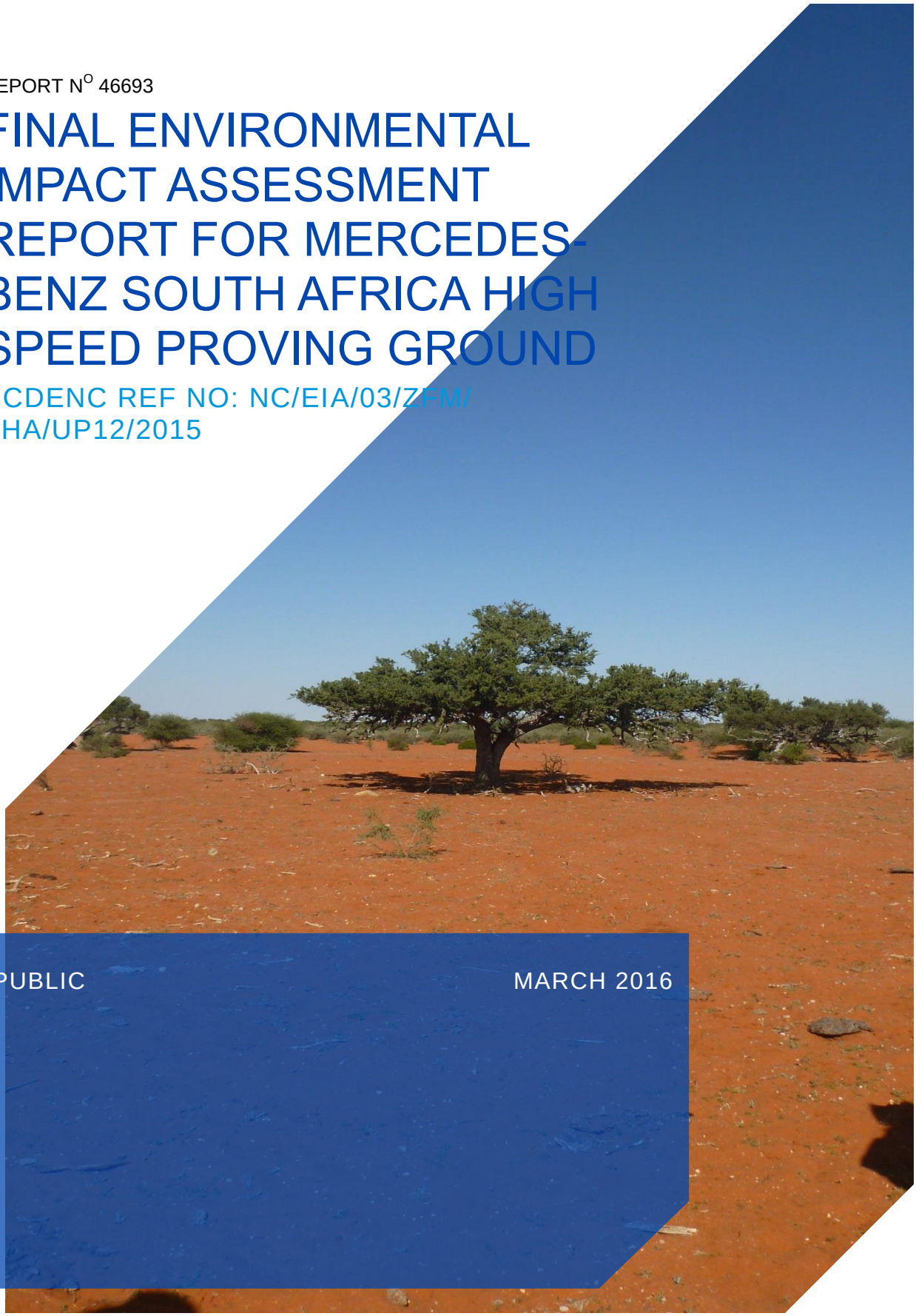
REPORT N^{O} 46693

FINAL ENVIRONMENTAL IMPACT ASSESSMENT REPORT FOR MERCEDES-BENZ SOUTH AFRICA HIGH SPEED PROVING GROUND

NCDENC REF NO: NC/EIA/03/ZFM/KHA/UP12/2015



PUBLIC

MARCH 2016

WSP | PARSONS BRINCKERHOFF

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Mercedes-Benz South Africa

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WAIVER

Purpose and basis of preparation of this Report

*This Draft Environmental Impact Assessment Report for an Environmental Authorisation for the proposed development of a High Speed Proving Ground (HSPG) for vehicle testing for Mercedes-Benz South Africa (NCDENC Reference: NC/EIA/03/ZFM/KHA/UP12/2015) has been prepared by WSP Environmental Proprietary Limited (**WSP**) on behalf and at the request of Mercedes Benz South Africa (Pty) Ltd (**Client**), to provide the Client an understanding of the Relevant Documents.*

Unless otherwise agreed by us in writing, we do not accept responsibility or legal liability to any person other than the Client for the contents of, or any omissions from, this Report.

To prepare this Report, we have reviewed only the documents and information provided to us by the Client or any third parties directed to provide information and documents to us by the Client. We have not reviewed any other documents in relation to this Report and except where otherwise indicated in the Report.

PRODUCTION TEAM

CLIENT

Mercedes Benz South Africa	Owen Smith
General Planner IngenAix GmbH	Marc Schmits-Lapainer

WSP | PARSONS BRINCKERHOFF

Director	Malcolme Logie
Project Manager	Anri Scheepers

SUBCONSULTANTS

Biodiversity Impact Assessment	PB Consult Ecological & Botanical Management Services
Wetland Study Impact Assessment	Ixhaphozi Enviro Services CC
Traffic Impact Assessment	WSP | Parsons Brinckerhoff, Africa - Development, Transportation and Infrastructure
Hydrogeological Impact Assessment	Geo-Logic Hydrogeological Consultants
Soils and Land Capability Impact Assessment	Terra Soil Science
Socio-Economic Impact Assessment	Tony Barbour Environmental Consulting and Research
Heritage Impact Assessment	Agency for Cultural Resource Management
Geological Assessment	Council for Geoscience
Geotechnical Assessment	ARQ Consulting Engineers
Air Quality Impact Assessment	WSP Environmental (Pty) Ltd
Noise Impact Assessment	WSP Environmental (Pty) Ltd
Paleontological Impact Assessment	BM Geological Services

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Abbreviations

Abbreviation	Definition
AASHTO	American Association of State Highway and Transportation Officials
AEL	Atmospheric Emissions License
AIA	Archaeological Impact Assessment
BBBEE	Broad Based Black Economic Empowerment
BGIS	Biodiversity Geographical Information System
BPG	Best Practice Guidelines
°C.	Degrees Celsius
CR	Critically endangered
DAFF	Department of Agriculture, Forestry and Fisheries
dBA	Decibels
DEA	Department of Environmental Affairs
DMR	Northern Cape Department of Mineral Resources
DSR	Draft Scoping Report
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EHS	Environmental, Health and Safety
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EIR	Environmental Impact Report
EIS	Ecological Importance and Sensitivity
EMF	Environmental Management Framework
EMPr	Environmental Management Plan/ Programme
EPA	Environmental Protection Agency's
FAO	Food and Agricultural Organisation
FSR	Final Scoping Report
GDP	Gross Domestic Product
GGP	Gross Geographic Product
GNR	Government Notice Regulation
ha	Hectare
HDI	Human Development Index
HDPE	High-Density Polyethylene
HSA	Hazardous Substances Act (No. 15 of 1979)
HSPG	High Speed Proving Ground
HIV/ AIDS	Human Immunodeficiency Virus/ Acquired Immunodeficiency Syndrome

Abbreviation	Definition
I&APs	Interested & Affected Parties
IDP	Integrated Development Plan
IngenAix	General Planner IngenAix GmbH
IWULA	Integrated Water Use License Application
KHLM	//Khara Hais Municipality
km	Kilometres
l/ s	Litre per Second
LReq,d	Equivalent continuous rating level, daytime
LReq,n	Equivalent continuous rating level, night time
LSA	Later Stone Age
m	Metre
m^2	Square Metres
m^3	Cubic Metres
MAP	Mean Annual Precipitation
masl	Metres Above Sea Level
mg/ l	Milligrams per Litre
MPRDA	Mineral and Petroleum Resources Development Act (No. 28 of 2002)
MBSA	Mercedes-Benz South Africa
NBSAP	National Biodiversity Strategy and Action Plan
NCDENC	Northern Cape Department of Environmental and Nature Conservation
NCNCA	Northern Cape Nature Conservation Act (No. 9 of 2009)
NCSDF	Northern Cape Special Development Framework
NEFPA	National Freshwater Ecosystem Priority Areas
NEMA	National Environmental Management Act (No. 107 of 1998)
NEMAQA	National Environmental Management Air Quality Act (No. 39 of 2004)
NEMBA	National Environmental Management Biodiversity Act (No. 10 of 2004)
NEMPAA	National Environmental Management Protected Areas Act (No. 57 of 2003)
NEMWA	National Environmental Management Waste Act (No. 59 of 2008)
NFA	National Forests Act (No. 84 of 1998)
NGOs	Non-Government Organisations
NHRA	National Heritage Resources Act (No. 25 of 1999)
NPI	Australian National pollution Inventory
NWA	National Water Act (No. 36 of 1998)
OWC	Orange River Wine Cellars
PES	Present Ecological State
PCD	Pollution Control Dam
PM	Particulate Matter
PoS	Purpose of Study
PPE	Personal Protective Equipment

Abbreviation	Definition
R&D	Research and Development
R/ ZAR	South African Rand
SABS	South African Bureau of Standards
SAHRA	South African Heritage Resource Agency
SANBI	South African National Biodiversity Institute
SANS	South African National Standards
S&EIR	Scoping and Environmental Impact Reporting
SIA	Social Impact Assessment
SoER	State of the Environment Report
TWQR	Target Water Quality Requirements
USDA	United State Department of Agriculture
WML	Waste Management License
WSP	WSP Environmental (Pty) Ltd
WWTP	Wastewater Treatment plant
WUL	Water Use License
WULA	Water Use License Application
ZFMDM	ZF Mgcawu District Municipality

1 INTRODUCTION

1.1 PROJECT BACKGROUND

Mercedes-Benz South Africa (Pty) Ltd (MBSA) proposes to develop a HSPG for vehicle testing for the Mercedes-Benz Research and Development Team, in the Northern Cape Province of South Africa. The site is located on property Steenkamps Pan, Farm 419/06 in the //Khara Hais Municipality, approximately 38 km North-east of Upington (**Figure 1-2**).

WSP Environmental (Pty) Ltd (WSP) has been appointed by the General Planner IngenAix GmbH (IngenAix) on behalf of MBSA to manage the Scoping and Environmental Impact Reporting (S&EIR) process for the proposed project.

MBSA, a subsidiary of Daimler AG located in Germany, is a supplier of both premium passenger cars and versatile commercial vehicles. The company structure is illustrated in **Figure 1-1**.

1.2 PURPOSE OF THIS REPORT

The purpose of this Environmental Impact Assessment Report (EIAR) and Environmental Management Programme Report (EMPr) is to provide stakeholders and decision makers with an overview of the proposed development of a High Speed Proving Ground (HSPG) for vehicle testing for the Mercedes-Benz Research and Development Team in the Northern Cape Province of South Africa. This report aims to characterise the environmental and social context of the proposed project and identify and assess potential environmental and social impacts associated with the proposed project.

The main objectives of the Environmental Impact Reporting (EIR) Phase are to:

1. Further detail the existing status of the biophysical and socio-economic environment;
2. Describe the process of engagement with stakeholders moving into the EIR Phase, including their views and concerns;
3. Provide specialist study reports and summarised findings;
4. Identify, describe and assess the anticipated social and environmental impacts associated with the proposed project; and
5. Provide mitigation and management measures for the identified significant impacts.

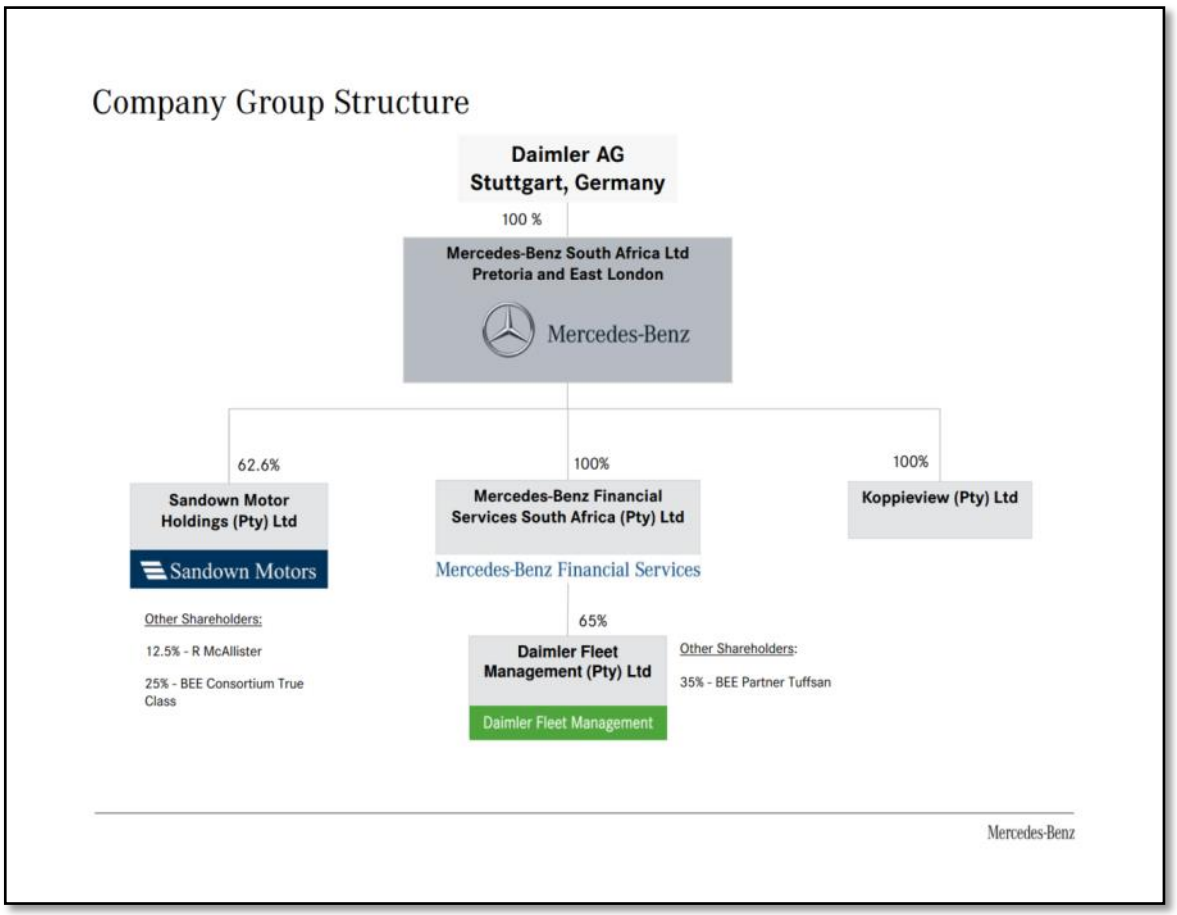


Figure 1-1: Proponent Company Structure

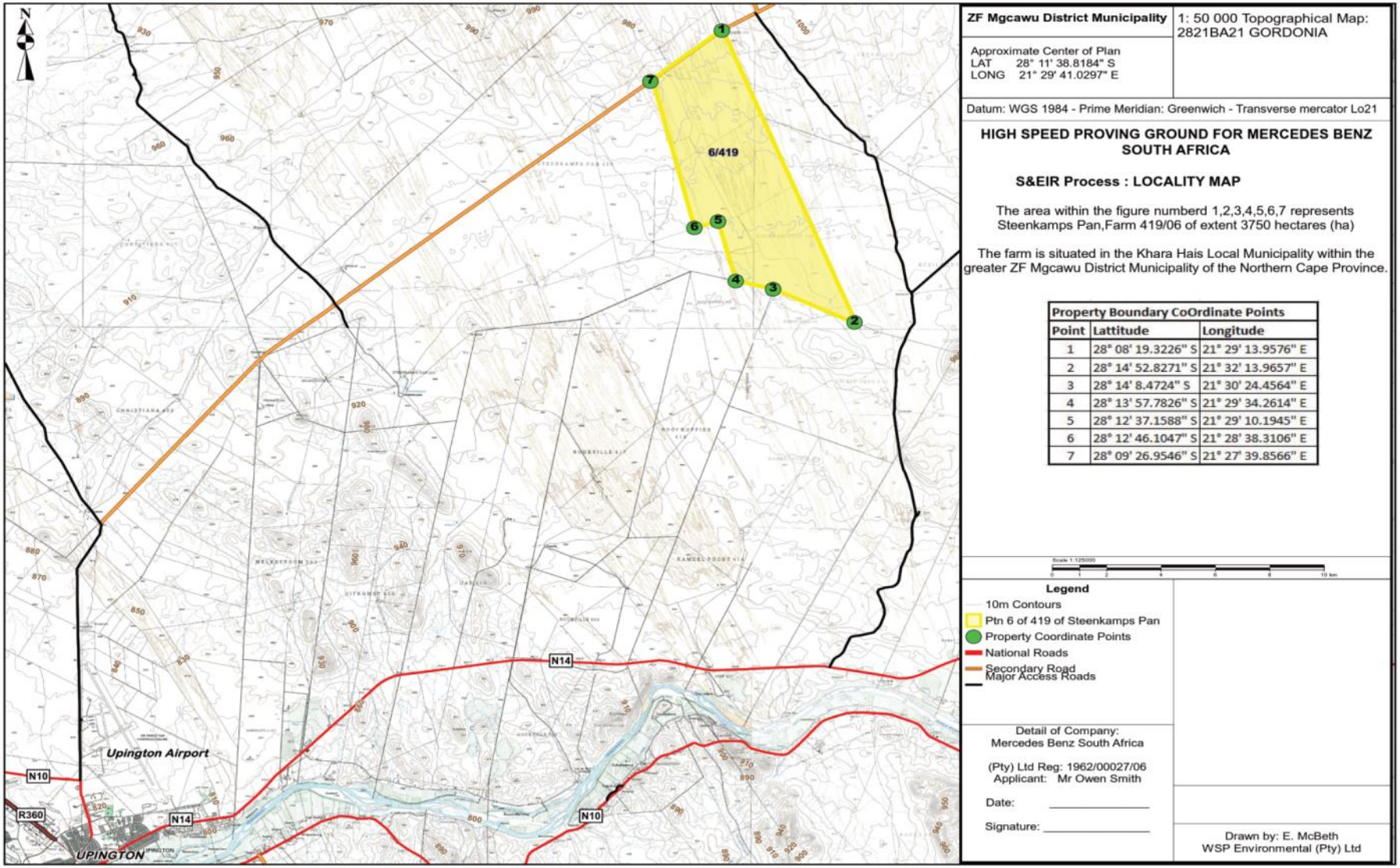


Figure 1-2: Locality Map for the High Speed Proving Ground

1.3 TERMS OF REFERENCE

Prior to the commencement of the proposed project, the following are required:

- Environmental authorisation (EA) for activities identified in terms of GNR 983, 984 and 985 (4 December 2014) published in terms of the National Environmental Management Act (No. 107 of 1998) (NEMA); and
- A water use license (WUL) in terms of the National Water Act (No. 36 of 2004) (NWA).

An integrated S&EIR process will therefore need to be completed in order to meet the abovementioned legal requirements and assess the potential impacts associated with the proposed project.

1.4 ROLE PLAYERS

DECISION MAKING AUTHORITIES

The proposed project will require an EA for the proposed development of the MBSA HSPG which requires a full S&EIR process to be undertaken. The Northern Cape Department of Environment and Nature Conservation (NCDENC) will be responsible for reviewing relevant technical information and making the final decision as to grant or reject the EA. Details of the decision-making authority are provided in **Table 1-1**.

Table 1-1: Contact Details Decision-making Authority

Northern Cape Department of Environment and Nature Conservation	
Case Officer	Mr O. Riba
Address	Sasko Building Long Street 90 Kimberley 8301
Postal Address	Private Bag X6102 Kimberley 8301
Contact Information	Tel: 060 991 4817 Email: oriba.denc@gmail.com
Reference Number	NC/EIA/03/ZFM/KHA/UP12/2015

PROJECT PROPONENT

The Proponent, MBSA, proposes to develop a HSPG for vehicle testing for the Mercedes-Benz Research and Development Team in the Northern Cape Province of South Africa. The site is located on property Steenkamps Pan, Farm 419/06 in the //Khara Hais Municipality, approximately 38 km North-east of Upington. Details of the proponent are detailed in **Table 1-2**.

Table 1-2: Project Proponent Details

Project Proponent:	Mercedes-Benz South Africa (Pty) Ltd
Company Registration:	1962/00027/06
Contact Person:	Mr Owen Smith
Physical Address:	Wierda Road (M10 West/R576) Zwartkop
Postal Address:	P O Box 1717 Pretoria South Africa
Telephone:	+27 12 673 6744
Fax:	+27 12 677 1851
E-mail:	owen.smith@daimler.com

ENVIRONMENTAL ASSESSMENT PRACTITIONER

WSP Global Inc. and Parsons Brinckerhoff have combined and are now one of the world's leading engineering professional services consulting firms. We bring together our 32,000 staff, based in more than 500 offices, across 39 countries to provide engineering and multidisciplinary services in a vast array of industry sectors, with a focus on technical excellence and client service.

In Africa, WSP, Environment & Energy, is a leading environmental consultancy with a broad range of expertise and over 20 years' experience in the regional market. As part of a global business, we provide the marketplace with a dynamic blend of local knowledge and global expertise. While we form part of WSP Global Inc., we are also committed to transformation in our operational region, with 26% Broad Based Black Economic Empowerment (BBBEE) ownership and having achieved Level 3 BBBEE certification in South Africa.

We offer independent, insightful and professional advice to our clients to achieve a balance between environmental protection, social desirability and economic development.

At WSP Environment & Energy, we have a reputation for delivery and excellence and provide a diverse range of integrated and innovative solutions to both public and private sector clients across the industrial, mining, infrastructure and financial sectors.

WSP was appointed by the General Planner IngenAix GmbH on behalf of MBSA to fulfil the role of the independent environmental assessment practitioner (EAP) to facilitate the S&EIR process. **Table 1-3** details the contact details of the EAP.

Table 1-3: Details of the Environmental Assessment Practitioner

Environmental Assessment Practitioner (EAP)	WSP Environmental (Pty) Ltd
Company Registration:	1995/08790/07
Contact Person:	Malcolme Logie
Postal Address:	PO Box 98867 Sloane Park 2151 Johannesburg
Telephone:	011 300 6085
Fax:	011 361 1301
E-mail:	Malcolme.Logie@WSPGroup.co.za

WSP pride's themselves on their reputation for delivery and technical excellence and provides a broad range of environmental and energy related services across a range of economic areas including the industrial, mining, financial, tourism and public sectors. Curriculum vitae of the EAP and relevant qualifications have been included in **Appendix 1**.

1.5 STRUCTURE OF THIS REPORT

The EIAR has been compiled in a diligent and independent manner, and includes the following:

- An introduction to the proposed project, the project proponent, the EAP and specialists, as well as competent authorities (**Section 1**);
- Description of the legislation applicable to the proposed project (**Section 2**);
- Approach to the EIA Phase (**Section 3**);
- Project description including existing and proposed activities (**Section 4**);
- Project need and desirability (**Section 5**);
- Project alternatives including 'no-go' alternatives (**Section 6**);
- Description of the baseline biophysical and socio-economic conditions of the proposed project area (**Section 7**);
- Summary of Specialist Studies (**Section 8**);
- Impact assessment Methodology (**Section 9**);
- Impact assessment and management of potential environmental and socio-economic impacts, including cumulative impacts (**Section 10**);
- Public Participation Process (**Section 11**);
- EMPr requirements (**Section 12**);
- Environmental Impact Statement (**Section 13**); and
- Conclusion (**Section 14**).

The EIAR has been drafted in accordance with the NEMA EIA Regulations (GNR 982 of December 2014). The EIAR has been compiled in a diligent and independent manner, and **Table 1-4** denote the relevant GNR requirements and corresponding sections within this report.

Table 1-4: Legislation requirements as detailed in NEMA GNR 982

Legislated requirements as per the NEMA GNR 982	Relevant Report Section
Contents of the Environmental Impact Assessment Report	
Details of the EAP who compiled the report.	**1.4**
Details of the expertise of the EAP to carry out an Environmental Impact Assessment (EIA).	**1.4**
The location of the activity, including- → The 21 digit Surveyor General code of each cadastral land parcel; → Where available, the physical address and farm name; and → Where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties.	**4**
A plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is- → a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or → on land where the property has not been defined, the coordinates within which the activity is to be undertaken.	**Figure 1-2**
A description of the scope of the proposed activity, including- → All listed and specified activities triggered; and → A description of the activities to be undertaken, including associated structures and infrastructure.	**4**
A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process.	**2**
A motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location.	**5**
A motivation for the preferred development footprint within the approved site.	**6**
A full description of the process followed to reach the proposed preferred activity, site and location within the site, including -	
Details of all the alternatives considered.	**6**
Details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs.	**11**
A summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them.	**Appendix 5-2**
The environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects.	**7**
The impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts- → Can be reversed; → May cause irreplaceable loss of resources; and → Can be avoided, managed or mitigated.	**10**

Legislated requirements as per the NEMA GNR 982	Relevant Report Section
Contents of the Environmental Impact Assessment Report	
The methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks.	**9**
Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects.	**10**
The possible mitigation measures that could be applied and level of residual risk.	**10**
If no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such.	**6**
A concluding statement indicating the preferred alternatives development location within the approved site.	**6**
Details of the development footprint alternatives considered.	**6**
A full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred location through the life of the activity, including: → a description of all environmental issues and risks that were identified during the environmental impact assessment process; and → An assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.	**10**
An assessment of each identified potentially significant impact and risk, including: → Cumulative impacts; → The nature, significance and consequences of the impact and risk; → The extent and duration of the impact and risk; → The probability of the impact and risk occurring; → The degree to which the impact and risk can be reversed; → The degree to which the impact and risk may cause irreplaceable loss of resources; and → The degree to which the impact and risk can be mitigated.	**10**
Where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report.	**8**
An environmental impact statement which contains: → a summary of the key findings of the environmental impact assessment → a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and → a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives.	**13**
Based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation.	**Appendix 4**

Legislated requirements as per the NEMA GNR 982	Relevant Report Section
Contents of the Environmental Impact Assessment Report	
The final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment.	**6**
Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation.	**14**
A description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed.	**1.6**
A reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation.	**14**
Where the proposed activity does not include operational aspects, the period for which the EA is required and the date on which the activity will be concluded and the post construction monitoring requirements finalised.	**N/A**
An undertaking under oath or affirmation by the EAP in relation to: → the correctness of the information provided in the reports; → the inclusion of comments and inputs from stakeholders and I&APs; → the inclusion of inputs and recommendations from the specialist reports where relevant; and → any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties.	**Appendix 7**
Where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts.	**N/A**
An indication of any deviation from the approved scoping report, including the plan of study, including: → Any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and → A motivation for the deviation.	**N/A**
Any specific information that may be required by the competent authority.	**N/A**
Any other matters required in terms of section 24(4)(a) and (b) of the Act.	**N/A**

1.6 ASSUMPTIONS AND LIMITATIONS

- This EIAR has been prepared for the purposes outlined in the initial proposal prepared by WSP for the scope and the period of work described in WSP's proposal;
- All information regarding the proposed project infrastructure was provided by the Proponent. This includes the project description, motivation and alternatives considered;
- Where data supplied by MBSA or other specialist consultants, has been used, it has been assumed that the information is correct unless otherwise stated. No responsibility is accepted by WSP for incomplete or inaccurate data supplied by external parties;
- It is WSP's professional opinion that the adopted predictive methods are sufficient and adequate for rating the significance of the impacts during the EIR Phase; and
- The information and data included in the EIAR is based upon information that existed at the time of the compilation of the report.

2 REGULATORY CONTEXT

This section of the EIAR provides an outline of relevant legislation and regulations, which are applicable to (or have implications for) the proposed project.

Applicable Legislation	Permits/Authorisations Required (Y/N)	Description
The Constitution of South Africa (No. 108 of 1996)	N	The Constitution cannot manage environmental resources as a stand-alone piece of legislation hence additional legislation has been promulgated in order to manage the various spheres of both the social and natural environment. Each promulgated act and associated Regulations are designed to focus on various industries or components of the environment to ensure that the objectives of the Constitution are effectively implemented and upheld on an on-going basis throughout the country. In terms of Section 7, a positive obligation is placed on the State to give effect to the environmental rights
National Environmental Management Act (No. 107 of 1998)	Y	In terms of Section 24(2) of the National Environmental Management Act (No. 107 of 1998) (NEMA) the Minister may identify activities which may not commence without prior authorisation The Minister thus published the following listing notices: GNR 983 (Listing Notice 1), 984 (Listing Notice 2) and 985 (Listing Notice 3) (4 December 2014). The regulations outlining the procedures required for authorisation are published in GNR 982 (EIA Regulations) (4 December 2014). Listing Notice 1 identifies activities that require a Basic Assessment (BA) process to be undertaken, in terms of the EIA Regulations, prior to commencement of that activity. Listing Notice 2 identifies activities that require an S&EIR process to be undertaken, in terms of the EIA

Applicable Legislation	Permits/Authorisations Required (Y/N)	Description
		Regulations, prior to commencement of that activity. Listing Notice 3 identifies activities within specific areas that require a BA process to be undertaken, in terms of the EIA Regulations, prior to commencement of that activity. WSP undertook a detailed analysis of the listed activities contained in Listing Notice 1, 2 and 3 in order to ascertain which of the activities are relevant to the proposed project. The activities, potentially applicable to the proposed project are as follows: → GNR 983: Activities 14, 24 (ii); → GNR 984: Activities 6, 15, 21; and → GNR 985: Activity 11(iii). The result of the analysis indicated that an S&EIR process is required. Under the One Environmental System, the Minister of Mineral Resources will issue EAs and waste management licences in terms of the NEMA and the National Environmental Management Waste Act (No. 59 of 2008) (NEMWA). The Minister of Environmental Affairs will be the appeal authority for these authorisations.
National Environmental Management Waste Act (No. 59 of 2008)	N	Section 20 of the NEMWA states that no person may commence, undertake or conduct a waste management activity except in accordance with a WML. A list of waste management activities that require a WML was published in GNR 921 (29 November 2013). GNR 921 states that a person who wishes to commence with a waste management activity must undertake the required BA or S&EIR process in accordance with GNR 982 stipulated under NEMA. WSP undertook a detailed analysis of the

Applicable Legislation	Permits/Authorisations Required (Y/N)	Description
		listed activities contained in GNR 921 in order to ascertain which of the activities are relevant to the proposed project and it was determined that none of the activities are applicable. GNR 926 of 2013 under the NEMWA provides a set of national norms and standards for the storage of waste, which apply, to any person who stores general or hazardous waste in a waste storage facility. The purpose of these norms and standards is to: → Provide a uniform national approach relating to the management of waste storage facilities; → Ensure best practice in the management of waste storage facilities; and → Provide minimum standards for the design and operation of new and existing waste storage facilities.
National Water Act (No. 36 of 1998)	Y	Section 22(1) of the National Water Act (No. 36 of 1998) (NWA) states that a person may only use water if the water use is authorised by a license under NWA or if the responsible authority has dispensed with a license requirement if it is satisfied that the purpose the NWA will be met by the granting of a license, permit or other authorisation under any other law. A person may only use water without a license if the water use is permissible: → Under Schedule I of NWA; → As a continuation of an existing lawful use; and → In terms of a general authorisation issued under Section 39 of NWA. A water use license (WUL) is required in terms of Section 41 of the NWA for activities listed in Section 21 of the said Act. The water uses potentially applicable to the

Applicable Legislation	Permits/Authorisations Required (Y/N)	Description
		proposed project include: → Section 21(a): Taking of water from a water resource; → Section 21(b): Storing water; → Section 21(c): Impeding or diverting the flow of water in a water course; → Section 21(g): Disposing of water in a manner which may detrimentally impact on a water resource; and → Section 21(i): Altering the bed, bank, course or characteristics of a watercourse. Hydroscience has been appointed to apply for the Water Use License and ensure the proposed project is compliant in terms of this act. **Appendix 6** provides further information regarding the WUL Application Process.
National Environmental Management Biodiversity Act (No. 10 of 2004)	N	Sections 52(1)(a) and 56(1) of the National Environmental Management Biodiversity Act (No. 10 of 2004) (NEMBA) state that the Minister may publish national lists of species and ecosystems, respectively, that are threatened or are in need of protection. A list of species that are threatened or are in need of protection was published in GNR 151 (23 February 2007), with GNR 152 (23 February 2007) detailing the regulations relating to such species. These regulations are imposed where restricted activities involve specimens of listed threatened or protected species. GNR 152 defines the requirements of permitting and the process related thereto. A biodiversity study was undertaken to investigate and assess the potential impact the HSPG may have on the immediate and surrounding environment. This study concluded that a number of protected species where found within the footprint of the HSPG however no species of conservation concern was recorded in terms

Applicable Legislation	Permits/Authorisations Required (Y/N)	Description
		of the latest Red List of species for South Africa.
National Heritage Resources Act (No. 25 of 1999)	Y	Section 34 and 38 of the NHRA detail specific activities that require an approved heritage impact assessment by the South African Heritage Resource Agency (SAHRA). The heritage activities identified as potentially applicable for the proposed project are as follows → 1(a) - The construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length; → 1(c) - Any development or other activity which will change the character of a site: → Exceeding 5 000m^2 in extent; or → Involving three or more existing erven or subdivisions. → 1(d) - The re-zoning of a site exceeding 10 000m^2 in extent; → 2 - Any development of the site where "development" means any physical intervention, excavation, or actions, other than those caused by natural forces, which results in a change to the nature, appearance or physical nature of a place, or influences its stability and future well-being, including: ▪ Construction, alteration, demolition, removal or change of use of a place or a structure at a place; or ▪ Carrying out any works on or over or under a place; or ▪ Any change to the natural or existing condition or topography of land; or ▪ Any removal or destruction of trees, or removal of vegetation or topsoil. Section 48(2) requires a permit from the SAHRA to perform such actions at such time and subject to such terms, conditions and restrictions or directions as may be specified in the permit.
National Forest Act (No. 84 of 1998)	Y	The Act governs the management and protection of trees and forests. A forestry

Applicable Legislation	Permits/Authorisations Required (Y/N)	Description
		licence is required for the removal of any protected tree species of concern. A biodiversity study was undertaken to investigate and assess the potential impact the HSPG may have on the immediate and surrounding environment. This study concluded that three species protected in terms of the NFA were encountered namely: → *Acacia erioloba*; → *Acacia haematoxylon*; and → *Boscia albitrunca*. Therefore, a tree permit will be applied for due to the potential impact from the development of the HSPG.
Fencing Act (No. 31 of 1963)	N	The purpose of the Fencing Act is to consolidate the laws relating to fences and the fencing of farms and other holdings and matters incidental thereto. Section 17 requires that any person erecting a boundary fence may clean any bush along the line of the fence up to 1.5 metres on each side thereof and remove any tree standing in the immediate line of the fence. However, this provision must be read in conjunction with the environmental legal provisions relevant to the protection of flora.
Hazardous Substances Act (No. 15 of 1979)	N	The Hazardous Substances Act and Regulations regulates the: → Keeping; → Handling; → Transporting; → Conveyance; → Use and disposal; and → Quality of hazardous substances. Hazardous substances contained on-site will need to be managed in accordance with the

Applicable Legislation	Permits/Authorisations Required (Y/N)	Description
		Act and material safety data sheets (MSDS) will need to accompany all dangerous goods (hydrocarbon fuels, cleaning chemicals, paints, etc.).
Northern Cape Nature Conservation Act 9 of 2009	Y	The Northern Cape Nature Conservation Act (NCNCA) was established to provide for the sustainable utilisation of wild animals, aquatic biota and plants; to provide for the implementation of the convention of International Trade in Endangered Species of Wild fauna and Flora; to provide for offences and penalties for contravention of the Act; to provide for the issuing of permits and other authorisations; and to provide for matters connected therewith. Three species listed in terms of the NCNCA were encountered during the biodiversity study namely: → *Aloe claviflora*; → *Boscia foetida*; and → *Rushia cf. intricate*. All of these species are considered to be of Least Concern in terms of the IUCN (International Union for the Conservation of Nature). Therefore, a flora permit will be applied for due to the potential impact from the development of the HSPG.
Conservation of Agriculture Resources, 1983 (Act 43 of 1983)	N	The Conservation of Agriculture Resource Act, 1993 must be considered with specific reference to Article 7(1) the Utilisation and Protection of vleis, marshes, water sponges and water courses which states that no land user shell utilize the vegetation in a vlei or water sponge or within the flood area of a water course or within 10 meters horizontally outside such flood area in a manner that causes or may cause the deterioration of or damage to the natural agriculture resources.

Applicable Legislation	Permits/Authorisations Required (Y/N)	Description
		Article 7(3)(b) of Regulation 9238 with reference to the cultivate of any land on his farm unit within the flood area of a water course or within 10 meters horizontally outside the flood are of a water course must also be considered. As a result of the location of the HSPG it is foreseen that the wetland will not be impacted on by the construction and operation of the HSPG. However this act must still be considered and adhered to.
//Khara Hais Municipality Aerial Systems Bylaw (By-law No 18 of 2007)	Y	Permission is required from the municipality in order to erect aerial systems. It is anticipated that a communication tower will be erected and permission will be obtained from the municipality.
//Khara Hais Municipality Integrated Development Plan 2012 – 2017 (Approved Tuesday 26 May 2015)	N	The Integrated Development Plan (IDP) provides an overall framework for development in the area. The IDP has been considered during the EIR Phase to assess whether the development falls within the framework of the area.

3 S&EIR PROCESS AND METHODOLOGY

The S&EIR processes for the proposed project are being undertaken as one integrated process comprising of three phases, namely the:

- Application Phase;
- Scoping Phase; and
- EIR Phase.

This report documents the tasks which will be undertaken as part of the EIR Phase. These tasks include the stakeholder consultation process, the documentation of the issues which have been identified as a result of these activities and the undertaking of various specialist studies.

3.1 APPLICATION PHASE

The application phase consisted of completing the appropriate application form by the EAP and the Proponent as well as the subsequent submission and registration of the proposed project with the Competent Authorities.

The NEMA application form was submitted to the NCDENC on 1 September 2015 and subsequently accepted on 9 September 2015. The NCDENC reference number allocated to this application is NC/EIA/03/ZFM/KHA/UP12/2015. This reference number appears on all official correspondence with the authorities and the public regarding the proposed project. A copy of the application forms and the acknowledgement of receipt of the applications are included in **Appendix 5-4** and **Appendix 5-5** respectively.

The WUL applications were submitted to Department of Water and Sanitation (DWS) on 18 February 2016. This was undertaken by Hydroscience.

All commenting authorities were notified of the proposed project by email, fax and SMS as part of the stakeholder notification process detailed in Section 10. In addition, a competent authority meeting was held with the NCDENC on 14 October 2015 to notify the Department of the proposed project and the EA process to be followed (see meeting records attached as **Appendix 5-6**).

3.2 SCOPING PHASE

The preliminary investigations undertaken during the scoping phase included aspects such as the physical, biological and social environment. The information in the scoping report was compiled from various sources, including the client, site visits, interviews and meetings with authorities and stakeholders, and literature reviews. Both positive and negative potential impacts that the proposed project may have on the environment were identified and discussed.

The Scoping Phase was undertaken in accordance with the NEMA, as read with GNR 982 of the NEMA. The objectives of the Scoping phase were to:

- Identify the relevant policies and legislation relevant to the activity;
- Motivate the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;

- Identify and confirm the preferred activity and technology alternative through an impact and risk assessment and ranking process;
- Identify and confirm the preferred site, through a detailed site selection process, which includes an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified alternatives focusing on the geographical, physical, biological, social, economic, and cultural aspects of the environment;
- Identify the key issues to be addressed in the assessment phase;
- Agree on the level of assessment to be undertaken, including the methodology to be applied, the expertise required as well as the extent of further consultation to be undertaken to determine the impacts and risks the activity will impose on the preferred site through the life of the activity, including the nature, significance, consequence, extent, duration and probability of the impacts to inform the location of the development footprint within the preferred site; and
- Identify suitable measures to avoid, manage or mitigate identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

WSP completed the scoping phase of the S&EIR process which included a review of existing information, the gathering of baseline data, stakeholder engagement and the compilation of a Final Scoping Report (FSR). The Scoping Phase was approved by the NCDENC on 12 January 2016, refer to **Appendix 5-8**.

STAKEHOLDER REVIEW PRIOR TO SUBMISSION

The Draft Scoping Report (DSR) was made available to all stakeholders and authorities on 16 September 2015, for a 30 day review period. The comments received from stakeholders have been recorded and incorporated into the FSR which was submitted to the NCDENC as well as any other relevant commenting authorities.

SUBMISSION AND DECISION-MAKING

The delegated competent authority was allocated 43 days to review the FSR. The FSR was placed on stakeholder review for a reasonable time period during the Department's final review and decision-making process. Any comments received during this period were forwarded to the delegated authority. Acceptance of the FSR and authorisation to proceed with the EIR Phase was issued on 12 January 2016 by the NCDENC (**Appendix 5-8**).

