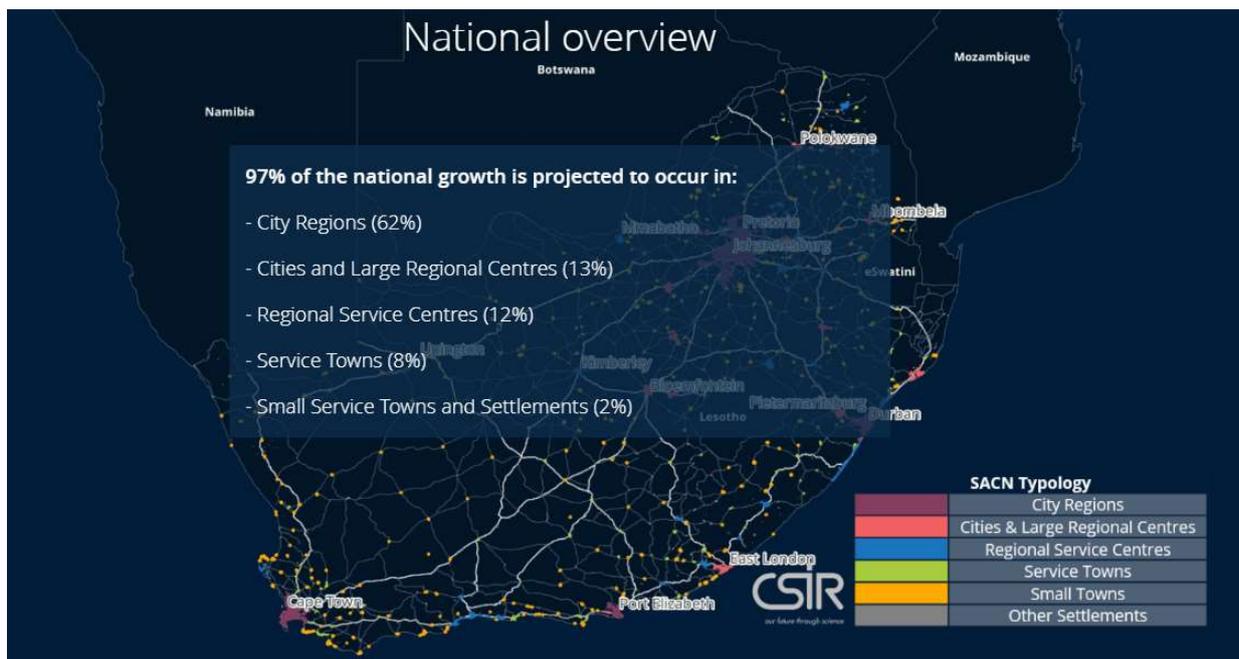


Figure 4: Predicted National Population Growth by 2050 (CSIR, 2019)

The City of Johannesburg Metropolitan Municipality, as the fastest-growing municipality in Gauteng, is projected to grow by 84% (3.6 million people) by 2050. The City of Tshwane Metropolitan Municipality is projected to grow by 76% (2.2 million people), followed by Ekurhuleni Metropolitan Municipality which will grow by 60% (1.7 million people).

The Green Book (CSIR, 2019) further expands on the settlement vulnerability of the various municipalities. Figure 5: City of Johannesburg Settlement Vulnerability (CSIR, 2019) is a visual representation of settlement vulnerability of the City of Johannesburg in terms of six (6) composite indicators e.g. low access to services, high socio-economic vulnerabilities, poor regional connectivity, environmental pressure or high economic pressures. This allows for an investigation of the relative vulnerabilities of settlements within a specific local municipality.



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Based on the risk profile the Green Book proposes a range of planning and design actions can be taken by the municipality to adapt to the impacts of climate change, reduce exposure to hazards, and exploit opportunities for sustainable development. Two of these actions are to:

- Protect critical infrastructure; and
- Connect key transit nodes.

It is recommended that key transit nodes are connected to support climate resilience and disaster response. The creation of compact, connected and well-arranged settlements that allow for short distances and climate-friendly mobility options to decrease the transport cost burden is preferred.

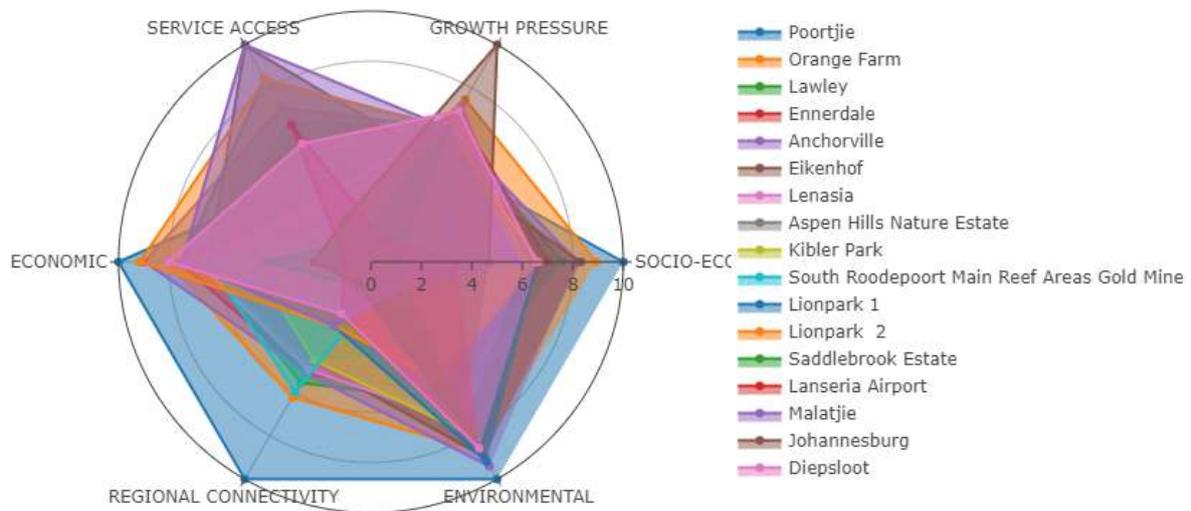


Figure 5: City of Johannesburg Settlement Vulnerability (CSIR, 2019)

In terms of the maintenance and protection of transportation infrastructure, including roads, railways, ports and airports, it is concluded that these types of infrastructure are especially vulnerable to flooding and heat stress which can disrupt services and significantly damage infrastructure. Planning, design, operations, maintenance, and emergency management processes may all, therefore, require adjustments to adequately address current and anticipated changes in climate.

1.3 Environmental Screening as Tool

Environmental screening is a systematic tool which assists in the identification of the various licence application processes that need to be adhered to, specialist studies that require commissioning and the potential environmental fatal flaws of the proposed project at a planning stage.

The advantage of the environmental screening process is to identify and address environmental fatal flaws as early as possible in the environmental life cycle of the project in order to prevent



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delays in the future. Certain environmental characteristics are often limiting factors when considering locations for development. Such characteristics could include unsuitable topography, heritage artefacts, endangered ecosystems (e.g. wetlands), endangered habitats (e.g. specific habitat of vegetation ensuring the survival of endangered species) or Endangered or Critically Endangered species (flora and fauna), the presence or close proximity of sensitive communities, negative impacts on water sources, or pollution in some form. These characteristics can be investigated through the review of desktop sources of information. Project teams can also undertake a high-level site inspection to observe all relevant features of the receiving environment within the study area.

The identification of the aspects of the receiving environment is facilitated through desktop and Geographic Information System (GIS) analysis in conjunction with an environmental legislative screening. The information obtained through the desktop and GIS analysis is used to compile the environmental fatal flaw analysis, in other words, to identify any features that will unequivocally prevent the development of infrastructure within the study area. Information gathered from the GIS mapping exercise particularly aids in the identification of potential fatal flaws, as well as to inform the design of the proposed projects, for the purpose of minimising adverse environmental impacts. The Department of Environment, Forestry and Fisheries' (DEFF) (previously the Department of Environmental Affairs) Screening Tool will be utilised to feed into screening report for the proposed routes in terms of Regulation 16(1)(b)(v) of General Notice Regulations (GNR) 982 of the EIA Regulations 2014, as amended.

Lastly, the understanding of the requirements of environmental regulations and legislation and the limitations they impose on development is vital for the proposed project. In this phase, the project team can assess relevant environmental legislation as well as national and international conservation, biodiversity and sustainable development guiding principles.

1.4 Site Description

As described by SMEC et al, (2016)¹⁰ the proposed routes are located in the Gauteng Province, within the City of Johannesburg Metropolitan Municipality. Large parts of the broader area have been transformed by urban/built-up areas cultivation and mining activities. The routes traverse the Savanna and Grassland Biome and several vegetation units are present within the broader area. The seven most prominent include; the Marikana Thornveld, the Andesite Mountain Bushveld, the Rand Highveld Grassland, the Carletonville Dolomite Grassland, the Egoli Granite Grassland, the Gold Reef Mountain Bushveld and the Soweto Highveld Grassland. Thicket, bushland and woodland are found in the northern reaches of the route within the Savanna biome, and grassland occurs throughout the rest of the proposed study area.

The terrain along the proposed route is characterised by a variety of forms which includes pans, flat plains and undulating plains, as well as some undulating hills, mountains and tall hills. The general

¹⁰ Feasibility Study for Possible Rapid Rail Extensions to the Gauteng Network, 2016, SMEC, Deloitte & CDH



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topography slopes down in northerly direction with the surface elevation ranging from approximately 1750m to 1250m above sea level.

1.5 Preliminary Routes Alternatives

Three alternative routes were initially proposed for assessment. These included the preferred route identified by a SMEC *et al* (2016) in addition to two alternate routes. Two additional routes were thereafter added for assessment and after an initial GIS exercise, a sixth route was added. The routes are therefore entitled Alternative 1, Alternative 2, Alternative 3, Alternative 4, Alternative 5 and Alternative 6.

The routes are all located within a corridor which, at its minimum, is approximately 600m wide and at its maximum approximately 1.8km. This width includes a 300m buffer added to the centre line of the northernmost and southernmost route. Please refer to Section 2 for a detailed discussion of the findings.

1.6 Receiving Environment

1.6.1 Location and Topography

The City of Johannesburg Metropolitan Municipality is located on the north-eastern plateau of South Africa known as the Highveld, at an elevation of approximately 1700m above sea level, within the Province of Gauteng¹¹

The identified routes are made up of a third of urban residential areas, with lower percentages accrued to grassland and thicket/dense bush respectively. Urban townships and urban commercial areas account for the remainder of the land cover within the identified routes, with minimal cover attributed to wetlands, woodlands/open bush and plantations/woodlots.

1.6.2 Climate

The City enjoys a fairly dry and sunny climate. Temperatures in Johannesburg are usually relatively mild due to the City's high altitude, with an average maximum daytime temperature of 25 °C in the summer, dropping to around 17 °C in winter. In winter the temperature intermittently drops to below freezing at night, causing frost. Snow is a rare occurrence, having been recorded on six occasions in the past 60 years. The City is located in the summer rainfall region of South Africa with a very clear seasonal cycle; rain events characteristically occur in the form of late afternoon downpours in the months of October to April, although infrequent showers do occur through the course of the winter months. The annual average rainfall is 713 millimetres, predominantly concentrated in the summer months¹².

The average hourly wind speed in Johannesburg experiences significant seasonal variation over the course of the year. The windier part of the year lasts for 4.1 months, from July 30 to December 2,

¹¹ Climate Change Adaptation Plan, 2009, City of Johannesburg Metropolitan Municipality

¹² Climate Change Adaptation Plan, 2009, City of Johannesburg Metropolitan Municipality



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with average wind speeds of more than 3.6 meters per second. The calmer time of year lasts for 7.9 months, from December 2 to July 30.¹³

1.6.3 Geology

According to the Gauteng Provincial Environmental Management Framework (2014), the geology of the Gauteng Province (including the City of Johannesburg Metropolitan Municipality) forms the foundation for the development of the landscape, soils and vegetation cover that developed upon it over millions of years. It is also the source of minerals that form an important part of the economy of the area.¹⁴ The most important geological event that took place in the province was the formation of the Witwatersrand Supergroup. Over time, the sediments formed the prominent quartzite hills and shale valleys around Pretoria of which the Magaliesberg is the most prominent. As indicated in the Gauteng Provincial Environmental Management Framework (2014), the City of Johannesburg Metropolitan Municipality comprises mostly of quartzite and granite dominated geological formations.

1.7 Legislative Framework

This section includes a review of the legislation and policy guidelines identified as pertinent to environmental screening for the proposed development. The proposed development has been screened against the requirements of the following legislation:

- The Constitution, 1996 (Act No. 108 of 1996);
- National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998) as amended; including associated published guidelines;
- Environmental Impact Assessment Regulations, 2014 (as amended);
- National Environmental Management: Waste Act (NEM: WA), 2008 (Act No. 59 of 2008);
- National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004);
- National Water Act, 1998 (Act No. 36 of 1998);
- National Heritage Resources Act, 1999 (Act No. 25 of 1999);
- National Environment Management: Biodiversity Act, 2004 (Act No. 10 of 2004);
- Gauteng Transport Infrastructure Act, 2001 (Act No. 8 of 2001, amended 2003);
- Occupational Health and Safety Act, 1993 (Act No.85 of 1993);
- Climate Change Bill, 2018;
- Green Transport Strategy;
- Gauteng Environmental Management Framework; and
- Municipal Bylaws and associated requirements for Trade Permits.

Section 1.8 below details the applicability of the legislation to the project.

¹³ <https://weatherspark.com/y/95256/Average-Weather-in-Johannesburg-South-Africa-Year-Round>

¹⁴ Gauteng Provincial Environmental Management Framework, 2014, Environomics



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1.8 Impacts of Legislation on the Proposed Project

LEGISLATION	APPLICABILITY TO THE PROJECT
<p>The Constitution of the Republic of South Africa, Section 24 (Environmental Right):</p>	<p>1) Everyone has the right</p> <p>a) to an environment that is not harmful to their health or well-being; and</p> <p>b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:</p> <p>i) prevent pollution and ecological degradation;</p> <p>ii) promote conservation; and</p> <p>iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.”</p> <p>In light of this development and potential impacts on the environment, the provisions of the constitution need to be supported. By applying the principles of Duty of Care and undertaking a full EIA for the proposed development, these provisions will be addressed.</p>
<p>National Environmental Management Act, 1998 (Act no. 107 of 1998) (NEMA) and EIA Regulations, 2014.</p>	<p>NEMA is the key environmental management legislation and states in section 2(4)(k) that “the environment is held in public trust for the people, the beneficial use of resources must serve the public interest and the environment must be protected as the people’s common heritage” thereby paving the way for an EIA process to assess developments that may have a harmful impact on the environment.</p> <p>Section 28 of NEMA ensures that environmental screening is incorporated into each activity, although it is not formally termed as such. Section 28 (1) imposes a duty which requires that:</p> <p>“Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment”.</p> <p>The EIA regulations describe the EIA process to be followed including the Public Participation Process and the Listed Activities that may have a harmful impact on the environment and must be assessed. For the purpose of this project, a full EIA and associated specialist studies will be required.</p>
<p>National Environmental Management: Waste Act, 2008 (Act no. 59 of 2008) (NEM: WA)</p>	<p>This Act provides for regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation. Also to provide for national norms and standards for regulating the management of waste by all spheres of government; to provide for specific waste management measures; to provide for the licensing and control of waste management activities.</p> <p>Although none of the proposed activities is likely to trigger activities in terms of the Waste Act, waste will still be generated during construction and needs to be managed accordingly. By undertaking an EIA and associated EMPr, certain mitigation measures will be implemented to reduce the potential impacts of waste generation in all its forms.</p>
<p>National Environmental Management: Air Quality Act, 2004 (Act no. 39 of 2004); (NEM: AQA)</p>	<p>Whilst the proposed development is unlikely to trigger a Listed Activity in terms of section 21 of the NEM: AQA, consideration must be given to any potential activities that are believed to have a significant detrimental effect on the environment. No person may conduct an activity so listed without a provisional atmospheric emission license.</p>
<p>National Environmental Management: Air Quality Act, 2004 (Act no. 39 of 2004) – National Dust Control Regulations</p>	<p>The purpose of the regulations is to prescribe general measures for the control of dust in all areas.</p> <p>The proposed development will generate dust emissions during the construction phase, which must fall within the dustfall standard of the particular land use.</p>
<p>National Water Act, 1998 (Act no. 36 of 1998) (NWA)</p>	<p>This Act provides for the protection and management of water resources. A Water Use License Application (WULA) is made to authorise water use activities pertaining to the altering of the bed, bank, course and characteristics of the watercourse and for the abstraction of water for use during the operational phases (where applicable).</p> <p>The GMA will be required to register the respective water uses as a result of the proposed development.</p>
<p>National Heritage Resources Act, 1999 (Act No. 25 of 1999); (NHRA)</p>	<p>The NHRA serves to introduce an integrated and interactive system for the identification, assessment and management of the heritage resources of South Africa. The NHRA promotes good governance and the empowerment of civil society to preserve their heritage for future generations and sets out the principles of heritage resource management whilst making provision for legislation protecting national heritage</p> <p>The GMA will be required to obtain authorisation from the South African Heritage Resources Agency.</p>



LEGISLATION	APPLICABILITY TO THE PROJECT
National Environmental Management: Biodiversity Act, 2004 (Act no. 10 of 2004) (NEM: BA)	<p>The Biodiversity Act provides for the management and protection of the country's biodiversity within the framework established by NEMA. It provides for the protection of species and ecosystems in need of protection, sustainable use of indigenous biological resources, and equity in bio-prospecting.</p> <p>In terms of fauna (wildlife) occurring at the site, at the time of the site visit a few locally common bird species were observed. No large mammal species, rare or threatened species were observed during the site visit, however, there is a possibility that some of these could potentially utilise the wetland and ridge habitats. This would need to be further investigated by a specialist.</p> <p>The GMA would need to appoint an Ecological specialist in order to determine the potential threat to biodiversity.</p>
Occupational Health and Safety Act, 1993 (Act no. 85 of 1993) (OHSA)	<p>While consideration for management of health and safety falls outside the purpose of this document, there are a number of overlaps and synergies that are relevant in terms of environmental management.</p> <p>The OHS Act imposes various duties on employers. This includes ensuring the health and safety of their employees, including taking steps as may be reasonably practicable to eliminate or mitigate any hazard or potential hazard to the health and safety of their employees, providing the necessary information, instructions, training and supervision, as well as not permitting any employee to do any work or to produce, process, use, store, handle or transport any article or substance or to operate any plant or machinery unless the precautionary measures have been taken.</p> <p>In addition, there is a veritable myriad of regulations promulgated under the OHS Act which may have relevance to the depot project and stations, with regard to safe working conditions in that context. They include the General Administrative Regulations, General Safety Regulations, Construction Regulations and the Environmental Regulations for Workplaces.</p> <p>The GMA needs to consider the general duties of employers to their employees with regards to Health and Safety. The GMA will also need to consider the general duties of employers and self-employed persons to persons other than their employees.</p>
Gauteng Transport Infrastructure Act, 2001 (Act No. 8 of 2001, amended 2003)	<p>Part 2, Section 6 (1) (2) and (3) of the Infrastructure Act reads as follows:</p> <p><i>Part 2: Route Determination and Preliminary Design of Provincial Roads and Railway Lines</i></p> <p><i>6. Route Determination</i></p> <p><i>(1) In determining the route of a provincial road or railway line the amendment of a route published in terms of subsection (9) or deemed to have been published in terms of subsection 10 (1) or the amendment of a route of an existing provincial road or railway line, the MEC must cause a preliminary route alignment to be done in the form of a written report as prescribed and containing recommendations with respect to the route and the MEC must therefore follow the procedure set out in this section.</i></p> <p><i>(2) Before determining a route or amended route, the MEC must cause such environmental investigation and report in respect thereof to be done as the competent authority contemplated in section 22 of ECA, or the authority contemplated in the relevant corresponding sections of NEMA once those sections come into operation, may decide.</i></p> <p><i>(3) The MEC must thereafter cause a notice to be published in the prescribed form and manner, containing -</i></p> <p><i>a) broad description of the route;</i></p> <p><i>b) particulars of the times and places at which the preliminary route report and environmental report can be inspected and copies be made;</i></p> <p><i>c) An invitation to all interested and affected parties to comment in writing before a date, not less than 30 days after publication of the notice, on the recommended route; and</i></p> <p><i>d) A reference to the regulatory measures which take effect in terms of section 7 on the publication of the route in terms of subsection (11).</i></p> <p>An Environmental Investigation and report, as set out in Clause 6(2) of the GTIA must be undertaken. The Environmental Investigation must be subject to Public Inquiry for which a qualified commission must be established.</p>
Climate Change Bill, 2018	<p>The aim of the Climate Change Bill, 2018 is to build an effective climate change response and safeguard the long-term, just transition to a climate-resilient and lower carbon economy and society. This will be done within the framework of sustainable development and will provide for all matters related to climate change.</p> <p>The Bill acknowledges that anthropogenic climate change represents a critical threat to all society and the environment, and requires an effective, broad-minded and well-coordinated response. It further emphasises that, amongst others, anticipated local climate change impacts have the potential to destabilize the country's development goals, and that responses to climate change raise distinctive challenges, thus requiring a legislative framework for the implementation of the country's national climate change response.</p> <p>The Bill further addresses issues related to institutional and coordination arrangement across the three spheres of government namely national, provincial and local. It further highlights the need for the spheres of government and entities, sectors as well business to respond to challenges of climate change. It lastly addresses the matters relating to the national adaptation to impacts of climate change, greenhouse gas emissions and removals, and policy alignment and institutional arrangements¹⁵.</p> <p>The objectives are thus defined to be:</p> <ul style="list-style-type: none"> • to provide for the coordinated and integrated response to climate change and its impacts by all spheres of government in accordance with the principles of cooperative governance; • to provide for the effective management of inevitable climate change impacts through enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change, with a view to building social, economic, and

¹⁵ <https://pmg.org.za/call-for-comment/683/>



LEGISLATION	APPLICABILITY TO THE PROJECT
	<p>environmental resilience and an adequate national adaptation response in the context of the global climate change response; and</p> <ul style="list-style-type: none"> to make a fair contribution to the global effort to stabilise greenhouse gas concentrations in the atmosphere at a level that avoids dangerous anthropogenic interference with the climate system within a timeframe and in a manner that enables economic, employment, social and environmental development to proceed in a sustainable manner.¹⁶ <p>The implementation of the next phase of the Gauteng Rapid Rail Integrated Network Extension, within the context of the Bill, therefore places the onus on the GMA to implement the project in a manner that engages all spheres of Government in order to provide an integrated response to climate change. It further steers the development in the direction of managing climate impacts related to the project in a manner which will enhance adaptive capacity as well as strengthen resilience and reduce vulnerability (through all phases of the project).</p>
Green Transport Strategy	<p>According to South Africa's Low Emission Development Strategy produced by the DEA in 2018 <i>"much attention with regard to climate change impacts in the transport sector, has been on mitigating the potential for these impacts, rather than focusing on adaptation and resilience measures to cope with these impacts. The vulnerability of this sector to climate-impacts relates to physical transportation infrastructure (i.e. buildings, pipelines, roads and railways). Looking to the future, specific measures and developments in the sector will need to be implemented to enhance the resilience of transport infrastructure against potential climate impacts"</i>¹⁷.</p> <p>To this end, South Africa's Green Transport Strategy (GTS) was launched by the Department of Transport (DoT) in 2018 to promote a transport system that is environmentally friendly and helps boost economic growth and create jobs. In South Africa, the transport sector is the most rapidly growing source of greenhouse gas (GHG) emissions, and its continued growth is expected to have an increasing impact on biodiversity, air quality, land resources and water quality. It accounts for 10.8% of emissions in the country, with road transport responsible for 91.2% of that¹⁸.</p> <p>The vision and mission of the GTS is to <i>"substantially reduce GHG emissions and other environmental impacts from transportation with 5% by 2050"</i> and to <i>"support the contribution of the transport sector to the social and economic development of the country while incrementally initiating innovative green alternative transformations in the sector to assist with the reduction of harmful emissions and negative environmental impacts associated with transport systems"</i>.¹⁹</p> <p>To achieve these objectives, the GST highlights:</p> <ul style="list-style-type: none"> ensuring that South Africa has environmentally sustainable low carbon fuels by 2022 by converting 5% of the public and national sector fleet to cleaner alternative fuel and efficient technology vehicles; promoting fuel economy norms and standards and implementing regulations that promote improved efficiency in fossil-fuel powered vehicles; ensuring a modal shift from road to rail transport by encouraging a 30% shift for freight transport, from road to rail, and a 20% shift of passenger transport from private cars to public and eco-mobility transport; investing in green energy infrastructure, such as biogas filling stations and electric car charging points; reviewing current levels of the environmental levy on new motor vehicle CO₂ emissions and expanding it to commercial vehicles; and helping ensure that freight vehicles only enter urban hubs during off-peak hours, by possibly implementing road freight permits and road-use charges.²⁰ <p>In summary, the GST proposes the following measures to ensure that transport infrastructure is resilient to harsh climatic conditions:</p> <ul style="list-style-type: none"> constructing low-carbon and climate-resilient road transport infrastructure (i.e. bus lanes, railways and non-motorised transport infrastructure), which tackle climate change by both reducing emissions as well as adapting to its inevitable impacts; developing strategies that build climate resilience into urban and rural integrated transit planning and systems; and creating standards and guidelines for climate-resilient materials for construction, maintenance and upgrading of road networks in the country.²¹ <p>With the implementation of the next phase of the Gauteng Rapid Rail Integrated Network Extension the GMA will contribute to ensuring a modal shift from road to rail transport by encouraging a shift of passenger transport from private cars to public and eco-mobility transport. It is hoped that this action will further contribute to the construction of low-carbon and climate-resilient transport infrastructure.</p>
Gauteng Environmental Management Framework	<p>The Gauteng Department of Agriculture and Rural Development (GDARD) commissioned the compilation of an Environmental Management Framework for the Gauteng Province (GPEMF). The GPEMF replaces all other EMFs in Gauteng with the exception of the Cradle of Humankind World Heritage Site which is incorporated within the GPEMF. The objective of the GPEMF is to guide sustainable land use management within the Gauteng Province. The GPEMF, inter alia, serves the following purposes:</p> <ul style="list-style-type: none"> To provide a strategic and overall framework for environmental management in Gauteng; Align sustainable development initiatives with the environmental resources, developmental pressures, as well as the growth imperatives of Gauteng; Determine geographical areas where certain activities can be excluded from an EIA process; and

¹⁶ Climate Change Bill, 2018. https://www.environment.gov.za/sites/default/files/legislations/climatechangebill2018_gn41689.pdf

¹⁷ Department of Environmental Affairs (2018). South Africa's Low Emission Development Strategy 2018