3.3 ENVIRONMENTAL IMPACT REPORTING PHASE

The EIR Phase (this phase) is undertaken to investigate and assess the potential impacts as previously identified during the Scoping Phase. Specialist studies (as identified in the Scoping Phase) were also completed to facilitate such assessment. The impacts were assessed to determine their significance so that appropriate mitigation and management measures could be developed for implementation during the proposed project. WSP compiled a EIAR (this report) following the completion of the required specialist studies, impact assessment and development of mitigation and management measures.

All requirements as contemplated in NEMA GNR 982 have been included in the EIR, this report. The objective of the environmental impact assessment process is to, through a consultative process:

- Determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;
- Describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;

- Identify the location of the development footprint within the preferred site based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;
- Determine the:
  - Nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and
  - Degree to which these impacts-
    - Can be reversed;
    - May cause irreplaceable loss of resources; and
    - Can be avoided, managed or mitigated;
- Identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment;
- Identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;
- Identify suitable measures to avoid, manage or mitigate identified impacts; and
- Identify residual risks that need to be managed and monitored.

SPECIALIST STUDIES

Table 3-1 outlines the specialist studies that were undertaken during the course of the S&EIR process. The full specialist study reports and signed declarations of independence have been included as appendices. The curricula vitae of the specialists have been attached in **Appendix 2-13**.

Table 3-1: Specialist Studies

Specialist Study	Organisation Responsible for the Study	Appendix
Biodiversity Impact Assessment	PB Consult Ecological & Botanical Management Services	Appendix 2-1
Wetland Impact Assessment	Ixhaphozi Enviro Services CC	Appendix 2-2
Traffic Impact Assessment	WSP | Parsons Brinckerhoff, Africa - Development, Transportation and Infrastructure	Appendix 2-3
Hydrogeological Impact Assessment	Geo-Logic Hydrogeological Consultants	Appendix 2-4
Soils and Land Capability Impact Assessment	Terra Soil Science	Appendix 2-5
Socio-Economic Impact Assessment	Tony Barbour Environmental Consulting and Research	Appendix 2-6
Heritage Impact Assessment	Agency for Cultural Resource Management	Appendix 2-7
Geological Assessment	Council for Geoscience	Appendix 2-8
Geotechnical Assessment	ARQ Consulting Engineers	Appendix 2-9
Air Quality Impact	WSP Environmental (Pty) Ltd	Appendix 2-10

Specialist Study	Organisation Responsible for the Study	Appendix
Assessment		
Noise Impact Assessment	WSP Environmental (Pty) Ltd	Appendix 2-11
Paleontological Impact Assessment	BM Geological Services	Appendix 2-12

STAKEHOLDER REVIEW PRIOR TO SUBMISSION

The Draft EIAR was made available to stakeholders and authorities for review from 8 February 2016 to 11 March 2016, for a 30 day review period. The comments received from stakeholders have been recorded and incorporated into the Final EIAR which was submitted to the NCDENC as well as any other relevant commenting authorities.

SUBMISSION AND DECISION-MAKING

In accordance with the NEMA, the following process will need to be followed by the decision making authority in order to process the EA and the WULA application:

→ Once the Final EIAR (including comments received by stakeholders) has been submitted, the DEA will be allocated 107 days to review the report in which time they may:

- Accept the EIAR;
- Notify the Proponent that the EIAR has been referred for specialist review;
- Request the Proponent to make such amendments to the EIAR as the delegated authority may require for acceptance thereof; or
- Reject the EIAR if it does not comply with the content requirements.

4 PROJECT DESCRIPTION

4.1 DESCRIPTION OF THE LISTED ACTIVITIES

Listed activity as described in GN R.983, 984 and 985	Description of project activity that triggers listed activity
GNR 983 – Activity 12(xii)(a): the development of- (i) canals exceeding 100 square metres in size; (ii) channels exceeding 100 square metres in size; (iii) bridges exceeding 100 square metres in size; (iv) dams, where the dam, including infrastructure and water surface area, exceeds 100 square metres in size; (v) weirs, where the weir, including infrastructure and water surface area, exceeds 100 square metres in size; (vi) bulk storm water outlet structures exceeding 100 square metres in size; (vii) marinas exceeding 100 square metres in size; (viii) jetties exceeding 100 square metres in size; (ix) slipways exceeding 100 square metres in size; (x) buildings exceeding 100 square metres in size; (xi) boardwalks exceeding 100 square metres in size; or **(xii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs-** **a) within a watercourse;** b) in front of a development setback; or c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; - excluding- (aa) the development of infrastructure or	A section 21 (c) and (i) water use licence may be required in terms of the National Water Act (No. 36 of 1998), and as such this activity will apply. Section 21 (c) and (i) applies when impeding or diverting the flow of water in a watercourse and altering the bed, banks, course or characteristics of a watercourse This activity may be triggered by the construction of culverts as part of stormwater management.

Listed activity as described in GN R.983, 984 and 985	Description of project activity that triggers listed activity
structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (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; (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; (dd) where such development occurs within an urban area; or (ee) where such development occurs within existing roads or road reserves.	
GNR 983 – Activity 14: The development of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.	The proposed project involves the construction of a fuel station with four aboveground storage tanks (approx. 10m^3 each) (full mobile system with fuel-tanks and fuel-pumps as one mobile unit each) for the storage and handling of fuel that has the combined capacity of 40 cubic metres. Diesel tanks for power generators for electricity generation at the High Speed Proving Ground will be placed apart from the fuel station (approx. up to 60 m³). As such a total of approx. 100 cubic metres will be stored onsite.
GNR 983 – Activity 19: The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from- **(i) a watercourse ;** **(ii)** the seashore; or **(iii)** the littoral active zone, an estuary or a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever distance is the greater but excluding where such infilling, depositing, dredging, excavation, removal or moving- **a)** will occur behind a development setback; **b)** is for maintenance purposes undertaken in accordance with a maintenance management plan;	A section 21 (c) and (i) water use licence may be required in terms of the National Water Act (No. 36 of 1998), and as such this activity will apply. Section 21 (c) and (i) applies when impeding or diverting the flow of water in a watercourse and altering the bed, banks, course or characteristics of a watercourse This activity may be triggered by the construction of culverts as part of stormwater management.

Listed activity as described in GN R.983, 984 and 985	Description of project activity that triggers listed activity
or **c)** falls within the ambit of activity 21 in this Notice, in which case that activity applies.	
GNR 983 – Activity 24(ii): The development 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; or → **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- → roads which are identified and included in activity 27 in Listing Notice 2 of 2014; or → roads where the entire road falls within an urban area.	The proposed project involves the development of an Oval HSPG with a total length of 17km and width of 13m. The HSPG will be used for the testing of high speed motor vehicles. A handling track will be developed within the HSPG. The handling track will be a total length of 5.5km and have a width of overall 16m plus run-off areas.
GNR 984 – Activity 6: The development of facilities or infrastructure for any process or activity which requires a permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent, excluding- → activities which are identified and included in Listing Notice 1 of 2014; → activities which are included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies; or → **the development of facilities or infrastructure for the treatment of**	A section 21 (g) water use licence may be required in terms of the National Water Act (No. 36 of 1998), and as such this activity will apply. Section 21 (g) applies when disposing of waste in a manner which may detrimentally impact on a water resource. Wastewater contaminated with hydrocarbons (originating from the car wash, fuel station and workshop areas) will be stored on site as well as sewage in conservancy tanks ($70m^3$). None of these wastewaters will be disposed of onsite but will only be stored. The small quantities (< 1 $000m^3$) may also only require a General Authorisation (GNR665, 2013) and containment facilities will be designed according to legal specification to prevent overflows, spillages or leakages thereby preventing impacts to the

Listed activity as described in GN R.983, 984 and 985	Description of project activity that triggers listed activity
effluent, wastewater or sewage where such facilities have a daily throughput capacity of 2 000 cubic metres or less.	environment.
GNR 984 – Activity 15: The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for- → **the undertaking of a linear activity; or** → maintenance purposes undertaken in accordance with a maintenance management plan.	The proposed project will require the clearance of approximately 200ha. The proposed location of the proposed project is situated on a farm where minimal human influence has occurred. As such the property is dominated by mostly indigenous vegetation of the Savannah Biome (Kalahari Duneveld Bioregion) commonly found within the Northern Cape.
GNR 984 – Activity 19: The removal and disposal of minerals contemplated in terms of section 20 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including associated infrastructure, structures and earthworks, directly related to prospecting 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 2002).	During the construction phases, material required for the construction and development of the HSPG will be abstracted. The material will be extracted by means of one borrow pit (calcrete) and one quarry (granite) located within the boundary of the site.
GNR 984 – Activity 21: Any activity including the operation of that activity associated with the primary processing of a mineral resource including winning, reduction, extraction, classifying, concentrating, crushing, screening and washing but excluding the smelting, beneficiation, refining, calcining or gasification of the mineral resource in which case activity 6 in this Notice applies.	The material required to construct the HSPG is required to undergo crushing in order to obtain the mandatory material size. As such a crushing plant will be required for the construction of the HSPG and associated infrastructure.
GNR 985 – Activity 11(iii): The development of tracks or routes the testing, for recreational use or outdoor racing motor powered of vehicles excluding conversion of existing tracks or routes for the testing, recreational use or outdoor racing of motor powered vehicles.	The proposed project involves the development of a HSPG for vehicle testing for the Mercedes-Benz Research and Development Team. The proposed location of the activity is situated 38 kilometres (km) north-east of Upington on the property Steenkamps Pan, Farm 419/06, Northern Cape. The property is dominated by mostly indigenous vegetation of the Savannah Biome (Kalahari Duneveld Bioregion)

Listed activity as described in GN R.983, 984 and 985	Description of project activity that triggers listed activity
Northern Cape: → In an estuary; → In areas seawards of the development setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined; or → **Within areas of indigenous vegetation outside urban areas.**	commonly found within the Northern Cape.

4.2 DESCRIPTION OF THE PROPOSED ACTIVITY

MBSA a subsidiary of Daimler AG, Germany is a supplier of both premium passenger cars and versatile commercial vehicles. MBSA proposes to develop a HSPG for vehicle testing for the Mercedes-Benz Research and Development Team in the Northern Cape Province of South Africa. The high speed proving ground will be situated on approximately 3 750 hectares (ha) located approximately 38 kilometres (km) north-east of Upington on the property Steenkamps Pan, Farm 419/06, Northern Cape. The HSPG will be used for heat-relevant vehicle testing. It is proposed that the HSPG will operate mainly during the summer months and possible other *ad hoc* periods as and when required. The establishment of the facility will enable MBSA to undertake testing of vehicles under hot climate conditions in parallel to the European Winter Season under specified technical conditions in terms of testing modules. The proposed development is anticipated to be a self-sustaining entity with minimal negative impacts to the surrounding environment.

The master layout of the HSPG is provided in **Figure 4-1**.

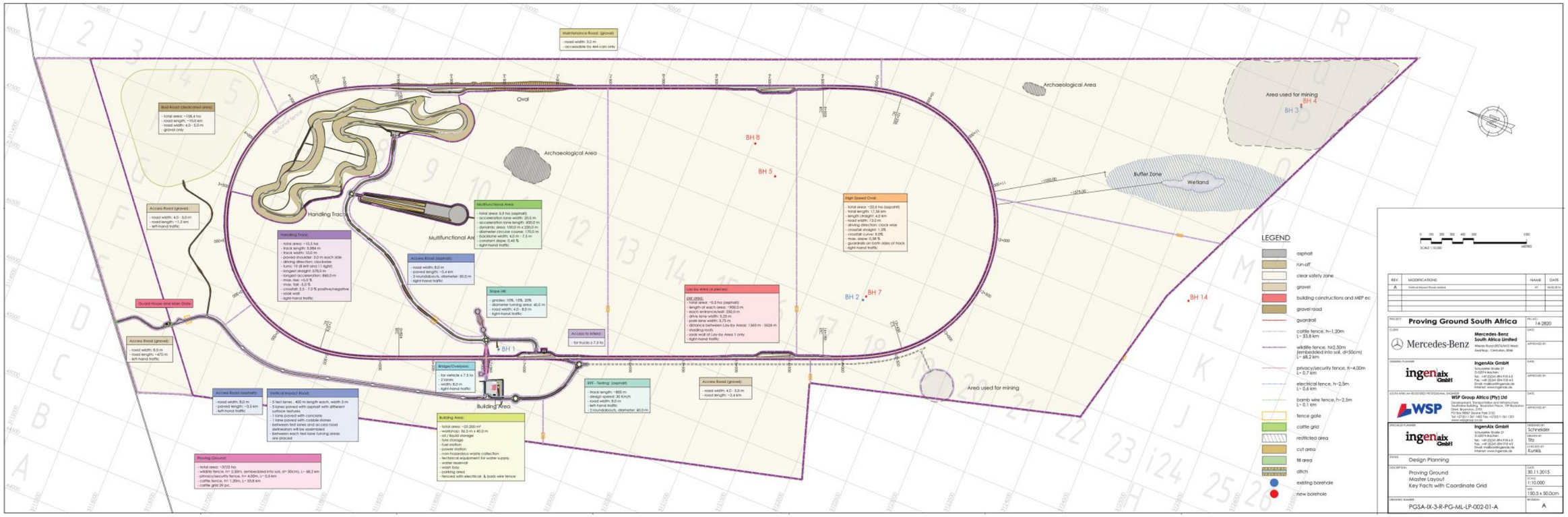


Figure 4-1: HSPG Master Layout

CONSTRUCTION PHASE

The construction phase of the HSPG will take place over a two year period, with construction occurring in two phases. Phase one will include construction of the oval, lay-bys, bridge, slope hill, access roads (outside the oval) and buildings and is envisaged to have a duration of fourteen months. Phase two will commence after phase 1 and is anticipated to last eight months. This phase will include the construction of the handling track, multi-functional area, bad roads and access roads inside the oval.

During the construction phases, material required for the construction and development of the HSPG will also be abstracted. The material will be extracted by means of one borrow pit (calcrete) and one quarry (granite) located within the boundary of the site. Granite material will be obtained from the quarry located west of the proving ground, while calcrete material will be obtained from the borrow pit located southeast of the proving ground (**Figure 4-1**).

The construction phases will be operational from 07:00 – 17:00 (Monday to Friday) and 07:00 – 14:00 (Saturdays).

OPERATIONAL PHASE

The test modules that will be designed and operated at the site include:

- High-Speed Oval – A ~17km long loop for performing acceleration tests (50 – 250 km/h);
- Handling Track – A ~5.8km long module designed for testing the handling characteristics of the test vehicles (50 – 230km/h);
- Multi-Functional Area – A ~0.8km long module for testing the steering characteristics of the test vehicles (up to 120km/h);
- Diesel Particulate Filter Road – A ~0.8km long module for testing the diesel particle filter applications of the test vehicles (10 – 30km/h);
- Bad Roads – A ~10km long off-road module designed to conduct comfort and corrosion testing (40 – 80km/h); and
- Access Roads (outside oval) – A ~2.5km test module designed for performing acceleration tests (0 – 100km/h).
- Impact Roads – Five test lanes of ~ 400m each.

The test modules will be operational from 08:00 – 20:00 (Monday to Saturday) for six months of the year (October to April). The six month period will coincide with the European winter season testing. Ad hoc testing may be conducted at the site during the remainder of the year.

HIGH SPEED OVAL

The High Speed Oval will be 17.36km long with 3 vehicle lanes, two of which are 3.75m each and an outer lane of 4.0m. The straights are approximately 4000m long with 752.8m long transition curves leading into the two 1250m radii curves on either side of the Oval. These curves are approximately 3174.2m in length.

Road crossfall is at 1.5% along the straight and transition over the full length of the transition curves to a super elevation of 9% along the full length of each curve.

Operational requirements of the High Speed Oval are to facilitate high speed testing and associated vehicle operations. For ensuring safety, guard rails on both sides of the track at full length of the track are planned.

HANDLING TRACK

The handling track will be 5.984km long with a surfaced width varying between 8, 10 and 12m, plus 3m asphalted run off on each side for the entire length of the Handling Track. The curves of the track are edged by concrete race curbs. There are two bypass facilities to allow vehicles to exit and re-enter the track when required. Access to the track is via a single Lay-by facility.

Gravel vehicle safety run-off areas, between 10m and 60m wide, are provided along the full extent of the track with the wider run-off being located at the more complex portions of the track. In extension of the gravelled run off areas “clear safety zones” are placed. Those areas are free of vegetation and other obstacles. By doing so safety is increased and fire hazard is minimized.

Operational requirements of the handling track are to facilitate the testing and development of extreme vehicle handling capabilities and operations. The handling track has an estimated maximum operating speed of 230km/h on the straights and 200km/h on specific curves. For ensuring safety run-off areas and clear safety zones are planned. Testing of cars, especially high speed testing will be done by specially trained testing personnel only.

MULTIFUNCTIONAL AREA AND SLOPE HILL

The multifunctional area will have a dynamic area of 150 x 400m with an acceleration lane of 20 x 600m. There will also be a diameter circular course of 170m. The width of the backlane will be 4 to 7.5m.

Operational requirements of the Multifunctional Area are to facilitate the testing and development of general vehicle handling capabilities and operations. The intention is to place the vehicle and driver under anticipated operating conditions and test specific characteristics.

DIESEL PARTICULATE FILTER ROAD

The diesel particulate filter road will be approximately 0.8km in length with a width of 8m.

GRAVELLED BAD ROADS

The gravelled bad roads will cover an approximate area of 108.4 ha with a road length of approximately 10km. The road will be single lane and have a width between 4 to 5m. These roads will be gravelled only.

Operational requirements of the Bad Roads are to replicate gravel roads used by the general public and test characteristics related to driver comfort and vehicle operations and endurance. The Internal and External Access Road network within the Proving Ground facility differentiates between left and right hand side traffic, designed to South African and German road design standards respectively. All Paved Access Roads will operate between the speed of 60km/h and 100km/h.

GRAVELLED ACCESS ROADS

The gravelled Access roads will be approximately 2km in length and will include a gravelled parking area of approximately 2 500m².

ASPHALT PAVED ACCESS ROADS

There will be asphalt paved access roads on both the “confidential side” and “public side”. The asphalt paved access roads on the “confidential side” will be approximately 2.5km in length and will include paved parking areas of approximately 3 000m².

The asphalt paved access roads on the “public side” will be approximately 2.5km in length and will include paved parking areas of approximately 2 000m². The road width of both sections will be 8m.

IMPACT ROADS

The impact roads will consist of 5 test lanes each with a length of 400m and width of 5m. It is planned that 3 lanes will be paved with asphalt with different surface textures, 1 lane will be concreted and 1 lane will be paved with cobble stone.

BRIDGE

The bridge provides access from the Building Area to the inside of the High Speed Oval and will be 8m in width. The bridge will have two lanes with a concrete safety barrier and potentially a privacy fence.

ROAD DESIGN

Construction material for road construction is proposed to be sourced from the property via a granite quarry, calcrete borrow pit and possible cut to fill operations.

Design of the road markings and signage will be done according to the Road Traffic Signs Manual for SADC Countries. This will be for the Access Roads on the property outside the Oval only.

The Internal Access Road network on the property inside the Oval will conform to German road design standards. Road signs requiring German standards (incl. fixing elements) will be manufactured in Germany.

A “Super Rail” guardrail system has been specified for use on both sides of the Oval. The “Super Rail” system will be supplied and erected in accordance with specifications provided by Daimler R&D.

Standard steel post guardrails are also required at the bridge over the Oval and Slope Hill/Grades testing module. Gabion mattresses will be applied along the toe line of the road fill embankments at localised areas and on the outlet side of drainage structures for erosion protection.

BUILDING AREA

The building area will include the following:

- Workshop;
- Tyre storage;
- Fuel station;
- Power supply;
- Waste collection area;
- Water reservoir;
- Wash bay;
- Parking area; and
- Communication system.

The total building area will be approximately 22 000m^2. The layout of the building area is provided in **Figure 4-2**

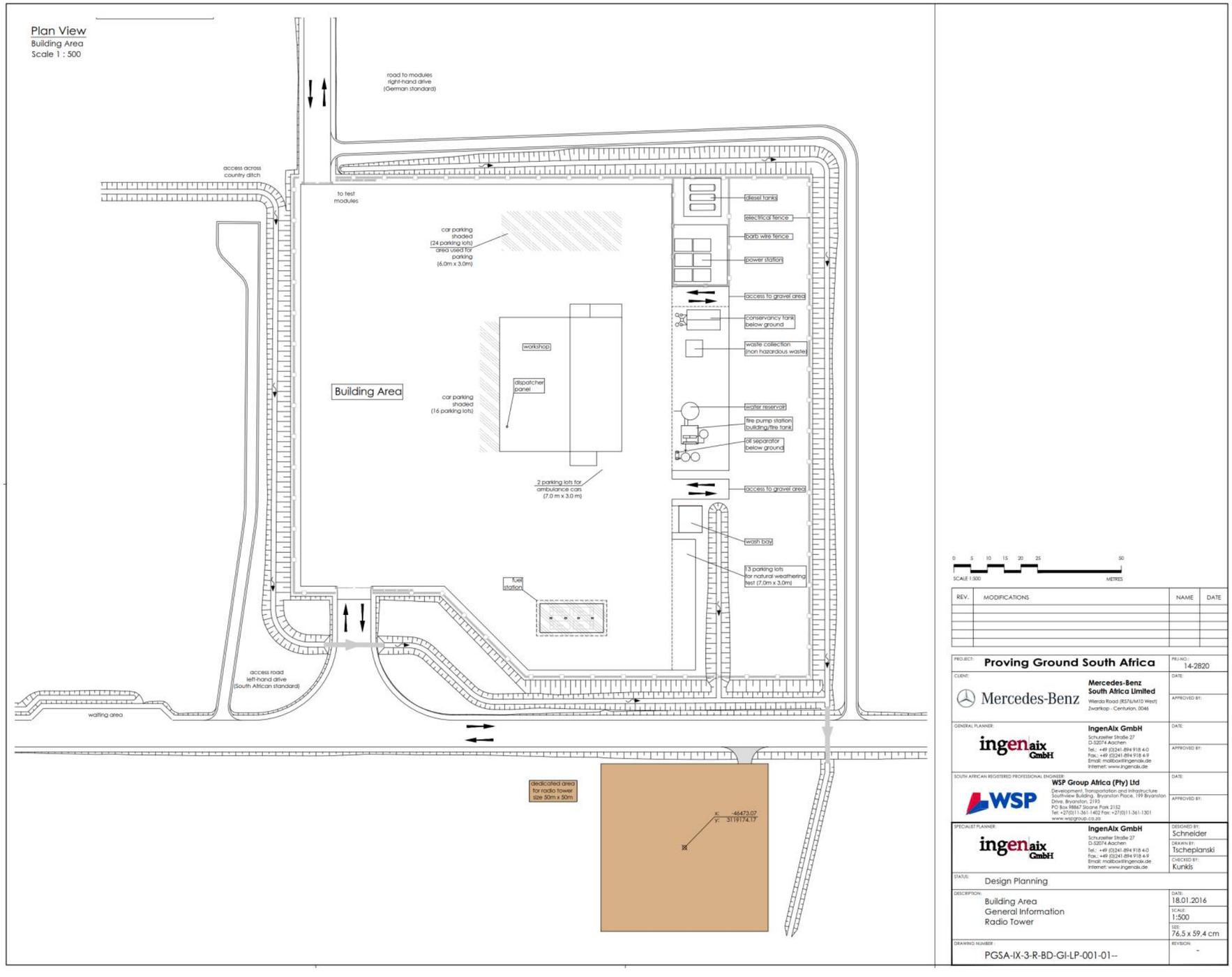


Figure 4-2: Layout of the building area

FUEL STATION

A fuel station will be installed on the proving ground near the workshop building (full mobile system with fuel-tanks and fuel-pumps). The fuel station will have 4 x 10.25 litre tanks. A Transtank system will be used for the fuel station. The Transtank unit is mobile and self-containing (bunded or double walled), this allows that the tanks can be moved and stored in a secure location when the HSPG is not operational. The layout of the fuel station is provided in **Figure 4-3**.

DIESEL STORAGE

Diesel for power supply will be stored in 3 above ground tanks of 20 m^3 each. The diesel will be stored within a bunded area. This way spillages, leaks, overflows would be highly visible to allow for fast action and clean-up. Fuel storage containers will be double-walled to prevent leakages.

WASTE WATER

During the construction phase portable chemical ablution facilities will be provided by the contractor. There will be at least 1 toilet per 20 people.

OIL SEPARATOR

The wastewater from the car wash and the workshop area will drain to an oil separator prior to being delivered to the conservancy tank.

The main purpose of the oil separator is to remove mineral oil contaminants before the wastewater is drained into the conservancy tank system. The separator operates with the gravity principle in that the oil or fuel contaminants (being of a lower specific weight than water) float to the surface of the separator before reaching the separator's outlet. The inlet of the separator, connected to nearby drains without odour traps, is hydraulically designed to distribute the incoming wastewater in an evenly manner which optimizes the separation efficiency. Sludge and sediment, with a specific gravity higher than water, settle to the base of the chamber while fuel and oil particles float to the surface. The integrated emergency closure switch (float switch) prevents oil / fuel from flowing out of the separator's outlet.

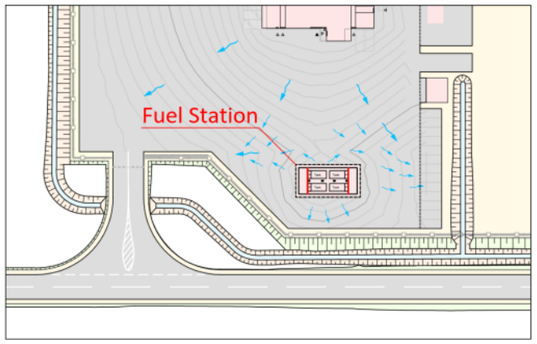
The hydrocarbons collected from the oil separator will be stored in suitable containers at the hazardous waste storage area. The waste will be disposed at an appropriately licenced facility.

CONSERVANCY TANK

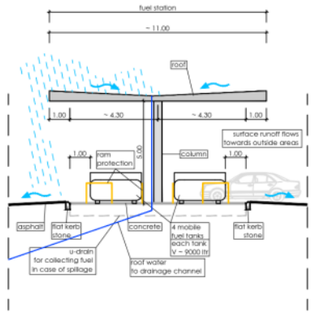
Wastewater generated from the ablution facilities at the building area and all other wastewater generated at the building area will report to the conservancy tank. There will be two duplicate conservancy tanks of 70 m^3 each. The bottom of the tanks will be situated approximately 3m below ground level.

The conservancy tank will be emptied by honeysucker every 10 – 14 days for off-site disposal to Upington Wastewater Treatment Plant (WWTP).

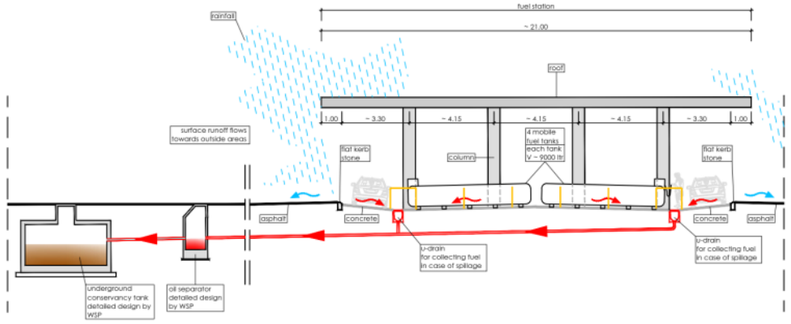
Layout Plan - Building Area
Scale 1:1000



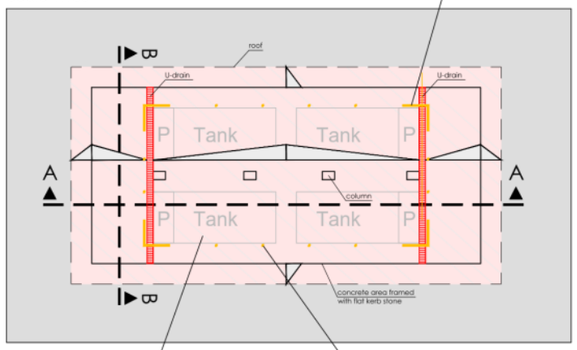
Fuel Station - Section B-B
Scale 1:150



Fuel Station - Section A-A
Scale 1:150



Plan View - Fuel Station
Scale 1:150



self-bounded system
"Transtank T10"
according specification

Note:
all ram protection removeable

REV.	MODIFICATIONS	NAME	DATE

PROJECT: **Proving Ground South Africa** — PRJ-NO.: 14-2820

CLIENT: Mercedes-Benz — **Mercedes-Benz South Africa Limited**, Wierda Road (R576/M10 West), Zwartkop - Centurion, 0046 — DATE: — APPROVED BY:

GENERAL PLANNER: ingenaix GmbH — **IngenAix GmbH**, Schurzelter Straße 27, D-52074 Aachen, Tel.: +49 (0)241-894 918 4-0, Fax.: +49 (0)241-894 918 4-9, Email: mailbox@ingenaix.de, Internet: www.ingenaix.de — DATE: — APPROVED BY:

SOUTH AFRICAN REGISTERED PROFESSIONAL ENGINEER: — DATE: — APPROVED BY:

SPECIALIST PLANNER: ingenaix GmbH — **IngenAix GmbH**, Schurzelter Straße 27, D-52074 Aachen, Tel.: +49 (0)241-894 918 4-0, Fax.: +49 (0)241-894 918 4-9, Email: mailbox@ingenaix.de, Internet: www.ingenaix.de — DESIGNED BY: Schneider — DRAWN BY: Wullen — CHECKED BY: Kunkis

STATUS: Design Planning

DESCRIPTION: Fuel Station, General Information, Schematic Plan — DATE: 30.10.2015 — SCALE: 1:1000, 150 — SIZE: 76.5 x 29.7 cm

DRAWING NUMBER: PGSA-IX-3-B-FS-GI-SC-001-01-- — REVISION: -

Figure 4-3: Fuel Station Layout

POWER SUPPLY

There is no utility power available at this location, and MBSA does not intend applying for utility power. Therefore the complete site will be supplied by suitable sized diesel generators sets, with a bulk diesel tank.

The diesel bulk tank will be sized to be capable to run the entire operation at peak occupation for at least 14 days without re-fuelling, or to a maximum of 30 days.

The power supply shall mainly be provided by diesel-generators. Diesel for power supply will be stored in up to 3 above ground tanks of 20m^3 each. The Bulk Diesel Tank Area will be an open area which is fenced off and bunded by concrete flooring and walls (capacity of bund area 110% of storage volume).

A 250kVA and 125kVA diesel generator will be installed in the generator plant area. Each generator plinth will be bunded separately to allow for 110% of the diesel day tank capacity. The generator area will be an open area which is fenced off. The generators are equipped with a weather proof canopy and are sound isulated.

The guardhouse will wither be provided with a separate generator or a PV solar system including adequate batteries to be charged and used during night time. The guardhouse design and equipment installed will determine the number of solar panels and batteries to be installed. A separate structure might have to be provided if the roof space is not adequate to accommodate the solar panels.

Should the MBSA wish to install an electric fence around the Building Area, it will be fed from a separate weather proof enclosure at the fence with PV solar panels utilising a multi-zone energizer.

WATER SUPPLY

There is no potable water supply to the site and as such water will be abstracted from the underlying aquifer. Water will be required for the following activities:

- Use of water for construction phase;
- Use of water for operational phase;
- Use of water for livestock;
- Potable water for human consumption will be brought in from Upington (bottled water); and
- Fresh water storage in a single storey building reservoir to ensure continued availability and availability for emergency situations such as firefighting (volume being calculated to allow for two (2) day storage).

An integrated water use licence is being undertaken and the water supply is detailed in therein, refer to **Appendix 6**. The water demand during the construction phase will be 300m^3/day and will be sourced from Boreholes BH1, 5 & 8 (Farm Steenkampspan) and Borehole H/BH10 (Farm Duiker Rand)

During the operational phase, the water demand will reduce significantly and 10m^3/day would be adequate. In addition approximately 120 - 135m^3 of water will be required to be stored for firefighting. During the operational phase water will be sourced from borehole BH1.

Water will be transferred from the boreholes (water source) via a reservoir. Water will be stored in a 150m^3 reservoir to ensure continuous availability and for emergency purposes. The tank will be

situated on a 300 mm high raised concrete ring beam with sand infill. The tank will act as a threefold system with the stock water draw-off at the highest level, the domestic draw-off at the next level above the fire water storage volume. A lower outlet is situated at the bottom of the tank which feeds the fire pumps.

The gap between the middle and lower outlet is the volume dedicated for firefighting. Each of the end users are therefore on its own take-off pipeline and each will have an individual isolating valve. This will allow separate control and isolation if maintenance is required on any of the user's pipelines.

Farming activities (cattle farming) will continue throughout the construction and operational phase and will require 5.6 - 6m^3 of water per day for approximately 80 head of cattle. The water will be sourced from boreholes BH2, 3 & 4 (Farm Steenkampspan).

A stand-by pump will be available to pump water. Power to the borehole pump will be supplied by solar panels.

WASTE

During the construction phase the following waste will be generate:

- Construction waste (building rubble);
- Domestic waste;
- Recyclable waste; and
- Hazardous waste from spillage.

Construction waste (building rubble) and domestic waste will be collected in suitable containers (drums/skips/bins) on the site. The waste will be removed by a contractor for disposal at the Upington landfill/waste management facility.

Recyclable waste such as glass bottles, plastic bags, etc. must be stored in suitable containers to allow for recycling and emptied on an as-required basis for recycling purposes during the construction and clean-up phase.

Spillages will be cleaned and placed in suitable containers prior to disposal at an appropriately licenced facility.

During the operational phase the following waste will be generated:

- Used tyres;
- Domestic waste;
- Recyclable waste; and
- Hazardous waste.

Used tyres are classified as used parts (not waste) and will be taken back to Germany.

All solid waste will be collected in suitable containers (drums/skips/bins) on site in the building area. Recyclable waste such as glass bottles, plastic bags, etc. must be stored in suitable containers to allow for recycling and emptied on an as-required basis for recycling purposes during the construction and clean-up phase. Waste will be removed from site by a contractor for disposal at the Upington waste management facility (general waste) or Holfontein (hazardous waste) on a regular basis.

A closed single storey waste building for solid waste collection (storage < 30 days) will be erected.

COMMUNICATION SYSTEMS

Communication connectivity for data to Upington is ensured by implementation of directional radio. A radio tower will be constructed within the building area within an area of 50m by 50m, the exact height of the tower has not been confirmed, however the tower will be in excess of 15m. For communication on the proving ground professional mobile radio equipment will be used.

FIRE PROTECTION

The fire prevention and protection systems design criteria have been based on requirements determined by site layout, building layout, building occupancy classification, equipment installed and general activities carried out on site and inside buildings. The design criteria are further strictly controlled by National and Local Government Regulations.

All areas inside buildings are classified as per regulations, this is based on type of activity, fire risk factor and total of occupants. The applicable standards and regulations are listed below:

- SANS 10400-T National Building Regulations – Part T: Fire protection;
- SANS 10400-W National Building Regulations – Part W: Fire installation;
- SANS 10139 Fire detection and alarm systems for buildings – System design, installation and servicing;
- SANS 10089-3 The petroleum industry – Part 3: The installation of underground storage tanks, pumps/ dispensers and pipe work at service stations and consumer installations; and
- SANS 10131 Above-ground storage tanks for petroleum products.

As the facility does not have municipal water supply or a constant guaranteed water feed system the fire water supply requirements need to be met by installation of bulk water tank and pump system.

A single land road will run along the fences and this will serve as a fire break. The fire protection break layout is provided in **Figure 4-4**.

FENCING

A wild life fence will be erected around the property and along both sides of the High Speed Oval, Handling Track and Multifunctional Area with a length of approximately 68km and height of 2.5m. Cattle fences will be installed in numerous areas across the property, in order to restrict movement and to manage grazing, the cattle fences will be approximately 34km in length and will 1.2m in height.

In addition a privacy / security fence will be constructed along the access road the HSPG, the fence will be approximately 0.6km in length with a height of 4m.

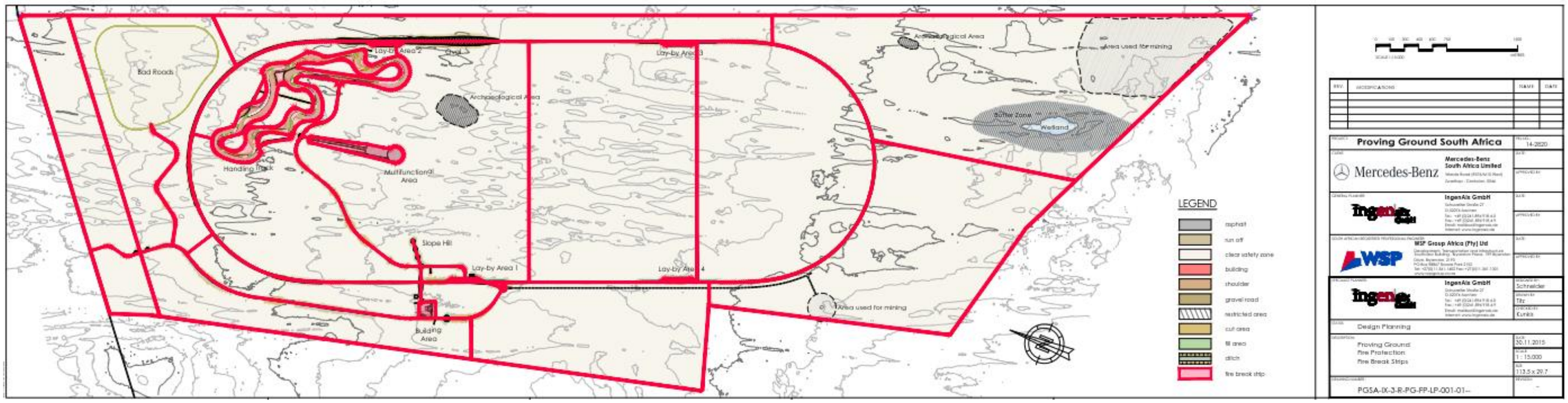


Figure 4-4: Fire Breaks

MATERIAL SOURCING

Construction material for the construction of the HSPG (road layerworks and concrete works) is proposed to be sourced from Steenkamps Pan, Farm 419 Portion 6 via a granite quarry in the south west of the site, calcrete borrow pit in the south east of the site and possible cut to fill operations along the High Speed Oval. All material abstracted will be used on site.

It will take approximately three months to develop the borrow pit and quarry. During these three months clearing will take place along with removal and stockpiling of topsoil. Once the area is cleared construction of the access roads/ramps will take place, where after excavation will commence.

BORROW PIT (CALCRETE)

The purpose of the borrow pit is to obtain suitable calcrete for the construction of the HSPG. The borrow pit will be approximately 20 ha in extent. Approximately 350 000m^3 of material will be cleared of which 240 000m^3 of calcrete will be used for the construction of the HSPG. The borrow pit will have a maximum depth of 4m. Refer to **Figure 4-5** for the quarry layout and details.

The main activities associated with mining of the borrow pit will include the clearing of the borrow pit area (i.e. removal of sand (topsoil), trees and grass), removal of topsoil to stockpile, construction of access roads/ramps, excavation of the borrow pit material to stockpile, loading the borrow material into tipper trucks, processing (crushing and screening) the borrowed material, management of the borrow pit, and closure and rehabilitation of the borrow pit.

The borrow pit's initial cleared material prior to excavation will be shaped into temporary berms around the excavation areas in order that any stormwater runoff is redirected around the excavations. The available area to source the calcrete is vast and the borrow pit could be extended and excavated in such a way that the shallow calcrete is extracted to a minimum depth with the surrounding topography, allowing areas to be freely draining. The borrow pit area will not intrude in the wetland buffer area which is 500m from the wetland itself. Excess material from the site, will be utilised to rehabilitate the area once the material sourcing is complete. After rehabilitation, the area will drain freely.

The abstracted calcrete will be processed through a single stage jaw crusher at the Borrow pit.

QUARRY (GRANITE)

The purpose of the quarry is to obtain suitable granite for the construction of the HSPG. The quarry will be 3.5 ha in extend. Approximately 210 000m^3 of material will be cleared of which 160 000m^3 of granite will be used for the construction of the proving ground. The quarry will have a maximum depth of 15m. Refer to **Figure 4-6** for the borrow pit layout and details.

The main activities associated with mining of the quarry will include the clearing of the borrow pit area (i.e. removal of sand (topsoil), trees and grass), removal of topsoil to stockpile, construction of access roads/ramps, excavation of the granite to stockpile, loading the granite into tipper trucks, processing (crushing) the granite, management of the quarry, and closure and rehabilitation of the quarry.

The quarry will also have temporary berms to redirect the runoff around the excavation. As the quarry will have depths of approximately 12 metres, any water which is contained in the excavation will be allowed to evaporate. Given the hot climate and minimal rainfall, the contained water should evaporate rapidly. The quarry will be rehabilitated in similar fashion as the borrow pit by using excess materials from the construction process.

The abstracted granite will be processed through a multi-stage crusher (crushing and screening) located at the quarry site.