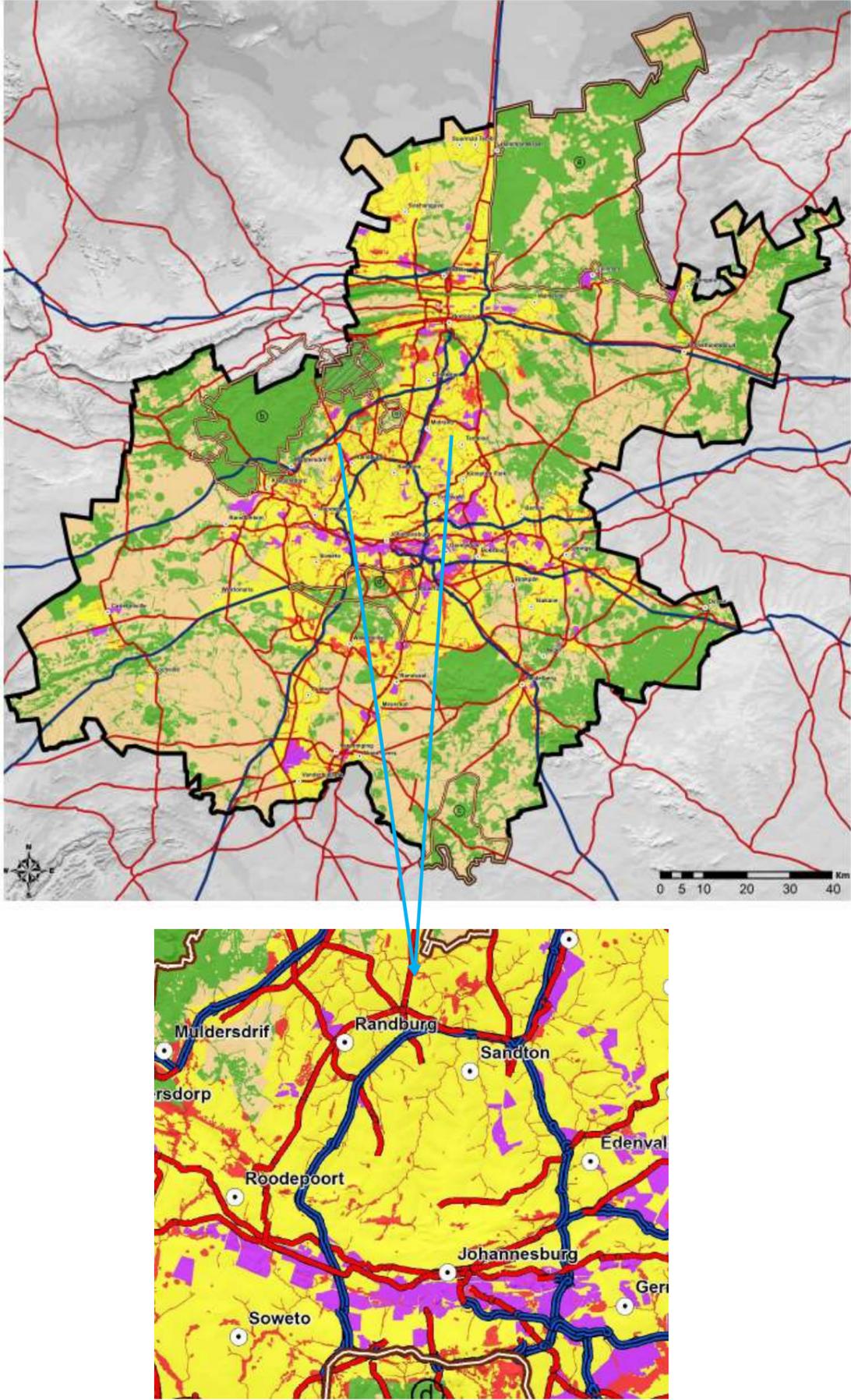
¹⁸ <https://sdg.iisd.org/news/south-africa-launches-green-transport-strategy/>

¹⁹ <http://www.energy.gov.za/files/biogas/2017-Biogas-Conference/day1/Green-transport-strategy-Transport.pdf>

²⁰ <https://sdg.iisd.org/news/south-africa-launches-green-transport-strategy/>

²¹ Department of Environmental Affairs (2018). South Africa's Low Emission Development Strategy 2018



LEGISLATION	APPLICABILITY TO THE PROJECT
	<ul style="list-style-type: none"> Identify appropriate, inappropriate and conditionally compatible activities in various Environmental Management Zones in a manner that promotes proactive decision-making²². <p>The GPEMF is spatially depicted as follows²³:</p>  <p>MAP LEGEND:</p> <p>ENVIRONMENTAL MANAGEMENT ZONES</p> <ul style="list-style-type: none"> Zone 1 Zone 2 Zone 3 Zone 4 Zone 5 Special Control Zones Special Control Zone for Conservation, Recreation and Tourism <p>Roads</p> <ul style="list-style-type: none"> National Road Arterial Road <p>Special Control Zones:</p> <ul style="list-style-type: none"> (a) Dinokeng (b) CoHWHs (c) Vaaldam (d) Jhb South (e) Jhb North

²² Gauteng Provincial Environmental Management Framework, 2014, Environomics

²³ <http://www.klipsa.org.za/Data/Sites/1/media/policies/gpemfposter.pdf>



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LEGISLATION	APPLICABILITY TO THE PROJECT
	<p>The planned expansion is located within Zone 1 of the GPEMF. Zone 1 is referred to as the Urban Development Zone. The intention of this zone is to streamline urban development activities in it and to promote development infill, densification and concentration of urban development, in order to establish a more effective and efficient city region that will minimise urban sprawl into rural areas²⁴.</p> <p>Any further development past the Little Falls station may, however, fall within the Zone 2: High Control Zone (within the Urban Development Zone). This zone is identified as sensitive to development activities with only conservation being allowed in this zone. This constraint needs to be taken into consideration in any additional planning.</p> <p>Another constraint placed on planning towards the Cradle of Human Kind World Heritage site is the Special Control Zone SCZ (b) which aims to incorporate the Cradle of Humankind World Heritage Site EMF into the Gauteng EMF. It has its own management zones and management guidelines that must be followed²⁵.</p>
Municipal Bylaws	<p>The City of Johannesburg Metropolitan Municipality may have certain requirements in terms of bylaws and trade permits, and a few of these may be applicable to this proposed development, namely the following:</p> <ul style="list-style-type: none"> • Disaster Management Bylaws; • Electricity Supply Bylaws; • Environmental Health; • Keeping of Animals; • Nuisances; • Solid Waste Bylaws; • Storm Water Management Bylaws; and Water Services Bylaws. <p>The GMA will need to consider the above during the implementation of the project.</p>

²⁴ <http://www.klipsa.org.za/Data/Sites/1/media/policies/gpemfposter.pdf>

²⁵ <http://www.klipsa.org.za/Data/Sites/1/media/policies/gpemfposter.pdf>



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2 Environmental Screening Findings

This screening assessment was undertaken from May to August 2019 to identify the possible environmental implications for the proposed development. The subsections below thus provide the site-specific environmental descriptions and findings, legal compliance, environmental implications and fatal flaw considerations for the proposed development.

2.1 GIS Sensitivity Mapping and Screening

A sensitivity mapping exercise was undertaken for the proposed route alternatives. The purpose of the exercise was to pro-actively identify sensitive areas that should be avoided by the GMA or alternatively, make known the potential risks and environmental impacts that would likely be associated with the preferred route alignment.

Note: The maps should always be used in conjunction with appropriately executed fieldwork to inform site-level decisions. Study of the maps alone cannot replace on-site assessments for land use applications.

The composite and individual sensitivity maps are shown in Figure 8 to Figure 14 below and illustrates the location of the proposed route alternatives, overlain onto the main environmental aspects of the receiving environment. The sensitivity of the areas affected by the route alternatives is thus discussed in Sections 2.2. to Sections 2.7 in terms of:

- Conservation planning as per the South African National Biodiversity Institute;
- The National Environmental Management: Biodiversity Act (No.10 of 2004): Threatened or Protected Species Regulations; and
- The Gauteng Ridges Guideline Guidelines Policy (as reviewed and updated in January 2004 and April 2006).

As such the following is illustrated by the mapping exercise:

- Figure 6: Vegetation types;
- Figure 7: Composite sensitivity map which overlays Ecological Support Areas, Important Areas, Irreplaceable Areas, Protected Areas, ridge sensitivities classes as well as rivers and streams;
- Figure 8: Critical Biodiversity Areas expanded;
- Figure 9: River classes;
- Figure 10: Threatened Ecosystems in terms of Critical, Endangered and Vulnerable Ecosystems;
- Figure 11: Environmental sensitivities associated with ridges; and
- Figure 12: Land Cover.

It is evident from the sensitivity mapping exercise that the routes are located in close proximity to wetlands, watercourses, ridges and ecologically sensitive areas and hence need to be protected and where they cannot be protected, the impacts need to be mitigated to reduce negative impacts.



2.2 Fauna and Flora

2.2.1 Fauna

Although the assessment of the route alternatives in terms of areas of conservation importance and ecological sensitivity as well as proximity to ridges will provide an indication of potential habitat for faunal (and floral) species; a specialist Faunal Assessment will need to be commissioned in order to determine in-situ faunal populations and faunal movements.

2.2.2 Flora

The northern section of the proposed route from Marlboro station to the Wilgeheuwel area predominantly consists of Egoli Granite Grassland of the Grassland biome within the Mesic Highveld Grassland Bioregion. It has a conservation target of 24%, a conservation status of 'endangered' and a protection status of 'hardly protected'²⁶. A small section of the proposed route alternatives (excluding Alternative 4), before the Roodepoort area, consists predominantly of Gold Reef Mountain Bushveld of the Savanna Biome within the Central Bushveld Bioregion. It has a conservation target of 24%, a conservation status of 'least threatened' and a protection status of 'moderately protected'.

2.3 Conservation Areas

The conservation status of the route alternatives is illustrated in Figure 6. The alternatives pass through Ecological Support Areas (ESA) as well as Critical Biodiversity Areas (CBA). In terms of the percentage occurrence of conservation areas along the route alternatives, Table 1 provides a reference:

Table 1: Percentage Affected Conservation Areas (by type)

CPLAN	Alternative 01	Alternative 02	Alternative 03	Alternative 04	Alternative 05	Alternative 06
Ecological Support Area (ESA)	7.1%	6.9%	6.8%	5.9%	6.0%	6.5%
CBA - Important Area	7.7%	6.6%	6.4%	5.6%	6.0%	7.7%
CBA - Irreplaceable Area	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
CBA - Protected Area	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

²⁶ National Vegetation Types from Vegetation Map for South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2006)



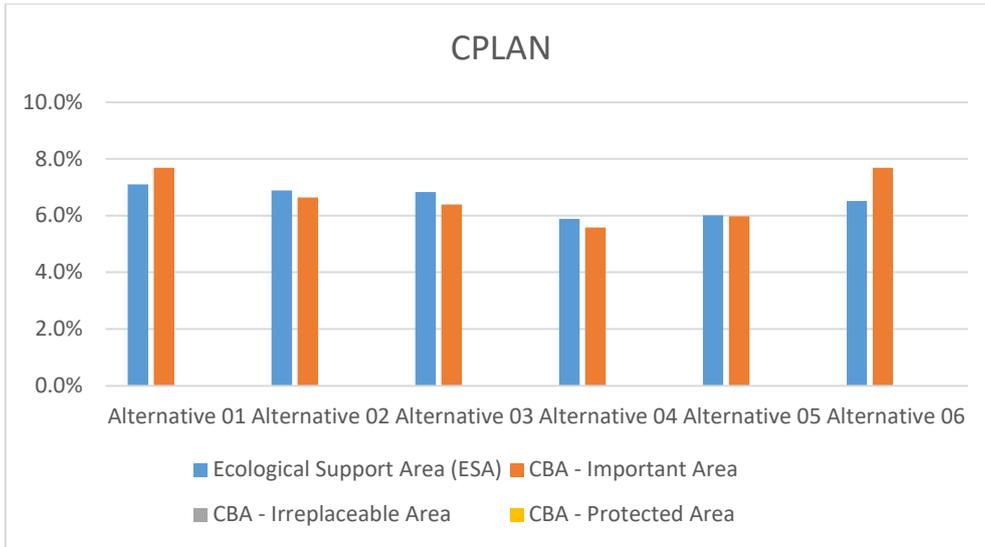


Figure 6: Percentage Affected Conservation Areas (CPLAN) in terms of the Proposed Route Alternatives

None of the route alternatives crosses Irreplaceable or Protected Areas. However, Alternatives 1 and Alternative 6 crosses the maximum Important Areas whilst Alternative 1 and Alternative 2 the maximum Ecological Support Areas. Conversely, Alternatives 4 and Alternative 5 crosses both the minimum Important and Ecological Support Areas.

Alternatives 4 and 5 are the preferred alternatives from a conservation area perspective, as they have the lowest impact amongst the other alternatives.

Notably, this must be confirmed by a site visit to determine the in-situ habitat.

2.4 Watercourses

There is a significant presence of watercourses throughout the extent of the six alternative routes (as illustrated in Figure 11). The routes traverse the perennial Jukskei River adjacent to the Marlboro station, the Sandspruit, Braamfonteinspruit, the perennial Klein Jukskei River, the Papoenspruit as well as the Wilge Spruit and many associated tributaries. In terms of the percentage occurrence of affected watercourses (water areas) along the route alternatives, Table 2 provides a reference:

Table 2: Percentage Affected Water Areas

Water Areas	Alternative 01	Alternative 02	Alternative 03	Alternative 04	Alternative 05	Alternative 06
Water permanent	0.03%	0.06%	0.04%	0.02%	0.03%	0.06%
Water seasonal	0.03%	0.01%	0.03%	0.03%	0.00%	0.01%
Wetlands	1.99%	1.74%	1.72%	1.36%	1.32%	1.40%



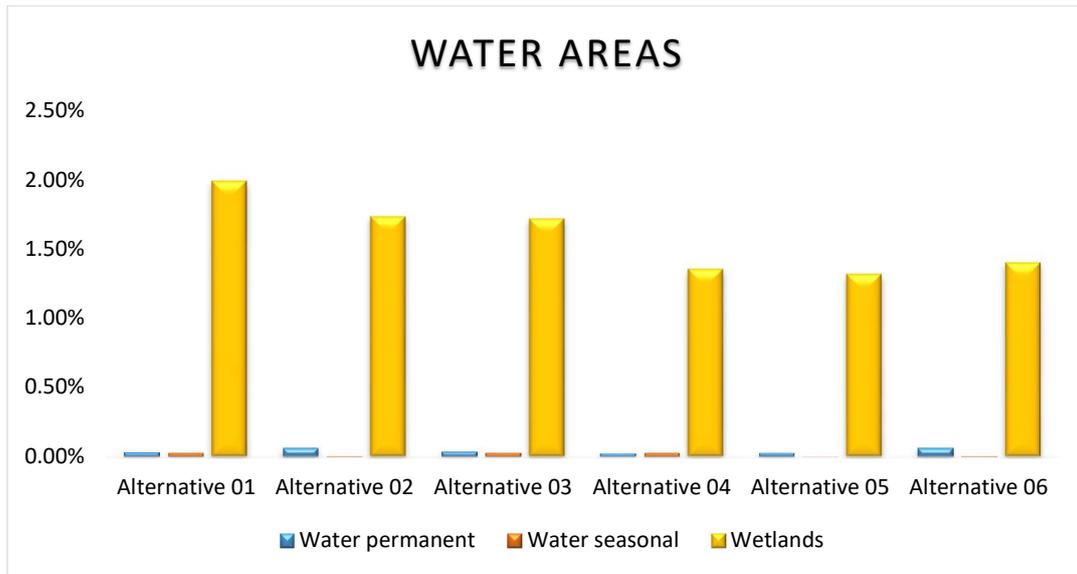


Figure 7: Percentage Affected Water Areas in terms of the Route Alternatives

Based on the above information, it is clear that watercourses are present within the proposed development area and it is suggested that a formal wetland delineation and functional assessment be undertaken in order to comply with the relevant environmental legislation and determine the Present Ecological State of the wetlands.

Alternative 1 encompasses the highest occurrence of water areas (in particular wetland areas) in terms of the proposed route alternatives, with Alternative 5 containing the least.

From a pure percentage watercourse area affected, Alternative 5 is thus preferred. What must be determined by a specialist study however is the ecological state and nature of the affected watercourse and what kind of engineering inventions would need to be put in place to cross said watercourses.



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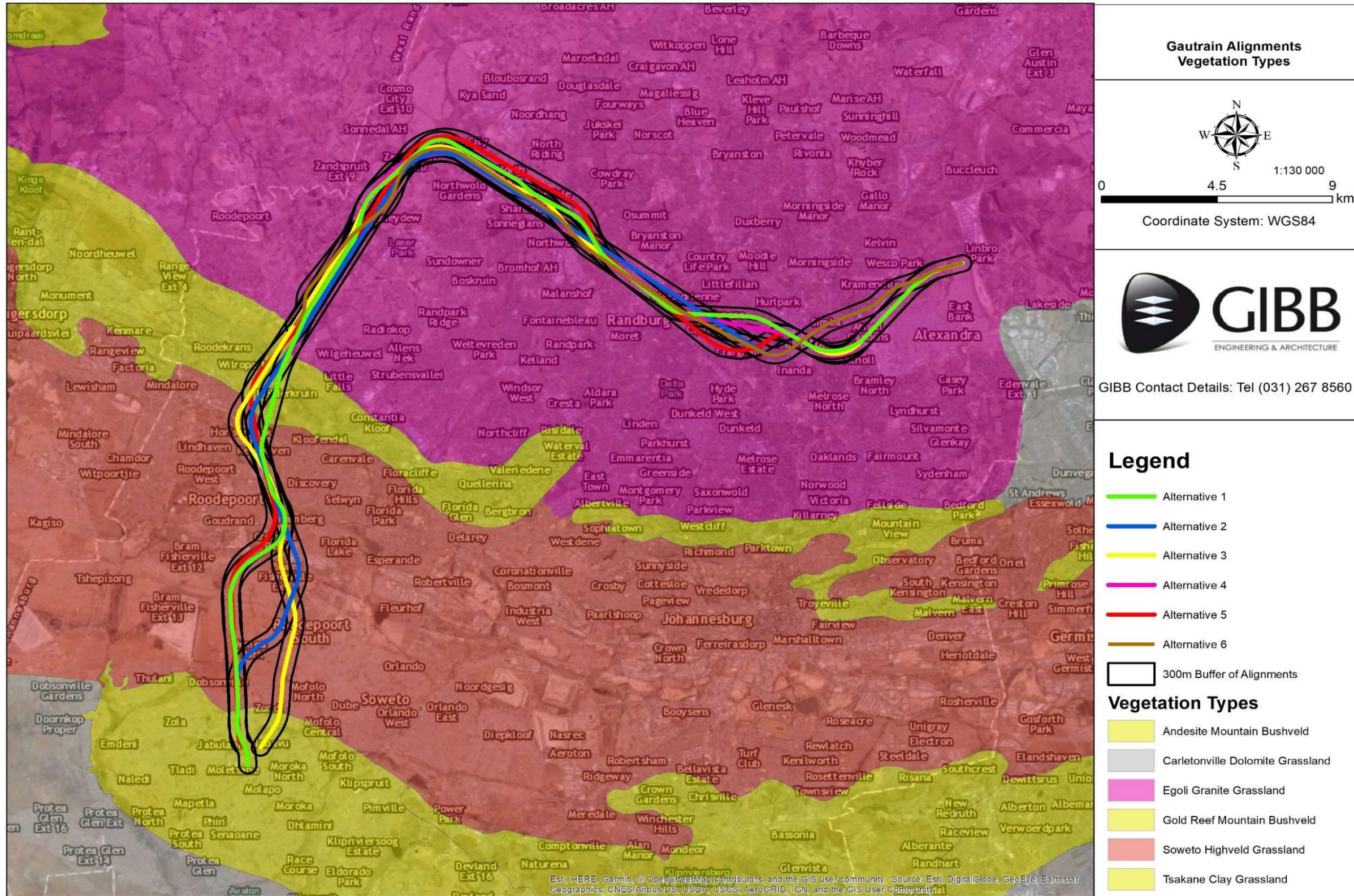


Figure 8: Vegetation Types

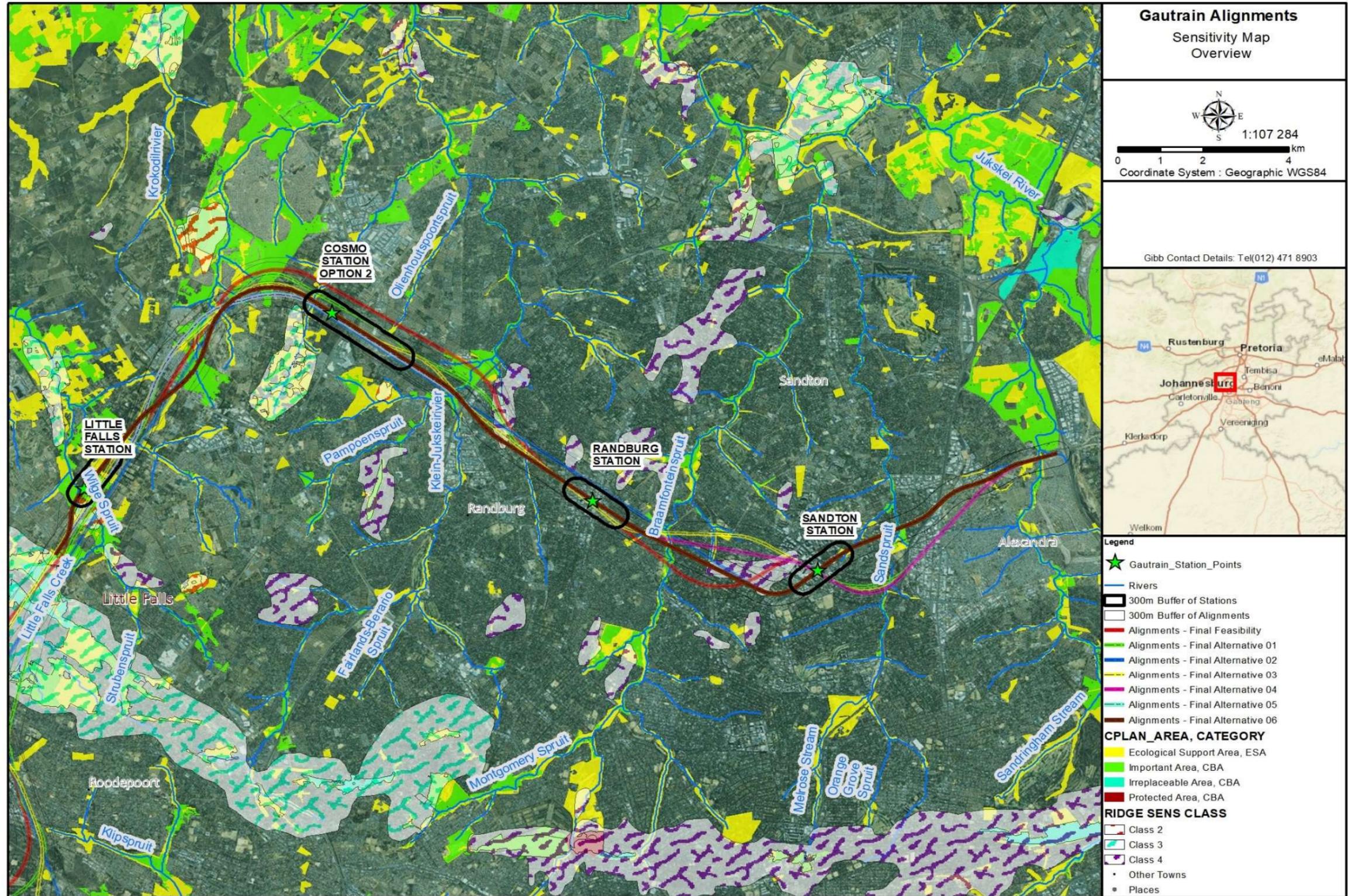


Figure 9: Composite Sensitivity Map

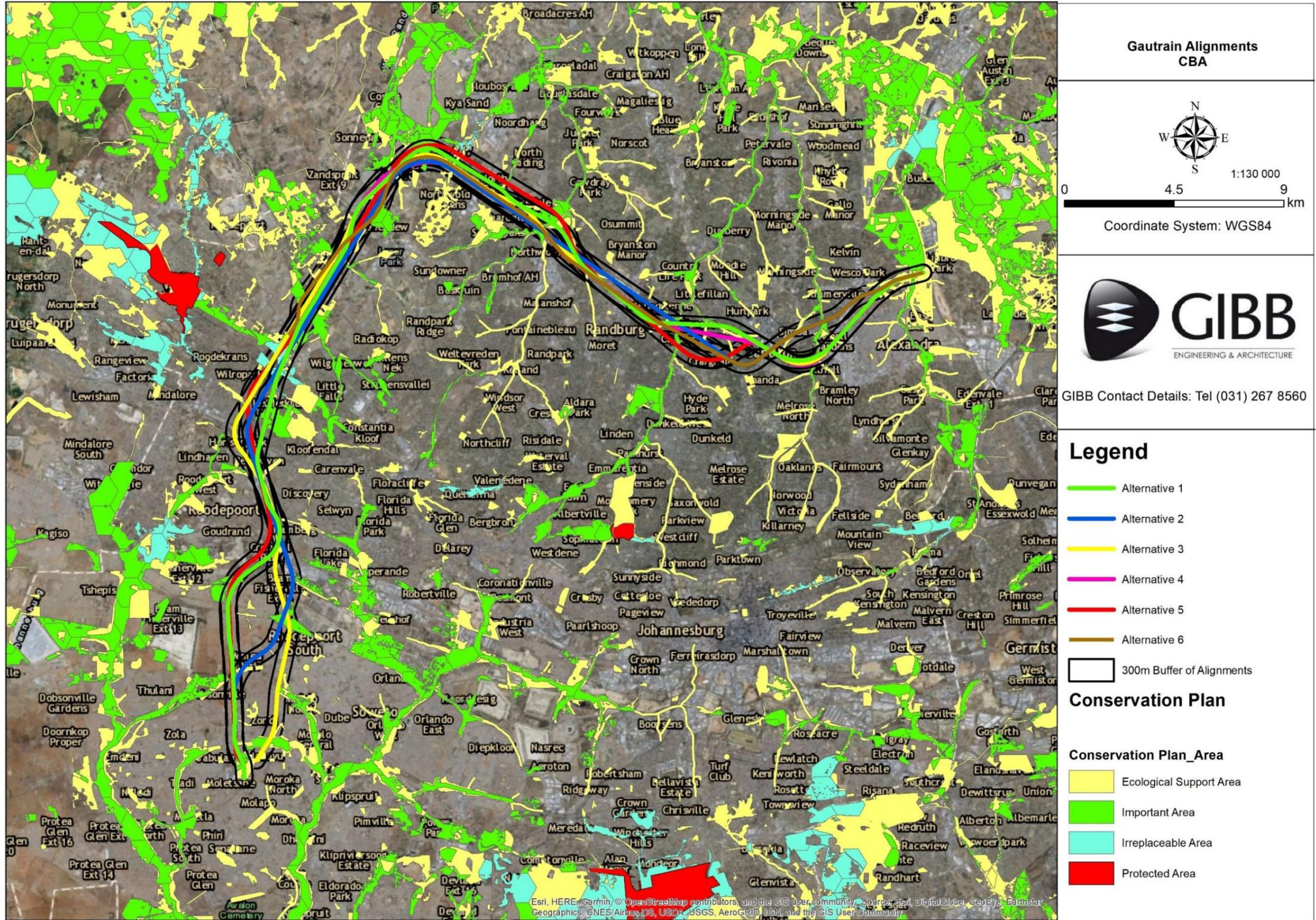


Figure 10: Environmental Sensitivities Associated with Critical Biodiversity Areas