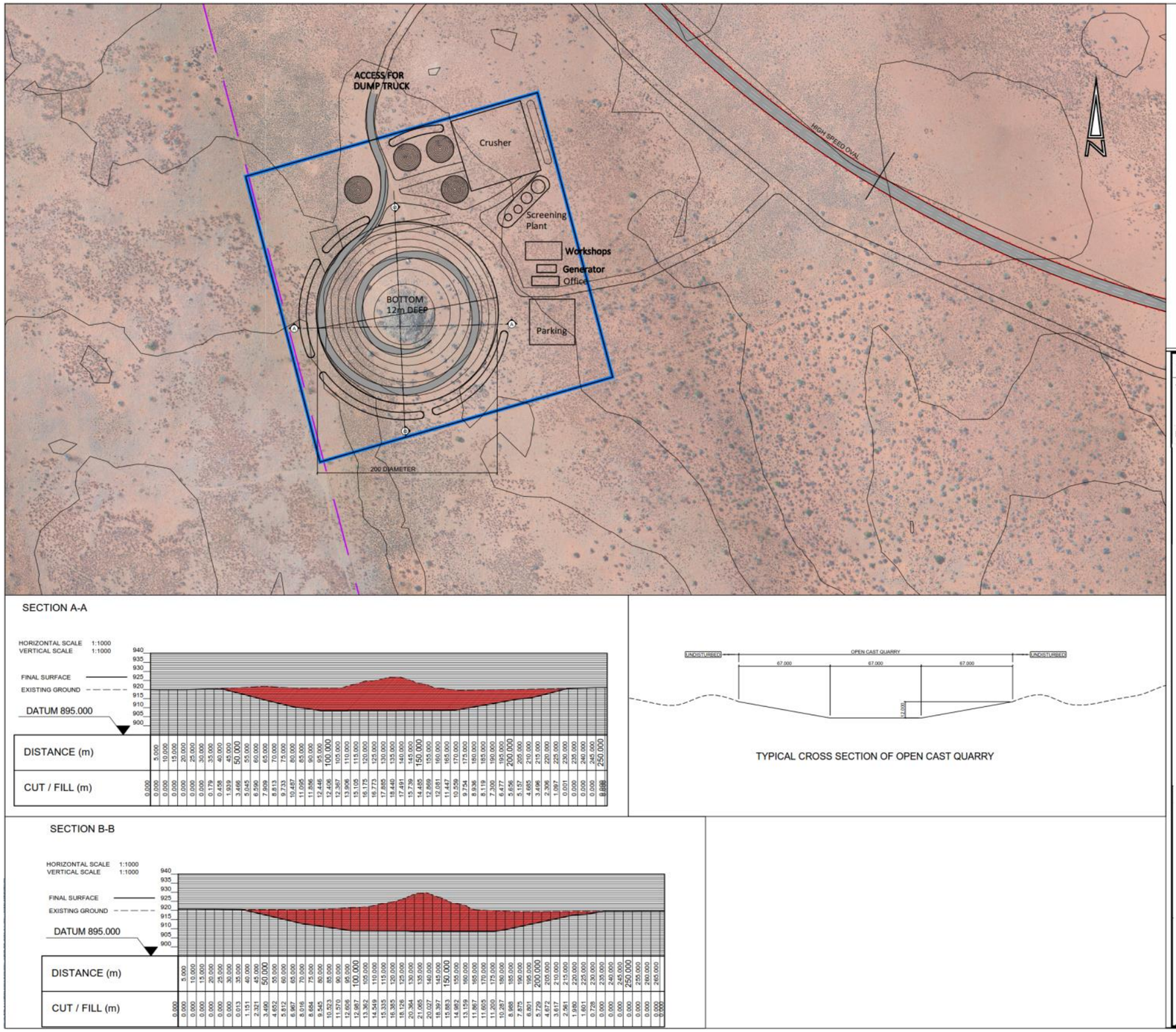


Figure 4-5: Quarry layout

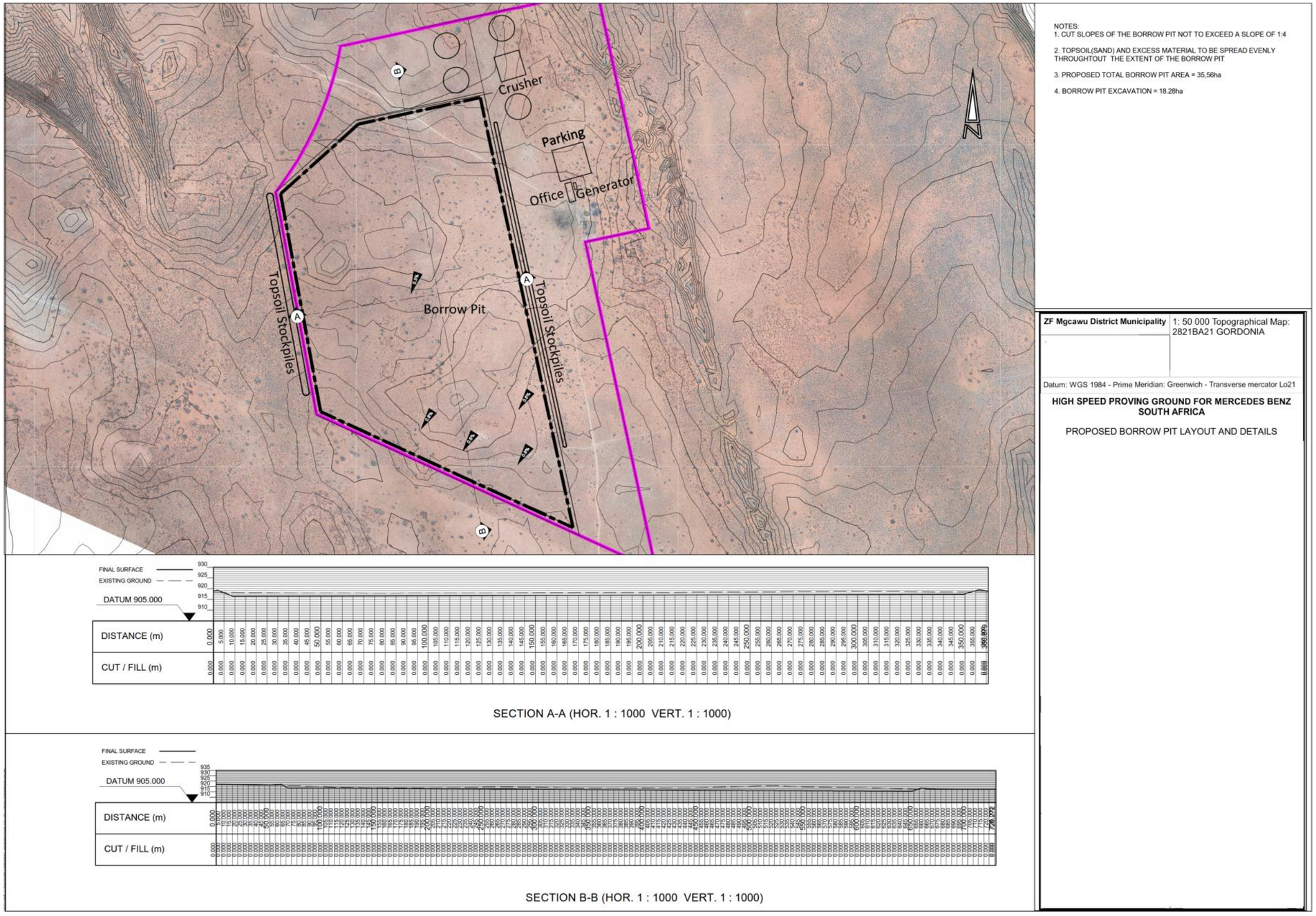


Figure 4-6: Borrow pit layout

STORMWATER

Geometric designs for the High Speed Oval (Oval) with 4 Lay-by Areas, Handling Track, Multifunctional Area, Slope Hill and External and Internal Access Roads are complete. Design of the Bad Roads and Perimeter Patrol and Maintenance Gravel Track will be done at a later stage. Bad Roads and Perimeter Roads will not affect the outer drainage system as they will be designed with the existing topography and may be flooded in case of stormwater flooding events. Refer to **Appendix 6** for the Integrated Water Use Licence Application.

The “outer system” of the HSPG refers to water run-off that enters from catchment areas outside the facility. The water follows the natural topography and is managed through crossing culverts or in channels alongside the new constructions. This drainage system also caters for the Inner System (run-off from all internal hard surfaces).

The following regarding stormwater management should be noted:

- Clean and natural runoff from up-gradient catchment areas flowing towards the HSPG is diverted around structures to prevent any possible contamination. Flows deviated around the HSPG will return to its natural flow path further down gradient;
- For the purposes of the project, the potential “dirty water” is defined as water that might be contaminated in the case of an accidental spillage/leakage from the Building Area, and measures have been put in place to be able to handle water. No dirty runoff is anticipated because rain will not be in contact with potential pollution sources due to the following:
  - Fuel station where fuel may be spilled is roofed and bunded;
  - Diesel storage area where diesel may be spilled is bunded and therefore any rain water falling onto this area will be contained within the bund and evaporate;
  - Waste areas, car wash and workshop are all within buildings or roofed; and
  - Fuel barrels will be stored in the oil storage room in bunded area attached to the workshop in the building area.
- The dirty water circuit therefore only includes:
  - Water from the workshop due to hydrocarbon spillages and floor washing. Water from the car wash due to the use of water and detergents for washing cars. The water from these areas will be captured and diverted through an oil separator before entering the conservancy tank (capture and contain); and
  - Water from the showers and toilets that will be captured in the conservancy tank for off-site disposal to the Upington WWTW.
- All soil structures are going to be earth structures (mixture of sand and calcrete) which will minimise the movement of structures. Maintenance has also been provided for;
- Construction: Embankments and/or diversion drains will be established around excavation areas and stockpiles to divert surface runoff away from these areas to avoid water pollution. Stagnant water must not be allowed in the borrow pit or quarry area during the construction phase. Contaminated water must be pumped out and treated before re-used for construction purposes.

Refer to **Figure 4-7** for stormwater management around the handling track and **Figure 4-8** for stormwater management at the building area.

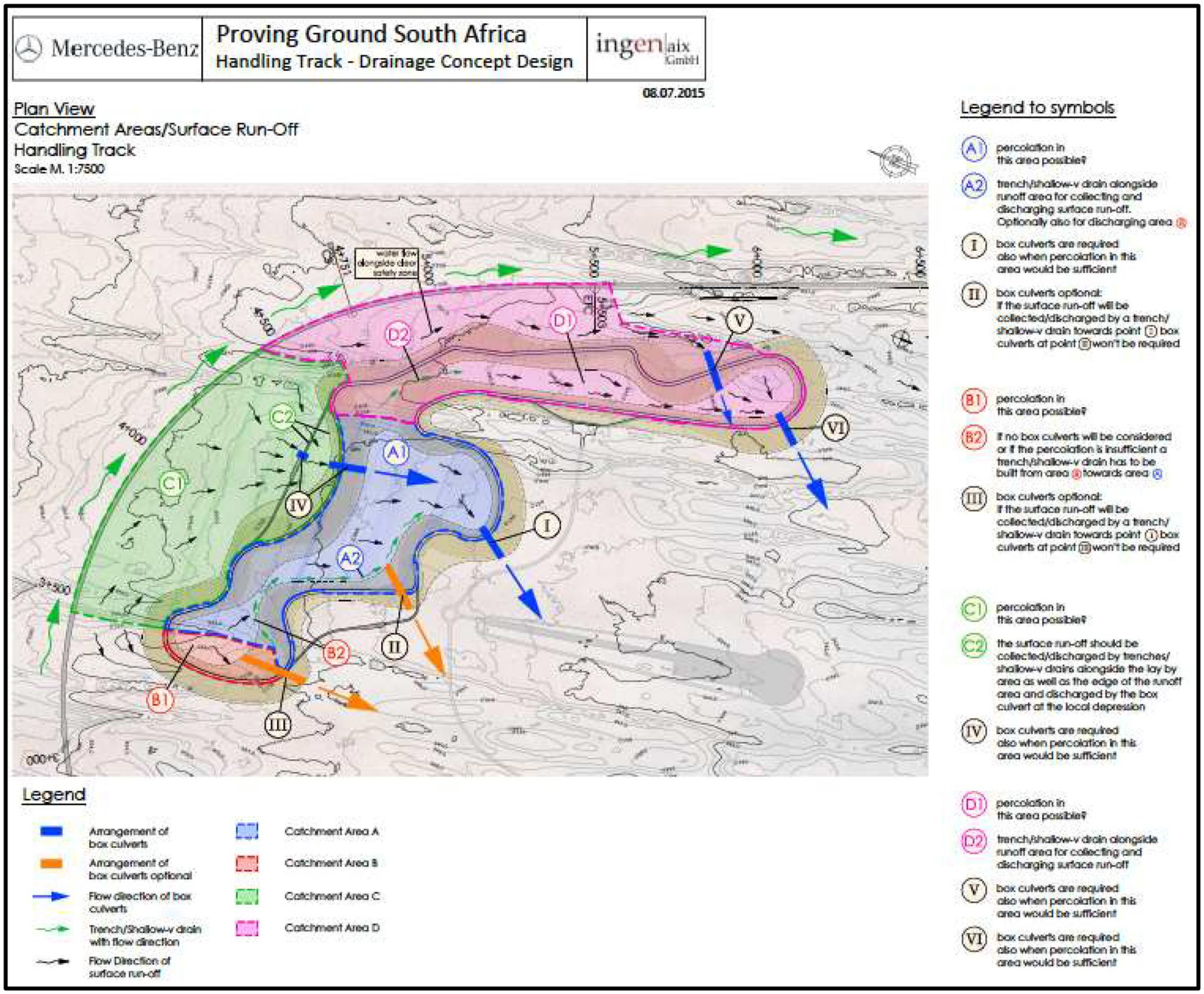


Figure 4-7: Stormwater management around handling track

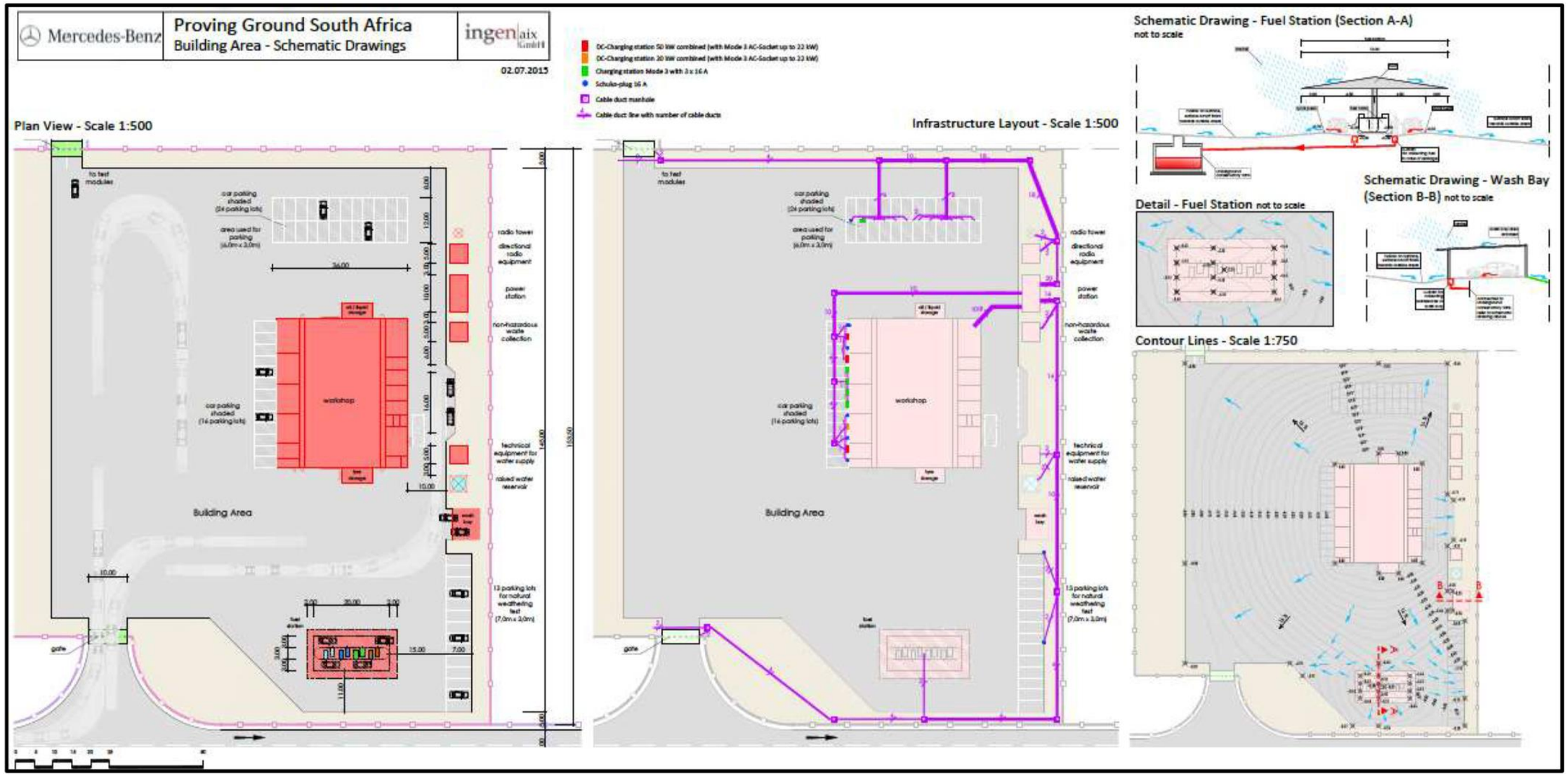


Figure 4-8: Stormwater management at building area

DESCRIPTION OF THE PROPERTY

Farm Name:	Steenkamps Pan, Farm 419/06, Northern Cape
Application area (Ha)	3750ha
Magisterial district:	Upington
Distance and direction from nearest town	38km North-East of Upington
21 digit Surveyor General Code for each farm portion	C02800000000041900006
Central Co-ordinates of the Proposed Property	28° 11' 38.8184" S 21° 29' 41.0297" E
Land Owner	Alchris Boerdery CC (1998/048749/23)
Title Deed	T2792/2007

The **Figure 4-9** illustrates the proposed location and site layout for the MBSA HSPG.

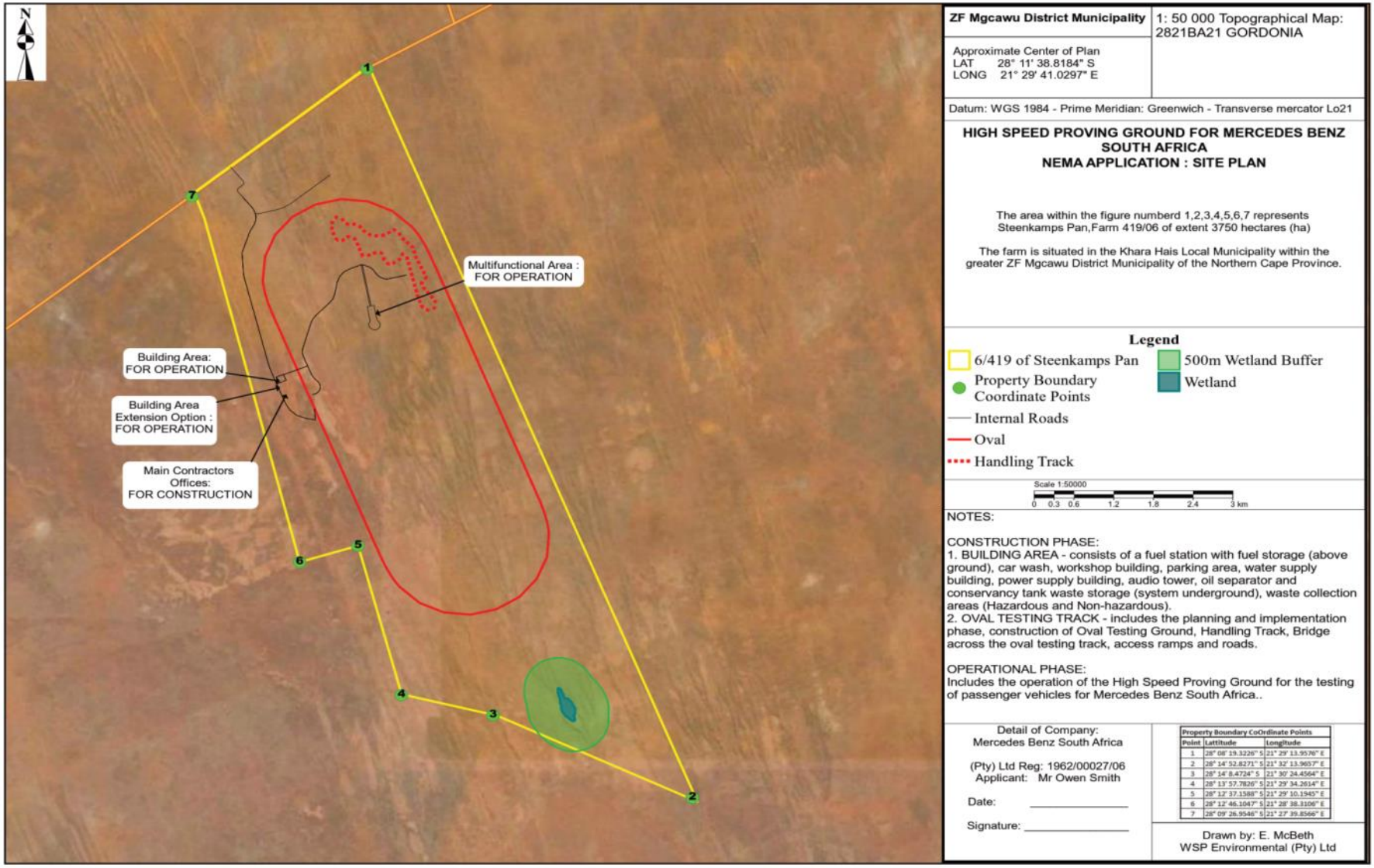


Figure 4-9: Site Plan of the Mercedes-Benz High Speed Proving Ground

5 NEED AND DESIRABILITY

The construction and operation of the MBSA HSPG and associated infrastructure will enable MBSA to undertake testing of vehicles under hot climate conditions in parallel to the European winter season under specified technical conditions in terms of testing modules. MBSA will potentially have to consider alternative locations outside of South Africa for the testing of the vehicles if Upington and surrounding is no longer considered an option.

The construction and operation of the MBSA HSPG will also create approximately 200 employment opportunities with the majority, if not all, of the low and semi-skilled workers employed during the construction phase likely to live in Upington and the surrounds.

6 ASSESSMENT OF PROJECT ALTERNATIVES

In accordance with the NEMA EIA Regulations of 2014, this chapter contains a description of the alternatives that have been identified for the project. The identification of alternatives provides the rationale for the proposed (preferred) option(s) to the decision making authority, and is a requirement of the EIA Regulations.

6.1 LOCATION ALTERNATIVES

MBSA commenced with investigations in 2012 to identify the most suitable/feasible site for the proposed development of a HSPG. A list of criteria was identified by MBSA in order to assist with the selection of the proposed location for the HSPG. The site had to meet the general specifications below:

- The correct shape for the development of a HSPG;
- Size of the property would need to be large enough to accommodate the required infrastructure for a HSPG;
- Hidden from outside view lines (i.e. flight routes from the Upington Airport and major road networks);
- Financial feasible;
- Proximity to the Upington Airport;
- Must be accessible by car and truck;
- A sufficient quantity and quality of water available from the site (i.e. boreholes);
- Assessment of geology must indicate the potential for all aggregates required for the development of the HSPG (i.e. calcrete and granite); and
- Availability of property.

A multi-disciplinary team of technical and legal consultants was established in order to to identify the most suitable property for the proposed HSPG. The objective was to systematically scan the extended area around Upington for suitable properties based on the above specifications.

Based on the general specifications Steenkamps Pan, Farm 419/06, was selected for the proposed development of the MBSA HSPG as illustrated in **Figure 6-6.** The property has the following attributes:

- Located 38km North-east of Upington;
- Access by a 40km gravel road away from any major road route or traffic congestion;
- The surrounding landowners includes private farms, family trusts and a government owned property;
- No settlements, tourism or public activities are located in close proximity of the farm;
- A sufficient quantity of the materials to be mined required for the development of the HSPG is available and located within the boundary of the site; and
- Financially feasible.
- Activity Alternatives

The property was selected for the development the HSPG for vehicle testing under high ambient temperature for the Mercedes-Benz Research and Development Team. As no other activity will be considered, no alternatives sites have been investigated.

6.2 DESIGN AND LAYOUT ALTERNATIVES

When considering the best positions for the testing modules operational and environmental issues such as natural surface drainage flows and local topography were considered, and are discussed below.

HSPG LAYOUT ALTERNATIVE 1

Figure 6-1 and **Figure 6-2** illustrate layout alternative 1 of the HSPG. The oval testing track is estimated to be 19km long which means that the oval testing track will be established within the 500m buffer of a wetland.

Within the initial layout the building area was located in the infield of the Oval. Due to operational reasons (e.g. confidentiality, availability of water and length of access for delivery on the property) the building area was moved to the outside of the oval testing track and downsized.

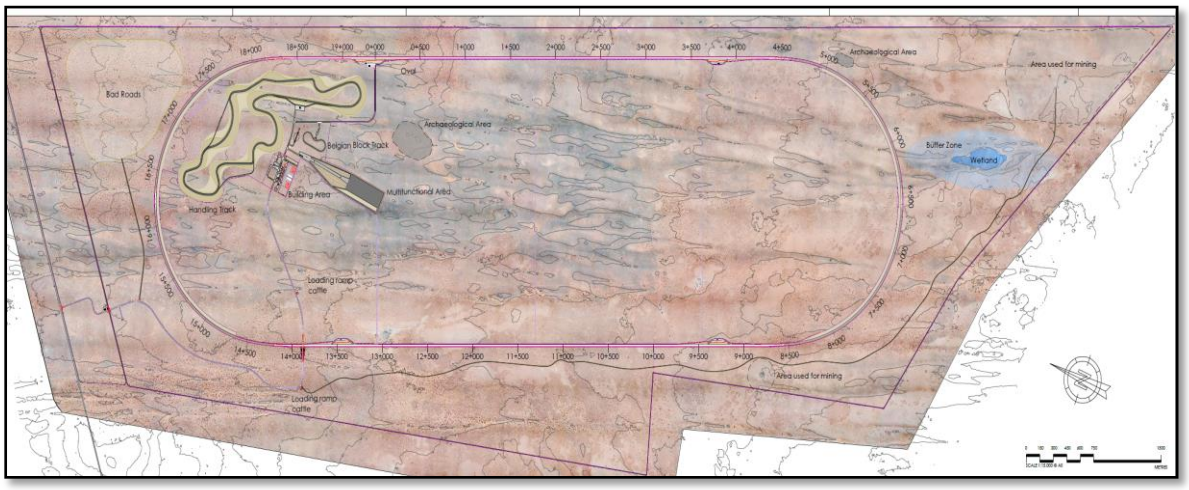


Figure 6-1: Alternative High Speed Proving Ground Layout no. 1

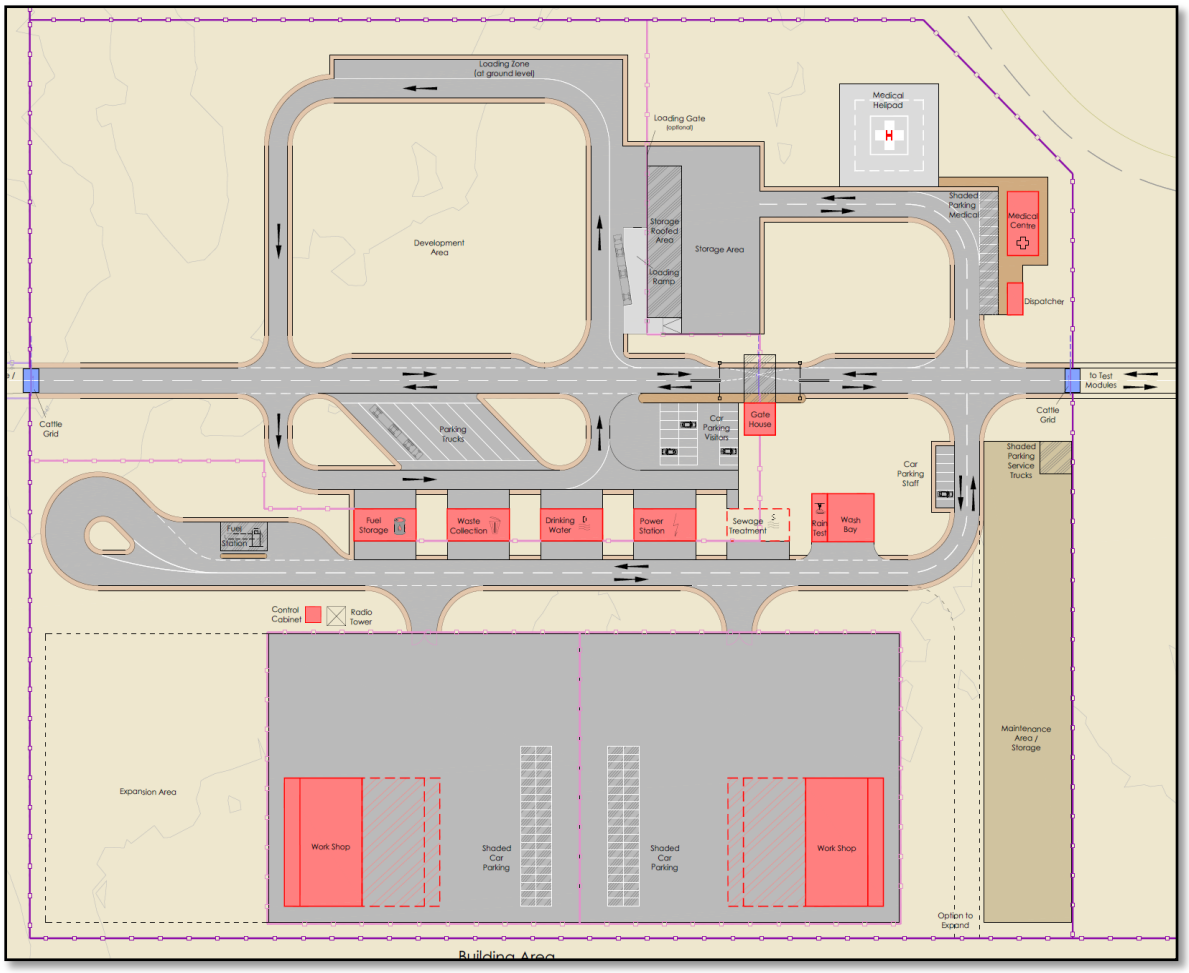


Figure 6-2: Initial Layout Building Area

HSPG LAYOUT ALTERNATIVE 2

Figure 6-3 illustrates the layout alternative 2 of the HSPG. The oval testing track will be approximate 17km in length and does not go through the 500m buffer of the wetland. This is the preferred alternative as the wetland shall not be impacted. Further assessment was therefore undertaken in the EIR on this Alternative.

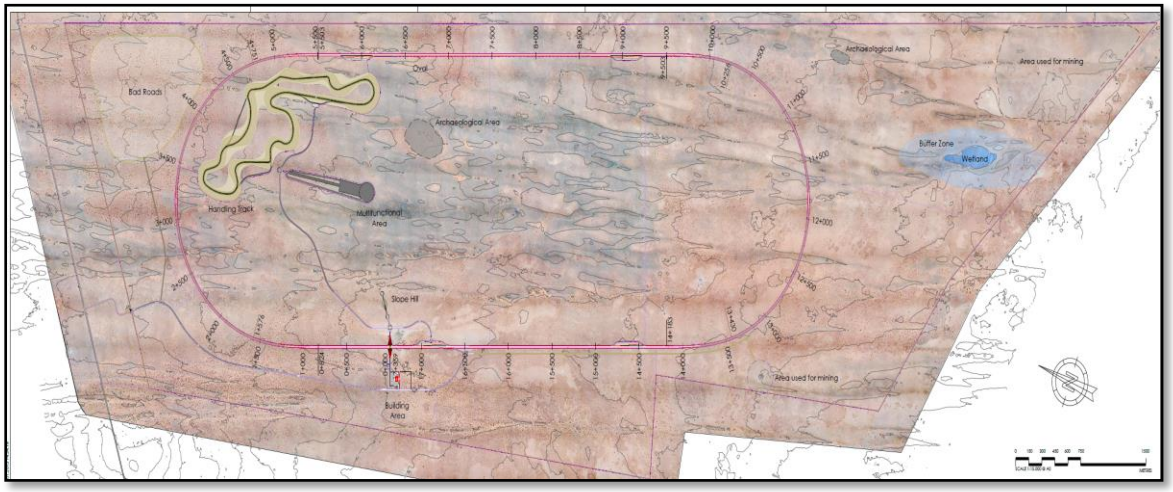


Figure 6-3: Alternative High Speed Proving Ground Layout no. 2

Figure 6-4 illustrates how the building area has been downsized and the sealed area has thus been minimized.

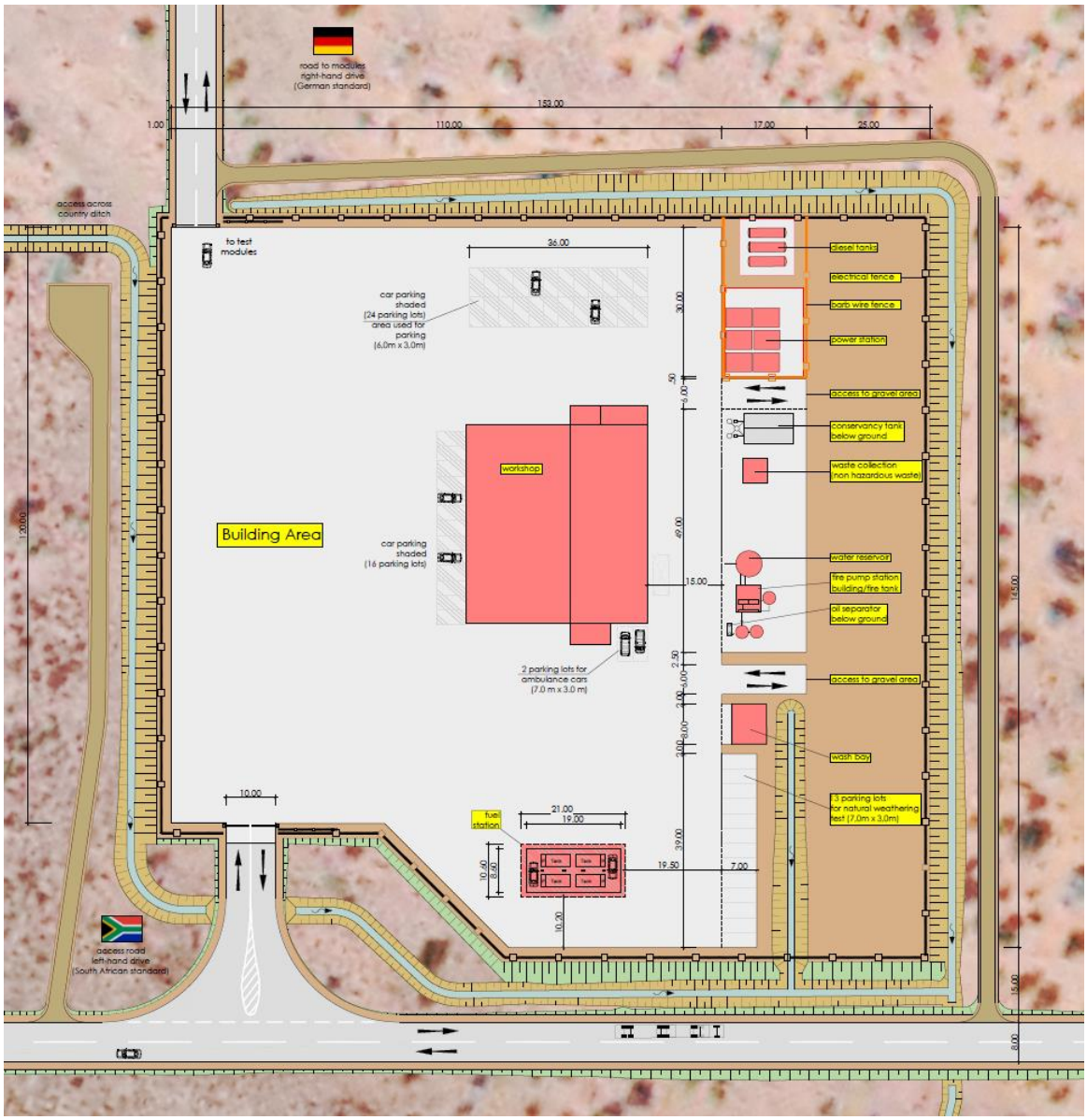


Figure 6-4: Final proposed Building Area

6.3 RESOURCE ALTERNATIVES

SOURCING OF MATERIAL ON-SITE

The material required for the construction of the HSPG will potentially be sourced from on-site. This will depend on the quality and quantity of material that is required. The material will be sourced from a combination of cut-to-fill activities and from dedicated areas containing the required material. Refer to **Figure 6-5** for proposed locations for the material to be sourced.

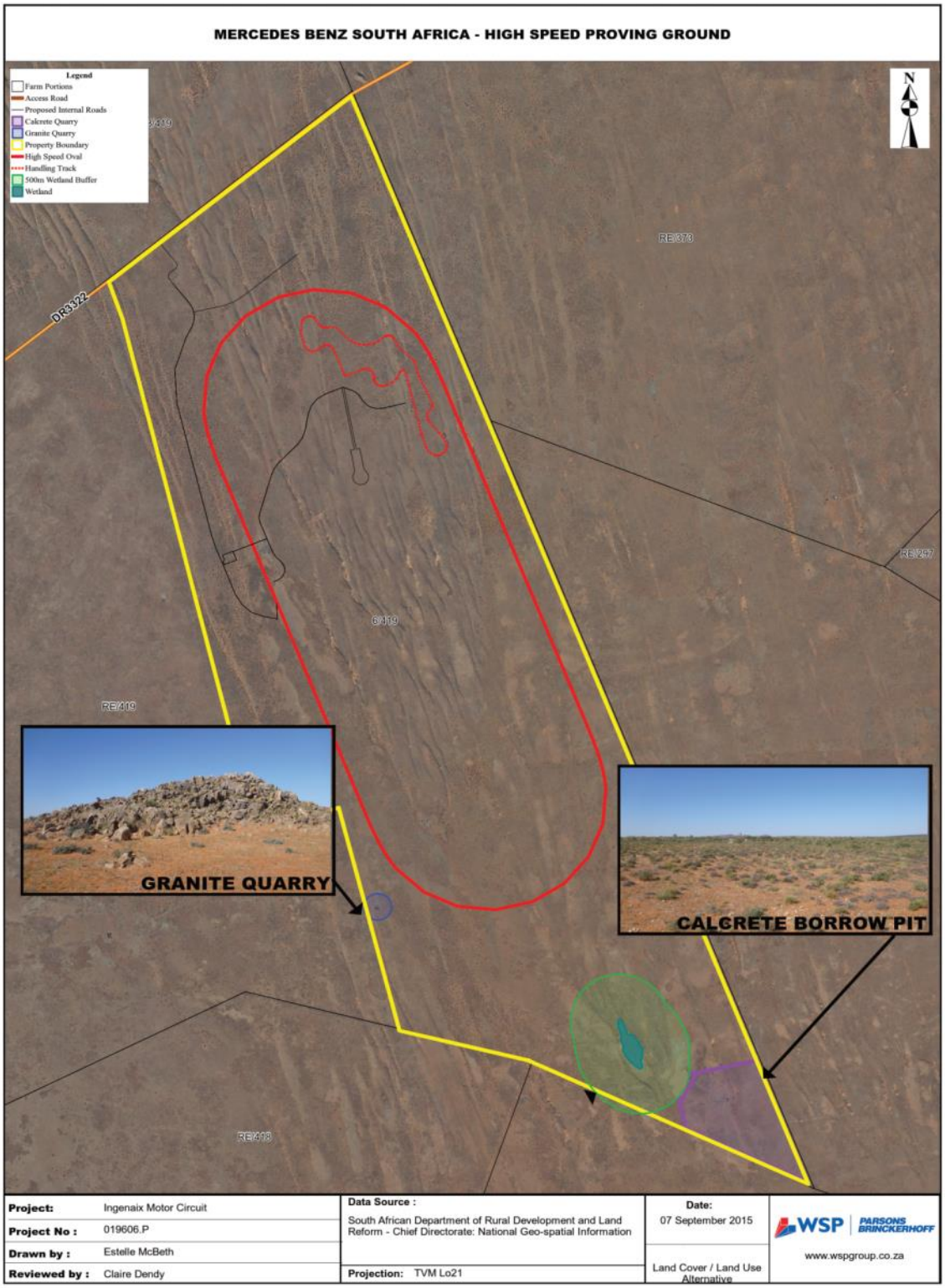


Figure 6-5: Proposed Alternative Locations for the Material to be sourced from for the Development of The HSPG

SOURCING OF MATERIAL OFF-SITE

If all the required material cannot be sourced on-site some material may have to be imported from off-site. The sourcing of material off-site may prove to be costly.

6.4 OPERATIONAL ALTERNATIVES

The HSPG will be used for heat-relevant vehicle testing. It is proposed that the HSPG will operate mainly during the summer months and possible other *ad hoc* periods as and when required. The establishment of the facility will enable MBSA to undertake testing of vehicles under hot climate conditions in parallel to the European winter season under specified technical conditions in terms of testing modules. As such no operational alternatives have been considered.