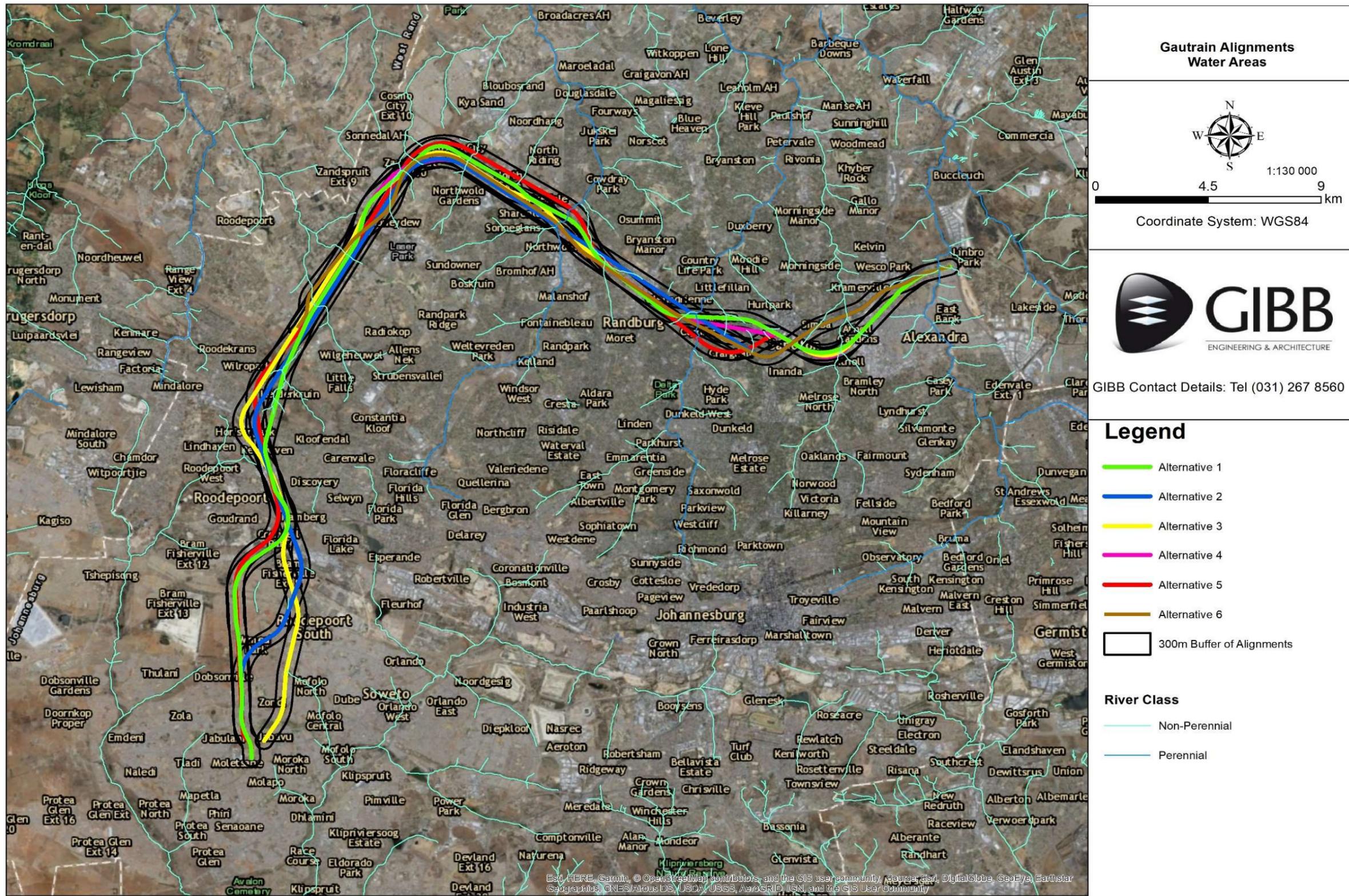


Figure 11: Environmental Sensitivities Associated with Watercourses

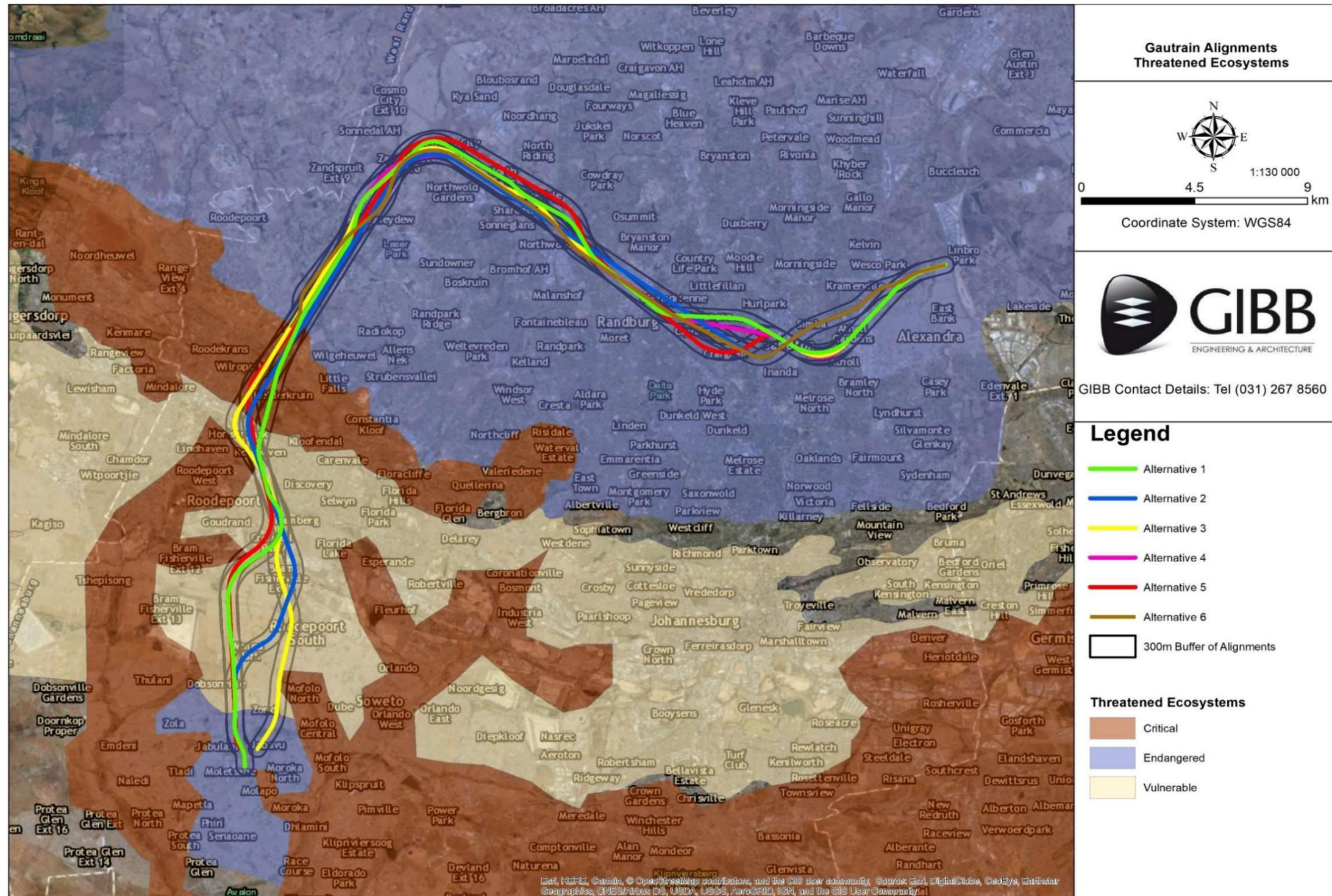


Figure 12: Environmental Sensitivities Associated with Threatened Ecosystems

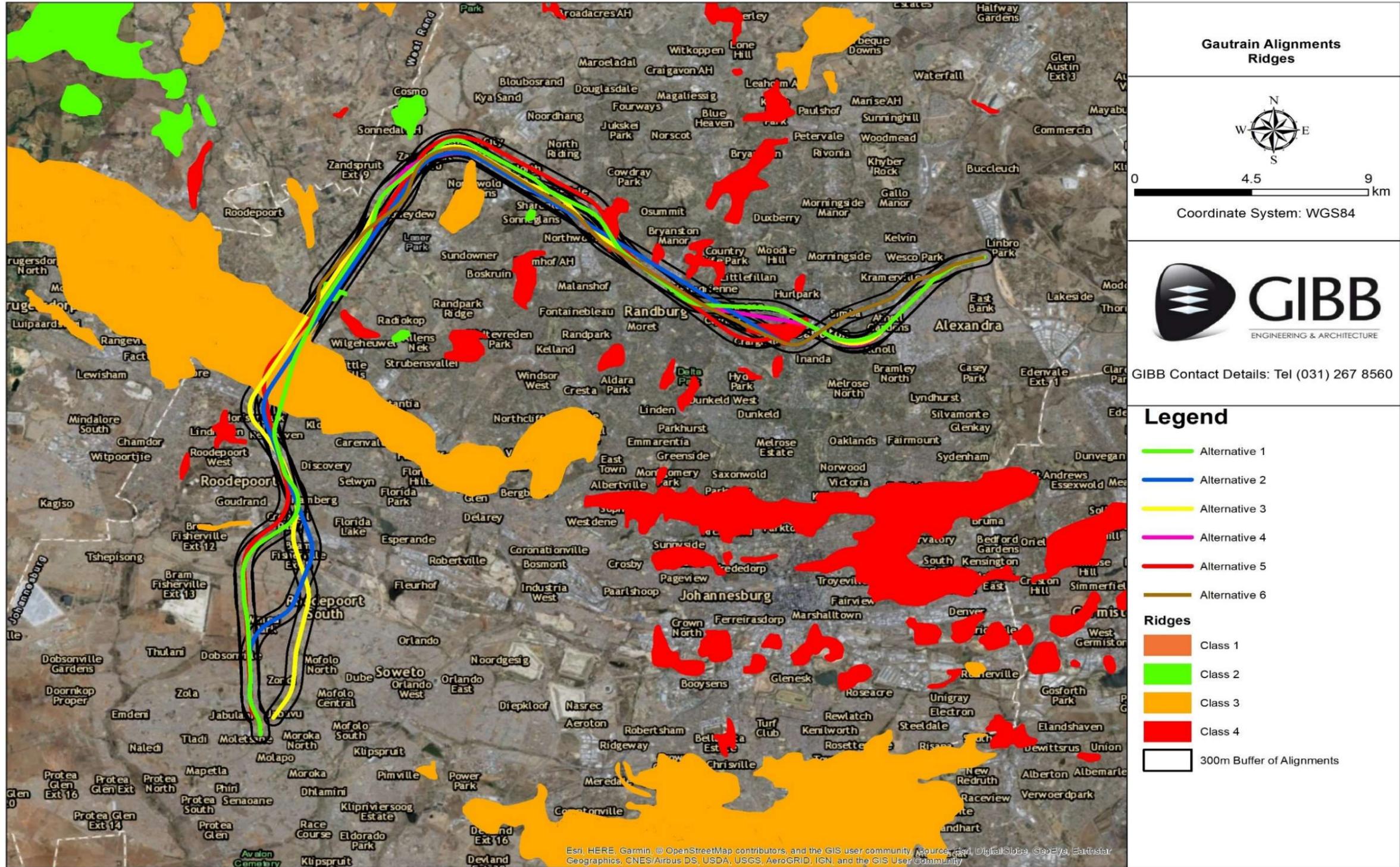


Figure 13: Environmental Sensitivities Associated with Ridges

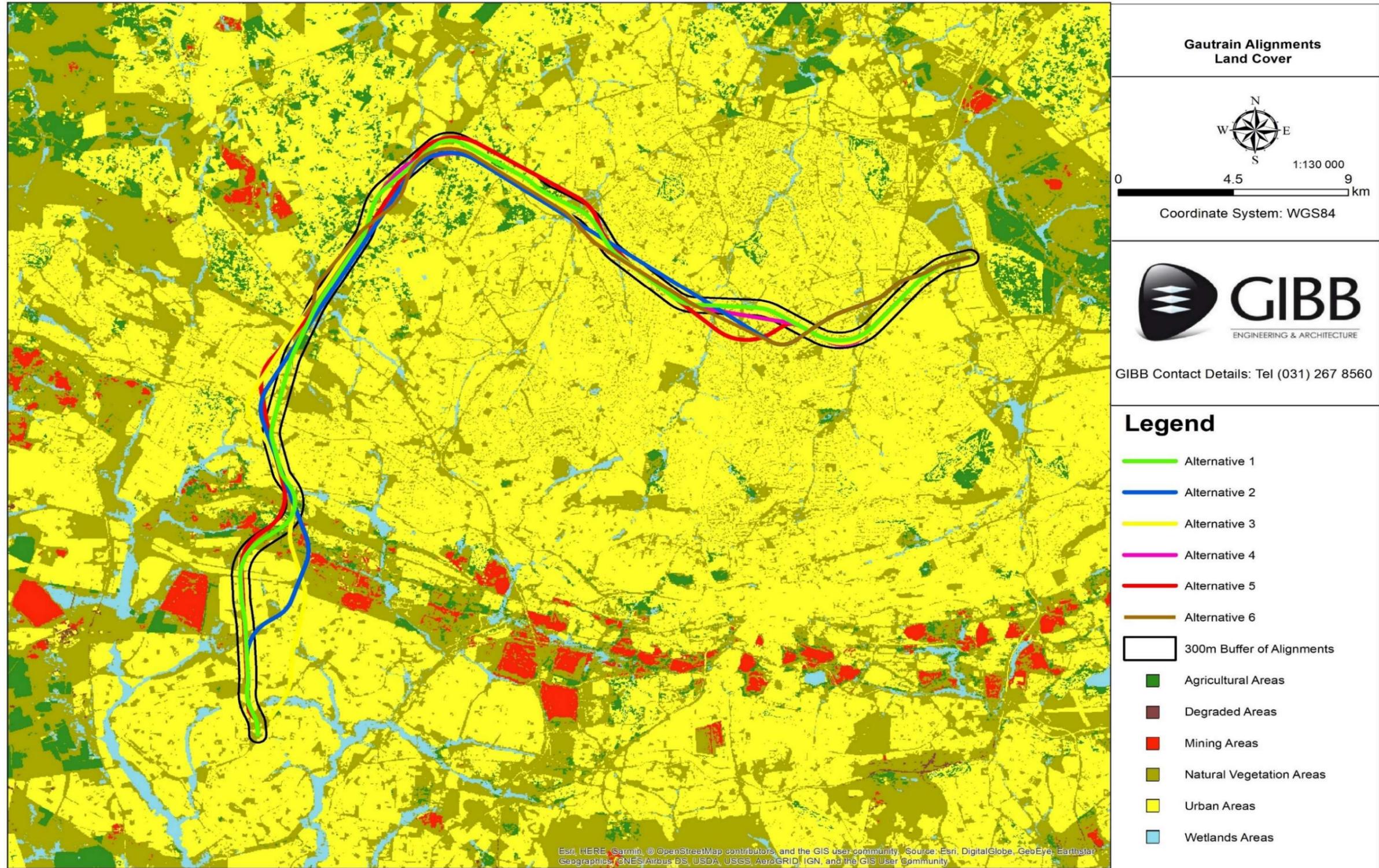


Figure 14: Environmental Sensitivities Associated with Land Cover

2.5 Threatened Ecosystems

The route alternatives were screened in terms of ecosystem status. All the route alternatives cross Endangered Ecosystem areas, although on the ground verification would be required to confirm the integrity of the GIS data. In terms of the percentage occurrence of affected ecosystems related to the route alternatives, Table 3 provides a reference:

Table 3: Percentage Affected Ecosystem Area (per type)

Alternatives	Critically Endangered	Endangered	Vulnerable
Alternative 01	0%	100%	0%
Alternative 02	0%	100%	0%
Alternative 03	0%	100%	0%
Alternative 04	0%	100%	0%
Alternative 05	0%	100%	0%
Alternative 06	0%	100%	0%

As is seen from the data all route alternatives are located within Endangered Areas

2.6 Ridges

The ridges which occur in the proposed route corridor are mainly Class 4 ridges (Figure 15). Route Alternative 6 has however been aligned to miss a large percentage of the Class 4 ridges and where it does cross a Class 4 ridge it does so within the peripheral areas of the ridges. Please refer to

Figure 13. It is however still recommended that the alignment in these areas is designed to be below ground level.