6.5 NO GO ALTERNATIVE

In the event that MBSA HSPG is a No-Go option, the positive impacts that would have arisen as a result of this development would not occur and as such the current status quo would remain. The positive impacts could include an increase in employment and business opportunities, benefit to local hospitality and tourism sector, investment in local development initiatives and raise profile of the Upington region. The No-Go option would therefore represent in a lost opportunity for Upington and the local economy. In addition, MBSA shall potentially consider alternative locations outside of South Africa.

6.6 MOTIVATION WHERE NO ALTERNATIVE SITES WERE CONSIDERED

MBSA commenced with investigations in 2012 to identify the most suitable/feasible site for the proposed development of a HSPG. A list of criteria was identified by MBSA in order to assist with the selection of the proposed location for the HSPG. Based on the general specifications Steenkamps Pan, Farm 419/06, was selected for the proposed development of the MBSA HSPG.

6.7 STATEMENT MOTIVATING THE PREFERRED SITE LOCATION AND LAYOUT

The final site layout and location is illustrated in **Figure 6-6** and **Figure 6-7** has been selected in order to optimise the operation of the HSPG as well as to minimise the potential impacts to the environment. A wetland was identified, as a result it was determined that minimal impact to the wetland would occur if the oval testing track was shorted from 19km to 17km to avoid the 500m wetland buffer zone.

The topography of the site is shaped by sandy areas and sand dunes. The dunes are situated lengthwise in the property, from North north-west to South south-east and are highly developed especially in the northern half of the property. The southern half of the property is notably flatter and less covered by sand and sand dunes. The rectangular stretched shape and the existing topography of site only allows for an oval testing track positioned lengthwise of the property. This shape and position of the oval testing track also would consider the existing sand dunes and so would reduce the impact to the immediate environment. Due to the perfect fit of the oval testing track into the property and the privacy requirements for the HSPG, the various other handling tracks can only be placed in the north-eastern part of the inner area of the oval.

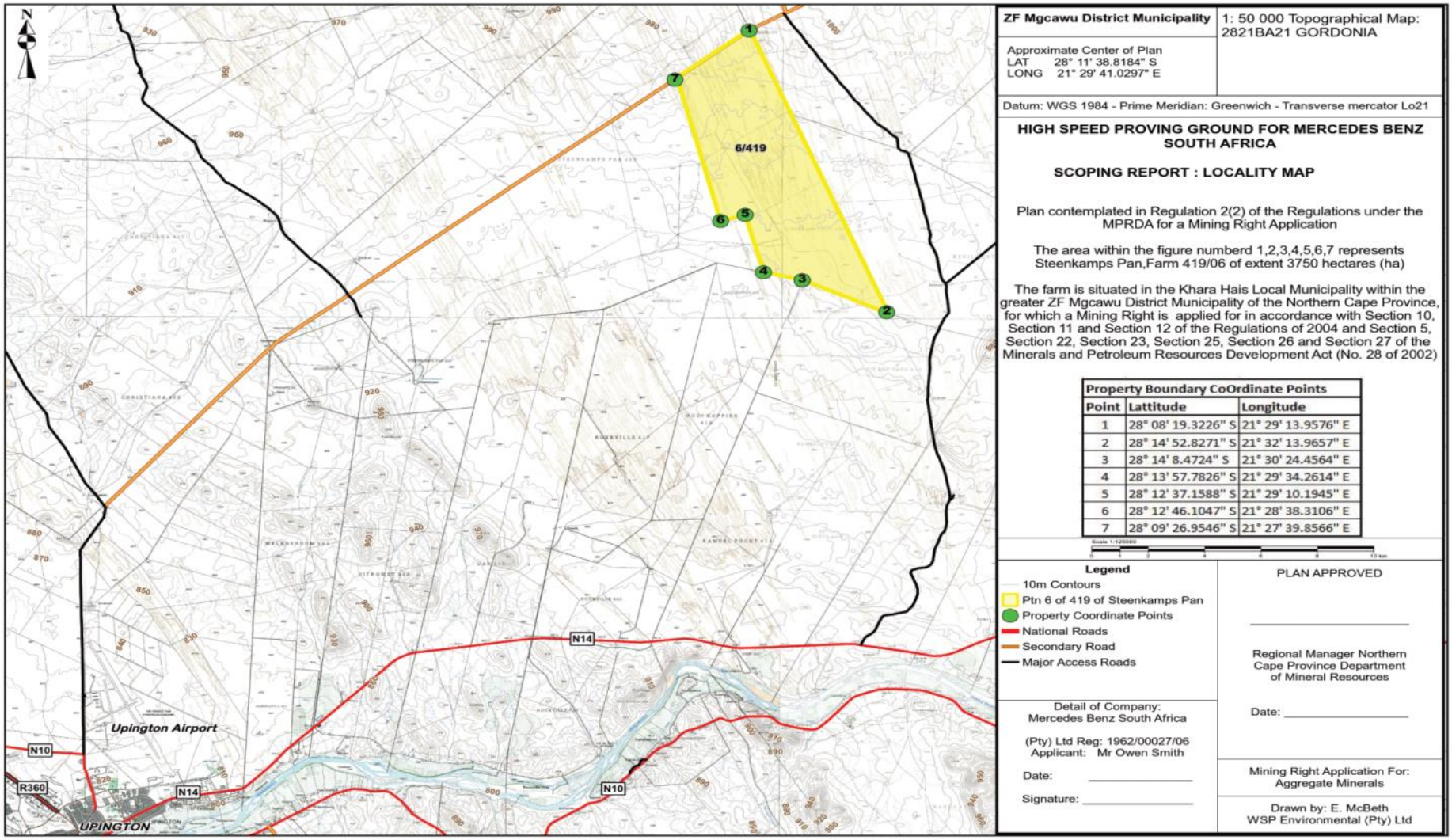


Figure 6-6: Location of the Identified Property for the Development of the MBSA High Speed Proving Ground

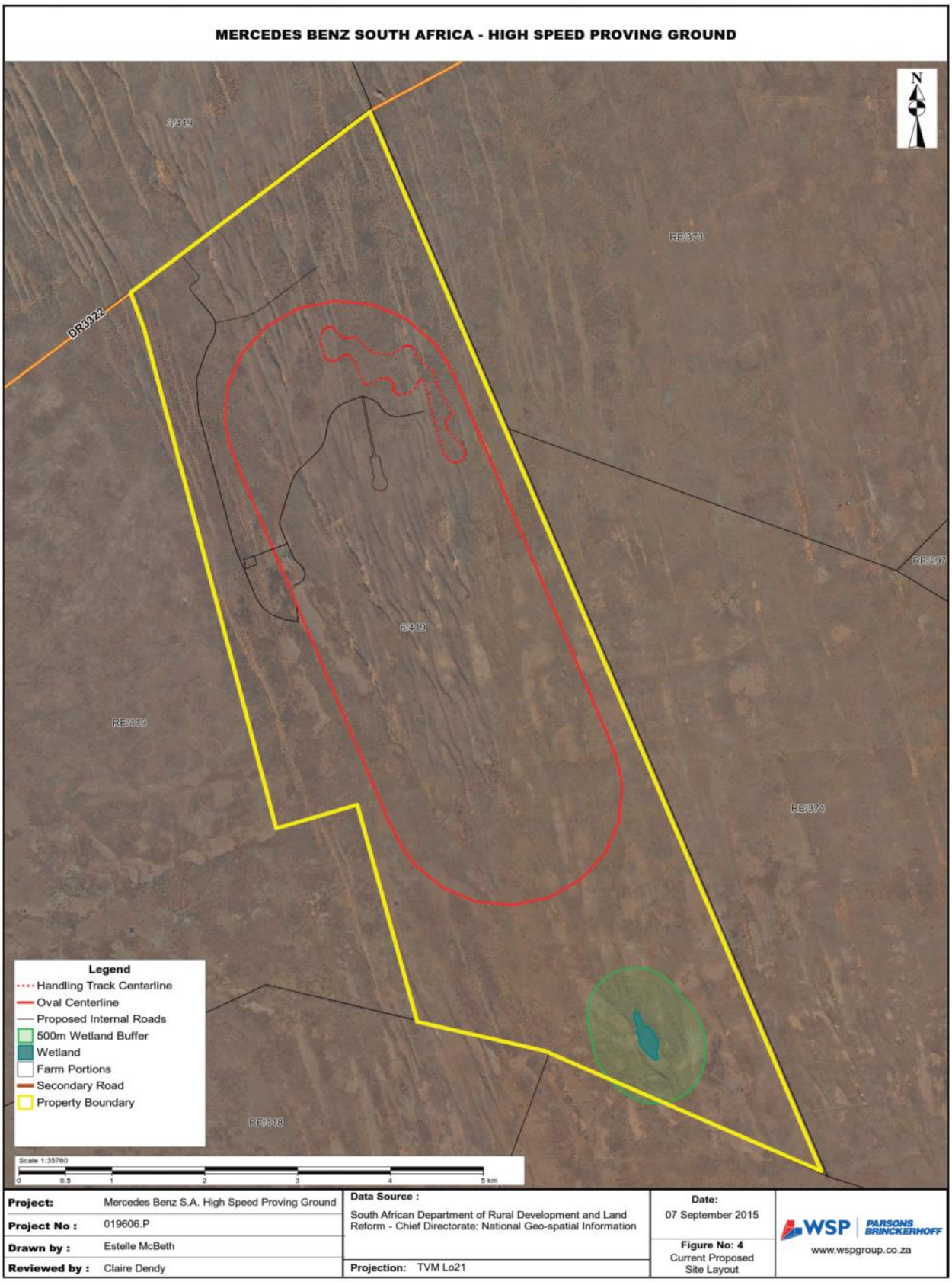


Figure 6-7: Final Site Plan for the Development of the MBSA High Speed Proving Ground

7 BASELINE ENVIRONMENT

7.1 GEOLOGY[1]

REGIONAL DESCRIPTION

The proposed MBSA HSPG is situated within Upington, Northern Cape Province. The geology found in Upington is that of the Bushmanland Sequence. Sedimentary and Volcanic rocks of this sequence include schist, quartzites and amphibolites. **Figure 7-1** illustrates the project area as it appears to be predominantly underlain by bedrock of the Mesoproterozoic Koras Group. There are significant outcrop exposures of the Leerkrans Formation evident close to the southeast margin of the project area and it is possible that the unit will be present beneath the project area. This however cannot be confirmed since almost the entire extent of the project area is covered with sediments of the Kalahari Group. An exposure of the Blauwbosch Granite is located approximately 9.5 km to the south-west of the project area. Intrusive rocks of this granite occur throughout the Koras Group, and may also be present in the project area, being buried beneath the Kalahari Group cover.

[1] The Geology information was provided by BM Geological Services

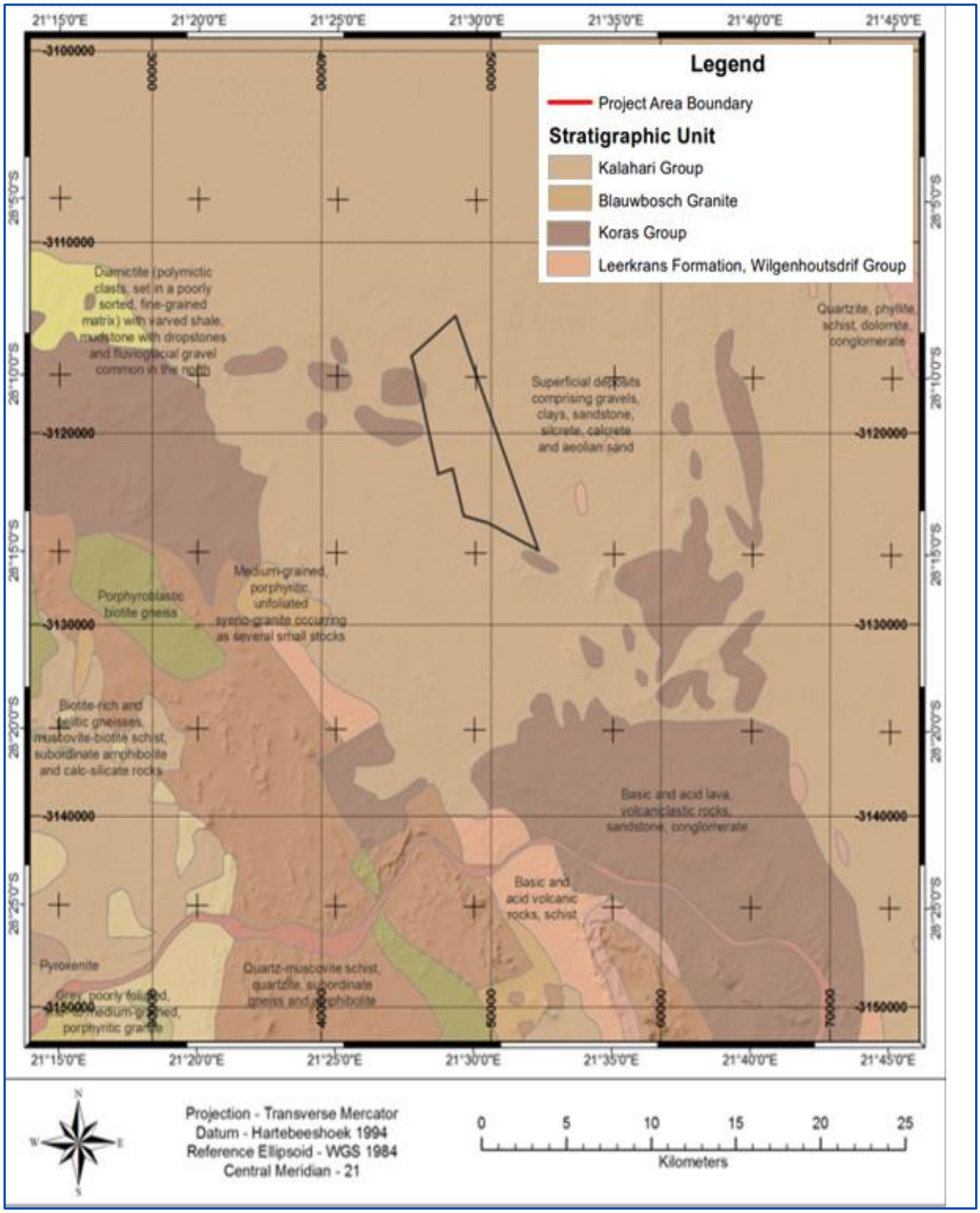


Figure 7-1: Map of the Geology Underlying the Project Area and its Surrounding Environs

SITE DESCRIPTION

LEERKRANS FORMATION, WILGENHOUTSDRIF GROUP

The Wilgenhoutsdrif Group largely consist of volcanogenic rocks that occupy a wedge-shaped outcrop area and form part of the Palaeoproterozoic to Neoarchaean age Namaqua-Natal Province (Cornell et al., 2006)[2]. The Leerkrans Formation reveals a cyclic repetition of dominantly volcanic rocks intercalated with sedimentary rocks. The lower cycle consists of a rhyolite overlain by a greenstone unit containing lapilli, calcite-filled amygdales and locally preserved pillow lavas. Metabasic intrusions occur as sill-like bodies within the sequence. A sequence of immature sediments overlie the volcanic rocks and grade upwards from metapelite to schistose quartzite and conglomerate (Cornell et al., 2006[2]). The second and overlying cycle commences with a felsic pyroclastic deposit which grades upwards into a tuff. These basal lithologies are overlain by greenstones and pyroclastic rocks which subsequently grade into greenschist and phyllite.

Age dating of the Wilgenhoutsdrif has proved difficult due to pervasive metamorphism caused by the ca. 1100 Ma Namaqua -Natal orogeny (Cornell, et al., 2006).

KORAS GROUP

The Mesoproterozoic Koras Group is divisible into three sectors; these being the northern, central and southern sectors. The project area is located within the southern sector. The stratigraphic sequence comprising the Koras Group is, in order of decreasing age, the Christiana, Boom River, Swartkopsleegte, Ezelsfontein, Rouxville and Leeuwdraai Formations. Lithologically, the sequence consists of interbedded conglomerates, sandstones, volcanic breccia and tuff as well as rhyodacitic, rhyolitic and basaltic lavas (Cornell et al., 2006[5]). The sequence was deposited into a series of grabens and half grabens that formed as a result of the regional scale collision and deformation (approx. 1 200 Ma) that occurred as part of the Namaqua Orogen (Jacobs et al., 1993[3]). The strata of the Koras Group are essentially un-deformed, but are invariably altered to greenschist facies (Cornell et al., 2006[5]). The lower portion of the group has been dated as being 1171 Ma (Gutzmer et al., 2000[4]).

BLAUWBOSCH GRANITE

The Blauwbosch Granite is the most widespread plutonic rock related to the Koras Group. The unit is unfoliated, porphyritic alkali granite, which forms relatively small, irregular plutons (Cornwell et al., 2006[5]).

KALAHARI GROUP

The stratigraphic units comprising the Kalahari Group constitute the most extensive body of terrestrial sediments of Cenozoic age in southern Africa. The Kalahari Group is composed (in

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[2] Cornell, D.H., Thomas, R.J., Moen, H.F.G., Reid, D.L. Moore, J.M., and Gibson, R.L. (2006). The Namaqua-Natal Province. In Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J. (eds) The Geology of South Africa, Johannesburg: Council for Geoscience, Pretoria: Geological Society of South Africa, pp. 325-379.

[3] Jacobs, J., Thomas, R.J. and Weber, K. (1993). Accretion and indentation tectonics at the southern margin of the Kaapvaal Craton during the Kibaran (Grenville) Orogeny. Geology, 21, 203-206.

[4] Gutzmer, J., Beukes, N.J., Pickard, A. And Barley, M.E. (2000). 1170 Ma SHRIMP age for Koras Group bimodal volcanism, Northern Cape Province. South African Journal of Geology, 103, 32-37.

5 Cornell, D.H., Thomas, R.J., Moen, H.F.G., Reid, D.L. Moore, J.M., and Gibson, R.L. (2006). The Namaqua-Natal Province. In Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J. (eds) The Geology of South Africa, Johannesburg: Council for Geoscience, Pretoria: Geological Society of South Africa, pp. 325-379.

order of decreasing stratigraphic age) of the Wessels, Budin, Eden, Obobogorob, Gordonia and Lonely Formations (Partridge et al., 2006[6]). The Late Pliocene/Early Pleistocene to Recent age Gordonia Formation consists of red aeolian sands; the unit is often present as linear sand dune systems. The Gordonia Formation is up to 30m thick and consists of rounded quartz grains coloured red by a thin coating of hematite. Aeolian overprinting of sands originally deposited by streams and sheet wash is evident in some places. A considerable area of the Gordonia Formation is covered by linear dunes. These dunes may have formed as early as the Late Pleistocene or Early Pleistocene (Moore and Dingle, 1998[7]). The Gordonia Formation covers most of the underlying stratigraphic units within the region and usually rests on a calcrete surface.

7.2 CLIMATE

REGIONAL DESCRIPTION

The Northern Cape Province is mainly semi desert however, the western areas of the Northern Cape, including Namaqualand, a small section of the Green Kalahari and Calvinia, Nieuwoudville and Loeriesfontein in the Upper Karoo fall into the winter rainfall area from April to September.

The eastern summer rainfall areas experience thunderstorms that resonate across the landscape. The Northern Cape's weather is typical of desert and semi desert areas. This area experiences fluctuating temperatures and varying topographies. The annual rainfall is sparse, 50 to 400mm per annum. In January, afternoon temperatures usually range from 20 to 40 ºC.

During winter, dew and frost is often experienced to supplement the low rainfall of the region. Sutherland in the Karoo is one of the coldest towns in South Africa.

SITE DESCRIPTION

The property shows a typical semi-desert or dry savannah climate. It is located in the summer rainfall region of South Africa and approximately 70% of the average rainfall occurs during the period October to April each year. Summer is very hot with maximum temperatures of up to 40°C and winters are cool to cold with average temperatures of 10°C, although it could drop to below 0°C coupled with frost. The predominant wind direction is from north to south. The **Figure 7-2** shows the average temperature values for Upington per month and range from 4°C in June to 35°C in January **Figure 7-3** shows the average rainfall for Upington. The region is the coldest during July.

[6] Partridge, T.S., Botha, G.A., and Haddin, I.G. (2006). Cenozoic deposits of the interior. In Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J. (eds) The Geology of South Africa, Johannesburg: Council for Geoscience, Pretoria: Geological Society of South Africa, pp. 585-604.

[7] Moore, A.E. and Dingle, R.V. (1998). Evidence of fluvial sediment transport of Kalahari sands in central Botswana. South African Journal of Geology, 101, pp: 143-153.

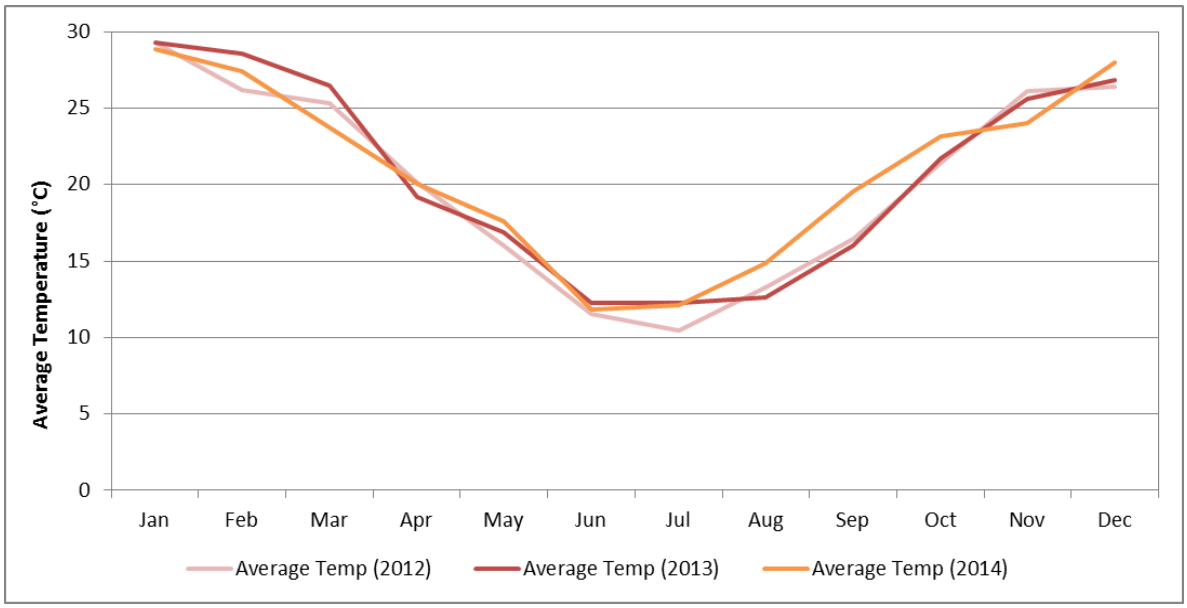

Figure 7-2: Average temperatures for Upington

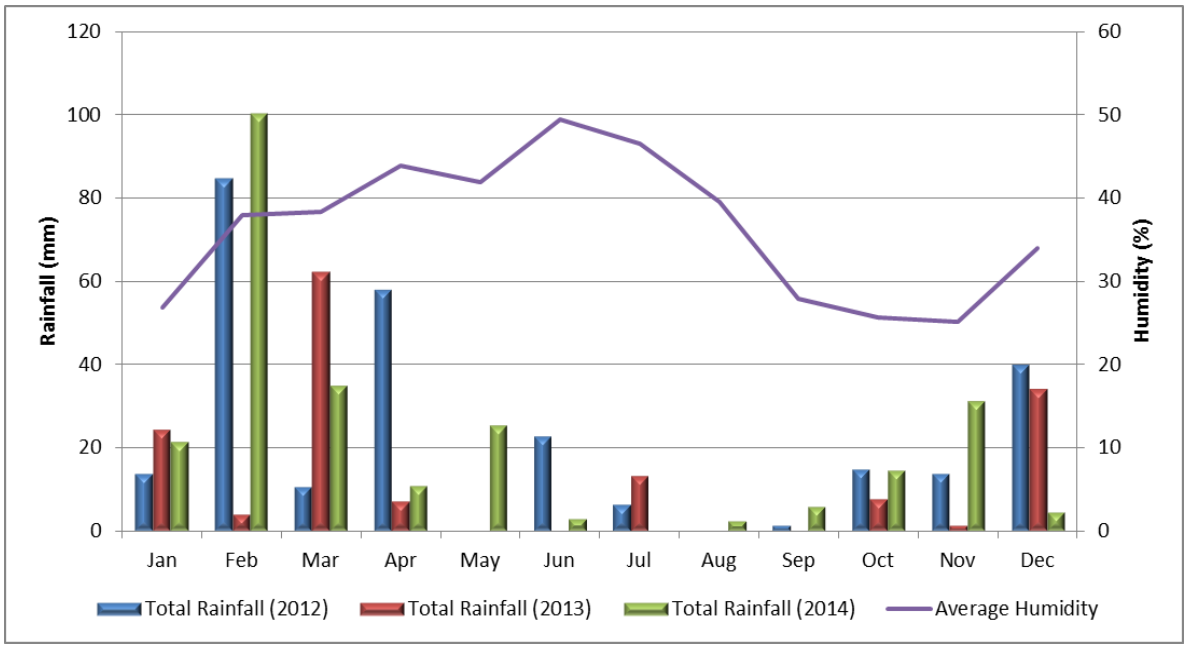

Figure 7-3: Average Rainfall and humidity for Upington

7.3 TOPOGRAPHY

REGIONAL DESCRIPTION

The Kalahari basin stretches northwards from just north of the Orange River into Botswana and Namibia. It is a flat, sand covered, semi-desert area, on average between 900m to 1200m above sea level. It is characterised by a number of large pans to the North of Upington, by dry river beds

(such as the Kuruman, Nossob and Molopo Rivers) and by dunes which strike Northwest to Southeast. The region is underlain by Karoo rocks and rocks belonging to the tertiary Kalahari Group (Siyanda Draft EMF, 2008[8]). The area in which the property falls, forms part of the Kalahari dale, and is typically characterised by continuous linear dunes and inter dune straaten. The landscape is one of the simplest in the world and consists mainly of sandy dunes inter-specked with calciferous plains and dry pans. The Kalahari is drained by three very sporadic flowing streams namely the Nossob, Auob and Molopo Rivers. Last recordings of flows in the lower regions of the Molopo and Kuruman Rivers were in 1933 and again in the 1974/5 and 1975/6 season.

SITE DESCRIPTION

Figure 7-5 illustrates the topography of the Steenkamps Pan, Farm 419/06. The property represents a typical Kalahari landscape with linear dunes and inter-dune straaten striking in a northwest - southeast direction. Calciferous outcrops are commonly found within the inter-dune straaten where by calcrete is just below the surface. The proposed location for the HSPG is predominantly flat with a small rocky outcrop (sometimes referred to as an Inselberg) near the western boundary of the farm. In terms of elevation the landscape shows a very slight drop in elevation (average slope 0.2%) from North to South and East to west (Refer to **Figure 7-4**). Elevation varies from approximately 967 to 920m from north to south and 945 to 937m from east to west. The landscape is thus relatively flat and the only factor limiting line of sight being the height of the alternating dunes. On this property the largest dunes tends to be found almost in the middle of the north-south track area as well as towards the north east corner of the farm.

[8] Siyanda Draft EMF Report. 2008. Draft Environmental Framework report for the Siyanda District Municipality. A joined project between Siyanda District Municipality, Department of Tourism, Environment and Conservation, Department of Environmental Affairs and Tourism, Northern Cape. In association with MetroGIS & Mosakong Management. 2008.

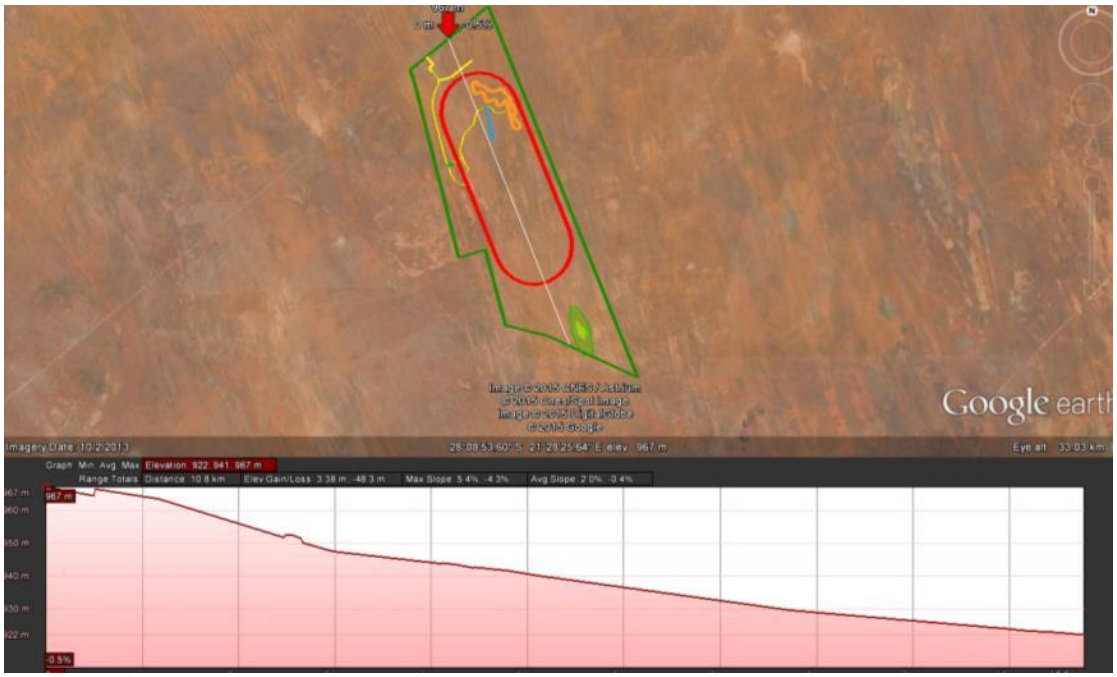

Figure 7-4: Elevation Data Shows a Slight drop in elevation from North to South and East to West

Due to the sandy nature of much of the soils the Kalahari is susceptible to wind erosion if the natural vegetation cover is disturbed. Pure sands (material with 95% or more with a particle size of 0.05-2.00 mm) are susceptible to being transported and re-deposited by strong winds whenever insufficiently protected by plant cover or windbreaks. Shifting sands tend to damage herbaceous, low-growing vegetation types and generate more shifting sands, starting a vicious circle (Siyanda Draft EMF, 2008[8]).

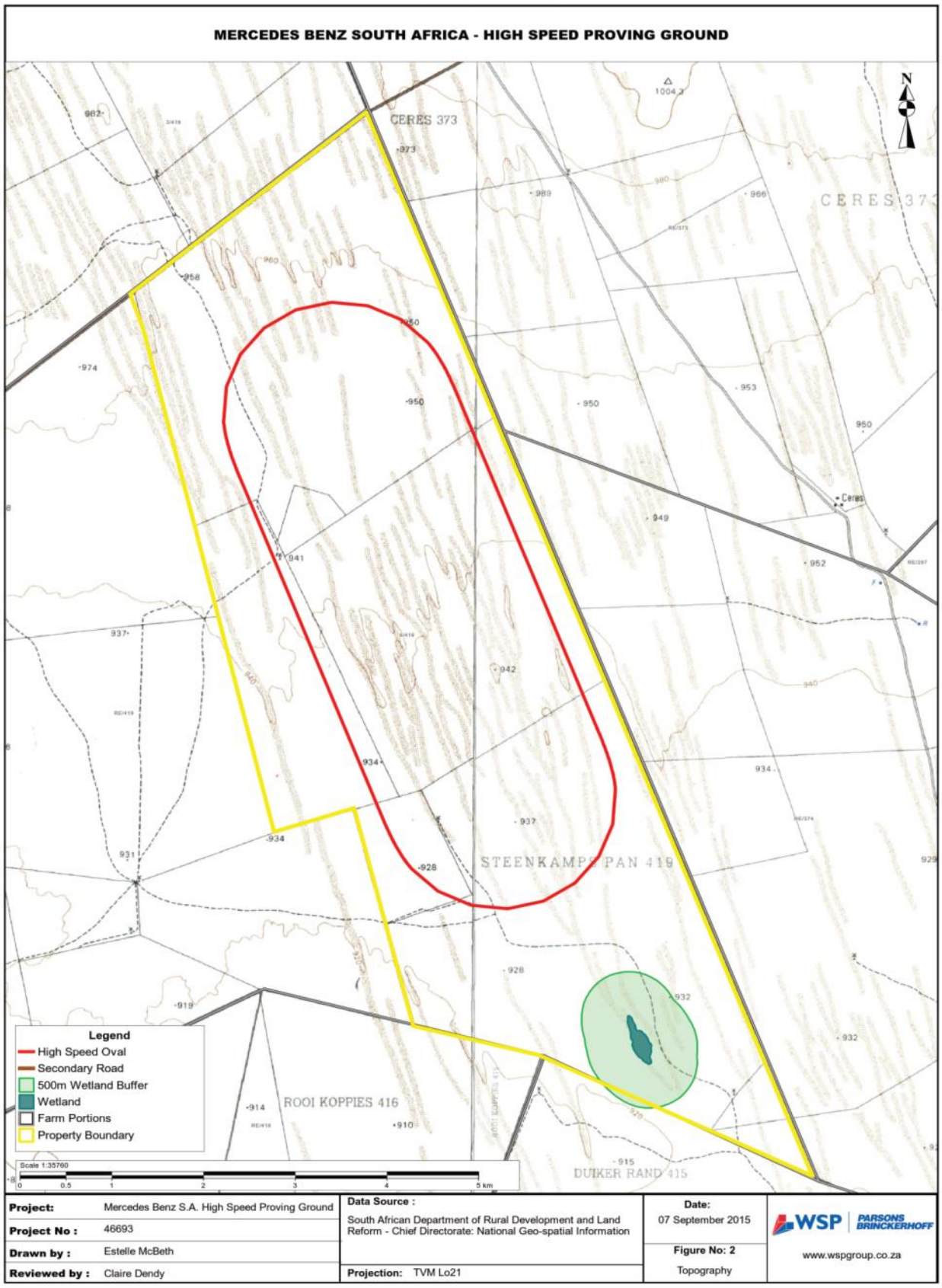

Figure 7-5: Topographic map of the Steenkamps Pan, Farm 419/06

7.4 SOIL AND LAND CAPABILITY

REGIONAL DESCRIPTION

According to Mucina & Rutherford (2006)[9] and the SANBI Biodiversity Geographical Information System, the soils for this area can be described as aeolian sand underlain by calcrete of the Kalahari Group. Mostly fixed parallel sand dunes with *Af* land type (described below) almost exclusively, while sandy soils of the Namib soil form may be expected on the flat plains. Outcrops of calcrete can be expected in certain duneveld types.

[9] Mucina, L. & Rutherford, M.C. (eds.) 2006. The vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.

SITE DESCRIPTION

Figure 7-6 presents the land type distribution for the site and surrounding area. The land type found on the site is Af7 (Land Type Survey Staff, 1972 – 2006).

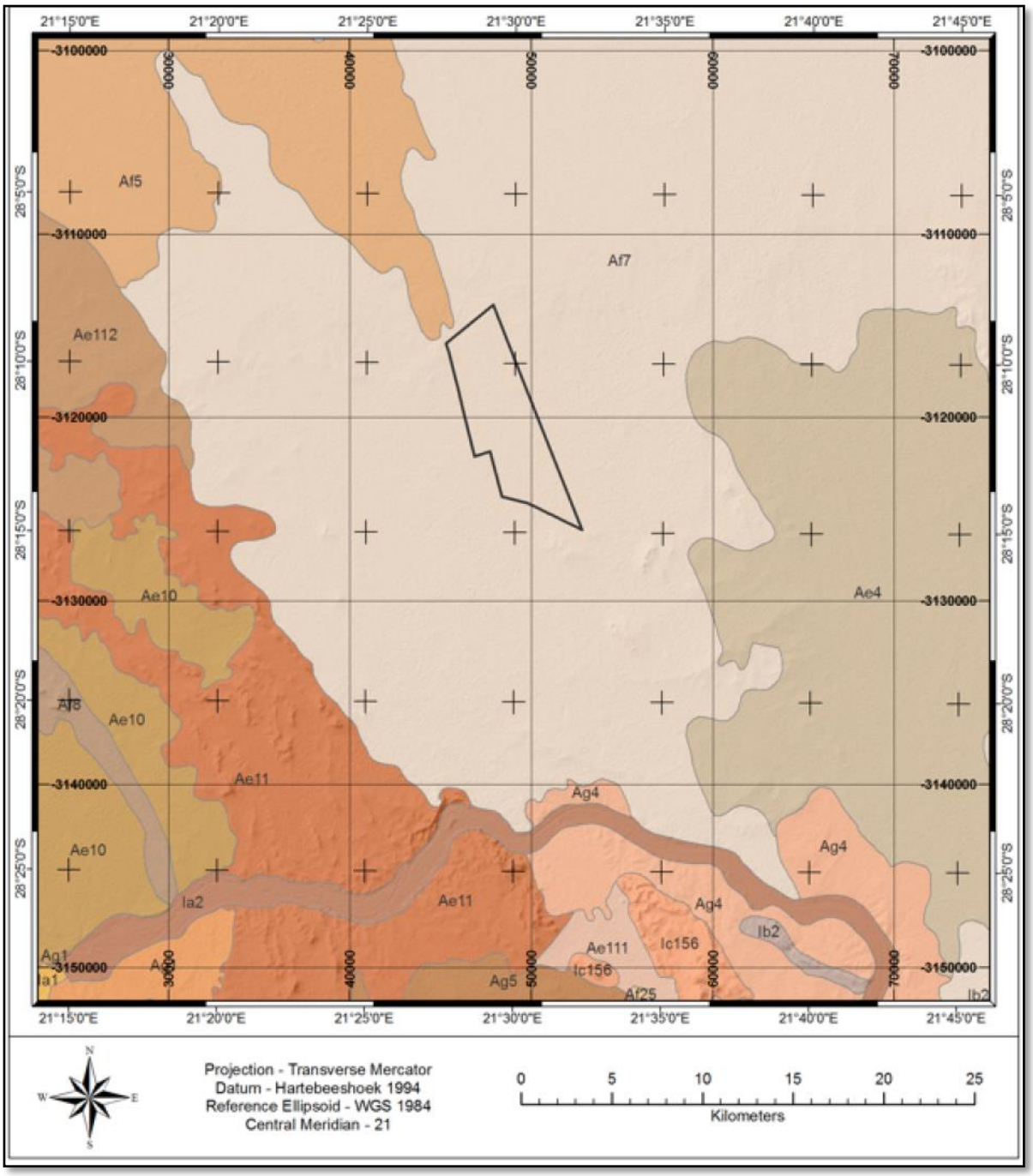

Figure 7-6: Land Type Map of the Survey Site and its Surrounding Area

LAND TYPE AF7

Land Type – General: Af land types denote areas with dominantly deep red high base status soils (eutrophic and lime containing) with regularly occurring dunes.

Soils: Soils are red coloured, eutrophic sandy soils derived from Aeolian deposits. The depths vary according to position in the landscape with soils overlying rock outcrops being shallow and soils comprising dunes being relatively deep.

Land capability and land use: The land use in the general land type area is limited to extensive and low intensity grazing due to the very low biological productivity associated with low rainfall and arid conditions. The land capability mimics the land use.

Two main soil zones or associations can be found at the proposed site, namely, the 1) rocky and shallow soils and 2) red dune soils. The rocky and shallow zones occur interspersed with dune areas. In both cases the dominant soils are of the Mispah (orthic A horizon / hard rock), Glenrosa (orthic A horizon / lithocutanic B horizon) and Hutton (orthic A horizon / red apedal B horizon / unspecified – usually hard or weathering rock in the area). Calcrete areas are limited and the dominant soils are Coega (orthic A horizon / hardpan carbonate). An endorheic type depression is found in the south where soils of the Brandvlei (orthic A horizon / soft carbonate B horizon) dominate. In the specific context the Brandvlei soils indicate areas with secondary lime accumulation due to more regular wetness when compared to the surrounding landscape.

AGRICULTURAL POTENTIAL

The agricultural potential is very low due to the low rainfall and aridity. The distinct presence of dunes in this landscape precludes the area from being developed for irrigated agriculture purposes due to the significant effort required to level the terrain.

The soils are considered to be of low agricultural potential due to the shallow and rocky profiles. The sandy deeper dune soils have a low water holding capacity and are not suited to irrigation land uses due to significant local topographical variation. The rainfall is variable and the average is below 200mm per year. This constitutes a very arid environment with a subsequent poor biomass production. This aspect is a further limitation on agricultural potential.

The grazing potential of the site is low and in excess of 20ha per large stock unit. This value will vary on a yearly basis depending on rainfall distribution over seasons, management aspects such as rotation and control of fires. The most persistent plants are shrubs that have a relatively low potential. After wetter periods significant grass growth can be observed and in which case the potential increases. However, the dry nature of the area leads to a significant fire hazard once the grasses dry out and wind speeds start to increase. Due to the continuous nature of veld in the area (and poor disaggregation due to lack of roads and fire breaks) fires pose significant risks to grazing potential with a subsequent risk of destruction of large swathes of grazing veld.

7.5 LAND USE

REGIONAL DESCRIPTION

The Kalahari area is predominantly used for stock and game farming. Live stock is marketed either locally, at auctions in Upington, or for slaughtering in Upington and Groblershoop. Game is mainly utilised for food generation “biltong” or hunting activities. It is important to note that there is a definite shift amongst commercial farmers on the Botswana border to change from stock farming to game farming, due to the change in weather conditions and the poor access to water for their stock.

SITE DESCRIPTION

Steenkamps Pan has been used for cattle and sheep farming over a long period of time, and although the effect of continual mono-species grazing can be seen, the property remains largely natural, with very little permanent impacts associated with the current land use option. In itself the soils of the Kalahari has very little to no opportunities for productive use (Siyanda Draft EMF, 2008) and without access to water productive agriculture is limited to game farming. With access to groundwater live-stock farming becomes a possibility as is the case at Steenkamps Pan. Existing infrastructure is limited to boreholes (wind pumps) fences, “twee-spoor” access roads, cattle pens and two small buildings (houses). The land use of the Steenkamps Pan and its immediate surroundings are expected to remain natural veld. According to the biodiversity summaries for the ZF Mgcawu District Municipality (SANBI, BGIS), 99.6% of the area is still covered by natural veld (only 0.4% of the area transformed). Figure 7-7 illustrates the land uses for the proposed site.

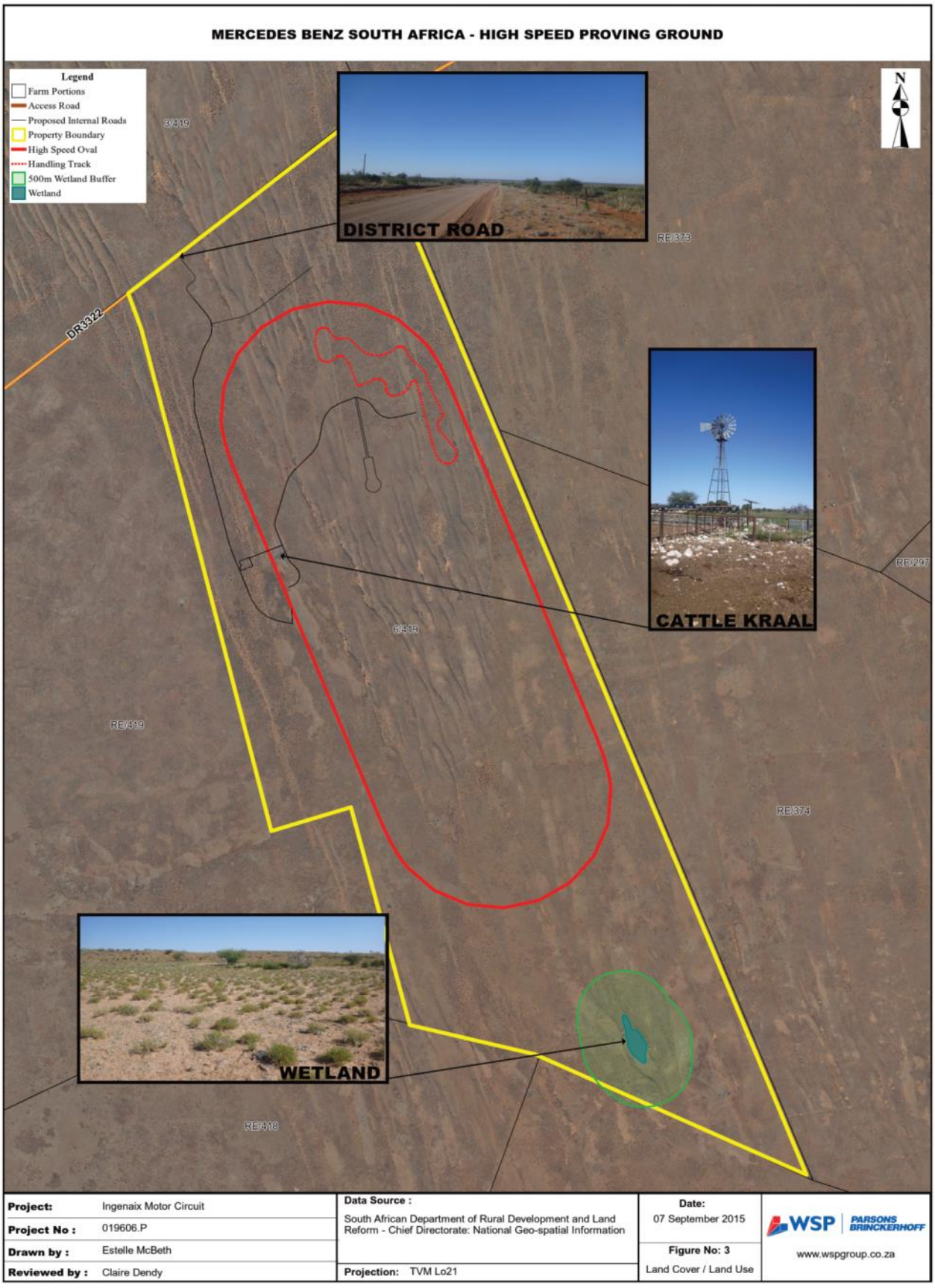

Figure 7-7: Land Use of the Proposed Location for the High Speed proving Ground

7.6 FLORA[10]

REGIONAL DESCRIPTION

The property falls within the Savannah Biome (Kalahari Duneveld Bioregion). The Savannah Biome is the most widespread Biome in Africa and also occupies most of the northern part of the Northern Cape, including the Kalahari Duneveld. According to Rutherford et al (2006)[9], the Savannah in South Africa has a low species to area ratio, and become even lower in the southern Kalahari part of the biome (with a sharply decreasing diversity of trees from east to west). On the other hand, Savannah is well known for its diversity of mammals. Rainfall seasonality and frequency are too unpredictable and winter temperatures too low to enable leaf succulents to dominate, while summers are too dry for dominance by perennial grasses alone, and the soils are generally too shallow and rainfall too low for trees.

According to the Vegetation Map of South Africa Mucina & Rutherford (2006)[9] one broad vegetation type (Gordonia Duneveld) is expected on the property and its immediate surroundings. The status of this vegetation type according to the 2004 National Spatial Biodiversity Assessment and the 2011 National Spatial Assessment or National List of Threatened Ecosystems (GN 1002, December 2011) is given in **Table 7-1**.

Table 7-1: Vegetation status according to the 2004 National Spatial Biodiversity Assessment and 2011 National Biodiversity Assessment

Vegetation Type	National Status	Remaining	Conservation Target	Formally Conserved
Gordonia Duneveld (SVkd 1)	Least Threatened	99.8%	16%	14.2%

Rutherford et al (2006)[11] describe Gordonia Duneveld open shrub land with ridges of grassland dominated by *Stipagrostis amabilis* (Dune Bushman Grass) on the dune crests and *Acacia haematoxylon* (Grey Camel Thorn) on the dune slopes, also with *Acacia mellifera* (Black Thorn) on lower slopes and *Rhigozum trichotomum* (Kalahari soap bush) in the inter dune straaten, occurring on parallel dunes 3-8 m above the plains. The small tree *Acacia mellifera* subsp. *detinens* (Black Thorn) is likely to occur, while tall shrubs like *Grewia flava* (Velvet Brandybush) and *Rhigozum trichotomum* (Kalahari Soap Bush) are common. Low shrubs like *Aptosimum albomarginatum*, *Monechma incanum* (Bloubos) and *Requienia sphaerosperma* are frequent together with succulent shrubs which may include *Lycium bosciifolium* (Limpopo Honeythorn), *L. pumilum* (box-thorn) and *Talinum caffrum* (Kalahari Butterweed). Grasses are dominant and is likely to include *Schmidtia kalahariensis* (Bushman Grass), *Brachiaria glomerata* (Sand Brachiaria), *Bulbostylis hispidula* (Beard of the Lion), *Centropodia glauca* (Kalahari-Gha Grass), *Eragrostis lehmanniana* (Lehmann's Love Grass), *Stipagrostis ciliate* (Tall Bushman Grass), *S. obtusa* (Fyn Twa) and *S. uniplumis* (Silky Bushman Grass). The following herbs may also be encountered namely *Hermbstaedtia fleckii* (Katstert), *Acanthosicyos naudinianus* (Gemsbok Cucumber), *Hermannia tomentosa* (Doll's Roses), *Limeum arenicolum, L argute-carinatum* (Klosaarbossie), *Oxygonum dregeanum* subsp. *canescens* var. *canescens*, *Sericorema remotiflora* (Wild Lettuce), *Sesamum triphyllum* (Wild Sesame) and *Tribulus zeyheri* (Yellow Devil's Thorn).

[10] The Biodiversity information was provided by PB Consult Ecological & Botanical Management Services
[11] Rutherford, M.C., Powrie, L. W. 2009. Severely degraded dunes of the southern Kalahari. Afr. J. of Ecol. 48. Page 930-938.

SITE DESCRIPTION

Most of Steenkamps pan is covered by dunes and plains on deep reddish sands. The vegetation is mostly shrubby grassland with a sparsely scattered tree over-layer. The landscape is dominated by the larger trees and shrubs, which consist mainly of *Acacia haematoxylon* (Grey camel thorn) and *Boscia albitrunca* (Shepherd's Tree), but *Acacia erioloba* (Camel Thorn), *Parkinsonia africana* (Green-hair Thorn), *Acacia mellifera* (Black thorn), *Rhigozum trichotomum* (Kalahari Soap Bush) and Lycium species are also Dune crests are usually dominated by the tall dune *Stipagrostis amabilis* (Bushman Grass) with the *Crotalaria spartioides* (Dune Bush) also common. Trees like *Boscia albitrunca* (Shepherd's Tree) and *Acacia haematoxylon* were often found on dune crests or along the dune slopes, while the shrub *Ehretia rigida* (Puzzle Bush) was encountered occasionally. *Acacia erioloba* (Camel Thorn) was less common and mostly associated with deeper sands in the inter dune straaten. The *Citrullus lanatus (*Tsamma Melon*)* and the *Acanthosicyos naudinianus* (Gemsbok Cucumber) are also expected within the dune landscape prominent. *Acacia mellifera* (Black Thorn), in combination with *Boscia albitrunca* (Shepherd's Tree) and Parkinsonia Africana (Green-hair Thorn) sometimes combines in a dense shrub layer, of up to 2 m, in deeper soils. *Rhigozum trichotomum* (Kalahari Soap Bush) sometimes forms an almost impregnable shrub layer (about 1 m tall) within the inter dune straiten. Other species encountered within the dune vegetation includes: *Aloe claviflora* (Aanteela alwyn), *Aptosimum cf. marlothii* (Koffiepit), *A. spinescens* (Violet), *Asparagus retrofractus* (Ming Asparagus Fern), *Barleria rigida*, *Elephantorrhiza elephantine* (Elands Bean), *Gnidia microphylla* (Yellow Heads);, *Helichrysum cf. argyrosphaerum* (Sheep's Ears), *Kleinia longiflora* (Sjambok Bush), *Lagerra decurrens* (Silky Sage), *Lycium bosciifolium* (Limpopo Honeythorn), *L. cinereum*, *L. hirsutum*, *Parkinsonia Africana* (Green-hair Thorn), *Prosopis grandulosa* (Honey Mesquite), *Salsola cf. rabiena* (Russian Thistle), *Senna italic* (Port Royal Senna), *Sericorema remotiflora* (Wild Lettuce), *Sutera species* (Bacopa), *Thesium lineatum* (Witstorm) and *Zygophyllum pubescens* (Hairy Zygophyllum). Poaceae included: *Centropodia glauca* (Kalahari-Gha Grass), *Eragrostis species* (Weeping Lovegrass), *Stipagrostis amabilis* (Bushman Dune Grass), *S. ciliate* (Tall Bushman Grass), and *S. uniplumis* (Silky Bushman Grass).

Signs of heavy grazing (but not severe overgrazing such as that which typically leads to dune erosion) were recorded at all localities visited. Such signs included the grazing of the highly palatable grass *Stipagrostis obtusa* (Fyn Twa) down to a height of 1cm or less and large areas encroached by the indigenous shrub *Rhigozum trichotomum* (Kalahari Soap Bush), which is usually a sign of overgrazing where it occurs in large, almost monospecific (in terms of shrubs) stands (Ixhaphozi Enviro Services CC, 2015).

Alien plant species have not transformed any significant area of indigenous vegetation within the proposed site. The small alien invasive tree *Prosopis glandulosa var. torryena* (Honey mesquite) does however occur throughout the site, albeit largely restricted to the foot slopes of dunes and inter dune flats where it always occurs at relatively low densities and is never dominant. *Prosopis glandulosa var. torryena* (Honey mesquite) is listed as a Category 3 invasive species in the Regulations on Alien and Invasive Species [National Environmental Management: Biodiversity Act (August 2014)]. As a Category 3 species, *Prosopis glandulosa* var. *torryena* (Honey mesquite) must be controlled by the landowner unless exemption is obtained in terms of Section 71 (3) of the Act (Ixhaphozi Enviro Services CC, 2015).

PROTECTED AND RED DATA SPECIES

Table 7-2 gives a list of the species encountered on the property. The National Forests Act (NFA) of 1998 (Act 84 of 1998) provides for the protection of forests as well as specific tree species (GN 71 6 of 7 September 2012).

Three species protected in terms of the NFA were encountered namely:

- *Acacia erioloba* (Camel thorn);

- *Acacia haematoxylon* (Grey Camel thorn); and
- *Boscia albitrunca* (Sheppard's tree).

Acacia haematoxylon was encountered throughout the property, but was mostly associated with the dunes and inter dune straaten. Of the three species *Acacia haematoxylon* is the most abundant. Most of the trees encountered was relatively small (<2 m), but larger individuals was also regularly encountered on deeper sand. **Figure 7-8** provides the location for the location of potential protected species.

Table 7-2: List of species encountered on the sites (excluding grass species)

Reference No.	Species Name	Occurrence	Family	SANBI/NCNCA/NFA Status
1	*Acacia erioloba*	Occasionally found throughout the property on deeper sands	FABACEAE	Protected in terms of the NFA
2	*Acacia haematoxylon*	Common on sandy dunes	FABACEAE	Protected in terms of the NFA
3	*Acacia mellifera*	Common throughout	FABACEAE	LC
4	*Acanthosicyos naudinianus*	Occasionally	CUCURBITACEAE	LC
5	*Aloe claviflora*	Rarely observed	ASPODELACEAE	LC, but all species protected in terms of the NCNCA
6	*Aptosimum albomarginatum*	Common on calcrete outcrops	SCROPHULAREACEAE	LC
7	*Aptosimum cf. marlothii*	Commonly found	SCROPHULAREACEAE	LC
8	*Aptosimum spinescens*	Common throughout	SCROPHULAREACEAE	LC
9	*Aristida congesta*	Common grass	POACEAE	LC
10	*Asparagus retrofractu*	Common	ASPARAGACEAE	LC
11	*Barleria rigida*	Occasionally near calcrete patches	ACANTHACEAE	LC
12	*Boscia albitrunca*	Very common throughout	CAPPARACEAE	Protected in terms of the NFA
13	*Boscia foetida*	Occasionally encountered	CAPPARACEAE	Protected in terms of the NCNCA
14	*Centropodia glauca*	Dominates dune crests	POACEAE	LC
15	*Citrullus lanatus*	Occasionally	CUCURBITACEAE	LC
16	*Crotalaria spartioides*	Common on dune crests	FABACEAE	LC
17	*Cucumis africanus*	Occasionally	CUCURBITACEAE	LC
18	*Elephantorrhiza*	Occasionally	FABACEAE	LC

Reference No.	Species Name	Occurrence	Family	SANBI/NCNCA/NFA Status
	elephantine			
19	*Eragrostis species*	Common	POACEAE	LC
20	*Eriocephalus species*	Occasionally at calcrete outcrops	ASTERACEAE	LC
21	*Fingerhuthia africana*	Common	POACEAE	LC
22	*Gnidia microphylla*	Common on dunes	THYMELAEACEAE	LC
23	*Gomphocarpus fruticosus*	Occasionally	APOCYANACEAE	Weed
24	*Helichrysum cf. argyrosphaerum*	Occasionally	ASTERACEAE	LC
25	*Hermannia tomentosa*	Common on dunes	STERCULIACEAE	LC
26	*Kleinia longiflora*	Rarely encountered in karroid	ASTERACEAE	LC
27	*Lagerra decurrens*	Occasionally	ASTERACEAE	LC
28	*Lycium bosciifolium*	Common throughout	SOLANACEAE	LC
29	*Lycium cinereum*	Common to karroid	SOLANACEAE	LC
30	*Lycium hirsutum*	Occasionally in Mekgacha	SOLANACEAE	LC
31	*Monechma genistifolium*	Commonly found	ACANTHACEAE	LC
32	*Monechma incanum*	Common at calcrete outcrops	ACANTHACEAE	LC
33	*Opuntia ficus-indica*	At one of the cattle pens	CACTACEAE	Category 1 invader
34	*Parkinsonia africana*	Commonly found on deeper sandy soils	FABACEAE	LC
35	*Prosopis grandulosa*	Occasionally near water courses	FABACEAE	Category 2 invader
36	*Pteronia species*	Occasionally	ASTERACEAE	LC
37	*Rhigozum trichotomum*	Common	BIGNONIACEAE	LC
38	*Rushia cf. intricata*	Common on calcrete outcrops	AIZOACEAE	LC, but all species protected in terms of the NCNCA
39	*Salsola cf. rabiena*	Occasionally throughout	CHENOPODIACEAE	LC

Reference No.	Species Name	Occurrence	Family	SANBI/NCNCA/NFA Status
40	*Salsola kali*	Occasional in disturbed areas	CHENOPODIACEAE	Weed
41	*Senna italica*	Occasionally throughout	FABACEAE	LC
42	*Sericorema remotiflora*	Occasionally	AMARANTHACEAE	LC
43	*Solanum incanum*	Occasionally	SOLANACEAE	LC
44	*Stipagrostis amabilis*	Dominate dune crests	POACEAE	LC
45	*Stipagrostis ciliata*	Common if not grazed	POACEAE	LC
46	*Stipagrostis obtusa*	Common when not grazed	POACEAE	LC
47	*Sutera species*	Rarely observed	SCROPHULARIACEAE	LC
48	*Tapinanthus oleifolius*	A parasite on larger trees	LORANTHACEAE	LC
49	*Thesium lineatum*	Occasionally	SANTALACEAE	LC
50	*Zygophyllum pubesc*ens	Occasionally	ZYGOPHYLLACEAE	LC

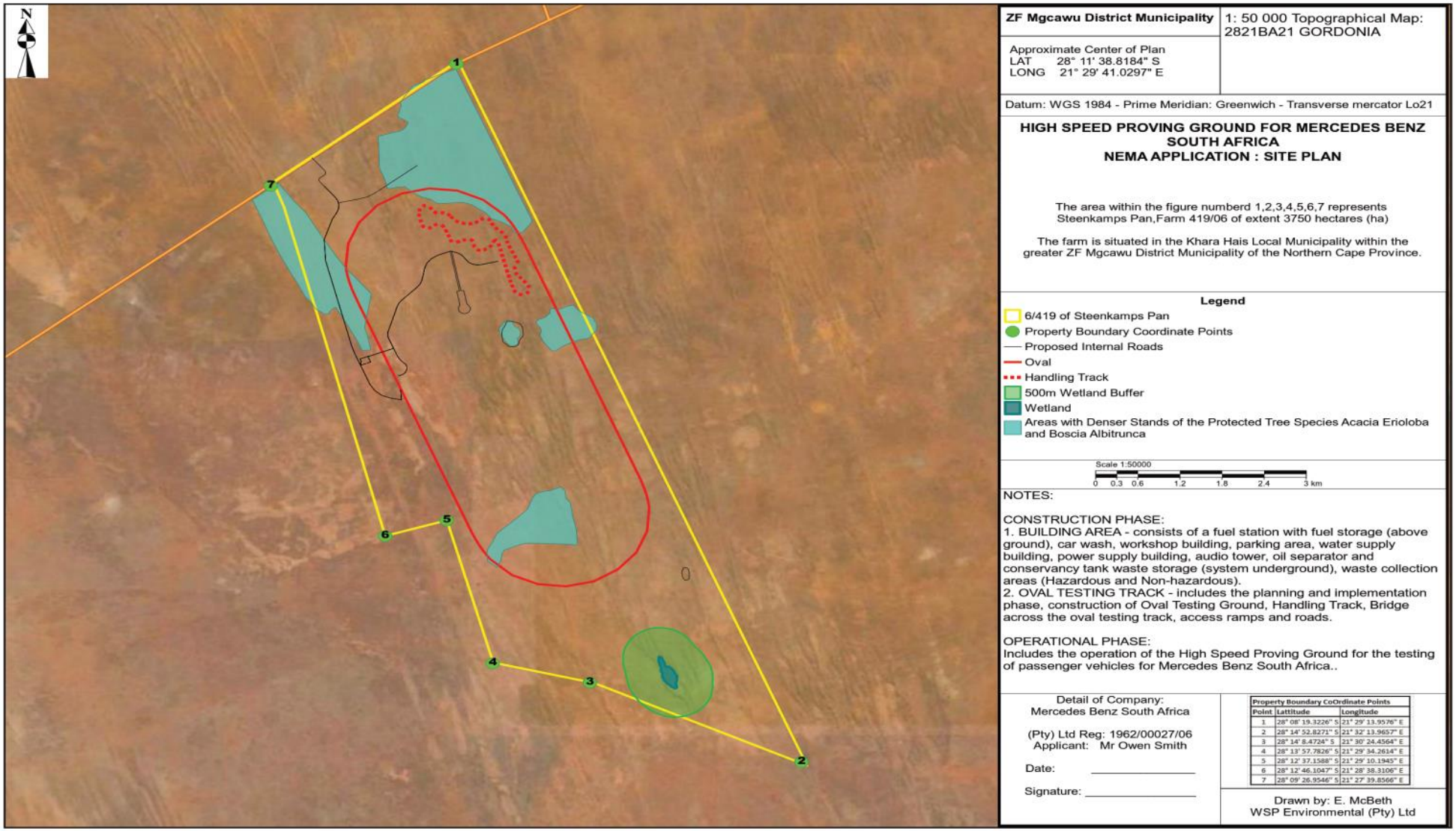

Figure 7-8: Potential Location of Protected Flora Species Located on the Proposed Property

7.7 FAUNA

REGIONAL DESCRIPTION[10]

Due to the climatic nature of the Upington region larger animals are expected to be limited. It is expected that fauna species would be limited to mostly avi-fauna, insects and reptile's species. The farm is intensively utilised for stock grazing and very few larger animal species remains.

SITE DESCRIPTION

MAMMALS

The site falls within the distribution range of approximately 50 mammal species indicating moderate diversity (Smithers, 1983[12]). Human activity in the area is medium-low and this coupled with hunting and grazing practices has limited the expected species on the property. Antelope species which includes *Antidorcas marsupialis* (Springbok) and *Raphicerus camprestis* (Steenbok) are expected to be present on the site. *Tragelaphus strepsiceros* (Kudu) and *Oryx gazelle* (Gemsbok) are common in this area and as such could potential venture onto the property. Other mammal species which are likely to occur in this area includes *Orycteropus afer (*Antbear), which is almost exclusively nocturnal, *Xerus inaurus* (Ground squirrel) the *Lepus capensis* (Cape hare) or *Lepus saxatilis* (Shrub hare), the *Canis mesomelas* (Black-backed jackal), *Octocyon megalotis* (Bat-eared fox), the mostly nocturnal *Mellivora capensis* (Honey badger), *Manis temminckii* (Ietermagog), *Hystrix africaeaustralis* (Porcupine), *Mungo mungo* (Mongoose), *Pedetes capensis* (Nocturnal Springhaas) and the *Surricatta suricatta* (Suricate).

REPTILES

The site falls within the distribution range of approximately 30 reptile species, indicating low diversity. As a result of the open planes on site the reptile composition is likely to be dominated by species which inhabit open areas, such as snakes, lizards, tortoise and geckos. Only lizards and tortoises were observed during the site visit. Species commonly found in this area include the *Karusasaurus polyzonus* (Karoo Girdled Lizard) which is usually associated with rocky outcrops, the *Pachydactylus montanus* (Namaqua Mountain Gecko) which shelters under rocks and the *Pedioplanis lineoocellata* (Spotted Sand Lizard) which is usually the most common reptile in the area.

AMPHIBIANS

The site falls within the distribution range of approximately 10 amphibian species, but most of these require perennial water for survival and will thus not be affected. No suitable breeding places were observed on the proposed site and it is deemed highly unlikely that the proposed development will have any significant impact on amphibian species.

AVI-FAUNA:

The site falls within the distribution range of approximately 200 bird species known from the broad area. However due to the medium-high human activity it is not expected that a fair representation of these species will be encountered on site or its immediate vicinity. Some of the birds most often seen include *Accipiter gentilis* (Goshawk), *Afrotis afraoides* (Black Korhaan), *Lanius collaris*

[12] Smithers, R.H.N. 1983. Die Soogdiere van die Suider-Afrikaanse substreek. University of Pretoria.

(Fiscal Shrike) and *Pteroclididae* spp. (Sandgrouse). No *Struthio camelus* (Ostriches) were observed on the property.

7.8 RIVERS, WETLANDS AND PANS

REGIONAL DESCRIPTION

The property falls within the Lower Orange Water Management Area (LOWMA). The LOWMA's natural environment is generally characterised by its arid climate with minimal rainfall and drought conditions. Evaporation (including evapotranspiration) is as high as 3000mm per annum, which is generally more than the Mean Annual Rainfall (Siyanda draft EMF, 2008[8]). As a result, little usable surface runoff is generated over most of the area as a result of the extremely low and infrequent rainfall.

With the exception of salt pans, wetlands are not frequent in the arid Kalahari Duneveld Bioregion within which the study area is situated and where the Mean Annual Potential Evaporation (2912mm) is 15 times the Mean Annual Precipitation (182 mm) (Mucina and Rutherford, 2006[9]). However, the highly permeable dune sands (Namib soil form) are interspersed with inter dune depressions where shallow, impermeable calcrete horizons may result in rapid saturation and even inundation of the shallow, overlying soils during rare high rainfall events.

SITE DESCRIPTION

Due to the location of the proposed site there is a possibility that a wetland can occur and further investigation will be completed during the EIR phase. **Figure 7-9** shows the potential location of the wetland.

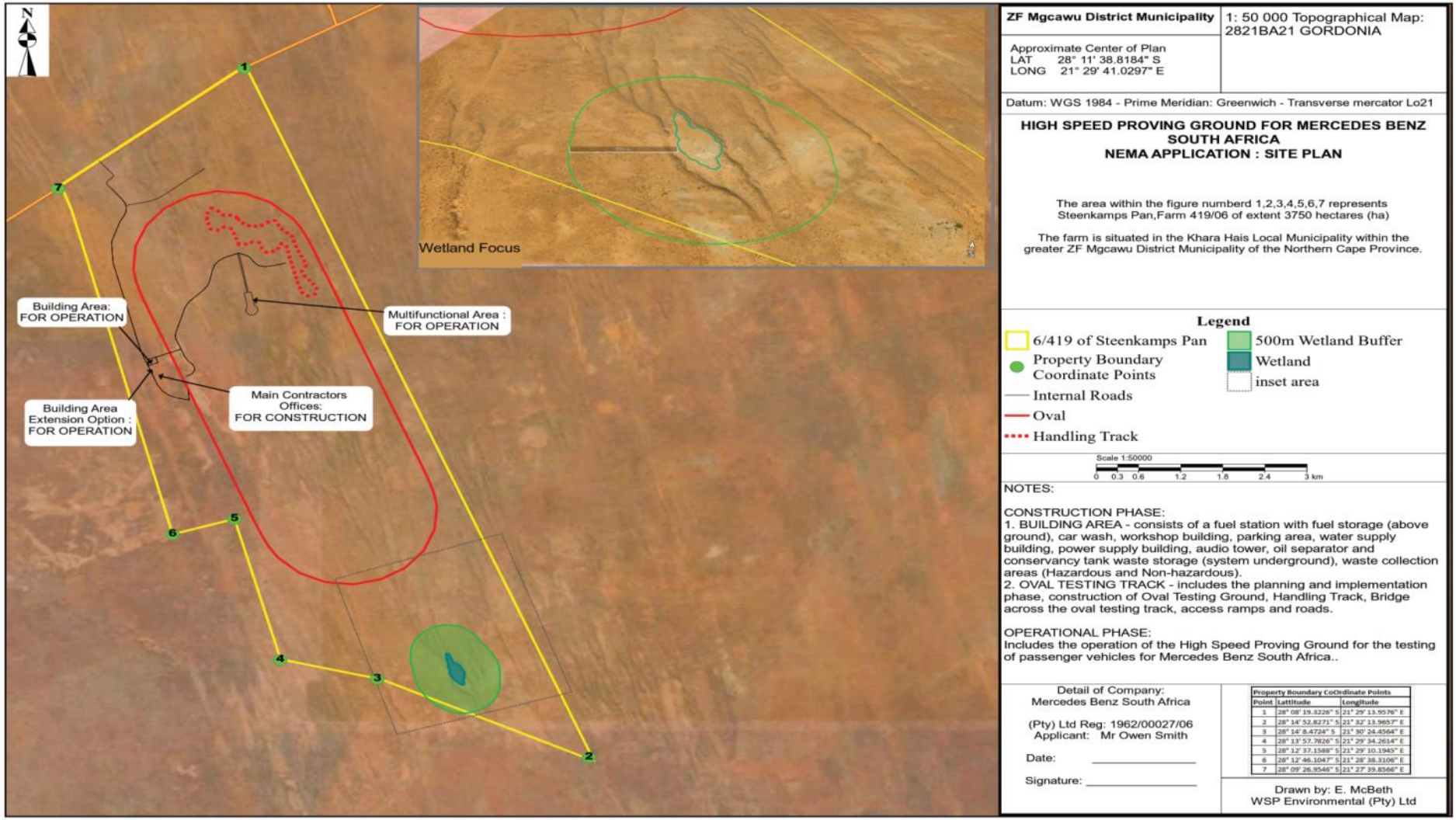

Figure 7-9: Wetland located within the proposed property for the MBSA High Speed Proving Ground

7.9 SURFACE WATER

REGIONAL DESCRIPTION

The predominant perennial surface water feature in the vicinity of the proposed development is the Orange River which is located 17km south and southwest of the proposed HSPG. The quaternary catchment area of the proposed project is D73E and falls within the LOWMA. The Orange River is main source of water for the ZF Mgcawu District Municipality (ZFMDM) and //Khara Hais Municipality (KHLM). The ZF Mgcawu District Environmental Management Framework cited that the evaporation rate in the LOWMA is estimated at 3000mm which is much higher than the Mean Annual Rainfall. The banks of the Orange River are heavily used for irrigated agriculture.

The Orange River's water quality is categorised as Moderately Transformed (Class C) due to existing agricultural activities along the river banks. The Orange River's major inflow of water is from the Vaal River which has high nutrient levels which sometimes result in algal blooms. Slow water flow rates also cause siltation and turbidity of the water which leads to water quality degradation within the river.

SITE DESCRIPTION

PRECIPITATION

The project area is influenced by two main catchment areas flowing from the north east, namely catchment 1, 2305ha and catchment 2, 670 ha with an average slope of 0.4% and 1% respectively. The average annual precipitation (MAP) is between 170mm to 176mm, with most of the rainfall occurring during the summer period. The lowest rainfall occurs in August at an average of about 1mm and the highest in March, averaging 61.2mm. The two closest weather stations to the project area are Pietmof (SAWS Number 0318023_W), at a distance of 25.5km, and Upington (SAWS Number 0317474_W), at a distance of 34.6km. **Figure 7-10** represents the average rainfall for the Upington area.

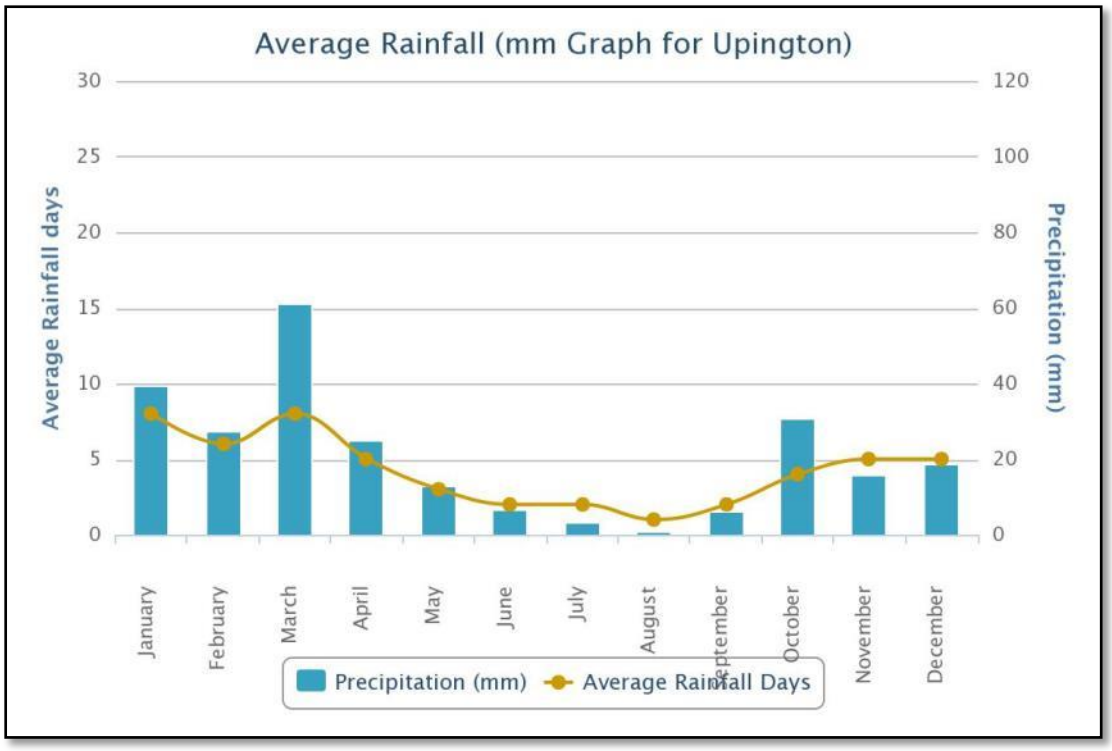

Figure 7-10: Average Rainfall for the Upington Area

TOPOGRAPHY

As indicated the general topography of the project area is very flat, directing surface runoff towards the watercourses on the southern portion of the project area. Surface elevation within the project area ranges from 970 m above mean seas level (masl) to 920m masl.

7.10 GROUNDWATER

REGIONAL DESCRIPTION

The Orange River flows through the Upington area. In this region the Orange River is expected to be a losing stream which refers to the groundwater is fed by the river system. This however is true for only a limited area around the river (few hundred metres to a few kilometres) in some areas. This relationship of the Orange River feeding water into the area depends largely on the rainfall in the area and the rainfall in the larger catchment area of the Orange River. In high rainfall periods, Upington area the aquifer is expected to make a contribution to the Orange River.

The rainfall in the area of Upington is low with a Mean Annual Precipitation (MAP) of 100 to 200mm/a. The Mean Annual Evaporation (MAE) on the other hand is high with more than 2600mm/a. The riparian Zone along the Orange River in this area is therefore submitted to very high evaporation figures limiting the contribution of groundwater to the Orange River.

SITE DESCRIPTION

On the site groundwater occurs in the fractured host rock which consists mainly of Metabasalt of the Leerkop Formation, felsic lavas and greenschist. Sandstone of the Rusplaas Formation is also reported on the site. Water strikes are noted at depths from 30 to more than 120 metres in depth. Water level depths range from 25 metres to 50 metres below ground level. Groundwater

flow directions on site are directly south towards the Orange River. Borehole yields reported on the farm and adjacent farms range from 0.1 to more than 7.5 l/s. Water quality on site can be categorized as Class 0 which is good quality water.

7.11 AIR QUALITY

REGIONAL DESCRIPTION

The area as a whole has an arid climate that receives predominantly summer rainfall, although rainfall events are quite erratic and cannot be relied on for agricultural purposes. Temperatures in the region fluctuate seasonally with summer temperatures ranging from 20°C to above 35°C while winter temperatures can range between 4 and 21°C.

Atmospheric transport within the area occurs both vertically and horizontally. Vertical transport is primarily due to deep convection. This convection transports air and any air pollutants contained therein from the surface into the upper atmosphere. Vertical motion is eventually inhibited due to the absolutely stable layers found preferentially at ~700hPa, ~500hPa and ~300hPa on no-rain days. These stable layers trap pollutants at lower atmospheric levels and so influence the transport of pollutants over the whole of southern Africa (Cosijn and Tyson, 1996; Garstang et al., 1996)

On a more local scale, like that of the Upington region, vertical motion and hence dispersion of pollutants is inhibited by surface inversions that form during the night. These inversions are a result of radiational cooling at the surface and are most pronounced just before sunrise. In the presence of sunlight the inversions begin to break down through convective heating and the height of the mixed layer is increased (Cosijn and Tyson, 1996; Tyson and Preston-Whyte, 2000).

In terms of horizontal transport, local winds may transport pollutants within the vicinity of their source. These include: anabatic and katabatic winds, valley and mountain winds, and mountain-plain and plain-mountain winds (Tyson and Preston-Whyte, 2000). On a larger scale, various synoptic systems affect atmospheric circulation over the Siyanda District Municipality as well as circulation over the whole of southern Africa. These systems include: continental highs, ridging highs, westerly lows, westerly waves and easterly waves, which transport air and any pollutants contained within over larger distances (Garstang et al., 1996; Tyson et al., 1996).

In the Upington region, transport associated with continental high pressure cells occurring all year round, but with greater frequency during winter. Easterly waves show an annual cycle, peaking in summer, with extremely seldom occurrences in winter. Transport associated with ridging highs and westerly waves dominates during winter (Garstang et al., 1996; Tyson and Preston-Whyte, 2000).

Recirculation is also important in the transport of pollutants and occurs frequently over southern Africa due to the high frequency of anticyclonic circulations (Garstang et al., 1996; Freiman and Piketh, 2003). Recirculation occurs when air is transported away from its source and returns in the opposite direction after rotating cyclonically or anticyclonically. Recirculation can occur at a number of scales from sub-continental to regional, and an interaction between different scales of wind systems results in further recirculation (Tyson et al., 1996; Tyson and Preston-Whyte, 2000; Freiman and Piketh, 2003).

SITE DESCRIPTION

Meteorological data was sourced from the nearest, most reliable meteorological station in the region, namely the South African Weather Service's (SAWS) Upington station. The station is located at the Upington Airport, ~38 km southwest of the proposed proving ground and is positioned at a similar altitude, thus providing a good comparative dataset for the proposed project.

Wind roses are a useful tool in illustrating prevailing meteorological conditions for an area, indicating wind speeds and frequency of distribution. In the following wind roses, the colour of the bar indicates the wind speed whilst the length of the bar represents the frequency of winds *blowing from* a certain direction (as a percentage). In the Upington area, winds originate predominantly from the north (14.5% of the time), south-southwest (12.2% of the time) and southwest (11% of the time). Wind speeds are strongest from the north with wind speeds greater than 8 m/s occurring for 2% of the time from this direction. Calm conditions (wind speeds < 1 m/s) are experienced for 5.6% of the time (**Figure 7-11**).

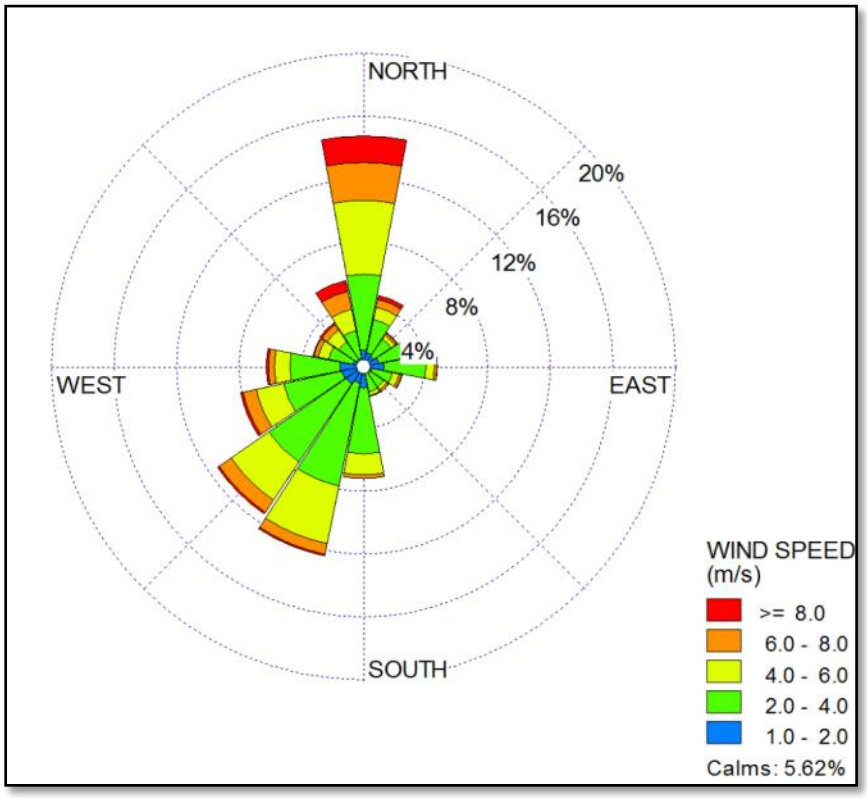

Figure 7-11: Surface wind rose plot for the Upington area for the 2012 to 2014 period

7.12 NOISE

The existing noise environment in the area surrounding the proposed proving ground is typically rural with limited anthropogenic influences. Current sources of noise include livestock, birds, insects and motor vehicles travelling along nearby roads.