In terms of percentage occurrence of affected ridges for the route alternatives, Table 4 provides a reference:

Table 4: Percentage Affected Ridges

	Alternative 01	Alternative 02	Alternative 03	Alternative 04	Alternative 05	Alternative 06
Class 1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Class 2	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Class 3	0.0%	0.2%	0.0%	0.1%	0.1%	0.0%
Class 4	3.9%	5.9%	2.6%	3.2%	4.3%	4.3%



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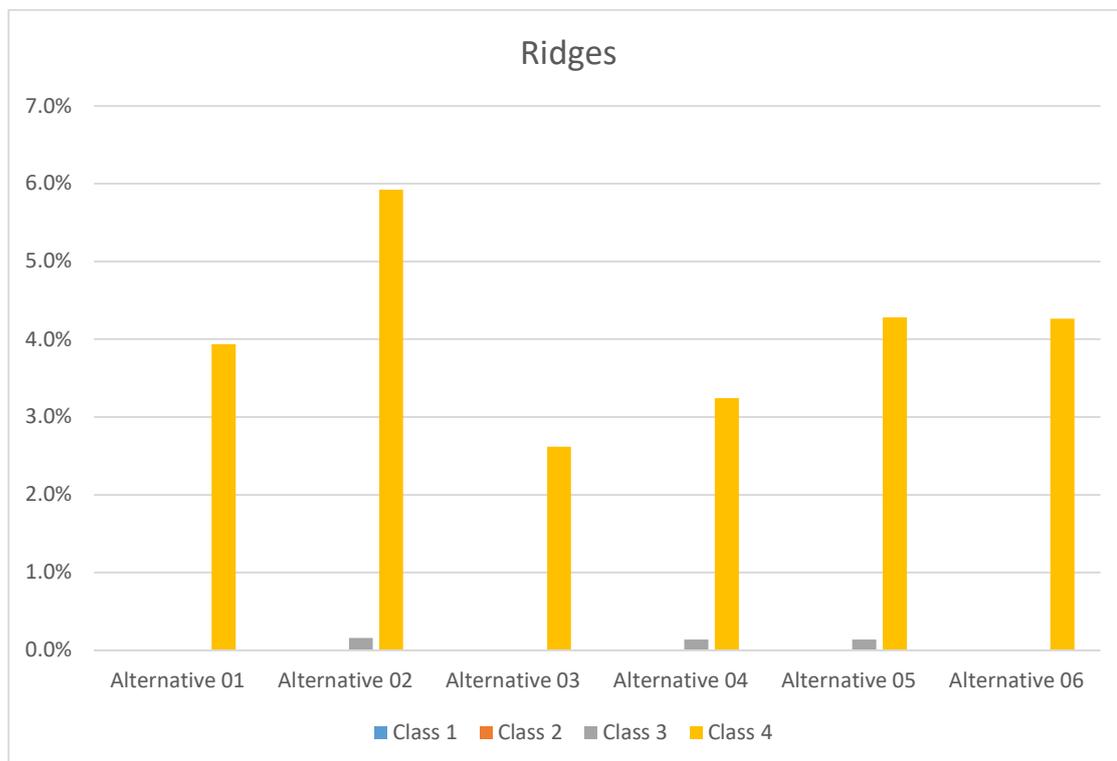


Figure 15: Percentage Affected Ridges in terms of Route Alternatives

Due to the design adjustment made to Alternative 6, it is the preferred route alignment in terms of the percentage affected ridges associated with the route.

2.7 Land Cover

The land cover types associated with the route alternatives are illustrated in Figure 16. The route alternatives are made up of a third of urban residential areas, with lower percentages accrued to grassland and thicket/dense bush respectively. Urban townships and urban commercial areas account for the remainder of the land cover within the identified routes, with minimal cover attributed to wetlands, woodlands/open bush and plantations/woodlots. In terms of percentile coverage of conservation areas for the route alternatives, Table 5 provides a reference:

From a land cover perspective, Alternatives 5 and 6 appears to be the preferred alternatives, as they contain the lowest percentage of wetlands.



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Table 5: Percentage Land Cover (per type)

Land Cover	Alternative 01	Alternative 02	Alternative 03	Alternative 04	Alternative 05	Alternative 06
Cultivated commercial fields (med)	1%	0%	1%	0%	0%	1%
Grassland	9%	8%	8%	8%	8%	8%
Low shrubland	0%	0%	0%	0%	0%	0%
Mines 1 bare	0%	0%	0%	0%	0%	0%
Mines 2 semi-bare	0%	0%	0%	0%	0%	0%
Plantations / Woodlots mature	5%	3%	5%	4%	4%	4%
Thicket /Dense bush	12%	14%	12%	12%	13%	13%
Urban built-up (dense trees / bush)	5%	5%	5%	5%	6%	5%
Urban commercial	8%	9%	8%	8%	10%	9%
Urban industrial	5%	2%	5%	5%	2%	2%
Urban informal (dense trees / bush)	2%	1%	2%	3%	2%	0%
Urban residential (low veg / grass)	32%	36%	33%	34%	34%	34%
Urban school and sports ground	1%	2%	2%	2%	2%	2%
Urban smallholding (dense trees / bush)	12%	11%	12%	12%	12%	13%
Urban sports and golf (low veg / grass)	2%	3%	2%	2%	2%	3%
Urban township (bare)	3%	2%	2%	2%	2%	2%
Water permanent	0%	0%	0%	0%	0%	0%
Water seasonal	0%	0%	0%	0%	0%	0%
Wetlands	2%	2%	2%	1%	1%	1%
Woodland/Open bush	2%	2%	2%	2%	2%	2%



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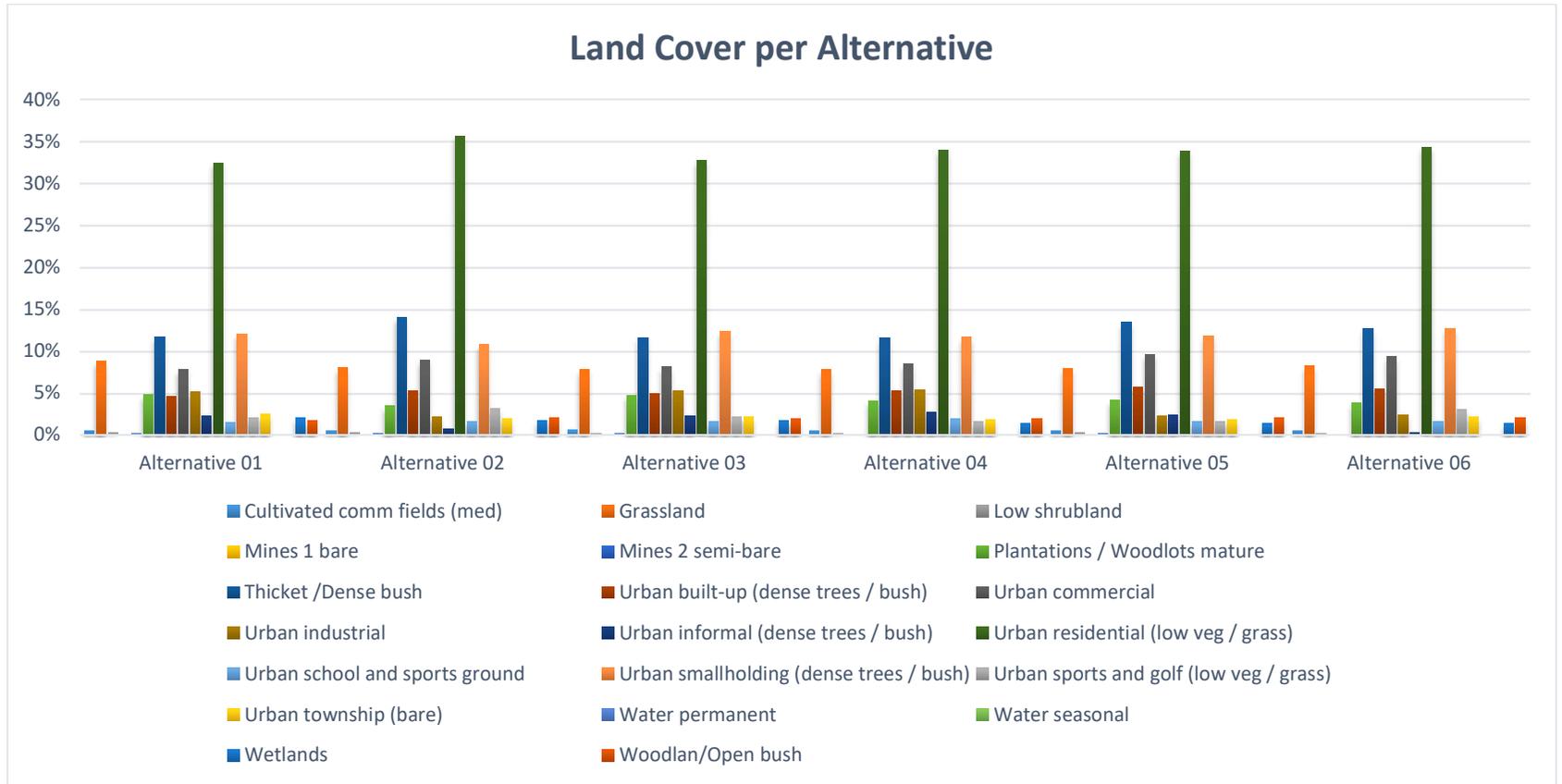


Figure 16: Percentage Land Cover Type per Route Alternative



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2.8 Station Locations

As discussed in Section 1 of the current report, the planned alignment includes five (5) stations at the Little Falls, Cosmo City, Randburg, Sandton and Marlboro areas. The Marlboro and Sandton stations are well established and located within well built-up areas (Figure 17 and Figure 18) and is therefore not subjected to screening in terms of this investigation.

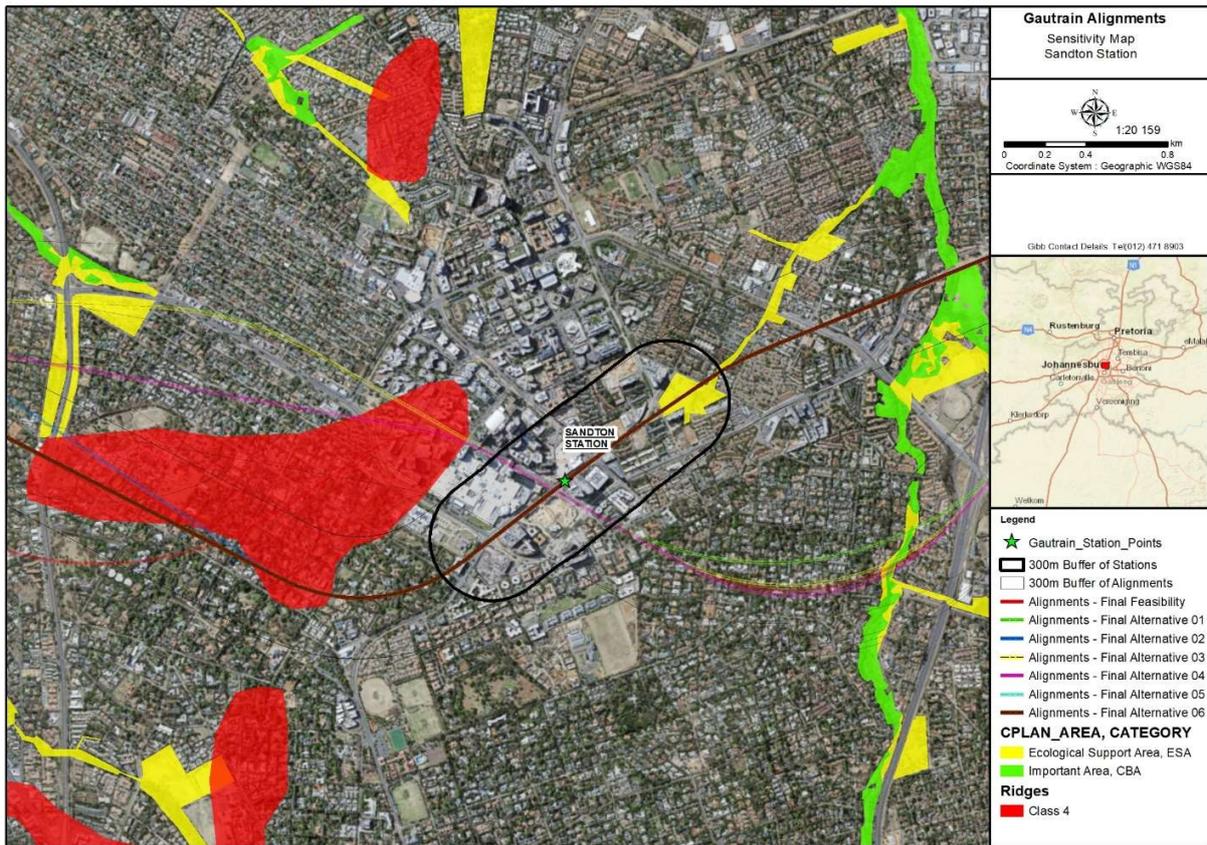


Figure 17: Sandton Station

The potential environmental sensitivities associated with the other proposed station areas are discussed in the sub-sections to follow.

Apart from having a biophysical impact on the receiving environment, the positioning of the stations is critical in responding to the sustainability principles as they have been incorporated in the Medium Term Strategic Framework, the Millennium Development Goals, the Sustainable Development Goals, Agenda 2063 and the recommendations of the Green Book. Broadly speaking the location of the stations need to create sustainable connected human communities and connect key transit nodes.