The South African National Standards (SANS) 10328:2008 (*Methods for environmental noise impact assessments*) presently inform environmental acoustic impact assessment in South Africa. As per SANS 10103:2008 (*The measurement and rating of environmental noise with respect to annoyance and to speech communication)*, typical rating levels with regard to noise are applicable in different districts, as presented in **Table 7-3**. In order to quantify the existing noise climate for this project, a worst-case rural noise level of 45 dB(A) during the day and 35 dB(A) at night is assumed to be a good representation of the current noise levels in the region.

Table 7-3: Typical Rating Levels for Noise in Districts (adapted from SANS 10103:2008)

Type of District	Classification	Equivalent Continuous Rating level for Noise (LReq, T) (dBA)	
		Outdoors	
		Day-time (LReq,d)	Night-time (LReq,n)
Rural	A	45	35
Suburban (with little road traffic)	B	50	40
Urban	C	55	45
Urban (with one or more of the following: workshops, business premises and main roads)	D	60	50
Central Business Districts	E	65	55
Industrial District	F	70	60
Guidelines in red are applicable to this			

7.13 VISUAL ASPECTS

REGIONAL DESCRIPTION

The Upington landscape is sparsely vegetated with predominantly Kalahari Duneveld Bioregion, and to the north is Bushmanland arid grasslands. The town of Upington has a population of approximately 47000 people (Stats SA, 2007), and lies 38km North-east of the proposed site. Key tourism features in the area include the Augrabies Falls National Park (60km south-west), the Kgalagadi Transfrontier Park, 220km north and the Orange River, 20km south of Upington.

Land use in the study area consists predominantly of agricultural activities. Farmsteads occur along the district gravel road between Upington and the proposed site. Potentially sensitive viewer locations include places of residence, work, leisure (including tourism), and travelling routes. Tourists are attracted by the Orange River Wine Route as well as other destinations such as the nearby game lodge - FM Safaris.

SITE DESCRIPTION

The landscape at the site is characterised by open plains and mountain ridges within a semi-arid region. Shrub land and thickets with occasional views of high mountain ridges in the distance are typical. The site is currently used for grazing. There are no sensitive receptors located at the site.

7.14 SOCIO-ECONOMIC

REGIONAL DESCRIPTION

The proposed MBSA High Speed Proving Ground is located ~ 38 km north-east of Upington within the KHLM (NC083), which forms part of the larger ZF Mgcawu Municipality District Municipality[13] (DC8) (**Figure 7-12**). The ZF Mgcawu District Municipality is the second largest district (approximately 103 871 km^2) in the Northern Cape. Upington is the administrative seat of the KHLM and has, since its inception, been the hub of activities in the region. The main land uses in the area are linked to grape farming and agriculture along the Gariep River (Orange River) and livestock farming away from the river. A number of solar energy projects have also been and are proposed in the area.

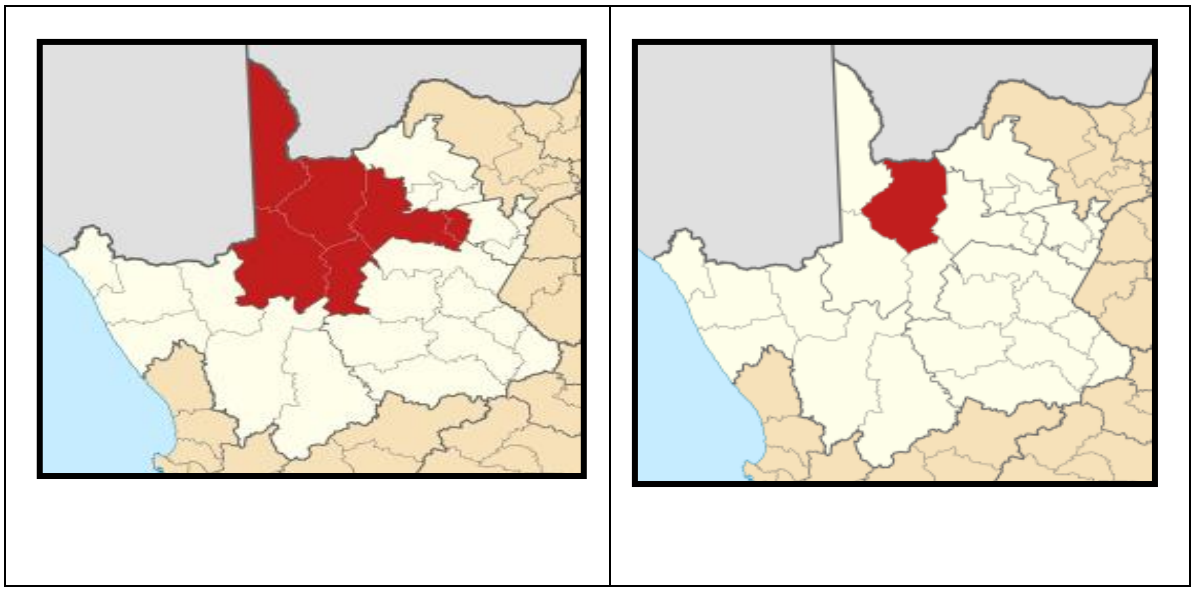

Figure 7-12: Location of ZF Mgcawu Municipality (left) and //Khara Hais Local Municipality (right) within the Northern Cape Province

POPULATION

Despite having the largest surface area, the Northern Cape has the smallest population of 1 145 861 (Census 2011[14]) or 2.28% of the population of South Africa. The population has increased from 991,919 in 2001. In terms of age, 30.1% are younger than 15 years of age and 64.2% fall within the economically active age group of 15-64 years of age (Census 2011[14]). The female proportion makes up approximately 52.7% of the total with males making up the remaining 47.3% (Census 2011[14]).

EDUCATION

Based on the information contained in the NCSDF the average adult education attainment levels in the Northern Cape are lower than the adult education attainment levels of South Africa as a whole. Approximately 19.7% of the Northern Cape adults have no schooling in comparison to South Africa's 18.1%. The Northern Cape has the second lowest percentage of adult individuals (5.5%) that obtained a tertiary education in South Africa.

[13] The ZF Mgcawu DM was previously referred to as the Siyanda DM. The name was changed in 2013.
[14] www.demarcation.org.za (Municipal and Ward demarcations)

The Northern Cape also has the smallest portion (11.1%) of highly skilled formal employees in South Africa and Gauteng has the highest (14.3%). Linked to this the Northern Cape has the second largest portion of semi and unskilled formal employees in the country. A lack of skilled people often results in both the public and the private sector being unable to implement planned growth strategies and achieve the desired productivity, service delivery and service quality (NCSDF, 2012[15]).

ECONOMIC DEVELOPMENT

Over the past 8 years there has been little to no variance in the Human Development Index (HDI) figures for the Northern Cape, indicating no increase or decrease in the overall standard of living. This trend is unlikely to change in the foreseeable future, mainly due to the marginal economic base of the poorer areas, and the consolidation of the economic base in the relatively better-off areas.

The percentage of Northern Cape people living below the poverty line has decreased from 40% in 1995 to 27% in 2011, while the poverty gap has decreased from 11% in 1995 to 8% in 2011 (**Figure 7-13**). The goal set by the province is to decrease the percentage of people living below the poverty line to 20% by 2015 (NCSDF, 2012[15]).

[15] Northern Cape Spatial Development Framework (2012)

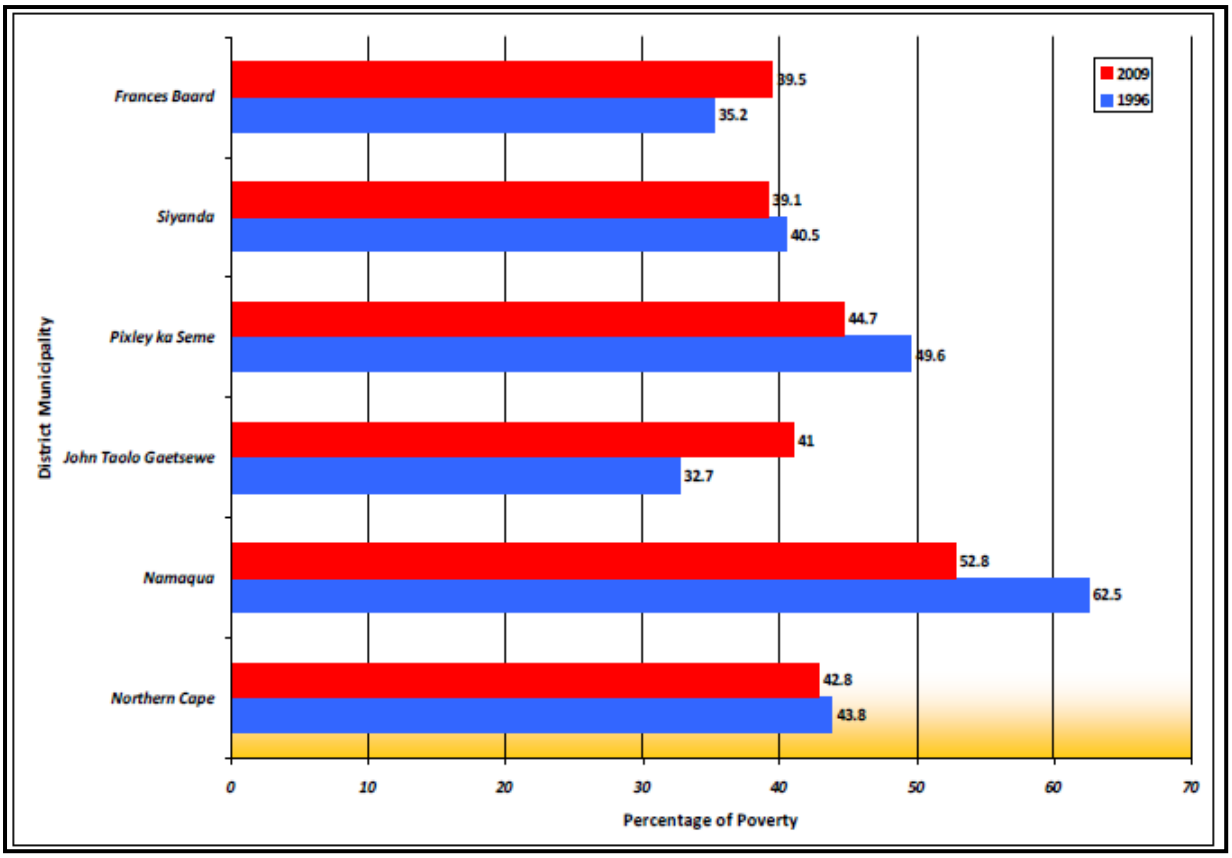

Figure 7-13: Percentage of people living in poverty in the Northern Cape (Source: Global Insight, 2009)

ECONOMIC SECTORS

The Northern Cape economy has shown significant recovery since 2000/2001 when it had a negative economic growth rate of -1.5% (LED Strategy[16]). The provincial economy reached a peak of 3.7% in 2003/2004 and remained the lowest of all provinces. The Northern Cape is the smallest contributing province to South Africa's economy (only 2% to South Africa GDP per region in 2007).

The mining sector is the largest contributor to the provincial GDP, contributing 28.9% to the GDP in 2002 and 27.6% in 2008. The mining sector is also important at a national level. In this regard the Northern Cape produces approximately 37% of South Africa's diamond output, 44% of its zinc, 70% of its silver, 84% of its iron-ore, 93% of its lead and 99% if its manganese.

Agriculture and agri-processing sector is also a key economic sector. Approximately 2% of the province is used for crop farming, mainly under irrigation in the Orange River Valley and Vaalharts Irrigation Scheme. Approximately 96% of the land is used for stock farming, including beef cattle and sheep or goats, as well as game farming. The agricultural sector contributed 5.8% to the Northern Cape GDP per region in 2007 which was approximately R1.3 billion, and it employs approximately 19.5% of the total formally employed individuals (NCSDF, 2012[15]). The sector is experiencing significant growth in value-added activities, including game-farming. Food production and processing for the local and export market is also growing significantly.

[16] //Khara Hais Local Economic Development Strategy (2010)

EMPLOYMENT

According to Statistics South Africa Labour (2012) the community and social services sector is the largest employer in the province at 29%, followed by the agricultural sector (16%), wholesale and retail trade (14%), finance (8%) manufacturing (6%) and mining (6%), etc. (**Figure 7-14**).

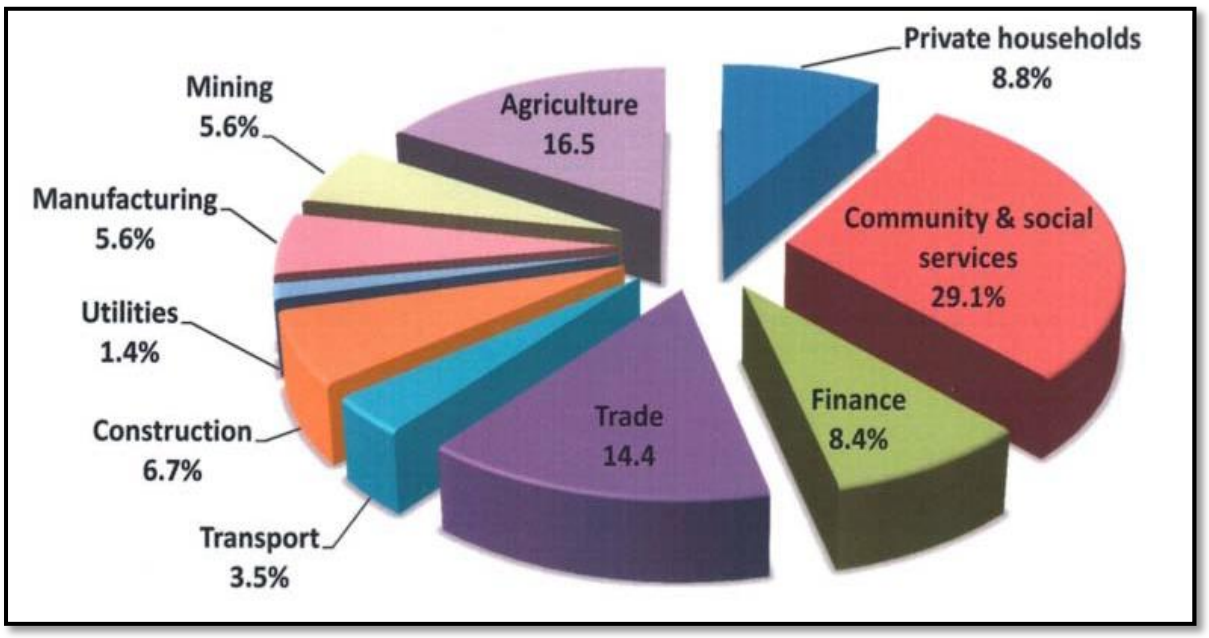

Figure 7-14: Employment by Economic Sector and Industry (Source: Statistics South Africa 2012).

SITE DESCRIPTION

DEMOGRAPHIC OVERVIEW

As indicated in **Table 7-4**, the population of the KHLM increased from 77 919 to 93 494 over the period 2001-2011, which represents an increase of almost 20%. The increase in the population in the KHLM was linked to an increase in the 15-64 and 65 + age groups. There was a decrease in the less than 15 age group. In terms of breakdown, the majority of the population are Coloured (65%), followed by Black African (23%) and Whites (10%). The total population in Ward 11 in 2011, where the proposed developed is located, was 7 542. Of this total the majority were Coloured (78%), followed Black Africa (10%) and Whites (8.5%). The main language spoken in the KHLM was Afrikaans (85.2%), followed by Setswana (3.5%) and English (1.9%).

As expected, the number of households in the KHLM increased from 17 934 to 23 245. The average household size decreased from 4.1 to 3.9. The number of formal dwellings also decreased from 81.2% to 75.2%. This implies that a number of the increased households in the KHLM are informal dwellings, which is a concern in terms of service delivery. The increase in the number of informal dwellings is likely to be linked to an influx of people into the urban areas from the rural areas.

The dependency ratio in the KHLM decreased from 58.7 to 54.7. The improvement indicates that there are fewer people who are dependent on the economically active 15-64 age group. This represents a positive socio-economic improvement.

Table 7-4: Overview of key demographic indicators for the ZFMDM and KHLM

	ZFMDM		KHLM	
ASPECT	**2001**	**2011**	**2001**	**2011**
Population	202 160	236 763	77 919	93 494
% Population <15 years	30.8	28.4	31.7	29.8
% Population 15-64	64.1	66.4	63.0	64.6
% Population 65+	5.1	5.1	5.3	5.4
Households	48 100	61 097	17 934	23 245
Household size (average)	3.7	3.5	4.1	3.9
Formal Dwellings %	83.9	79.4	81.2	75.2
Dependency ratio per 100 (15-64)	56.0	50.5	58.7	54.7
Unemployment rate (official) - % of economically active population	26.5	19.2	34.0	22.1
Youth unemployment rate (official) - % of economically active population 15-34	32.1	22.7	42.3	29.0
No schooling - % of population 20+	16.8	9.5	13.6	7.1
Higher Education - % of population 20+	4.8	6.3	5.9	7.8
Matric - % of population 20+	16.1	21.7	20.9	26.0

Source: Compiled from StatsSA Census 2011 Municipal Fact Sheet

HOUSEHOLD INCOME

Based on the data from the 2011 Census, 10.5 % of the population of the KHLM had no formal income, 2.6 % earn between R1 and R 4 800, 4.3 % earn between R 4 801 and R 9 600 per annum, 16.3 % between R 9 601 and 19 600 per annum and 21.2 % between R 19 600 and R 38 200 per annum (Census 2011[14]).

EMPLOYMENT

In terms of employment, the official unemployment rate in the KHLM decreased for the ten year period between 2001 and 2011, falling from 34.0 to 22.1% of the economically active population. Youth unemployment in the KHLM also dropped over the same period, from 42.3 to 29%. While unemployment figures appear to be low, specifically within the context of the figures for the Northern Cape Province as a whole (27.4% unemployment and 34.5% youth unemployment in 2011), they do not reflect the fact that the majority of the employment in the KHLM is seasonal and linked to the agricultural sector.

EDUCATION

Education levels in the KHLM improved between 2001 and 2011 with the percentage of the population over 20 years of age with no schooling dropping from 13.6% to 7.1%. The percentage of the population over the age of 20 with matric also increased from 20.9 to 26.0%. This is higher than the average for the ZFMDM (21.7%) and the Northern Cape (22.7%). This is linked to the important economic role played by the town of Upington and the associated well developed education facilities in the town.

BASIC SERVICES

As indicated in **Table 7-5** there has been a marginal decrease in the percentage of households with access to flush toilets in the KHLM. For the other three categories (piped water inside dwelling, access to weekly municipal refuse removal and households that use electricity) there was an improvement in the access municipal services. The decrease in number of households with flush toilets is likely to be linked to the increase in the number of informal dwellings in the KHLM between 2001 and 2011. It is also worth noting that the level of services in the KHLM is higher than the levels for the ZFMDM and the Northern Cape Province.

Table 7-5: Overview of access to basic services in the ZFMDM and KHLM

	ZFMDM		KHLM	
	2001	**2011**	**2001**	**2011**
% households with access to flush toilet	58.1	63.9	68.6	68.3
% households with weekly municipal refuse removal	58.6	70.3	79.3	87.2
% households with piped water inside dwelling	37.2	48.5	38.7	56.0
% households which uses electricity for lighting	73.5	86.6	73.6	91.1

Source: Compiled from StatsSA Census 2011 Municipal Fact Sheet

Schools: The KHLM area currently has 7 high schools and 23 primary schools. In addition the following institutions of higher education have campuses or satellite campuses in the town:

- Upington College for vocational education;
- Vaal Triangle University of Technology;
- Universal College Outcomes; and
- Technikon SA.

Hospitals and clinics: The KHLM area currently has two hospital and 10 clinics. Police *Stations:* The KHLM is serviced by four police stations; a bomb squad, dog unit and a satellite police station provide services to the community.

Sports and recreation: Formal sports facilities include a golf course, 3 swimming pools and 8 formal sports fields. In many of the suburbs and rural settlements there are public open areas used as sports fields, especially for soccer. The sports fields are usually not grass-covered, and are viewed as informal fields. Most of the schools also have their own sports facilities for the use of their learners.

AGRICULTURAL SECTOR

The agricultural sector is largely linked to irrigation along the Orange River (Gariep), specifically table and wine grapes. In this regard the //Khara Hais region accounts for ~ 40% of South Africa's grape exports. Most of Upington's wines are produced by Orange River Wine Cellars (OWC). The company has six depots in the area (all of them located adjacent to the Orange River) at Upington, Kanoneiland, Grootdrink, Kakamas, Keimoes and Groblershoop. The wines from OWC are exported, inter alia, to Europe and the USA. A number of privately owned cellars also exist in the area.

In terms of the agricultural sector there are seven smaller rural settlements and various farms. Settlements include: Lambrechtsdrift, Karos, Leerkrans, Leseding, Raaswater, Sesbrugge and Klippunt, and Kalksloot. The inhabitants of these settlements are mainly reliant upon agricultural activities for their livelihoods.

TOURISM SECTOR

Upington is well situated as a base for exploration of the region, and has an outstanding infrastructure in the form of accommodation. Various areas are classified as nature conservation areas. Spitskop Nature Reserve lies 13 km north of Upington. This nature reserve, of approximately 6 000 hectares, supports gemsbok, zebra, springbok, ostrich, eland, blue wildebeest, as well as smaller game, and can be viewed from a circular route running through the park. Other nature areas within the jurisdiction of //Khara Hais are Gariep Lodge and Uizip. The Kalahari Oranje Museum Complex has the status of a regional- and provincial museum. There are also a number of declared national monuments, including:

- Roman Catholic Church in Le Roux Street (still in use);
- NG Mother Community in Schroder Street (still in use);
- Hortentia water mill; and
- Missionary complex in Schroder Street (building is being used as a museum).

BUSINESS SECTOR

The central business district of Upington is located along the northern bank of the Orange River (then Gariep River). Due to certain physical limitations, such as the Orange River to the south and south-east and the railway line to the north, the business district has expanded westwards. Smaller suburban shopping centres are found in all residential areas. Both industrial areas on the northern and the south-western sides of the town (Updustria & Laboria) have railway facilities. Due to the unique spatial manifestation of the municipality, both the first and second economy is mostly located around the CBD and farms. Upington has a well-defined business centre with numerous residential areas. Secondary activities in the study area are mainly light industrial, warehousing, and light engineering works. Main traffic routes connect Upington, the hub of activities in the region, to cities such as Kimberley, Johannesburg, Cape Town and Namibia. Upington also serves as the ‘Portal’ to Namibia and vice versa, the ‘Frontier’ to the Kalahari and the Kgalagadi Transfrontier Park, the ‘Oasis’ in the desert’, the Agricultural hub of the Northern Cape, and the ‘Portal to the Kalahari’s hunting ground. Furthermore, two major national parks are situated within a few hours’ drive from Upington.

8 SPECIALIST STUDIES

8.1 BIODIVERSITY IMPACT ASSESSMENT

A Biodiversity Impact Assessment was undertaken by PB Consult and is dated 20 November 2015. Refer to **Appendix 2-1** for the detailed report.

SUMMARY OF FINDINGS

A summary of the significant biodiversity features are provided in **Table 8-1**.

Table 8-1: Significant biodiversity features

Potential impacts on biophysical environment		
Geology & soils	Geology & soils vary only slightly in the larger study area. But a small granite porphyry outcrop (Inselberg) was encountered	In general the geology and soils vary only slightly over most of the site, consisting either of aeolian sands or exposed calciferous material. However, on small granite porphyry outcrop was encountered and was identified as a source of road building material. In terms of geology or vegetation the outcrop is not considered of significant importance, however, it is likely to support a number of reptile and bird species. Mitigation will entail search and rescue of reptile species and timing the work to be outside the breeding season for owls (the bird nesting being most likely the Spotted eagle owl).
	Without mitigation: Medium	With mitigation: Medium/Low
Land use and cover	The proposed footprint will be localised, relatively small and should not lead to long term land-use impacts (apart from the physical footprint)	The area is been utilised mainly for grazing. The impact is considered localised with regards to land use. Mitigation entails keeping the footprint as small as possible and allowing natural process to continue (as much as possible) on the remainder of the property.
	Without mitigation: Medium/Low	With mitigation: Low
Potential impacts on threatened or protected ecosystems		
Vegetation type(s)	Gordonia Duneveld (Least threatened, with more than 99% remaining).	The vegetation type is classified as “Least threatened” and the impact considered localised and relatively small. It is considered unlikely that the proposed project will have any significant impacts on local or regional conservation targets. It might in fact add to regional conservation targets as the remaining natural veld will be protected from stock grazing practices. Mitigation entails keeping the footprint as small as possible and allowing natural process to continue (as much as possible) on the remainder of the property
	Without mitigation: Low	With mitigation: Insignificant

Corridors and conservation priority areas/networks	Draft Environmental Management Framework (EMF) for the Siyanda District Municipality.	According to the EMF, Gordonia Duneveld has a low conservation priority, and low sensitivity index. However, the soils have a wind erosion potential which will have to be managed. Mitigation will entail minimising the footprint and to ensure erosion control through good rehabilitation. Correct alien eradication will also be important.
	Without mitigation: Medium/Low	With mitigation: Low
Protected plant species	No SA red list species was observed. Three (3) tree species protected in terms of the NFA was encountered. Three (3) plant species protected in terms of the NCNCA was observed	A great number of trees listed in terms of the NFA trees were encountered within the proposed footprint areas. However, with good mitigation between 90 – 95% of these trees can be conserved. Previous experience showed that both Camelthorn and Sheppard's tree have deep root systems, which mean excavation can be done quite close to the tree without impacting on the root system. Three species protected in terms of the NCNCA were encountered. Individuals of at least one species will be impacted by the proposed development. Mitigation will entail excellent environmental control, slight layout alterations to avoid as many mature indigenous tree species as possible; good topsoil conservation and rehabilitation practices; and application for permits in terms of the NFA and the NCNCA.
	Without mitigation: High	With mitigation: Medium/Low
Fauna & Avi-fauna	All larger animal species will have to be excluded from the terrain for safety purposes. Also impacts on mature trees and granite outcrop.	Very few larger game species was observed or are expected as a result of the current land use practices (intensive stock grazing) and the impact on larger fauna is thus expected to be low and localised. The removal of larger trees and the granite outcrop will impact on local habitat may impact significantly on regional conservation targets, especially with regards to protected reptile species. Mitigation will entail minimising footprint and the impact on mature indigenous tree species and implementing search and rescue of fauna species during construction.
	Without mitigation: Medium/High	With mitigation: Medium/Low
Rivers & wetlands	No rivers or streams were observed, but two areas that show temporary wetland characteristics were identified (Grundling & Rossouw, 2014)	The project and especially the excavation of road building material have the potential to impact on these wetland features. Mitigation will entail protecting the wetland area and a buffer zone surrounding the wetland area.
	Without mitigation: Medium/Low	With mitigation: Insignificant
Invasive alien infestation	Low, but persistent *Prosopis* infestation was observed throughout the property	At present the infestation is low, but it is already spread across most of the property and it is vital that the further spreading of this species is stopped as

		soon as possible. All listed invasive alien species must be removed from the property. However, incorrect alien control methods used for especially *Prosopis* species may aggravate the situation and result in spreading in place of control of these species. Mitigation will entail correct alien control methods coupled with follow up work after rehabilitation.
	Without mitigation: Medium	With mitigation: Positive
Potential direct impacts		
Direct impacts	Refers to those impacts with a direct impact on biodiversity features.	The proposed project will have a direct impact on natural vegetation, which is likely to include protected plant species in terms of the NFA and NCNCA. It will also impact on small wetland areas, a granite outcrop and potentially on fauna and avi-fauna (especially reptile species). However, most of the impacts can be negated and are considered localised. Mitigation will include all the mitigation aspects discussed above.
	Without mitigation: High	With mitigation: Medium/Low
Potential indirect impacts		
Indirect impacts	Refers to impacts that are not a direct result of the main activity, but are impacts associated or resulting from the main activity.	The proposed project will have indirect impacts like the establishment of temporary lay-down areas, quarry sites for road building material, temporary construction sites and concrete mixing areas. However, with good environmental control it will be possible to minimise the impact of such indirect impacts. Mitigation will entail excellent environmental control and rehabilitation in accordance with approved management plans, placement of temporary lay-down areas or construction sites within areas that are not environmentally sensitive and will not impact on protected plant species. It will also entail good waste and wastewater control.
	Without mitigation: Medium/High	With mitigation: Medium/Low
Potential cumulative impacts		
Cumulative impacts	Refers to the cumulative loss of ecological function and other biodiversity features on a regional basis.	The proposed project will have a permanent but localised impact. However, it is considered unlikely that the cumulative impact will result in significant additional impact on local or regional biodiversity targets, but it will have a localised impact on protected plant species (and might have an impact on protected reptile species). Mitigation will entail excellent environmental control and all of the mitigation measures addressed above.
	Without mitigation: High	With mitigation: Medium/Low
The No-Go Option		
The No-Go Option	The “No-Go alternative” does not signify	The loss of full grown protected tree

	significant biodiversity gain or loss especially on a regional basis. However, it will ensure that none of the potential impacts above occur.	species will be negated. The potential impact on natural fauna will be negated (especially the potential impact on reptile species associated with the rocky outcrop). The potential impact on land-use and wetland areas will be negated. However, it will also mean that a potential source of additional income, not only during construction but also during operation is denied the Municipality. The Northern Cape Municipalities has identified the need for development and tourism as one of the potentially most significant sources of income. The marketing and use of the transportation infrastructure, especially Upington Airport and the major roads, to create a regional and even international hub for imports, exports and cargo handling/distribution is also seen as a potential source of income. The no-go option will mean that these potential economic gains will be lost to the province.

CONCLUSION

Having evaluated the biodiversity aspects and associated impacts pertaining to the proposed development, the author is of the opinion that the proposed project can be located on Steenkampspan (419/6) in such a way as to minimise the potential and actual impact on the identified environmental features and at the same time conforming to the objectives of the Draft Siyanda Municipal EMF.

The evaluation of the potential environmental impacts indicates the most significant potential impacts identified where:

- The potential impact on a great number of NFA protected tree species, especially *Acacia erioloba, Acacia haematoxylon* and *Boscia albitrunca*.
- The potential impact on reptile species as a result of the excavation of the granite outcrop (and associated habitat destruction).
- The potential impact on NCNCA protected plant species, especially *Boscia foetida* (very localised)

However, with appropriate mitigation it is considered highly unlikely that the proposed project will contribute significantly to any of the following:

- Significant loss of vegetation type and associated habitat.
- Loss of ecological processes (e.g. migration patterns, pollinators, river function etc.) due to development and operational activities.
- Loss of local biodiversity and threatened plant species.
- Loss of ecosystem connectivity

Lastly it is felt that good environmental planning and control during development planning, the appointment of a suitably qualified ECO and the implementation of an approved EMPr, could significantly reduce environmental impact.

With the available information to the author's disposal it is recommended that project be approved, provided that mitigation is adequately addresses (with special focus on the minimisation the impacts on indigenous tree species).

RECOMMENDATIONS

General recommendations are provided below:

- All construction must be done in accordance with an approved construction and operational phase EMPr, which must be developed by a suitably experienced Environmental Assessment Practitioner.
- A suitably qualified Environmental Control Officer must be appointed to monitor the construction phase in terms of the EMPr and the Biodiversity study recommendations as well as any other conditions pertaining to other specialist studies and requirements of the DENC or DAFF.
- The ECO should give onsite advice with regards to final route layout with the main aim of minimising the impact on protected plant species.
- The construction footprint must always aim at minimum impact.
- Wherever possible, lay-down areas or construction sites should be located within already disturbed areas (e.g. cattle pens) or areas of low ecological value and must be pre-approved by the ECO.
- Indiscriminate clearing of areas must be avoided.
- Topsoil, the top 10-20 cm layer of soil (containing 80-90% of the seed store), must be removed and protected for re-use during rehabilitation.
- During construction the protection of the grassy and shrub ground cover layer is of great importance (since it is this vegetation cover which is responsible for binding the sand of the dunes and thus the main protection against wind erosion). Minimising the footprint is thus of great importance.
- All listed alien invasive plant species must be eradicated from property, with emphasis on *Prosopis* species.
- It is imperative that the correct alien eradication methods are employed (especially with regards to *Prosopis* control) as incorrect methods WILL aggravate the infestation.
- An integrated waste management approach must be implemented during construction.
- Construction related waste may only be disposed of at Municipal approved waste disposal sites.

Mitigation with regards to protected tree species is provided below:

- The appropriate permit or licence application must be submitted before any construction work may be allowed.
- *Acacia erioloba*: Seedlings have a low survival rate and the trees have a very slow growth rate, which place emphasis on the protection of healthy seedbearing (mature) individuals. The overall objective must thus be to minimise impact on mature (seed bearing) individuals and no individual larger than 6 m may be removed.
- *Acacia haematoxylon*: The distribution (throughout the property) and numbers of the Grey Camelthorn is such that no matter how the infrastructure is placed it will be almost impossible not to have an impact on quite a number of these trees. Most of the trees are relative small individuals, rarely exceeding 4 m in height. Again they have a low seedling survival rate and slow growth rate. The aim should be to minimise impact on mature trees (wherever possible) and to protect all Grey Camelthorn trees larger than 5 m tall.

- *Boscia albitrunca*: Large numbers of Sheppard's trees were encountered on the property mostly associated with dunes (being less common in the inter-dune straaten). Inter-dune straaten should thus be preferred for the placement of infrastructure. Where dunes have to be crossed it should aim at the shortest route across the dune crest. The aim of impact minimisation should be to minimise the impact on healthy mature individuals.
- *Boscia foetida*: A few Stink-bushes was also encountered within or near to the development footprint towards the north west of the property. As with the Sheppard's tree the aim should be to minimise the impact on healthy mature individuals.

Rehabilitation recommendations are provided below:

- During rehabilitation topsoil (and other organic material) must be replaced over the disturbed soil to provide a source of seed and a seed bed to encourage re-growth of plant species.
- Because of the potential impact of wind erosion it is of great importance to ensure that dune crests are suitably stabilised as part of the rehabilitation process.
- Both *Acacia mellifera* and *Rhigozum trichotomum* branches have been used with great success for dune stabilization on similar projects in the Kalahari (Photo 12, underneath). However, *Acacia mellifera* will last much longer and should thus be preferred as stabilization material.
- Crushed calcrete is also used very successfully to stabilise dunes, and can be another method of ensuring dune stabilisation.
- All efforts should be made to rehabilitate quarry sites.

8.2 WETLAND IMPACT ASSESSMENT

A Wetland Delineation and Assessment was undertaken by Ixhaphozi Environmental Services CC and is dated 12 January 2015. Refer to **Appendix 2-2** for the detailed report.

RESULTS

WETLAND DELINEATION

A wetland system was delineated and is indicated in **Figure 8-1**.

SOIL CLASSIFICATION

The following soil forms where identified during the site visit:

- The Namib soil form (SP4.1, SP4.2, SPP1, SPP1.1, SPP6.3, SPP6.5, SP3.3, SP3.4).
- The Brandvlei soil form (SP1, SP6, SP6.1, SP6.2, P3).
- The Coega soil form (SP3.5, SP4, SP4.2, SP 5, SPP6, SSP6.4, SPP6.5, SPP7, SPP7.1, SPP9).
- The Prieska soil form (PS1, Br1, Br15, Br18, Br21, Br23, Br26, Br27, Br31, Br33).
- The Plooysburg soil form (Br2, Br3, Br4, Br5, Br6, Br8, Br9, Br10, Br11, Br12 Br13, Br14, Br16, Br17, Br19, Br20, Br22, Br24, Br26, Br28, Br29, Br30, Br32).

The soils of the Brandvlei soil form, which were encountered in a pan-like structure, are regarded as wetlands soils and indicative of temporary inundation.

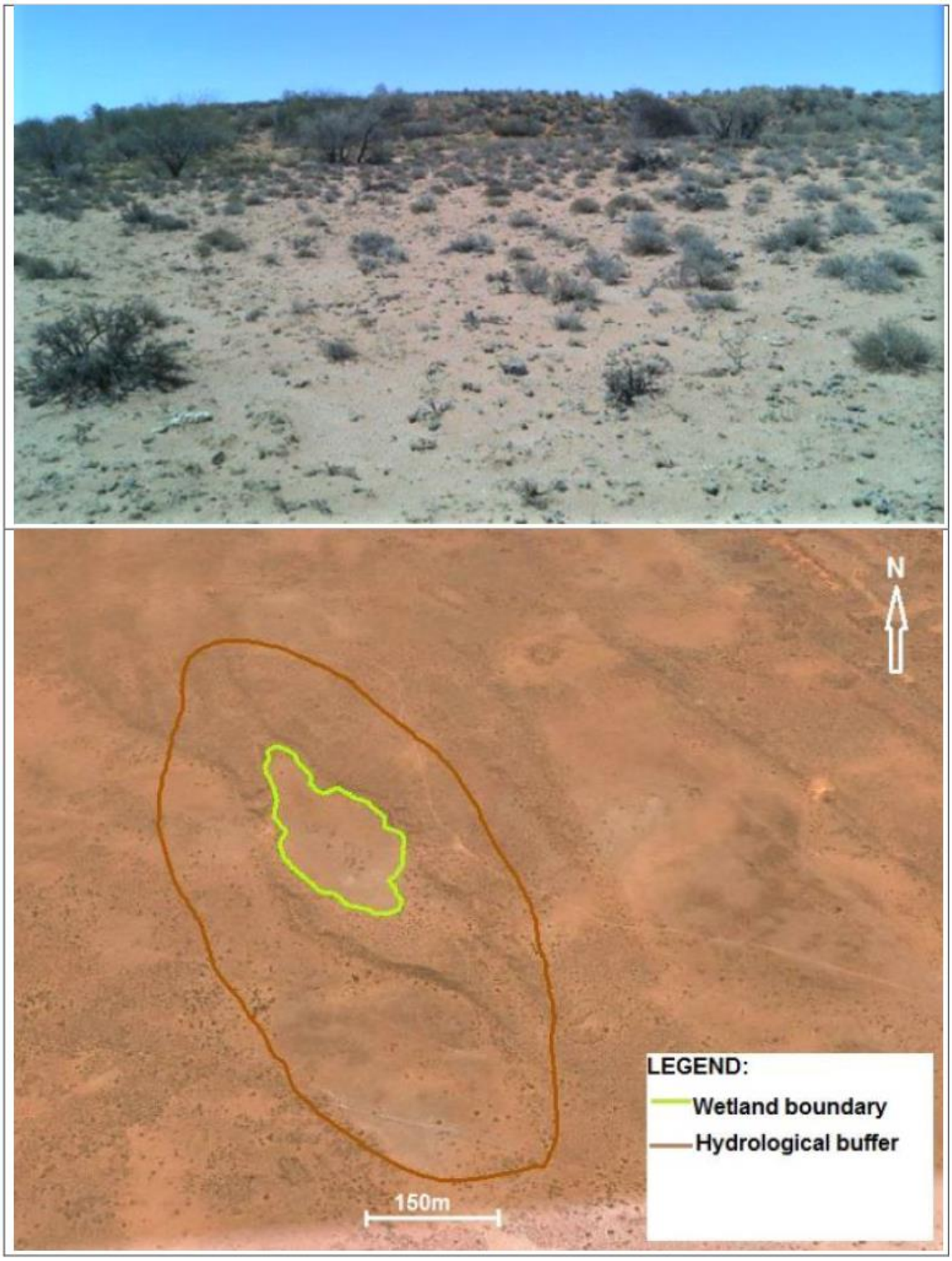

Figure 8-1: Wetland (top photo) and oblique image of delineated wetland boundary and recommended buffer (bottom photo)

VEGETATION CLASSIFICATION

Vegetation that potentially indicates wetland conditions was found at only one of the seven sites surveyed during the current study, namely site SP6. At this site, the vegetation of a shallow

depression in an interdune depression, is distinctive in terms of a combination of physiognomy (vegetation structure), species composition and species dominance, and is considered indicative of unique (within the study area) abiotic habitat conditions associated with endorheic (no channelled inlet or outlet) pans.

The vegetation found in the interdune depression at site SP6 is indicative of a small, endorheic pan that experiences brief soil saturation, or possibly even briefer soil inundation, periodically at very long intervals of many years or even decades. The pan can therefore be described as a pan which experiences ephemeral soil saturation or inundation periodically at long intervals. The pan is not inundated frequently enough and does not hold sufficient volumes of water to have formed a highly saline central zone comprising unvegetated (bare) soils, as is found in the typical salt pans of the southern Kalahari described by Leistner (1967). Ephemeral pans such as that found at site SP6 are abundant in the southern Kalahari but represent a unique and spatially restricted habitat within the study area and its immediate surrounds.

The evidence in support of the statement that the vegetation of the interdune depression at site SP6 is indicative of a small endorheic pan which experiences ephemeral soil saturation or inundation periodically at long intervals, can be summarised as follows:

- The Low Open Shrubland vegetation on the pan surface or floor (Zone A) is unique within the parts of the study area visited, both in terms of physiognomy and species composition and dominance.
- The dominant species on the pan surface (Zone A) are the low shrub *Monechma genistifolium subsp. australe* and the grass *Stipagrostis obtusa*, both of which are facultative halophytes (Van Rooyen 2001 and Leistner, 1967). These two species are completely dominant in terms of cover and density, and few other species contribute significantly to vegetation cover.
- Zone A (pan surface or floor) shows floristic and structural characteristics of the vegetation of typical salt pans of the southern Kalahari as described by Leistner. According to Leistner (1967) *Stipagrostis obtusa* is typically dominant in the outer zone of the surface of salt pans (Leistners's Zone C) and the Intermediate Zone (Leistner's Zone D) surrounding salt pans, and *Monechma genistifolium subsp. australe* is also typically dominant in the Intermediate Zone (Leistner's Zone D) surrounding salt pans.
- Species richness (α-diversity) on the pan floor (Zone A) is far lower than that found in Zones B and C, and only seven plant species were recorded within this zone.
- The soil form of the pan surface (Zone A) is Brandvlei, a soil form which typically indicates wetland conditions in the arid regions of the northern Cape (see soil section of report). The soils of Zone A are characterised by the presence of free lime (calcium carbonate) which is indicative of periodic saturation or inundation, and is usually associated with elevated salinity levels.

PRESENT ECOLOGICAL STATE AND ECOLOGICAL IMPORTANCE SENSITIVITY

The interdune pan and its surrounding catchment contain few noticeable disturbances and is almost entirely free of hard surface development. Catchment impacts, especially hydrological modifications that could affect the pan, are regarded as negligible. Impacts within the pan include a high grazing pressure and a low density of the invasive alien plant species *Prosopis glandulosa var. torreyana*, which contributes little to vegetation cover.

Based on the available information, the interdune pan at Site SP6 has a Largely natural PES (class B), which can improve to a class A PES through the reduction and maintenance of a moderate grazing pressure, as well as the successful control of the invasive *P. glandulosa var. torreyana*. In order to help ensure that *P. glandulosa var. torreyana* does not become re-established within the pan after initial control, follow-up control will be required, as well as control within the remainder of the property. It is therefore recommended that an alien control plan for the study area is developed and maintained. The level of confidence associated with the assigned

PES category is regarded as moderate due to the presence of only a few impacts of minor magnitude, which have a small overall significance.

The Ecological Importance and Sensitivity (EIS) class of the interdune pan is regarded as High (class B), No plant 'species of conservation concern' were recorded during the vegetation survey, nor were any historical records identified for pan associated 'species of conservation concern'.

CONCLUSION

The project area occurs in an arid and marginal region in terms of wetland distribution. However, one pan wetland was identified based on landscape setting, vegetation and soil form. This wetland is locally important in terms of biodiversity and should be conserved; and an adequate buffer provided for. The track and mining (if restricted to outside the buffer area) will not have a detrimental impact on the wetland. Therefore a fatal flaw is not foreseen.

RECOMMENDATIONS

- This interdune wetland (pan) should not be degraded due to the proposed development.
- A buffer zone should be established to ensure the pan receives adequate water from its catchment.
- The catchment of the pan should be the minimum boundary of the buffer zone.
- The pan and related buffer zone should form a corridor linking the inner track area with the outer undeveloped (natural area) to ensure that fauna and flora movement are not totally disrupted by the development.
- The water tract along SP3 should be defined as part of the stormwater management plan and mitigation defined accordingly.

8.3 TRAFFIC IMPACT ASSESSMENT

A Traffic Impact Assessment was undertaken by WSP | Parsons Brinckerhoff and is dated 7 October 2015. Refer to **Appendix 2-3** for the detailed report.

SUMMARY OF FINDINGS

CONSTRUCTION PHASE

The road construction materials (G7 – G10 bulk fill; G3 – G5 for base and subbase; and aggregate for asphalt) are planned to be sourced from the project site and will therefore not be transported on public roads.

The majority of construction plant will remain on site for the duration of the construction and taking the above scope of the works into account it is not expected that the construction of the proving ground will have a significant traffic impact.

OPERATIONS

The maximum monthly heavy vehicles trips generation is summarised in **Table 8-2** below.

Table 8-2: Monthly heavy vehicle trips

Description	To HSPG	From HSPG
Car carriers	4	4
Trucks for testing equipment	2	2
Fuel/diesel tankers	6	6
Non-hazardous waste trucks	1	1

Sewerage disposal	21	21
Hazardous waste trucks	1	1
Trucks for transporting used tyres	1	1
Technical service providers	4	4
Total	**40**	**40**

From the above it can be seen that the number of heavy vehicles expected to be generated by the proving ground will be low and is expected to have an insignificant impact on the traffic operating conditions on the surrounding public road network.

The maximum peak hour employee trip generation of the proving ground is summarised in **Table 8-3**.

Table 8-3: Maximum employee trip generation

Description	To HSPG		From HSPG	
	AM	PM	AM	PM
Mini-bus taxi (local staff)	1	1	1	1
Test cars	20	0	0	20
Total	**21**	**1**	**1**	**21**

Other light vehicle trips (± 5 – 8 trips per day) from various service providers will be generated by the proving ground throughout the day, but is not expected to be generated during the peak hours and were therefore not included in **Table 8-3**.

The South African manuals for traffic impact studies (TMH16(2) and RR 93/635(3)) only requires traffic impact studies to be conducted for development generating 50 or more peak hour trips, which is more than double the expected trip generation of the proving ground. It could therefore be concluded that the traffic impact of proving ground trips on the peak hour traffic conditions will be negligible.

The expected maximum daily traffic on the DR3322 will remain below the threshold to make it economically viable to surface the road with a bituminous seal, in accordance with the TRH20(7) guidelines.

CONCLUSIONS

From the site investigation and evaluation the following may be concluded:

- The proving ground will not generate significant volumes of heavy and light vehicle traffic.
- The heavy vehicles generated by the proving ground during construction and normal operations will not have a significant impact on the road pavements of the affected public roads.
- The peak hour trip generation of the proving ground will not have a significant impact on the traffic operating conditions of the affected public road network.
- The north-eastern shoulder sight distance at the proposed access location is slightly sub-standard, but considered to be acceptable subject to the implementation of appropriate warning signs.

RECOMMENDATIONS

Taking the above conclusions into account, the proving ground can be supported from a traffic point of view subject to the following recommendations:

- The access to the proving ground should have at least one inbound and one outbound lane of 3.5m each.
- SARTSM(6) compliant warning signs W107 and W108 should be implemented in advance of the proving ground access.

Should the client wish to engage with the Department of Roads regarding the maintenance of the DR3322; it is recommended that the gravel loss due to the traffic impact during the construction and operational phases as well as the safety hazard of the road surface condition be discussed.

8.4 HYDROGEOLOGICAL IMPACT ASSESSMENT

A Geohydrological and Contamination Risk Assessment was undertaken by GEO - LOGIC Hydrogeological Consultants cc and is dated January 2016. Refer to **Appendix 2-4** for the detailed report.

CONCLUSIONS

Water will be tapped from existing and newly drilled boreholes for the project. Water will be used during two construction phases which will be 14 months for the first phase and 8 months for the second phase. The water demand during the first construction phase will be 300m^3/d and during the second construction phase will also be 300m^3/d. The time line for the second construction phase is not finalised yet but is expected to be concluded within the first 5 years after start of operations.

During the operational phase of the project, the water demand will be much lower. Water will be used at the office site for washing, cleaning and ablution facilities. Bottled water will be used for consumption. During the operational phase the water demand for the development will be approximately 10m^3/d.

During the entire project the water demand for farming activities on Portion 6 of the farm Steenkampspan will be 6m^3/d. Farming activities will in future be limited to 80 head of cattle. Water will be sourced from the exiting boreholes that are currently used for farming. During later stages when construction water is not needed, the farming activities may also source water from the production boreholes used for the construction purposes. The water demand for farming activities however will not exceed 6m^3/d.

During the sustainable calculations a vast number of methods were used to calculate the availability of water on Steenkamspan and Duiker Rand. The availability of water in the large catchment area that could be delineated for the boreholes that will be used during the life of the project was also carefully considered. A vast number of answers were available after these calculations. A small number of these answers however need special attention.

- The boreholes that are earmarked to be used for abstraction can easily deliver water according the yields recommended in the report.
- None of the boreholes will be individually over pumped. In fact during the final calculations a very conservative approach was taken to calculate the final recommended yields. These recommended yields were further cut from 350m^3/d to 300m^3/d. The actual water demand for construction phase 1 is 276m^3/d and for construction phase 2 is 264m^3/d. For calculation purposes and to be a conservative water demand for both construction phases of 300m^3/d was used.
- The groundwater catchment feeding the aquifer is large and is calculated at 288.6km^3.
- 39.1% of the harvest potential figure of the aquifer of Steenkampspan will be needed.
- 52.1% of the harvest potential figure of the aquifer of Duiker Rand will be needed.

- 12.4.1% of the harvest potential will be used of the Delineated catchment aquifer per annum.
- 0.33% of the volume of water stored in the larger Delineated catchment aquifer of 288.6km^2 will be needed.

During careful consideration of the important facts above and the other evidence that the aquifer can sustain the water abstraction during the construction phase of 22 months spread over 5 years, we regard the abstraction viable. During the operational phase of the project the aquifer will have ample time to recover for the farm to be used as stock farming unit. The water demand after the construction phase will be very low if compared to other farming units in the area. The farm Steenkampspan will be an area in which the aquifer can recover to be available in future for water abstraction for stock farming.

RECOMMENDATIONS

The following mitigation measures are recommended in the Construction phase:

- Abstract water at the recommended rates for each individual borehole.
- Do not over use one borehole by pumping one specific borehole at all consistently.
- Always use at least all four boreholes.
- Use water scarcely and do not waste water.
- Measure water levels in stipulated boreholes (Section 9) on a monthly basis.
- If water levels are declining constantly contact the hydrogeologist.
- Take water samples at borehole BH 1 and the new monitoring borehole on an annual basis.
- A groundwater monitoring report must be produced on a six monthly basis.
- Use proper sanitation systems on site during construction and keep systems serviced.
- Stagnant water must not be allowed in the borrow pit or quarry area during the construction phase. Contaminated water must be pumped out and treated before re-used for construction purposes.
- Service plant equipment regularly.
- Keep fuel and oil in safe conditions on site during construction.
- Have stringent safety margins on site for all equipment that have a contamination risk involved.

The following mitigation measures are recommended in the operational phase:

- Service oil traps as specified by provider.
- The conservancy tank must be emptied on an interval specified by the engineer or architect.
- Develop a master plan for accidental spillage of fuel and oil on site.
- Place a groundwater monitoring borehole at the southern side of the building site.
- Measure water levels in the four production boreholes (now out of duty) on a three monthly basis.
- Take water samples at borehole BH 1 and the new monitoring borehole on an annual basis.
- A groundwater monitoring report must be produced on an annual basis.

8.5 SOILS AND LAND CAPABILITY IMPACT ASSESSMENT

A Soil, Land Use and Agricultural Potential Survey was undertaken by TerraSoil Science and is dated 21 July 2015. Refer to **Appendix 2-5** for the detailed report.

SURVEY RESULTS

The land type found on the site is Af7 (Land Type Survey Staff, 1972 – 2006). Af land types denote areas with dominantly deep red high base status soils (eutrophic and lime containing) with regularly occurring dunes. Soils: Soils are red coloured, eutrophic sandy soils derived from Aeolian deposits. The depths vary according to position in the landscape with soils overlying rock outcrops being shallow and soils comprising dunes being relatively deep.

The land use in the general land type area is limited to extensive and low intensity grazing due to the very low biological productivity associated with low rainfall and arid conditions. The land capability mimics the land use.

The agricultural potential is very low due to the low rainfall and aridity. The distinct presence of dunes in this landscape precludes the area from being developed for irrigated agriculture purposes due to the significant effort required to level the terrain.

It is evident that there is only one land use on the site namely extensive grazing / wilderness.

The soil survey revealed the presence of two main soil zones or associations. These are 1) rocky and shallow soils and 2) red dune soils. The rocky and shallow zones occur interspersed with dune areas. In both cases the dominant soils are of the Mispah (orthic A horizon / hard rock), Glenrosa (orthic A horizon / lithocutanic B horizon) and Hutton (orthic A horizon / red apedal B horizon / unspecified – usually hard or weathering rock in the area). Calcrete areas are limited and the dominant soils are Coega (orthic A horizon / hardpan carbonate). An endorheic type depression is found in the south where soils of the Brandvlei (orthic A horizon / soft carbonate B horizon) dominate. In the specific context the Brandvlei soils indicate areas with secondary lime accumulation due to more regular wetness when compared to the surrounding landscape. In the main the geotechnical investigation data confirms the observations during the field and soil survey.

The soils are considered to be of low agricultural potential due to the shallow and rocky profiles. The sandy deeper dune soils have a low water holding capacity and are not suited to irrigation land uses due to significant local topographical variation.

The grazing potential of the site is low and in excess of 20 ha per large stock unit. This value will vary on a yearly basis depending on rainfall distribution over seasons, management aspects such as rotation and control of fires. The most persistent plants are shrubs that have a relatively low potential. After wetter periods significant grass growth can be observed and in which case the potential increases. However, the dry nature of the area leads to a significant fire hazard once the grasses dry out and wind speeds start to increase. Due to the continuous nature of veld in the area (and poor disaggregation due to lack of roads and fire breaks) fires pose significant risks to grazing potential with a subsequent risk of destruction of large swathes of grazing veld. It is therefore imperative that grazing be managed on the site to ensure regular removal of excess dry grass biomass.

AGRICULTURAL POTENTIAL

Soils are predominantly rocky and shallow or deeper on dunes. The agricultural potential of the site is therefore considered to be low.

The rainfall is variable and the average is below 200 mm per year. This constitutes a very arid environment with a subsequent poor biomass production. This aspect is a further limitation on agricultural potential.

The current land use is exclusively extensive grazing and it is limited to more than 20 ha per large stock unit. Due to the low biological productivity of the site as determined by the rainfall grazing has to be managed to ensure adequate utilisation of various shrub and grass species (when present). The current land status appears to be consistent with the quality and potential expected for the general area. The soils on the site are not considered suitable for irrigation uses due to distinct spatial and local topographical variation.

CONCLUSIONS AND RECOMMENDATIONS

It is concluded that:

- The site is dominated by shallow and rocky soils interspersed with longitudinal dunes with deeper soils.
- The rainfall in the area is limited and leads to a very low biological productivity.
- The agricultural potential of the site is low and crop production is not possible.
- The only possible agricultural use of the site is for extensive grazing and then at intensities lower than 20 ha per large stock unit.
- The development of a facility that will sterilise a limited surface area of the site is not considered to have a detrimental effect on the current grazing potential. The main reasons being that:
  - Hard surfaces lead to runoff of water that results in localised increased biological productivity;
  - With adequate fencing and management the bulk of the site remains useful for grazing purposes.
- It is imperative that grazing land uses be continued to ensure utilisation of biomass, on a controlled basis, to aid in minimising fire hazards to surrounding land.

8.6 SOCIAL-ECONOMIC IMPACT ASSESSMENT

A Social Impact Assessment was undertaken by Tony Barbour Environmental Consulting and Research and is dated October 2015. Refer to **Appendix 2-6** for the detailed report.

SUMMARY OF KEY FINDINGS

POLICY AND PLANNING ISSUES

The review of the relevant planning and policy documents was undertaken as a part of the SIA. The key documents reviewed included:

- Northern Cape Provincial Growth and Development Strategy (2004-2014);
- Northern Cape Spatial Development Framework (2012);
- ZF Mcgawu District Municipality Integrated Development Plan (2007-2012);
- //Khara Hais Integrated Development Plan (2012-2017);
- //Khara Hais Local Economic Development Strategy (2010); and
- //Khara Hais Spatial Development Framework (2012).

The findings of the review of the district and local municipal policy documents indicate that high unemployment and poverty levels in the study area, coupled to low education and skills levels constitute the most urgent social development challenges in the study area. The proposed development has the potential to assist in addressing these challenges. The proposed development will also support private investment in the area and create opportunities for small, medium and micro enterprises (SMMEs). Based on the findings of the review the establishment of the proposed HSPG is supported.

CONSTRUCTION PHASE

The key social issues associated with the construction phase include:

POTENTIAL POSITIVE IMPACTS

Based on information from MBSA the construction phase for the proposed HSPG is expected to extend over a period of ~ 2 years (Stage 1 of Construction estimated to be ~ 14 months and Stage 2 of Construction estimated to be ~ 8 months). The ~ 2 year construction phase will create approximately 200 employment opportunities. Of this total ~ 15% (30) will be skilled, 30% (60) semi-skilled and 55% (110) low skilled. The majority of the low and semi-skilled workers will be historically disadvantaged individuals (HDIs). The majority, if not all, of the low and semi-skilled workers employed during the construction phase are also likely to live in Upington and surrounds. The //Khara Hais Local Municipality (KHLM) IDP notes that unemployment in the area and creation of employment opportunities represents a key challenge. The proposed project will therefore assist to create employment opportunities.

The total wage bill for the construction phase is estimated to be in the region of R 66 million (2015 rand values). Of this total R 15.8 million would be earned by low skilled workers, R 14.4 million by semi-skilled workers and R 36 million by skilled workers. Low and semi-skilled workers would therefore earn ~ 45% of the total monthly wage bill. The majority of the wage bill earned by construction workers will be spent in the local economy. A percentage of the wage bill earned by non-local workers employed during the construction phase will also be spent in the local economy. This spending will accrue to local companies and business and will represent an additional benefit for the local economy.

The capital expenditure associated with the construction of the proposed HSPG is estimated to be in the region of R 370-480 million (2015 rand values). In terms of business opportunities for local companies, expenditure during the construction phase will create business opportunities for the regional and local economy. The work associated with the construction phase will include the preparation and construction of the 17 km testing track and associated components, including potential establishment of a quarry and borrow pit on the site, access roads, workshops etc. Given the prominent role of the agriculture, mining and renewable energy sector in the area there are likely to be suitably qualified local contractors in Upington who can be appointed.

The local service sector will also benefit from the proposed development. The potential opportunities for this service sector would be linked to accommodation, catering, cleaning, transport and security, etc. associated with the construction workers employed during the construction phase.

In terms of local support, the KHLM Council passed a resolution at a meeting held on 27 January 2015 supporting the proposed project. Resolution 14/06/215 notes:

- That Council pledge its support to the construction of the proposed test track by MBSA in the jurisdiction area of //Khara Hais, near Upington;
- That Council intervene by requesting the Department of Land and Rural Development to sign the access agreement to the proposed test site, as requested by MBSA;

The proposed project is also strongly supported by the Upington Chamber of Commerce represented by Mr McMinn. The implementation of the proposed enhancement measures listed in the report would also enable the establishment of the proposed HSPG to support co-operation between the public and private sectors and the development of SMMEs in the KHLM.

POTENTIAL NEGATIVE IMPACTS

- Impacts on local communities associated with the presence of construction workers;
- Increased safety and security risk for local farmers associated with presence of construction workers on the site;
- Increased risk of grass fires associated with construction-related activities;
- Impact of construction related activities, including damage to roads, safety, noise and dust; and
- Potential loss of grazing land associated with construction-related activities.

Based on the findings of the SIA the significance, with mitigation, of all of the potential negative impacts associated with the construction phase was rated as Low Negative. All of the potential negative impacts can therefore be effectively mitigated if the recommended mitigation measures are implemented. In addition, given that the majority of the low and semi-skilled construction workers can be sourced from the local area the potential risk at a community level to local family structures and social networks is regarded as Low negative significance.

OPERATIONAL PHASE

The key social issues affecting the operational phase include:

POTENTIAL POSITIVE IMPACTS

- Benefit to local hospitality and tourism sector

The facility will be operated mainly during the summer months and possible other ad-hoc periods as and when required. However, the key focus in terms of testing will be during the hot summer months from October to March (6 months). During this period ~ 9 test teams made up of 10-20 members will travel to Upington for a period of 2-3 weeks. This translates into ~ 1 800-3 600 days of accommodation over the summer months. The majority of the members of these teams involved in testing during the 6 month period between October and March will be from Europe. In addition, ~ 8 local staff will be employed (security staff and cleaning).

Testing during the cooler winter period from April-September is likely to be less intense. For the purposes of the SIA it is assumed that ~ 4 test teams made up of ~ 10-15 members will be based in Upington for a period of ~ 2 weeks. This translates into ~ 560-850 days of accommodation over the ad-hoc periods. The teams involved in testing during this period will be largely made up of staff from Mercedes Benz South Africa.

The total number of accommodation days generated by the HSPG over a 12 month period will therefore be ~ 2 360-4 4 450. The demand for accommodation will extend over the operational lifespan of the project, which is anticipated to be decades. This will create significant opportunities for the local hospitality sector in Upington. The main operational phase (over the hot, summer months from October-March) also coincides with the low demand period for tourist accommodation in Upington and the Northern Cape. The component of the operational phase will therefore generate income for the local hospitality during the quieter, off-peak months. This represents a significant socio-economic benefit for both the owners of accommodation facilities and the staff employed. During the quieter, off-peak months staff numbers are reduced. The accommodation demand generated by the proposed HSPG will reduce the number of staff that are seasonally employed and who lose their jobs during the off season.

The Mercedes Benz personnel involved in testing are also likely to visit areas of interest over weekends, such as the Augrabies Falls National Park, and undertake activities such as river rafting on the Orange River, quad biking, and wine cellar tours etc. Local tourism operators and facilities in the area and Northern Cape will therefore also benefit during the operational phase. In addition, the families of overseas personnel are also highly likely to use the opportunity to visit South Africa during the October-March testing period. The operational phase will therefore create significant opportunities for the local hospitality sector. The operational phase will also benefit the tourism sector (local, regional and national).

→ Employment and business opportunities

In addition to the business and employment opportunities associated with the hospitality and tourism sector (see above), the operational phase will create opportunities for local catering, cleaning, transport and maintenance companies. This includes transport of equipment and vehicles to the site, on-site catering and cleaning etc. Providing these services will create opportunities for businesses in Upington. In addition, the HSPG and the associated security fencing etc. will need to be maintained. This will also create opportunities for local engineering contactors and service providers. A percentage of the monthly wage bill earned by the Mercedes Benz personnel involved in the testing will also be spent in the regional and local economy. This benefit will extend over the entire year. The benefits to the local and regional economy will extend over the operational lifespan of the project, which is anticipated to be decades.

→ Investment in local initiatives

Council Resolution 14/06/215 passed at a meeting held on 27 January 2015 notes that the Council will identify a key priority area that they would like Mercedes Benz SA to sponsor in terms of MBSA's social upliftment responsibilities. The project will therefore create an opportunity for MBSA to invest in local community development projects in the KHLM as part of their corporate social development programme.

POTENTIAL NEGATIVE IMPACTS

- → Visual impacts and associated impact on sense of place;
- → Noise impacts associated with testing;
- → Increased risk of grass fires; and
- → Impacts on road associated with transport of staff to and from the facility.

Based on the findings of the SIA the significance, with mitigation, of the all of the potential negative impacts associated with the operational phase was rated as Low Negative. All of the potential negative impacts can therefore be effectively mitigated if the recommended mitigation measures are implemented.

CUMULATIVE IMPACTS

The significance of the overall visual impact and impact on of the proposed HSPG on the areas rural sense of place is likely to be low. There are no similar facilities located in the vicinity of the site. The potential for cumulative visual impacts on the areas sense of place and landscape character is therefore regarded as negligible. The significance of the potential cumulative impact is rated as Low Negative.

NO-DEVELOPMENT OPTION

The employment opportunities associated with the construction and operational phase, as well as the benefits for the local and regional hospitality and tourism sector, would be forgone. The No-Development option would therefore represent a lost opportunity for Upington and the local economy. The significance is rates as a High Negative social cost.

DECOMMISSIONING

Given the relatively small number of people employed during the operational phase (~ 8), the social impact on the local community associated with decommissioning will be low. In addition, the potential impacts can be effectively managed with the implementation of a retrenchment and downscaling programme. With mitigation, the impacts are assessed to be Low Negative.

CONCLUSIONS AND RECOMMENDATIONS

The findings of the SIA indicate that the establishment of the proposed HSPG will create employment and business opportunities for locals during both the construction and operational phases of the project. The enhancement measures listed in the report should be implemented in order to enhance these benefits. The operational phase will also create significant benefits for the local hospitality, tourism and business sector which will extend over the entire year (12 months). These benefits will extend over the operational lifespan of the project, which is anticipated to be decades. The development will also create an opportunity for MBSA to invest in local community development programmes as part of it corporate social sustainability programme.

The establishment of the proposed HSPG is therefore supported by the findings of the SIA.

8.7 HERITAGE IMPACT ASSESSMENT

A Heritage Impact Assessment was undertaken by ACRM and is dated October 2015. Refer to **Appendix 2-7** for the detailed report.

FINDINGS

The following observations were made:

- Dispersed scatters of Later Stone Age (LSA) implements (of Low Grade 3C significance) were encountered during the field assessment. The lithics are spread thinly and unevenly over the surrounding landscape, and most likely represent discarded flakes and flake debris.
- The most compelling sites encountered during the study (Sites 028, 030 & 087) comprise high density scatters of LSA implements and debris from late Holocene (2-3000 year old) hunter-gatherer campsites, where domestic activities such as the production of stone tools, manufacture of beads, and processing of foodstuffs, were carried out. A large number of different types of tools were recorded on these sites, including scrapers, adzes, bladelets, awls, backed pieces, hammerstones, anvils, and upper and lower grindstones, in a range of raw material, both local (quartzite & quartz) and exotic (indurated shale, silcrete & chalcedony). Discreet activity areas were also identified where the manufacture of tools and beads took place, while organic remains including pottery and bone were found. The presence of microlithic backed bladelets (or composite arrow points), as well as clay pottery, indicates that the campsites most likely date within the last 2-3000 years, shortly before and after the introduction of domestic stock (such as sheep) into the region. Sites 028, 030 and 087 have been rated as having Moderate to High (Grade 3B) significance within a local context. The archaeological sites are, however, located outside the footprint area of the proposed development site and will therefore not be impacted by proposed construction activities.
- A late Holocene LSA campsite (Sites 011-014 & 715) was documented in the alignment of the proposed high speed test track at ± km 7. The small number of tools recorded in the wind deflated dune included flakes, bladelets, chunks, a hammerstone, cylindrical cores, an anvil, and grindstone fragments. It is possible, that more tools and cultural remains such as pottery, ostrich eggshell and beads lie buried beneath the shifting windblown sands. Sites 011-

014/715 will likely be impacted by construction of the proposed test track, and has been graded as having Medium to Low (Grade 3C) significance within a local context.

- A relatively large number of MSA tools older than 20 000 years, including flakes, miscellaneous retouched pieces, blades, chunks and cores were recorded across the south eastern portion of the farm in the proposed footprint of the calcrete quarry, and in the surrounding area. The tools are spread very thinly an unevenly over the surrounding landscape. More than 95% of the implements are in quartzite, but a few tools in indurated shale and banded ironstone were also noted. Two large scatters of MSA tools (Sites 055 & 056) were documented about 30 m from the north western boundary of the proposed calcrete quarry. The density of tools in this area, indicate fairly intensive flaking activity (i. e. the production of tools). Sites 055 & 056 have been rated as having Medium to Low (Grade 3C) significance within a local context.
- MSA and LSA tools (of Low Grade 3C significance), in quartz, quartzite, indurated shale, silcrete and chalcedony were found scattered around the base of the stone outcrop/inselberg known as Klip Kopje. The outcrop has been identified as a source material (quarry) for road building operations.
- A few quartz flakes and chunks were found in the proposed multi-functional area, but the footprint area is not a sensitive archaeological landscape.
- No archaeological resources were encountered in the proposed handling track, which is not a sensitive archaeological landscape.
- A small number of LSA quartz flakes and chunks were recorded in the alignment of the proposed internal access roads.
- No heritage remains were found in the proposed (new) building area, which is a degraded piece of land close to existing farm infrastructure.
- Dispersed scatters of LSA tools (mainly flakes & chunks) were recorded in the footprint area of the proposed gravelled bad roads in the north eastern portion of the farm. Late Holocene 2-3000 year old campsites (Sites 745-751 & Site 753) with flakes, chips, chunks, cores, bladelets, manuports, hammerstones, anvils and grindstone fragments were also documented in the proposed development site. The campsites have been graded as having Medium to Low Grade 3C significance within a local context. Indications are that the campsites will not be impacted by road construction activities. Much of the receiving environment in the proposed bad roads development site, however, is densely vegetated, resulting in poor archaeological visibility. It is therefore possible that more hunter-gatherer campsites will be uncovered during vegetation clearing operations, and may be impacted by road construction activities.

CONCLUSIONS

The field assessment has captured a good record of the archaeological heritage present on Farm 419/6 Steenkampspan. The study has shown that the cultural landscape is dominated by dispersed scatters of Later Stone Age implements (mainly flake debris), including a number of rare, late Holocene 2-3000 year old hunter-gatherer campsites.

Middle Stone Age tools appear to be confined to the south eastern portion of the farm in the vicinity of the proposed calcrete quarry.

No Early Stone Age remains were found.

Overall, from an archaeological perspective there are no fatal flaws, and provided that the recommendations are implemented, there are no objections to the proposed development proceeding.

RECOMMENDATIONS

With regard to the proposed construction of a vehicle testing proving ground on Farm 419/6 Steenkampspan, the following recommendations are made:

- Sites 028, 030 and 087 must be avoided during the construction and operational phase of the project. The site layout plan indicates that these, Grade 3B rated sites (of moderate to high significance will not be impacted by proposed construction activities. Archaeological mitigation will therefore not be required. On the advice of the consultant, the sites have been declared `No-Go Areas'.
- Sites 011-014/715, in the alignment of the oval track, must be mitigated. The remains must collected by a professional archaeologist. Sand must also be sieved for buried archaeological material. The remains must be curated and written up and a report submitted to the SAHRA. No archaeological material may be collected without a permit issued by SAHRA.
- A proposed 50m wide cutting on both sides of the centre line of the oval track between km 5 and km 7.1 will entail considerable earthmoving activities which may expose or uncover archaeological heritage, such as buried hunter-gatherer campsites and human remains. Therefore, it is recommended that archaeological monitoring by a professional archaeologist take place during earthmoving operations between km 5 and km 7.1.
- A 25m wide buffer must be established around Sites 055 and 056, which are located less than 30m from the north western boundary of the proposed calcrete quarry.
- The proposed haul road from the calcrete quarry must avoid Sites 055 & 056.
- Sites 745-751 and Site 753 in the proposed gravelled bad roads must be avoided in the final design of the roads. If this is not possible, the remains must be collected by a professional archaeologist. Sand must also be sieved for buried archaeological material. The remains must be curated and written up and a report presented to SAHRA. No archaeological material may be collected without a permit issued by SAHRA.
- The design and layout of the proposed gravelled bad roads must avoid the dune areas. The flatter, vegetated south eastern portion of the site is preferred for construction of the roads.
- Vegetation clearing operations and earthworks in the proposed gravelled bad roads must be monitored by a professional archaeologist. Most of the core footprint area is densely vegetated resulting in poor archaeological visibility. It is possible that buried LSA campsites and unmarked human remains may be exposed during vegetation clearing operations and road construction activities.
- The ECO and site contractors must be briefed by the archaeologist prior to the construction phase commending. This is to alert them to the possibility of uncovering archaeological heritage and the process to be followed in the event of this occurring.
- Should any unmarked human remains or ostrich eggshell caches for example, be uncovered or exposed during construction activities these must immediately be reported to the archaeologist (Jonathan Kaplan 082 321 0172), or SAHRA (Att: Mr Philip Hine 021 462 4502). Burials and ostrich eggshell caches must not be removed or disturbed until inspected by a professional archaeologist.
- The above recommendations must be included in the EMPr for the project.

8.8 GEOLOGICAL ASSESSMENT

A Geological and Mineral Potential Assessment was undertaken by the Council for Geoscience and is dated 30 January 2015. Refer to **Appendix 2-8** for the detailed report.

FINDINGS

Geologically, Portion 6 of the Farm Steenkamps Pan number 419 is almost entirely covered with reddish-brown windblown sand of the Gordonia Formation, which forms a series of northwest-trending dunes. Near the southeastern corner, exposures of the Blaauwbosch Granite are present (**Figure 8-2**), which take the form of a fine-grained granite porphyry (Moen, 2007). In the surrounding area, the same windblown sand of the Gordonia Formation is present and is predominant north of the proposed site. However, a variety of rocks assigned to two formations of the Namaqua Metamorphic Province, five formations of the Koras Group and granite porphyry of the Blaauwbosch Granite, which intruded the Koras Group about 1100 million years ago (Du Toit, 1998), form inliers that emerge from beneath the windblown sand cover (**Figure 8-2**). Calcrete overlying these rocks is exposed in places (Moen, 2007). The two formations of the Namaqua Metamorphic Province are named the Dagbreek and Leerkrans Formations. The Dagbreek Formation consist of quartzite and schist, whereas the Leerkrans Formation consists of gritty feldspathic schist on Uap 418 and phyllite, schist and talc schist on Steenkamps Pan 419 (**Figure 8-2**; Moen, 2007). The five formations of the Koras Group are from base upwards, the Rusplaas, Rouxville, Leeuwdraai, Adeisestad and Kalkpunt Formations. The Rusplaas Formation occurs on the farms Steenkamps Pan 419 and Duiker Rand 415, where it comprises quartzite and minor conglomerate (Moen, 2007). The Rouxville Formation is present on the northern part of the farm Steenkamps Pan 419 (**Figure 8-2**) and consists of fine-grained, non-amygdaloidal lava and some breccia. The Leeuwdraai Formation is exposed over a large area southeast of Portion 6 of Steenkamps Pan 419 (**Figure 8-2**) and comprises fine-grained felsic lava and porphyry (Moen, 2007). The Adeisestad Formation is exposed southeast of the Leeuwdraai Formation, which it overlies (**Figure 8-2**). It consists of amygdaloidal basic lava, volcanic breccia and tuffaceous rocks. The overlying Kalkpunt Formation is present on the farm Adeisestad 409 (**Figure 8-2**) and comprises sandstone, conglomerate and minor shale. Fine-grained granite porphyry of the younger Blaauwbosch Granite occurs on the farms Steenkamps Pan 419 and Uap 418 (**Figure 8-2**). Calcrete probably representative of the Quaternary Mokalanen Formation (Moen, 2007), is present on the farms Steenkamps Pan 419, Geelkop Pan A 297, Uap 418, Kameel Poort 414 and Uizip 413 (**Figure 8-2**).

There is no record of any mineral deposits being present on Portion 6 of the Farm Steenkamps Pan number 419 (**Figure 8-2**). However, deposits of talc, kieselguhr and copper are present in the surrounding area up to a distance of 8 km from the borders of Portion 6 (**Figure 8-2**). An occurrence of talc occurs in the Leerkrans Formation on Steenkamps Pan 419, approximately 2.6 km west of the boundary of Portion 6 (**Figure 8-2**). The locality is at co-ordinates: Latitude 28°10’42”S; Longitude 21°26’38”E (Du Toit, 1998). The talc is hosted by schist (Moen, 2007) and although some prospecting excavations were completed, the economic potential is low and mining is not likely to take place (Du Toit, 1998). Kieselguhr is located at co-ordinates: Latitude 28°14’00”S; Longitude 21°27’30”E (Du Toit, 1998), some 3.5 km west of the boundary of Portion 6 (**Figure 8-2**). Kieselguhr consists of a light-weight, soft, pale-coloured, chalky sediment, composed mainly of the opaline hollow shells of diatoms and is principally used as a filter aid in South Africa (Strydom, 1998). According to the SAMINDABA database, the deposit consists of diatomaceous limestone that partly fills a hollow in red sandstone of the Koras Group (formation name unknown). It is capped by hard calcrete and is sand-covered. No prospecting has taken place and the size and quality of the deposit is unknown. Detailed prospecting would be needed in order to ascertain the economic potential of this deposit. Copper is located at co-ordinates: Latitude 28°11’48”S; Longitude 21°23’55”E (Du Toit, 1998), some 7.5 km west of the boundary of Portion 6 (**Figure 8-2**). It is associated with red beds of the Rusplaas Formation, but no indication of size or grade is given.

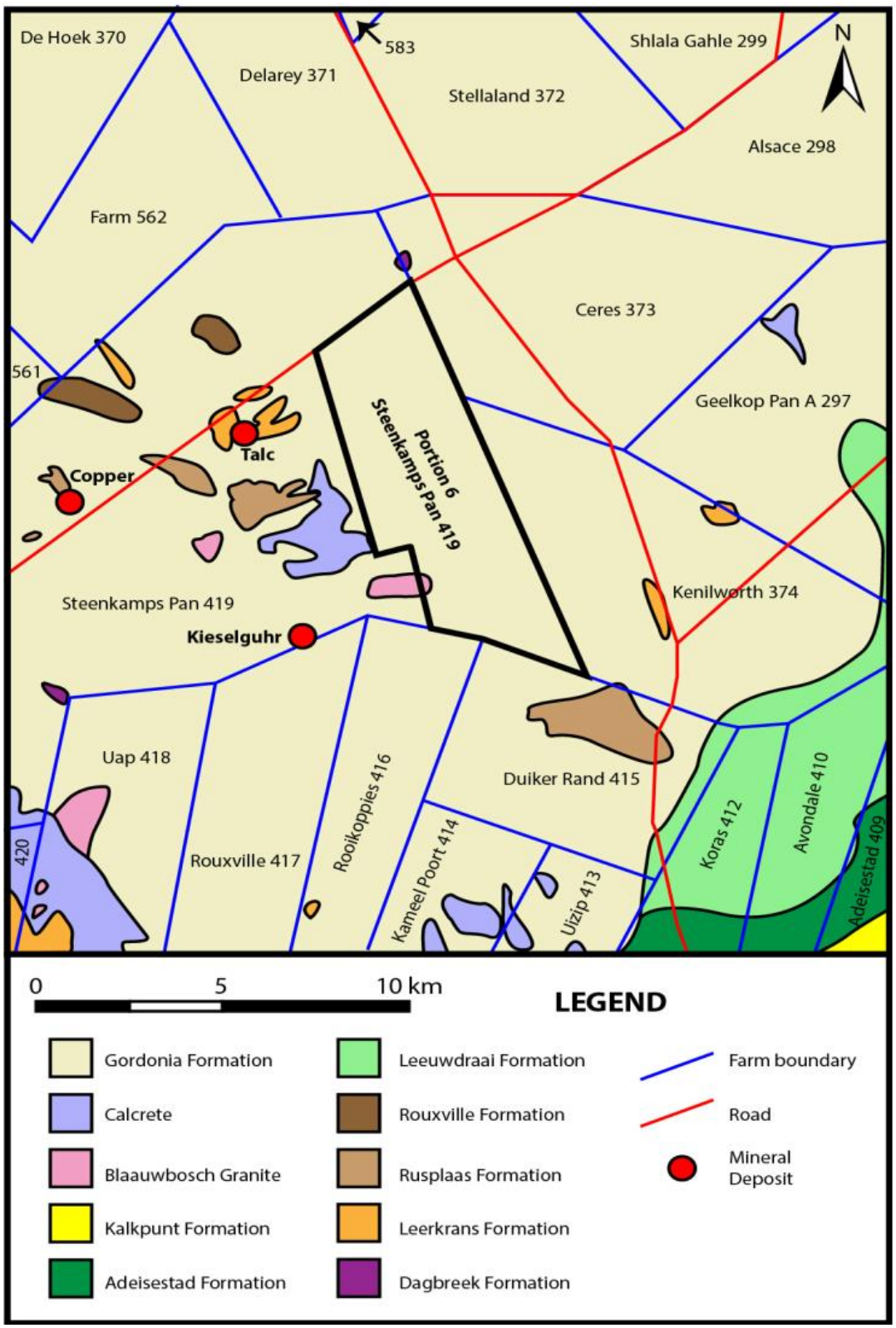

Figure 8-2: Geological map of Portion 6 of the farm Steenkamps Pan 419 and the surrounding area showing location of mineral deposits, farm boundaries and roads

CONCLUSIONS

It can be concluded that the proposed site for a vehicle test facility on Portion 6 of the farm Steenkamps Pan 419 has a very low mineral potential. Although deposits of talc, kieselguhr and copper are present in the surrounding area, the economic potential is unknown due to a lack of adequate prospecting. There are no dolomitic formations on this site nor in the surrounding area.

8.9 GEOTECHNICAL ASSESSMENT

A Geotechnical Investigation was undertaken by ARQ Consulting Engineers and is dated August 2015. Refer to **Appendix 2-9** for the detailed report.

FINDINGS AND RECOMMENDATIONS

ROADWAYS

For the oval and handling track and the multifunctional area accommodating light vehicles which may exert large horizontal forces in the surfacing layer due to braking, acceleration and turning at high speeds, the following is recommended:

- *Rip and re-compact in-situ material (subgrade) to 90% Mod AASHTO density at 0 to +2% of the OMC,
- 150mm C4 subbase layer,
- 150mm G3 basecourse,
- Asphalt surfacing layer

** Note that if the in-situ sand material comprises the subgrade, it should be compacted to 100% of the Mod AASHTO density.*

A cemented C4 subbase layer should comply with the following requirements:

- A selected natural material equivalent to G5 or G6 quality meeting the density and strength requirements,
- The maximum size of the material after compaction in place should not exceed two-thirds of the compacted thickness layer or 63mm, whichever is the smaller,
- After treatment the material should have a Plasticity Index not greater than 6,
- In regard to the crushing strength requirements of the cemented material, the laboratory design strength should be in accordance with the following values:
  - Minimum and maximum laboratory design, unconfined compressive strength at 7 days 100% Mod AASHTO density of 0.75 and 1.5MPa respectively,
- The grading modulus for the subbase material should not be less than 1.5,
- A CEM II B-V 32.5N cement may be utilised for stabilisation. A higher cement class may increase the pavement stiffness too much which may lead to a decrease in ductility of the layer and result in cracking.