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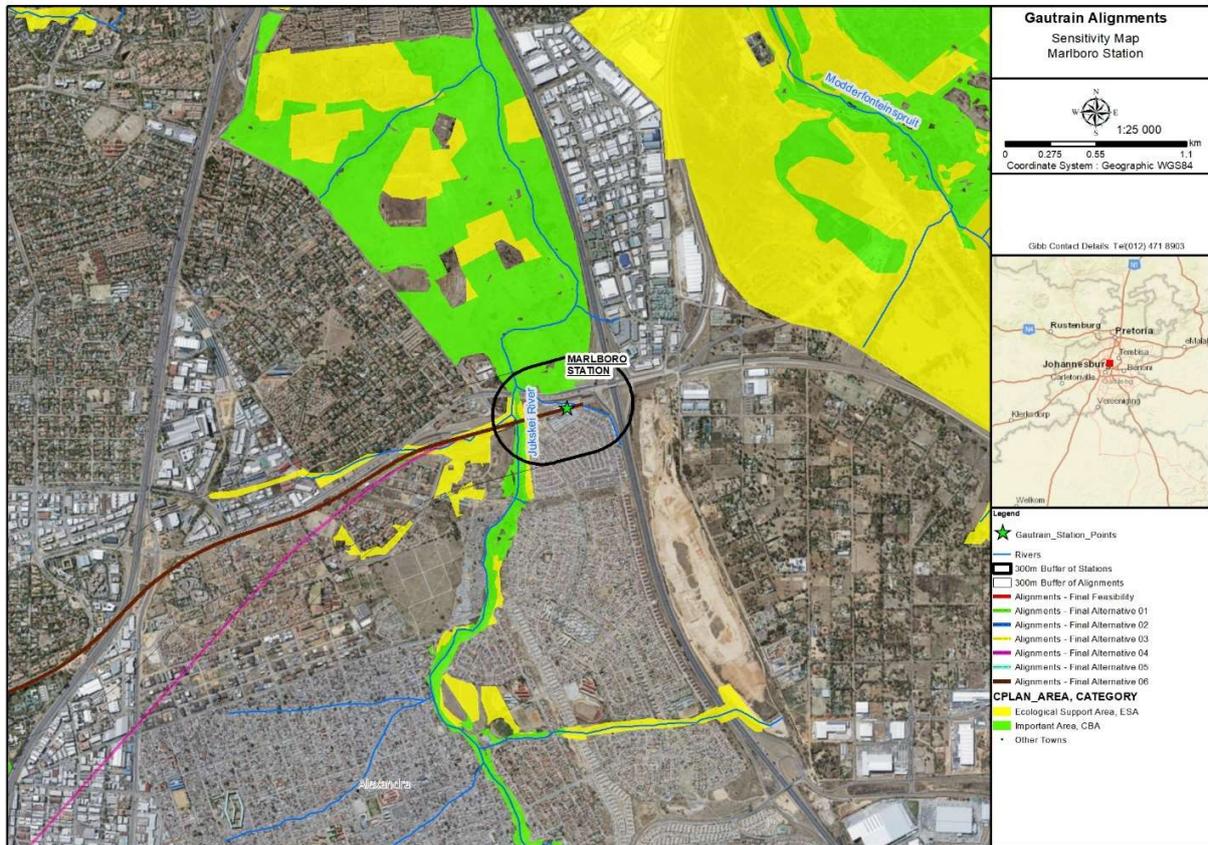


Figure 18: Marlboro Station

2.8.1 Little Falls Station

The Little Falls Station and the surrounding area identified for screening purposes, as illustrated by Figure 19, is characterised as follows:

- According to SANBI, 12.74% of the proposed site falls within an Ecological Support Area, whilst 32.13% falls within an Important Area
 - The highest percentage coverage amongst the four (4) remaining stations from a conservation plan perspective;
- Approximately 3.95% of the proposed site falls within Class 2 ridges;
 - The highest percentage coverage amongst the four (4) remaining stations;
- The majority of the land cover is Urban Smallholding (dense trees/bush) [45.80%], followed by Grassland (35.44%); and
- The proposed site does not traverse any watercourses.



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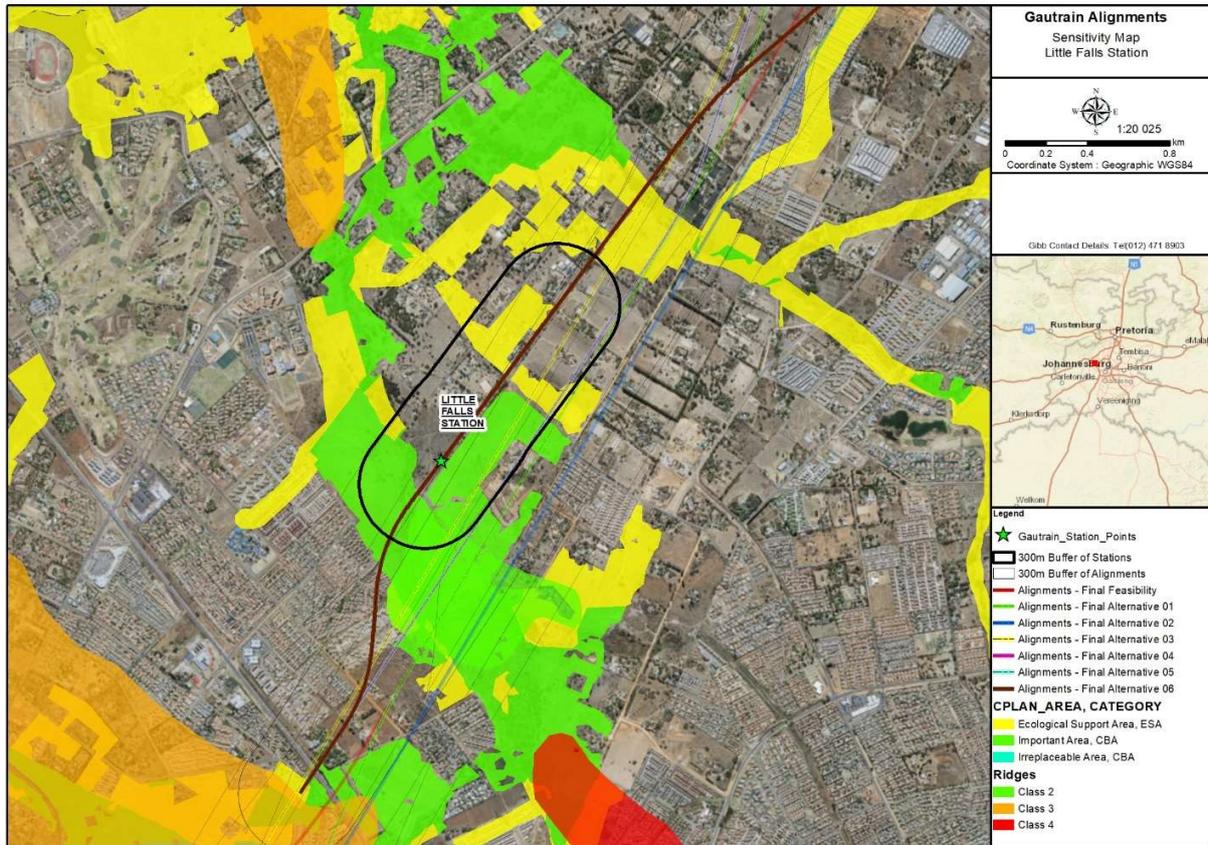


Figure 19: Little Falls Station

2.8.2 Cosmo Station (Option 2)

The Cosmo Station and the surrounding area identified for screening purposes, as illustrated by Figure 20, is characterised as follows:

- According to SANBI, 4.59% of the proposed site falls within an Ecological Support Area;
 - The second highest percentage coverage amongst the four (4) remaining stations;
- No area of the proposed site falls within any Class 1,2,3 or 4 ridges;
- The majority land cover is Urban Smallholding (dense trees/bush) [38.77%], followed closely by Urban Residential (low vegetation/grass) [32.61%] and then Plantations/Woodlots Mature [14.91%]; and
- The proposed site consists of 0.66% cover within watercourses.



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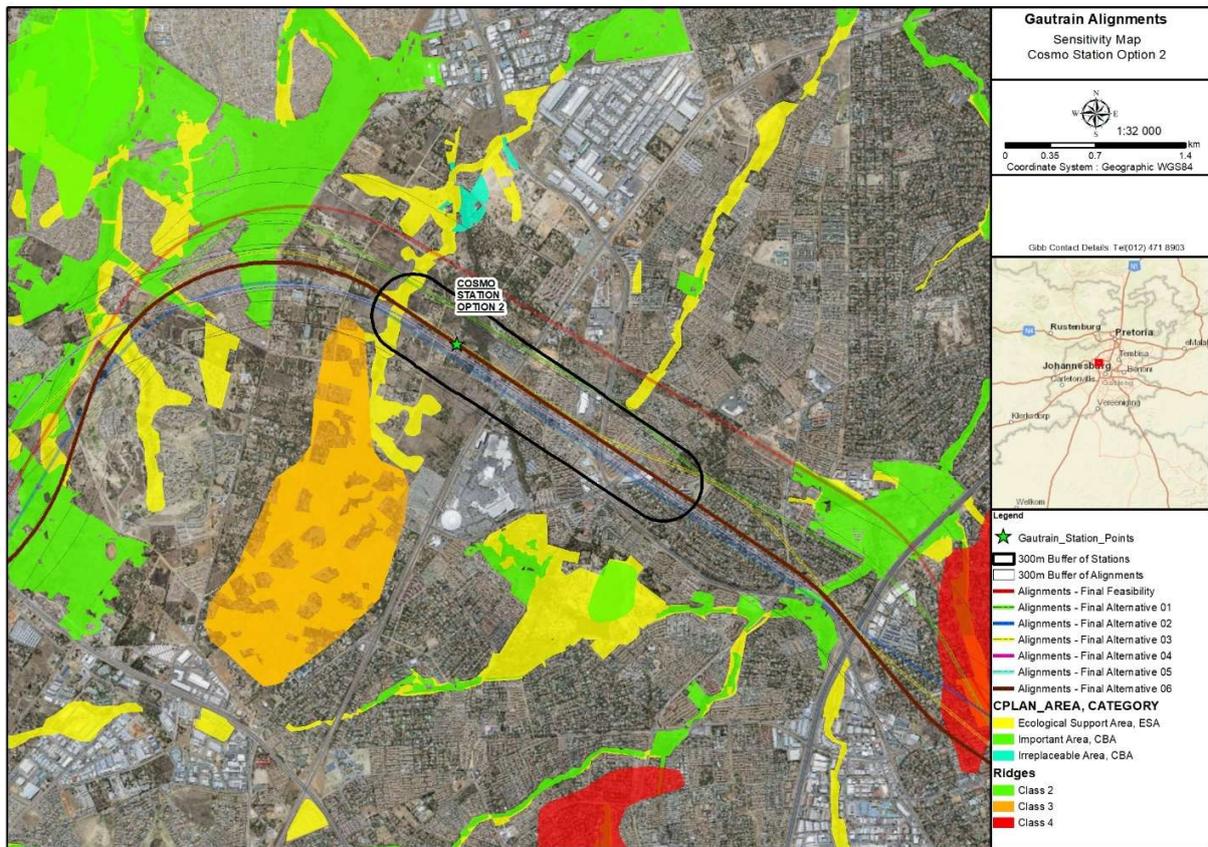


Figure 20: Cosmo Station (Option 2)

2.8.3 Randburg Station

The Randburg Station and the surrounding area identified for screening purposes, as illustrated by Figure 21, is characterised as follows:

- According to SANBI, no area of the proposed site falls within an Ecological Support Area/Important Area/Irreplaceable Area
 - The least sensitive from a conservation plan perspective;
- No area of the proposed site falls within any ridges
 - Least sensitive from a ridge aspect;
- The majority land cover is Urban Commercial (dense trees/bush) [46.99%], followed by Urban Residential (Low vegetation/grass) [35.44%]; and
- The proposed site does not traverse any watercourses.



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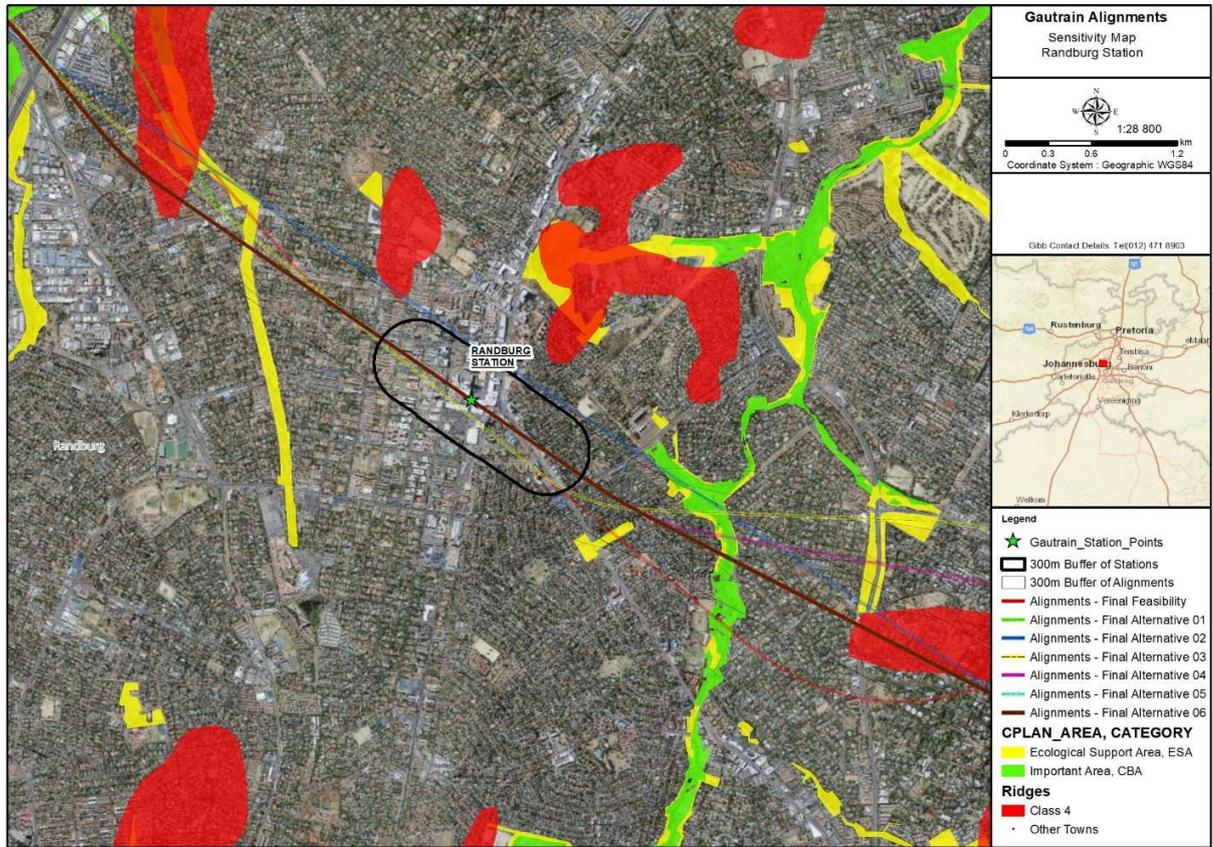


Figure 21: Randburg Station

2.9 Conclusion

Based on the available information from this desktop screening exercise, the following may be noted for the respective proposed station locations:

2.9.1 Little Falls Station (on existing ground level)

In terms of conservation planning as per the South African National Biodiversity Institute, a third of the assessed area of the proposed station location crosses Critical Biodiversity Areas (Important Area and Ecological Support Area) [32.13% and 12.74%]. The proposed station also impacts on the highest amount of natural area in terms of Grassland (35.44%).

As per the Gauteng Ridges Guideline Guidelines Policy (as reviewed and updated in January 2004 and April 2006), 3.95% of the assessed buffer of the proposed station crosses Class 2 Ridges (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), whilst the remainder does not traverse any additional ridges.



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An in-situ ecological assessment will thus be required to determine if any protected species are prevalent within the assessed footprint and 300m buffer in terms of the National Environmental Management: Biodiversity Act (No.10 of 2004): Threatened or Protected Species Regulations.

An assessment by the relevant specialists at the appropriate time in this process of the potential impact on the visual character of the area or the increase in noise, traffic and dust volumes will be required.

2.9.2 Cosmo Station Option 2 (on existing ground level)

In terms of conservation planning as per the South African National Biodiversity Institute, a minimal percentage of the proposed station footprint and buffer area assessed traverses Critical Biodiversity Areas (Ecological Support Area) [4.59%], with no further impact on additional conservation areas. An in-situ ecological assessment will be required to determine if any protected species are prevalent within the assessed 300m buffer in terms of the National Environmental Management: Biodiversity Act (No.10 of 2004): Threatened or Protected Species Regulations.

Furthermore, as per the Gauteng Ridges Guidelines Policy (as reviewed and updated in January 2004 and April 2006), the footprint and buffer area assessed surrounding it does not impact on any ridges either.

The proposed station impacts the second-highest amount of natural area in terms of Plantations/Woodlots Mature (14.91%). Despite this limitation, the proposed station is intended to be constructed on the existing ground level, and therefore earth moving activities and associated impacts may be more localised as opposed to the other station locations.

An assessment by the relevant specialists at the appropriate time in this process of the potential impact on the visual character of the area or the increase in noise, traffic and dust volumes will be required.

2.9.3 Randburg Station (underground)

In terms of conservation planning as per the South African National Biodiversity Institute, the proposed station footprint does not impact on Critical Biodiversity Areas. However, this proposed station will require more earthwork activities due to it being underground, which may result in a greater residual risk to the presence of in-situ species of biodiversity importance. An ecological assessment will, therefore, be required to determine if any protected species are prevalent within the assessed 300m buffer in terms of the National Environmental Management: Biodiversity Act (No.10 of 2004): Threatened or Protected Species Regulations.

Furthermore, as per the Gauteng Ridges Guidelines Policy (as reviewed and updated in January 2004 and April 2006), the footprint and buffer area assessed surrounding it does not impact on any ridges either.

The low impact on Critical Biodiversity Areas and ridges can be ascribed to the fact that the proposed station is located in a highly built-up area in terms of land use classification data (46.99%). This may

result in very localised impacts (specifically from a visual aspect) to the receiving environment due to the transformed/built-up nature of the area. This does not negate the need for an assessment by the relevant specialists at the appropriate time in this process of the potential impact on the visual character of the area or the increase in noise, traffic and dust volumes.

2.10 Heritage

According to the DEA Screening Tool Report, the proposed route alternatives were determined to have a 'High sensitivity' to archaeological and heritage resources. It is therefore highly recommended that a suitably qualified archaeologist undertake an assessment to determine the presence of any in-situ heritage resources or artefacts.

2.11 Environmental Fatal Flaw Analysis

Whilst cognisance is taken of the socio-economic importance of the project of this nature, the onus will be on the GMA and all relevant stakeholders to ensure the implementation of effective mitigation measures in order to protect Critical Biodiversity Areas as well as sensitive environmental receptors. In light of the above, the following is noted and recommended:

- The destruction of wetland habitat is likely to occur due to the length of the route alternatives. An offset strategy must be considered to determine a 'like for like' offset to compensate for the loss of these irreplaceable natural resources;
- As mentioned, the route alternatives are associated with natural wetlands and watercourses. These areas need to be avoided as far as possible. The mitigation of negative impacts on aquatic and wetland resources is a legal requirement for authorisation purposes and must be tailored to the significance of impacts and the particulars of the target area being affected;
- While the proposed railway line will be constructed within a designated railway servitude, there is still the potential for negative impacts on sensitive floral and faunal species. These areas (including ridges) may contain red data listed species and will require additional studies to identify and assess the negative impacts from the proposed development. Furthermore, consideration must be given to protected floral and faunal species, and strategies for search and rescue operations must be developed.

The design of the proposed development will need to take the above environmental risks into account, in order to prevent and/or mitigate the associated negative impacts.

2.12 Environmental Legal Requirements in terms of NEMA

The NEMA and the 2014 EIA Regulations (as amended) is the primary South African legislative framework governing the requirements for Environmental Impact Assessment. In terms of Section 24(2) of the NEMA, the Minister of Environmental Affairs has identified activities which may not

commence without prior authorisation from the Minister or Member of the Executive Committee (MEC).

The Minister has, in accordance with the above, published Listed Activities in Government Notice (GN) R 983 (Listing Notice 1), GN R 984 (Listing Notice 2) and GN R 985 (Listing Notice 3) (as amended, dated 7 April 2017). These activities may not commence prior to the receipt of Environmental Authorisation (EA) from the Minister or MEC. More specifically:

- Listing Notice 1 identifies activities that require Environmental Authorisation (EA), subject to a Basic Assessment (BA) process;
- Listing Notice 2 identifies activities that require EA subject to the undertaking of a Scoping and Environmental Impact Reporting (S&EIR) process; and
- Listing Notice 3 identifies activities, within specified geographical areas, that require EA, subject to a BA process.

In the light of the Listed Activities and licensing requirements identified in Table 6 below, the proposed development will require a full Scoping and EIA (S&EIR) Process. The activities listed in Table 6 may not commence without Environmental Authorisation from the Competent Authority.

In addition, revision of the identified Listed Activities may be required to include more Listed Activities once further details of the proposed development have been obtained from the GMA. This can be resolved either during the final design phase or alternatively through authority pre-application meetings in the next phase of the project.

Table 6: Potential Listed Activities Triggering the Need for a Scoping and EIR Process

Number and date of the Relevant Notice	Activity number	Description of the Listed Activity
Government Notice R983 promulgated on 4 December 2014 (as amended): Listing Notice 1	12	<p>"The development of –</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>



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Number and date of the Relevant Notice	Activity number	Description of the Listed Activity
Government Notice R983 promulgated on 4 December 2014 (as amended): Listing Notice 1	19	<p>“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 –</p> <p>(i) a watercourse</p>
Government Notice R983 promulgated on 4 December 2014 (as amended): Listing Notice 1	64	<p>“The expansion of railway lines, stations or shunting yards where there will be an increased development footprint, excluding—</p> <p>(i) railway lines, shunting yards and railway stations in industrial complexes or zones;</p> <p>(ii) underground railway lines in mines; or</p> <p>(iii) additional railway lines within the railway line reserve.”</p>
Government Notice R984 promulgated on 4 December 2014 (as amended): Listing Notice 2	12	<p>“The development of railway lines, stations or shunting yards excluding –</p> <p>(i) railway lines, shunting yards and railway stations in industrial complexes or zones;</p> <p>(ii) underground railway lines in a mining area; or</p> <p>(iii) additional railway lines within the railway line reserve.”</p>
Government Notice R983 promulgated on 4 December 2014 (as amended): Listing Notice 3	12	<p>“The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.</p> <p>(c) Gauteng</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>ii. Within Critical Biodiversity Areas or Ecological Support Areas identified in the Gauteng Conservation Plan or bioregional plans;...”</p>



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Number and date of the Relevant Notice	Activity number	Description of the Listed Activity
Government Notice R983 promulgated on 4 December 2014 (as amended): Listing Notice 3	14	<p>“The development of infrastructures or structures with a physical footprint of 10 square metres or more;</p> <p>Where such development occurs –</p> <p>(a) within a watercourse</p> <p>(c.) Gauteng</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>iv. Sites identified as Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans;</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 the relevant environmental authority;”</p>

Note: Please note that the excavation of material may be considered as a mining activity. In this eventuality, the Department of Mineral Resources (DMRE) (previously the Department of Mineral Resources) is the Competent Authority and a process in terms of the Mineral and Petroleum Resources Development Act (Act 28 of 2002) would be required. It is recommended that the DMRE and the GDARD are both consulted during the Stakeholder Engagement process during this phase of the project.

2.13 Specialist Studies During the S&EIR

The environmental screening review has provided an overview of the study area and highlights areas of concern, which need to be further investigated in the EIA phase for the project. The following specialist studies are thus recommended to be undertaken during the EIA phase:

- Faunal Impact Assessment by a suitably trained/qualified Zoologist or Ecologist;
- Terrestrial Vegetation/Habitat Impact Assessment by a suitably trained/qualified Terrestrial Ecologist familiar with the vegetation of the region;



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- A Search, Rescue and Relocation Management Plan for red data, protected and endangered species, medicinal plants, heritage resources and graves;
- Avifaunal Impact Assessment by a suitably trained/qualified Avifaunal Ecologist familiar with the Avifaunal Species of the region;
- Wetland Delineation and Functional Assessment as well as an Aquatic Habitat/Sensitivity Impact Assessment by a suitably trained/qualified Wetland and Aquatic Ecologist familiar with the wetlands and vegetation of the region;
- Agricultural Impact Assessment by a suitably trained/qualified Horticulturist/Agricultural Scientist;
- Visual Impact Assessment by a suitably trained/qualified specialist;
- Noise Impact Assessment by a suitably trained/qualified specialist;
- Geotechnical Assessment by a suitably trained/qualified specialist;
- Geohydrological Assessment by a suitably trained/qualified specialist;
- Traffic Impact Assessment by a suitably trained/qualified specialist;
- Socio-economic impact assessment by a suitably trained/qualified Socio-economist and Anthropologist;
- Heritage and Paleontological Impact Assessment by a suitably trained/qualified Archaeologist;
- Climate Impact Assessment by a suitably trained/qualified specialist; and
- Site Safety Report for each station by a suitably trained/qualified Health and Safety specialist.

2.14 Potential Permit / License Applications

2.14.1 Water Use Licences Applications (WULAs)

The proposed development will be within 500m of a watercourse and thus requires a Section 21 (c) and (i) Water Use Licence Application (WULA) from the Department of Water and Sanitation (DWS). The following activities are therefore applicable in terms of the NWA:

Table 7: Potential sections of the National Water Act triggered

Activity	Description
Section 21 (c)	Impeding and diverting the flow of water in a watercourse
Section 21 (i)	Altering the bed, bank, course or characteristics of a watercourse

*other water uses may be applicable related to discharge

2.15 Other Permits

Permits to remove/relocate sensitive species may be required. The National Forest Act, 1998 (Act No. 84 of 1998) enforces the protection of a number of indigenous trees. The removal of thinning or relocation of protected flora will require a permit prior to the commencement of said activities.



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3 Conclusions and Recommendations

The proposed development aims to expand the GMA rapid rail development in the Gauteng Province. In this context, the environmental screening exercise aimed to investigate the interaction of the proposed route alternatives with various aspect of the receiving environment and identify areas of impact. The aspects considered were:

- Conservation Status;
- Threatened Ecosystems;
- Water Areas;
- Ridges; and
- Land Cover.

Table 8 below endeavours to create a nominal ranking of the route alternatives to qualitatively determine a preferred route alternative.

Table 8: Ranking of Percentage Area Affected per Route Alternative

Alternatives	Ranking				
	Conservation Areas - Ecological Support Areas	Water Areas (Wetlands)	Threatened Ecosystems (Endangered)	Ridges (Class 3 and 4)	Land Cover (Wetlands)
Alternative 1	✗	✗	✗	✓	✗
Alternative 2	✗	✗	✗	✗	✗
Alternative 3	✓	✓	✗	✓	✗
Alternative 4	✓	✓	✗	✓	✗
Alternative 5	✓	✓	✗	✗	✓
Alternative 6	✓	✓	✗	✓	✓

Due to the design adjustment made to Alternative 6, it is the preferred route alignment in terms of the percentage affected ridges associated with the route. This is dependent on the assumption that the impacts on watercourses as well as ecological support and threatened areas can be mitigated.



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3.1 Final Recommendations:

- A full Environmental Impact Assessment in terms of the NEMA EIA Regulations 2014 (as amended) will be required. The GMA will be required to apply for and obtain Environmental Authorisation from the Competent Authority. A suitably trained/qualified EAP will need to be appointed to undertake the EIA;
- Specialists must be appointed for the EIA as per Section 2.13 of this report. It is important to note that additional specialist studies may be required due to input from Key Stakeholders and Interested and Affected Parties as well as Competent and Commenting Authorities;
- Any Public Participation Process during the EIA must be designed to best practise standards and in line with the requirements of the EIA Regulations 2014 (as amended);
- A WULA process will need to be undertaken due to the proximity of watercourses throughout the study area. The proposed project triggers a Section 21 (c) water use for the “impeding or diverting the flow of water in a watercourse” and a Section 21 (i) water use for “altering the bed, banks, course or characteristics of a watercourse”. As such an application must be lodged with the DWS in order to obtain the necessary water license prior to the commencement of the proposed activity;
- In the event that a station or the preferred route traverses NFEPA watercourses upon field investigation, impacts such as contaminated runoff and sedimentation to surrounding watercourses must be mitigated;
- The presence of any protected and potentially sensitive floral or faunal species must be established. Any potential protected or sensitive floral or faunal species should be avoided where possible, or where unavoidable, these species will need to be relocated outside of the development footprint. A suitable permit needs to be obtained with regards to damaging/disturbing or relocating these species;
- Impacts on noise receptors due to the position of and operations at the depot must be included in the Noise Impact Assessment;
- All infrastructure must be designed to accommodate geotechnical aspects of the receiving environment especially in the case of the presence of dolomite, limestone and karst landscapes as well as where structural features such as geological faults, folds, sills, dykes, shear or contact zones are present;
- All infrastructure must be designed to withstand tectonic events;
- All infrastructure must be designed with effective climate change mitigation and adaptation responses in order to create an environmentally sustainable, low-carbon economy;
- All stations must be located in a way as to create sustainable connected human communities and connect key transit nodes;
- A Site Safety Report must be compiled for each station; and



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- Based on the presented findings, it is recommended that Alternative 6 is considered as the preferred alternative. This may be further evaluated during the undertaking of in-situ assessments such as specialist studies as per section 2.13.



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