According to the test results from the borrow pit investigation as received from the client, the calcrete material generally classified as a G5 material and will be suitable for use in the construction of the sub base layer. This material will in all likelihood require crushing to the abovementioned sizes to ensure its suitability.

CRUSHING

For the borrow pit and quarry operations, the following is recommended:

- A permanent, multi-stage crusher with screens should be set up at the quarry to produce crushed stone basecourse and asphalt surfacing material.
- A mobile, 2 stage crusher should suffice in the crushing requirements at the borrow pit area for the calcretes (generally sub base material of G5 quality). The nominal maximum size for a G5 crushed material is 53mm before compaction and 63mm for uncrushed material.
- This strategy will allow various materials to be available for the consecutive construction of the layerworks.

BUILDING AREA

The following procedure is recommended in order to achieve proper site compaction and to reduce the risk of differential settlement beneath the strip footings:

- Excavate and stockpile in situ material on the footprint to a depth of 1.0m below the natural ground level (N.G.L),
- Remove all material > 100mm diameter from the stockpile,
- Mix the sand from the stockpile with the crushed calcrete gravel (< 53mm) from the borrow pit in a 1 to 1 mix ratio (50% sand, 50% calcrete),
- *Compact subgrade material to 100% Mod AASHTO density at 0 to +2% of the optimum moisture content (OMC) using a vibratory roller with a 300kN centrifugal force (e.g. Bomag 219D or similar),
- **Backfill the exposed area with the 50/50 mixture material (stockpiled sand and crushed calcrete), compacted in 150mm layers to 93% of the Mod AASHTO density at a moisture content of 0 to +2% of the OMC with the same vibratory roller,
- Found as shallow as possible (250mm below N.G.L) in the compacted strata at an allowable bearing pressure of 100kPa for the strip footings.

*Note: If the sand comprises the subgrade material – compact to 100% of the Mod AASHTO density. If sand material does not comprise the subgrade material – compact to 93% of the Mod AASHTO density.

**Calcrete material from the borrow pit may also be used as a founding material, compacted to 93% Mod AASHTO density.

The sand layer with general thickness of 0.95m is considered problematic with regard to the safety of the temporary excavations deeper than 1.2m. The sand material in any excavation should be battered back to a safe angle of 22 degrees to allow for a factor of safety of 1.4 against instability. This is at a ratio of 1(V): 2.5(H).

For permanent excavations in the soft to medium hard calcrete/ bedrock layer, the slope may be battered back to 1(V): 2(H) or 60 degrees according to calculation on chart 1 (dry conditions) from Hoek and Bray (1981).

BRIDGE

It is recommended that the bridge be founded via pad footings on the in-situ calcrete/ bedrock material. An allowable bearing capacity of 400kPa may be used when founding the piers and abutments via pad/spread footings.

The excavation for the foundations should be inspected by a competent engineer before the contractor may cast the blinding layer for the footings. It is furthermore expected that groundwater seepage will not be encountered during the foundation excavations.

The sand layer with general thickness of 0.1m in the bridge area is not considered to be problematic with regard to the safety of the temporary excavations. For temporary excavations in the soft to medium hard calcrete/ bedrock layer, the slope may be battered back to 1(V): 0.5(H) or 60 degrees according to the first chart from Hoek and Bray (1981).

CUTTINGS - GENERAL

The depth of the cuttings will vary according to the layout of the oval and handling track and the topography of the terrain.

8.10 AIR QUALITY IMPACT ASSESSMENT

An Air Quality Impact Assessment was undertaken by WSP Environmental and is dated 9 December 2015. Refer to **Appendix 2-10** for the detailed report.

CONCLUSIONS

This air quality impact assessment investigated emissions associated with the construction and operation of the Proposed High-Speed Proving Ground near Upington in the Northern Cape. The assessment consisted of the development of a comprehensive emissions inventory accounting for all construction and operational sources, as well as dispersion modelling to determine the dispersion of pollutants from the proposed site.

During the construction phase, particulate matter (PM_{10} and $PM_{2.5}$) concentrations at the three nearest farm house receptor locations are predicted to be low, with no exceedances of the relevant National Ambient Air Quality Standards predicted. Concentrations within the site boundary are predicted to exceed the relevant standards, with the highest concentrations predicted along the high-speed oval where cut-to-fill and general construction activities will occur.

During the operational phase, PM_{10}, $PM_{2.5}$, SO_2, NO_x, CO and VOC concentrations at the nearest farm house receptor locations are predicted to be low, with no exceedances of the relevant National Ambient Air Quality Standards predicted. Exceedances of PM10 concentrations are predicted along the off-site access road. Since this access road is unpaved, such concentrations can be attributed to the movement of vehicles along this road, to and from the site. The highest concentrations of SO_2, NO_x, CO and VOC are predicted along the high-speed oval, however, concentrations remain well below the relevant standards with no exceedances predicted. The test car tailpipes are the main source of such emissions.

The air quality impacts of the Proposed High-Speed Proving Ground were evaluated using a risk matrix which assessed the severity, extent, duration, probability and confidence of potentially significant impacts. Based on this rating system, it was calculated that the air quality impacts of the proposed project are expected to be “Low”.

RECOMMENDATIONS

Since emissions associated with the construction and operation of the HSPG will not impact on any surrounding receptors, no specific mitigation interventions are recommended. Should MBSA want to decrease particulate matter emissions from construction activities even further, the following mitigation options can be employed:

- Installation of windbreaks alongside cut-to-fill operations to limit the amount of dust that is entrained by wind;

- Covering of any stockpiles on site; and
- The use of dust masks for personnel working onsite in close proximity to general construction activities.

8.11 NOISE IMPACT ASSESSMENT

An Environmental Acoustic Impact Assessment was undertaken by WSP Environmental and is dated 25 November 2015. Refer to **Appendix 2-11** for the detailed report.

CONCLUSIONS

This environmental acoustic impact assessment investigated noise associated with the construction and operation of the HSPG near Upington in the Northern Cape. Due to the remoteness of the proposed site, no baseline acoustic monitoring was performed but rather the SANS guideline rating level for noise in rural districts was considered to be a reasonable representation of the current noise climate in the area.

Acoustic model results confirmed that noise levels at all nearby farm house receptor locations will be low, with no changes in the existing noise levels predicted during both the construction and operational phases. The highest noise levels during the construction phase are predicted around the quarry and borrow pit areas as well as at locations scattered along the high-speed oval, dependant on where specific construction equipment will be located at a given time. The highest noise levels during the operational phase are predicted along the high-speed oval, multifunctional area and handling track.

The acoustic impacts of the HSPG were evaluated using a risk matric which assessed the severity, extent, duration, probability and confidence of potentially significant impacts. Based on this rating system, it was calculated that the acoustic impacts of the proposed project are expected to be “Low”.

RECOMMENDATIONS

Since noise associated with the construction and operation of the HSPG will not impact on any surrounding receptors, no specific noise mitigation interventions are recommended. Should MBSA want to decrease construction noise even further, the following mitigation options can be employed:

- Installation of mufflers on exhausts of construction vehicles;
- Selection of construction equipment with lower sound power levels; and
- The use of ear protection equipment for personnel working onsite in close proximity to noise sources.

Although noise associated with blasting activities will not impact on the noise climate at any of the receiver locations, adequate blasting management techniques should be employed. This includes:

- Informing nearby residents as to when blasting will occur on a certain day at a given time;
- Not blasting after daytime hours; and
- Consideration for livestock that currently graze on the land and timeously moving them off site when a blast is to occur.

8.12 PALEONTOLOGICAL IMPACT ASSESSMENT

A Paleontological Impact Assessment was undertaken by MB Geological Services and is dated 3 January 2016. Refer to **Appendix 2-12** for the detailed report.

CONCLUSIONS

The proposed project area is large, being approximately 3 750 ha extent. However, any negative impacts to the palaeontological heritage of the region will be limited to the footprint area of the required infrastructure and the extent of any impacts is accordingly characterised as local.

The effects of the required construction operations upon the geological strata underlying the project area will be restricted to the bedrock strata comprising the Proterozoic Leerkrans Formation, Koras Group and potentially also the Blauwkrans Granite. The Cenozoic Kalahari Group forms an extensive superficial cover sequenced over much of the project area and consists of a layer of calcrete which is immediately overlain by aeolian sand of the Gordonia Formation (the latter often being present as NW-SE oriented sets of linear sand dunes).

The Leerkrans Formation, Koras Group, Blauwkrans Granite and the calcretes of the Kalahari Group are classified as being unfossiliferous herein. Accordingly, both the probability of the project resulting in a negative impact on the palaeontological heritage of these four units assessed as nil, as is the potential significance of any negative impact.

The aeolian sands of the aerially extensive Gordonia Formation are potentially fossiliferous and, as such, there is a potential for negative impact on the palaeontological heritage of this unit over the majority of the project area. However, the potential risk is categorised as low as no fossil materials were identified within the unit during the site visit. However, while generally scarce within the Gordonia Formation the presence of fossil assemblages has been documented within sediments coeval with the Gordonia Formation elsewhere within the Northern Cape Province. These fossil assemblages have provided valuable insights into the palaeoclimate and palaeoecology of the region. Thus, the fossils that may be anticipated to be present within these units are potentially highly significant to the cultural and scientific heritage of South Africa. As such, the risk of a negative impact is low, but the significance of any negative impact on the fossil assemblages could potentially be high on exposures of the Cenozoic regolith. Any damage that occurs to such fossil material during the excavation and construction of the project would be permanent and irreversible.

Due to the large size of the project area and a lack of roads or tracks in the area (which would have facilitated speedy access to a large portion of the area) it proved impossible to investigate the entire area in the time and budget available. The foot was undertaken in the northern half of the project area as the majority of the proposed infrastructure elements are planned to occur there. The transect path was also restricted to the northern sector because the only potentially fossiliferous geological unit in the project area (i.e., the aeolian sands of the Gordonia Formation) is most completely developed there. The site of the proposed borrow pit to be excavated in the extreme south of the project area was not investigated as examination of Google earth imagery indicated that the potentially fossiliferous sands of the Gordonia Formation are very thin to absent there. This assumption is further strengthened by the reality that the calcrete that will be extracted there is present throughout much of the project area, but extraction economics suggests that the material be extracted where the overburden is thinnest or absent. It was considered that this methodology provided adequate insight into the projects potential to negatively impact upon the palaeontological heritage of the area.

The potential negative impact to the palaeontological heritage of the area can be minimised by the implementation of appropriate mitigation processes. It is accordingly recommended that an employee (e.g., the environmental officer or whom-ever is responsible for compliance with the approved Environmental Management Program) of the client company be trained to identify the

types of fossils that may be expected to occur within the Gordonia Formation. This officer should make ongoing and thorough examination of the any excavations within the Gordonia Formation as they occur. Should any fossil materials be identified, the particular excavation(s) should be halted and SAHRA informed of the discovery. A qualified palaeontologist should then be appointed to evaluate the significance of the fossil materials. Should scientifically or culturally significant fossil material be exist within the project area any negative impact upon it could be mitigated by its excavation (under permit from SAHRA) by a palaeontologist and the resultant material being lodged with an appropriately permitted institution. In the event that an excavation is impossible or inappropriate the fossil or fossil locality could be protected and the site of any planned construction moved.

This study has not identified any palaeontological reason to prejudice the progression of this project, subject to the recommended mitigation programs being put in place.

RECOMMENDATIONS

It is recommended that an employee (e.g., the environmental officer or whom-ever is responsible for compliance with the approved Environmental Management Program) of the client company be trained to identify the types of fossils that may be expected to occur within the Gordonia Formation. This employee should make ongoing and thorough examinations of any excavations within the Gordonia Formation strata as they occur. Should any fossil materials be identified, the particular excavation(s) should be halted and SAHRA informed of the discovery. A qualified palaeontologist should then be appointed to evaluate the significance of the fossil materials. Should scientifically or culturally significant fossil material be exist within the project area any negative impact upon it could be mitigated by its excavation (under permit from SAHRA) by a palaeontologist and the resultant material being lodged with an appropriately permitted institution. In the event that an excavation is impossible or inappropriate the fossil or fossil locality could be protected and the site of any planned construction moved.

9 IMPACT ASSESSMENT METHODOLOGY

In accordance with GNR 982, promulgated in terms of Section 24(J) of the National Environmental Management Act, 1998 (Act 107 of 1998), specialists will be required to assess the significance of potential impacts in terms of the following criteria:

- Cumulative impacts;
- The nature, significance and consequences of the impact and risk;
- The extent and duration of the impact and risk;
- The probability of the impact and risk occurring;
- The degree to which the impact and risk can be reversed;
- The degree to which the impact and risk may cause irreplaceable loss of resources; and
- The degree to which the impact and risk can be mitigated.

The potential environmental impacts will be evaluated according to their intensity, extent, duration, probability and confidence of the impact. Furthermore, cumulative impacts will also be taken into consideration. Hackings risk assessment methodology[17] will be used for the ranking of the impacts.

The significance of environmental aspects can be determined and ranked by considering the criteria presented in **Table 9-1.** In some cases it may be necessary to undertake the impact assessment to determine whether a particular aspect is significant. Therefore, a fair degree of iteration is unavoidable during the assessment process.

Table 9-1: Criteria Used to Determine the Significance of Environmental Aspects

Significance Ranking	Negative Aspects	Positive Aspects
H (High)	Will always/often exceed legislation or standards. Has characteristics that could cause significant negative impacts.	Compliance with all legislation and standards. Has characteristics that could cause significant positive impacts.
M (Moderate)	Has characteristics that could cause negative impacts.	Has characteristics that could cause positive impacts.
L (Low)	Will never exceed legislation or standards. Unlikely to cause significant negative impacts.	Will always comply with all legislation and standards. Unlikely to cause significant positive impacts.

Where significant environmental aspects are present (“high” or “moderate”), significant environmental impacts may result. The significance of the impacts associated with the significant aspects can be determined by considering the risk:

[17] Sánchez, L E, and T Hacking (2002), “An approach to linking environmental impact assessment and environmental management systems”, Impact Assessment and Project Appraisal, 20(1), March, pages 25–38.

Significance of Environmental Impact (Risk) = Probability x Consequence

The consequence of impacts can be described by considering the severity, spatial extent and duration of the impact.

9.1 SEVERITY OF IMPACTS

Table 9-2 presents the ranking criteria that can be used to determine the severity of impacts on the bio-physical and socio-economic environment.

Table 9-3 provides additional ranking criteria for determining the severity of negative impacts on the bio-physical environment.

Table 9-2: Criteria for Ranking the Severity of Environmental Impacts

	Negative			Positive		
	High (H-)	Medium (M-)	Low (L-)	Low (L+)	Medium (M+)	High (H+)
Qualitative	Substantial deterioration. Death, illness or injury.	Moderate deterioration. Discomfort.	Minor deterioration. Nuisance or minor irritation.	Minor improvement.	Moderate improvement.	Substantial improvement.
Quantitative	Measurable deterioration.		Change not measurable i.e. will remain within current range.		Measurable improvement.	
	Recommended level will often be violated.	Recommended level will occasionally be violated.	Recommended level will never be violated.		Will be within or better than recommended level.	
Community Response	Vigorous community action.	Widespread complaints.	Sporadic complaints.		No observed reaction.	Favourable publicity

Table 9-3: Criteria for Ranking the Severity of Negative Impacts on the Bio-physical Environment

Ranking Criteria			
	Low (L-)	Medium (M-)	High (H-)
Soils and land capability	Minor deterioration in land capability. Soil alteration resulting in a low negative impact on one of the other environments (e.g. ecology).	Partial loss of land capability. Soil alteration resulting in a moderate negative impact on one of the other environments (e.g. ecology).	Complete loss of land capability. Soil alteration resulting in a high negative impact on one of the other environments (e.g. ecology).
Ecology (Plant and animal life)	Disturbance of areas that are degraded, have little conservation value or are unimportant to humans as a resource. Minor change in species variety or	Disturbance of areas that have some conservation value or are of some potential use to humans. Complete change in species variety or	Disturbance of areas that are pristine, have conservation value or are an important resource to humans. Destruction of rare or endangered

Ranking Criteria			
	Low (L-)	Medium (M-)	High (H-)
	prevalence.	prevalence.	species.
Surface and Groundwater	Quality deterioration resulting in a low negative impact on one of the other environments (ecology, community health etc.)	Quality deterioration resulting in a moderate negative impact on one of the other environments (ecology, community health etc.).	Quality deterioration resulting in a high negative impact on one of the other environments (ecology, community health etc.).

9.2 SPATIAL EXTENT AND DURATION OF IMPACTS

The duration and spatial scale of impacts can be ranked using the criteria in **Table 9-4**:

Table 9-4: Ranking the Duration and Spatial Scale of Impacts

Ranking Criteria			
	Low (L-)	Medium (M-)	High (H-)
Duration	Quickly reversible Less than the project life Short-term	Reversible over time Life of the project Medium-term	Permanent Beyond closure Long-term
Spatial Scale	Localised Within site boundary Site	Fairly widespread Beyond site boundary Local	Widespread Far beyond site boundary Regional/national

Where the severity of an impact varies with distance, the severity should be determined at the point of compliance or the point at which sensitive receptors will be encountered. This position corresponds to the spatial extent of the impact.

9.3 CONSEQUENCE OF IMPACTS

Having ranked the severity, duration and spatial extent, the overall consequence of impacts can be determined using the following qualitative guidelines:

Table 9-5: Ranking the Consequence of an Impact

Severity = L

DURATION	Long Term	H	Medium	Medium	Medium
	Medium Term	M	Low	Low	Medium
	Short Term	L	Low	Low	Medium

Severity = M

DURATION	Long Term	H	Medium	High	High
	Medium Term	M	Medium	Medium	High
	Short Term	L	Low	Medium	Medium

Severity = H

DURATION	Long Term	H	High	High	High

	Medium Term	M	Medium	Medium	High
	Short Term	L	Medium	Medium	High
			Low	Medium	High
			Localised - within site boundary (Site)	Fairly widespread - beyond site boundary (Local)	Widespread - Far beyond site boundary (Regional / National)
			SPATIAL SCALE		

To use **Table 9-5**, firstly go to one of the three "layers" based on the severity ranking obtained from **Table 9-1** and/ or **Table 9-2**. Thereafter determine the consequence ranking by locating the intersection of the appropriate duration and spatial scale rankings.

9.4 OVERALL SIGNIFICANCE OF IMPACTS

Combining the consequence of the impact and the probability of occurrence, as shown by **Table 9-6**, provides the overall significance (risk) of impacts.

Table 9-6: Ranking the Overall Significance of Impacts

Probability	Definite Continuous	H	Medium	Medium	High
	Possible Frequent	M	Medium	Medium	High
	Unlikely Seldom	L	Low	Low	Medium
			Low	Medium	High
			CONSEQUENCE (from Table 9-5)		

The overall significance ranking of the negative environmental impacts provides the following guidelines for decision making (**Table 9-7**):

Table 9-7: Guidelines for decision-making

	Nature of Impact	Decision Guideline
High	Unacceptable impacts.	Likely to be a fatal flaw.
Moderate	Noticeable impact.	These are unavoidable consequence, which will need to be accepted if the project is allowed to proceed.
Low	Minor impacts.	These impacts are not likely to affect the project decision.

10 ENVIRONMENTAL AND SOCIO-ECONOMIC IMPACTS

10.1 PHASES OF DEVELOPMENT

It is understood that the proposed project will cause impacts to the immediate and surrounding biophysical and socio-economic environment. Specific environmental and socio-economic impacts will occur at different phases of the proposed project. These phases include:

Construction: including the planning and implementation phases, construction of the HSPG and associated infrastructure.

Operation: including the operation of the HSPG.

Decommissioning: including the closure of the HSPG.

Potential impacts were identified during the scoping phase of the proposed project which have now been assessed below.

10.2 POTENTIAL IMPACTS

The impact assessment takes cognisance of the biophysical, socio-economic and cultural environments associated with the proposed HSPG. The following aspects were evaluated:

- Geology;
- Topography;
- Soils, Land Use and Land Capability;
- Biodiversity;
- Hydrology and geohydrology;
- Air Quality;
- Noise;
- Archaeology, Cultural and Heritage;
- Traffic;
- Visual; and
- Socio-economic.

10.3 ASSESSMENT OF ENVIRONMENTAL AND SOCIO-ECONOMIC IMPACTS

Impacts identified during the Scoping and EIR phase of the project have been quantified. A summary of the ratings is provided in **Table 10-1** and **Table 10-2** and full ratings table for all identified potential impacts are included in **Appendix 3**. Significant impacts and the factors contributing to the significance are discussed below.

A rating of Medium-High is set as the definition of significant, since such rating and above attracts an obligation for mitigation. Ratings of Medium and below are assumed not to require mitigation,

that is, they have no material effect on the project's implementation, and are therefore not discussed further in this report, although mitigation measures for them may be included in the EMPr for auditing purposes.

Impacts have been evaluated and quantified for the following activities:

- Impact associated with the construction of the HSPG;
- Impact associated with the operation of the HSPG; and
- Impacts associated with the decommissioning/closure of the HSPG.

IMPACT ASSOCIATED WITH THE CONSTRUCTION OF THE HSPG

Table 10-1 details the anticipated impacts and proposed mitigation measures associated with the construction of the HSPG. Further details with regards to the mitigation measures are details in the EMPr (**Appendix 4**).

IMPACTS ASSOCIATED WITH THE OPERATION OF THE HSPG

Table 10-2 details the anticipated impacts and proposed mitigation measures associated with the operation of the HSPG. Further details with regards to the mitigation measures are details in the EMPr (**Appendix 4**).

IMPACTS ASSOCIATED WITH THE DECOMISSIONING / CLOSURE OF THE HSPG

A risk based closure assessment has not been assessed as decommissioning/closure of the HSPG is not expected within the next few years. A closure impact assessment will only be completed once a closure date is established to identify the ideal scenario for closure planning. A multidisciplinary closure team will be established in order to identify different aspects that need to be considered for closure.

Table 10-1: Anticipated Impacts Associated with the Construction of the HSPG

Ref.	Aspect	Impact Description	Significance Without Mitigation	Significance With Mitigation
	Geology	The sourcing of the material for the construction of the HSPG may have a permanent impact on the mineral potential and geology of the Kalahari Group.	Medium (-)	Medium (-)
		Excavation may influence the underlying Kalahari Group of the site as a void may be created, that will have a steep gradient or stepped walls.	Medium (-)	Medium (-)
		Resultant impacts from blasting and vibrations may impact on Kalahari Group.	Medium (-)	Medium (-)
	Topography	The development of the Borrow Pit and Quarry will alter the linear dunes and inter-dune straaten of the area.	High (-)	Low (-)
		The development of the HSPG will alter the linear dunes and inter-dune straaten of the area.	High (-)	Medium (-)
		Activities associated with site clearing, topsoil stripping and topsoil stockpiling for the contractor laydown area and development of the HSPG may have an impact on the topography of the area.	Medium (-)	Low (-)
	Soil, Land Use and Land Capability	Activities associated with the extraction of material and development of the HSPG including development and use of access roads will have a direct impact on the dunes found in the area.	Medium (-)	Low (-)
		Stockpiling and crushing of construction material prior to being transferred into the tipper vehicles can result in the generation of dust and settling of the particulate matter on the surrounding environment (Fauna and Flora).	Medium (-)	Low (-)
		The construction of the HSPG will have an impact on the current land use and grazing potential of the area.	Low (-)	Low (-)
		Leakages and spillages of hydrocarbons from vehicles, machinery and equipment as well as the spillage of sewage from chemical toilets could cause deterioration of the soils resulting in a loss of land capability within the immediate area.	Medium (-)	Low (-)
		Soil contamination though poor management of wastes generated onsite.	Medium (-)	Low (-)
		Compaction of soil will concentrate surface water runoff from the site, resulting in downstream erosion, flooding or loss of biodiversity.	Medium (-)	Low (-)
	Biodiversity	The development of the HSPG could result in the loss of the already threatened Gordonia Duneveld.	Low (-)	Low (-)
		Traffic and transport activities may impact flora and fauna species.	Low (-)	Low (-)
		Pumping of groundwater from the proposed property and surrounding areas may have an impact on sensitive ecosystems such as wetlands and may result in a loss of flora and fauna species.	Medium (-)	Low (-)
		Generation of dust during clearing and excavation activities could result in the loss of biodiversity in the project area.	Low (-)	Low (-)
		Generation of noise during excavation activities resulting in the outflow of biodiversity from the project site.	Low (-)	Low (-)
		Incorrect management and storage of dangerous goods and chemicals, including waste and	Low (-)	Low (-)

Ref.	Aspect	Impact Description	Significance Without Mitigation	Significance With Mitigation
		sewage, could result in the pollution of soils and watercourses which may impact negatively on plants and subsequently animals.		
		Fragmentation of the biodiversity as a result of the development can lead to the loss in ecological connectivity of the area.	**Medium (-)**	**Low (-)**
		The construction of the HSPG may have a direct impact on the protected flora species of the area and may result in the loss / degradation of these species.	**High (-)**	**Medium (-)**
		Fauna species may be disturbed during the construction phase and may need to be relocated away from the proposed HSPG.	**High (-)**	**Medium (-)**
		The extract of material (Granite outcrop) required for the construction of the HSPG may have a direct impact on the smaller fauna species (Reptiles, Rodents) due to a loss in habitat.	**Medium (-)**	**Medium (-)**
		The project and especially the excavation of road building material have the potential to impact on biodiversity situated within the wetland area.	**Low (-)**	**Low (-)**
		Facilitation of alien invasive species resulting from excavation activities as people and vehicles are brought onto site. This can cause the displacement of indigenous species, transformation of terrestrial habitats and altering ecosystem functioning and services.	**Medium (-)**	**High (+)**
		The project and especially the excavation of road building material have the potential to impact on biodiversity situated within the wetland area.	**Low (-)**	**Low (-)**
	Rivers, Wetland and Pans	Alteration in the infiltration of both surface and groundwater may potential alter the flow regime of the wetland.	**Medium (-)**	**Low (-)**
		The abstraction of groundwater may affect the flow of water to and from the wetland.	**Medium (-)**	**Low (-)**
		The construction of the HSPG and extraction of materials for the development may alter the water quality of the wetland.	**Low (-)**	**Low (-)**
		Flow diversion of the surface water as a result of the construction of HSPG	**Low (-)**	**Low (-)**
		Change from wetland to terrestrial habitat and loss of wetland functions as a result of the construction of HSPG.	**Medium (-)**	**Low (-)**
		Direct destruction of wetland through the construction of the HSPG affecting wildlife habitat and flow attenuation functions, organic matter inputs and potential for erosion.	**Low (-)**	**Low (-)**
		Wetland contamination may occur from spillages and leakages of hydrocarbons, contaminated water onsite.	**Low (-)**	**Low (-)**
	Hydrology	The compaction of surfaces will modify the infiltration rates which may impact surface water.	**Medium (-)**	**Low (-)**
		The alteration/removal of vegetation may modify the infiltration rates which may impact surface water.	**Medium (-)**	**Low (-)**
		Contaminated from hydrocarbon spillages will affect runoff which may impact surface water.	**Medium (-)**	**Low (-)**
		The excavation of the material required to develop the HSPG may alter the natural drainage of the	**Medium (-)**	**Low (-)**

Ref.	Aspect	Impact Description	Significance Without Mitigation	Significance With Mitigation
		area.		
	Geohydrology	Contamination of Groundwater from the construction of the borrow pit and quarry area.	Low (-)	Low (-)
		The compaction of surfaces will modify the infiltration rates which may impact groundwater.	Low (-)	Low (-)
		Pumping of groundwater from the site and surrounding areas may reduce the natural groundwater recharge.	Low (-)	Low (-)
		Leakages and spillages of hydrocarbons from vehicles, machinery and equipment as well as the spillage of sewage from chemical toilets could result in the contamination of groundwater.	Medium (-)	Low (-)
	Air Quality	The generation of dust (PM10 and dust fallout) from land clearing, blasting, crushing and screening, transport via gravel roads, stockpiles, etc. may impact the air quality.	Low (-)	Low (-)
		Dust may impact on the health and safety of employees and the surrounding community through respiratory, visual and aesthetic impacts.	Low (-)	Low (-)
		Vehicle activity on the main road from the Upington Airport to the proposed project may generate dust which may impact on air quality.	Low (-)	Low (-)
		Emission of NO2, SO2, CO and VOC from vehicles, machinery and equipment.	Low (-)	Low (-)
		Impact from dust (PM10 and dust fallout) on biodiversity.	Low (-)	Low (-)
		Air quality impacts on residential receptors	Low (-)	Low (-)
	Noise and Vibrations	Acoustic impacts as a result of the construction of the HSPG on residential receptors	Low (-)	Low (-)
		Noise may be generated from blasting, transportation, machinery etc. which may have a negative impact on the surrounding biophysical and socio-economic environment.	Low (-)	Low (-)
		Vibrations from blasting may result in displacement of sensitive fauna species.	Low (-)	Low (-)
		Vibrations may cause failure which may impact on the health and safety of employees, as well as the subsidence of topography.	Low (-)	Low (-)
	Archaeological, Cultural and Heritage	The proposed project may have an impact on sites of archaeological, historic and cultural importance/significance which includes three site locations (Site 028,030 and 087).	High (-)	Low (-)
		The proposed construction of the oval testing track may have an impact on the archaeological, historic and culturally important items found ± km 7 in the north eastern portion of the farm (Site 011-017/715).	Low (-)	Low (-)
		The identification of buried archaeological sites and unmarked human remains may be uncovered during vegetation clearing, landscaping and earthmoving operations.	Low (-)	Low (-)
		The extraction of granite from the outcropping/inselberg located on the property may have an impact archaeological, historic and culturally important items found (Site 055 and 056).	Low (-)	Low (-)
		The development of the bad roads may have an impact on the archaeological, historic and culturally important items found in this area (Site 745-749, 750/751 and 753).	Medium (-)	Low (-)

Ref.	Aspect	Impact Description	Significance Without Mitigation	Significance With Mitigation
	Traffic	The estimated construction period of the HSPG infrastructure is two years could potentially cause a deterioration of the public roads (both paved and unpaved) due to increase vehicle traffic.	Low (-)	Low (-)
		Operation of vehicles may increase the occurrences of road accidents around the project site.	Low (-)	Low (-)
		The construction of the HSPG could result in an increase of road users (including light and heavy weight vehicles) to and from the site.	Low (-)	Low (-)
		The north-eastern shoulder sight distance at the proposed access location is below road standard which could pose a risk to health and safety for road users.	Medium (-)	Low (-)
	Visual	The generation of dust during construction of the HSPG may have visual impact within the surrounding area.	Medium (-)	Low (-)
		Visual intrusion associated with construction equipment including the crushing plant and vehicle movement may have an impact to the aesthetics of the area.	Low (-)	Low (-)
	Socio-economic	Creation of employment and business opportunities and opportunity for skills development and on-site training.	Medium (+)	High (+)
		Potential impacts on family structures and social networks associated with the presence of construction workers	Low (-)	Low (-)
		Safety and security risk associated with presence of construction workers.	Medium (-)	Low (-)
		Potential loss of livestock, crops and houses, damage to farm infrastructure and threat to human life associated with increased incidence of grass fires.	Medium (-)	Low (-)
		Potential noise, dust and safety impacts associated with construction activities and the movement of traffic to and from the site.	Medium (-)	Low (-)
		The activities associated with the construction phase, such as establishment of access roads, HSPG and borrow pits etc. May result in the loss of land available for grazing.	Low (-)	Low (-)

Table 10-2: Anticipated Impacts Associated with the Operation of the HSPG

Ref.	Aspect	Impact Description	Significance Without Mitigation	Significance With Mitigation
	Geology	Geology of the site will not be affected during the operation of the HSPG	N/A	N/A
	Topography	The topography will not be affected during the operation of the HSPG	N/A	N/A
	Soil, Land Use and Land Capability	Spillage of oils, greases, diesel etc. from testing vehicles can result in the contamination of soil resources.	Medium (-)	Low (-)
		Spillage of effluent from the conservancy tank if a leak were to occur can result in the contamination of soil resources	Low (-)	Low (-)
	Biodiversity	The operation of the HSPG could potentially limit the movement of fauna onsite.	Low (-)	Low (-)
		Pumping of groundwater may impact on sensitive ecosystems such as wetlands and may result in a loss of flora and fauna species.	Low (-)	Low (-)
		Traffic and transport activities may impact flora and fauna species	Medium (-)	Low (-)
		The removal of fauna species from site may result in uncontrolled growth of vegetation which may pose a fire risk to the surrounding areas.	Medium (-)	Low (-)
		The transport of vehicles along the unpaved road to the HSPG may result in the generation of dust which could result in a loss of biodiversity.	Medium (-)	Low (-)
		In the event that fauna gain access to the HSPG this could pose a health and safety risk.	Medium (-)	Low (-)
	Rivers, Wetland and Pans	Spillage of oils, greases, diesel etc. from testing vehicles can result in the contamination of the wetland.	Low (-)	Low (-)
		Spillage of effluent from the conservancy tank if a leak were to occur can result in the contamination of the wetland.	Low (-)	Low (-)
	Hydrology	Leakages and spillages of hydrocarbons from vehicles, and equipment (generators) could result in the contamination of surface water runoff from the site (i.e. pollution of the surrounding environment).	Medium (-)	Low (-)
		In the event that a leak occurs from the conservancy tank this could potentially result in the contamination of surface water.	Medium (-)	Low (-)
		Soil contamination may occur from the poor management of wastes generated onsite.	Low (-)	Low (-)
		The quarry and Borrow pit will be half backfilled from remaining material (uncontaminated soil) as such this could potentially create a void in which water may be naturally stored from stormwater runoff.	Medium (-)	Low (-)
	Geohydrology	Pumping of groundwater from the site and surrounding areas may reduce the natural groundwater recharge.	Low (-)	Low (-)
		Leakages and spillages of hydrocarbons from vehicles, and equipment as well as the spillage of sewage from the conservancy tank could result in the contamination of groundwater.	Medium (-)	Low (-)

Ref.	Aspect	Impact Description	Significance Without Mitigation	Significance With Mitigation
	Air Quality	Dust may impact on the health and safety of employees and the surrounding community through respiratory, visual and aesthetic impacts.	Low (-)	Low (-)
		Vehicle activity on the main road from the Upington Airport to the proposed project may generate dust which may impact on air quality.	Low (-)	Low (-)
		Emission of NO_2, SO_2, CO and VOC from vehicle testing, machinery and equipment.	Low (-)	Low (-)
		Impact from dust (PM_{10} and dust fallout) on biodiversity.	Low (-)	Low (-)
		Air quality impacts on residential receptors	Low (-)	Low (-)
	Noise and Vibrations	Acoustic impacts as a result of the operation of the HSPG on residential receptors.	Low (-)	Low (-)
		The testing of vehicles at the HSPG may generate noise which may have a negative impact on the surrounding biophysical and socio-economic environment.	Low (-)	Low (-)
	Archaeology, Historic and Cultural	During the operation of the HSPG it is not foreseen that the archaeology, historic or culture of this site will be impacted upon.	N/A	N/A
	Traffic	The peak hour trip generation of the proving ground may have an impact on the traffic operating conditions of the affected public road network.	Low (-)	Low (-)
		The operation of the HSPG could result in an increase of road users (including light and heavy weight vehicles) to and from the site.	Low (-)	Low (-)
		The north-eastern shoulder sight distance at the proposed access location is below road standard which could pose a risk to health and safety for road users.	Medium (-)	Low (-)
	Visual	The generation of dust from the moment of vehicles to and from the HSPG may have visual impact within the surrounding area.	Medium (-)	Low (-)
		Visual impact associated with the proposed facility and the potential impact on the areas rural sense of place.	Medium (-)	Low (-)
	Socio-economic	Creation of opportunities for the hospitality and tourism sector associated with the operational phase.	Medium (+)	High (+)
		Creation of employment and business opportunities associated with the operational phase.	Medium (+)	High (+)
		Raise profile of Upington and benefit town.	Medium (-)	Medium (+)
		Potential loss of livestock, crops and houses, damage to farm infrastructure and threat to human life associated with increased risk of grass fires.	Medium (-)	Low (-)
		Potential noise, dust and safety impacts associated with movement of operational phase traffic to and from the site.	Medium (-)	Low (-)

10.4 SIGNIFICANT IMPACTS IDENTIFIED

The impacts identified during the EIR phase of the S&EIR process have been evaluated using the methodology stated above. If the mitigation measure in the EMPr is correctly implemented these impacts should not pose a sever threat to the environment. A number of impacts however have been found to have a significant impact (impacts rated to have a medium or high (positive/negative) rating with mitigation). The following impacts have been listed below in Table 10-3 and Table 10-4.

Table 10-3: Anticipated Significant Impacts Associated with the Construction of the HSPG

Ref.	Aspect	Impact Description	Significance Without Mitigation	Significance With Mitigation
	Geology	The sourcing of the material for the construction of the HSPG may have a permanent impact on the mineral potential and geology of the Kalahari Group.	**Medium (-)**	**Medium (-)**
		Excavation may influence the underlying Kalahari Group of the site as a void may be created, that will have a steep gradient or stepped walls.	**Medium (-)**	**Medium (-)**
		Resultant impacts from blasting and vibrations may impact on Kalahari Group.	**Medium (-)**	**Medium (-)**
	Topography	The development of the HSPG will alter the linear dunes and inter-dune straaten of the area.	**High (-)**	**Medium (-)**
	Biodiversity	The construction of the HSPG may have a direct impact on the protected flora species of the area and may result in the loss / degradation of these species.	**High (-)**	**Medium (-)**
		Fauna species may be disturbed during the construction phase and may need to be relocated away from the proposed HSPG.	**High (-)**	**Medium (-)**
		The extract of material (Granite outcrop) required for the construction of the HSPG may have a direct impact on the smaller fauna species (Reptiles, Rodents) due to a loss in habitat.	**Medium (-)**	**Medium (-)**
		Facilitation of alien invasive species resulting from excavation activities as people and vehicles are brought onto site. This can cause the displacement of indigenous species, transformation of terrestrial habitats and altering ecosystem functioning and services.	**Medium (-)**	**High (+)**
	Socio-economic	Creation of employment and business opportunities and opportunity for skills development and on-site training.	**Medium (+)**	**High (+)**

Table 10-4: Anticipated Significant Impacts Associated with the Operation of the HSPG

Ref.	Aspect	Impact Description	Significance Without Mitigation	Significance With Mitigation
	Socio-economic	Creation of opportunities for the hospitality and tourism sector associated with the operational phase.	**Medium (+)**	**High (+)**
		Creation of employment and business opportunities associated with the operational phase.	**Medium (+)**	**High (+)**

Ref.	Aspect	Impact Description	Significance Without Mitigation	Significance With Mitigation
		Raise profile of Upington and benefit town.	**Medium (-)**	**Medium (+)**

CUMULATIVE IMPACT

The term cumulative impact can be used to describe the phenomenon of changes in the environment that result from the proposed project. Cumulative impacts have an incremental impact, and have a total effect on natural resources/ecosystems/human communities.

Secondary impacts can be defined as effects that are a result of the proposed project that occur "later in time or further removed in distance but are still reasonably foreseeable". These impacts are caused by another action that has an established connection to the project.

GEOLOGY

Material extracted from the quarry and borrow pit which will be utilised for the construction of the HSPG is predicted to have an irreplaceable impact on the geology and as such no mitigation measure will aid in the prevention or rehabilitation of this area. As the mining area is limited to only a small portion of the farm the cumulative impact is anticipated to be **low (-)** and will not have a direct impact on the remaining geology of the area.

TOPOGRAPHY

The development of the HSPG is predicted to alter the linear dunes and inter-dune straaten of the area. As this area falls within the Kalahari Duneveld Bioregion which is considered to have a least threated conservation status and therefore all effort should be made to reduce the impact associated with the construction of the HSPG. The proposed project will have a permanent but localised and relatively small impact. It is considered unlikely that the proposed project will have any significant impacts on local or regional conservation targets. It might in fact add to regional conservation targets as the remaining natural veld will be protected from stock grazing practices. The cumulative impact of the topography is considered to be **Low (-).**

BIODIVERSITY

The proposed project will have a permanent but localised impact. However, it is considered unlikely that the cumulative impact will result in significant additional impact on local or regional biodiversity targets, but it will have a localised impact on protected plant species (and might have an impact on protected reptile species). The cumulative impact is thus considered to have a **medium (-)** impact.

SOCIO-ECONOMIC

It is anticipated that the construction and operation of the HSPG will add to the creation of employment and business opportunities and therefore will provide:

- An overall opportunity to up-grade and improve skills levels in the area;
- Promotion of social and economic development and improvement in the overall well-being of the community;
- Creation of additional employment, business and economic opportunities in the area; and
- Raise profile of Upington and attract visitors and business to the area.

The cumulative impact is thus considered to be **Medium (+)**.

11 PUBLIC PARTICIPATION PROCESS

11.1 PUBLIC PARTICIPATION PROCESS

Public participation is understood to be a series of inclusive and culturally appropriate interactions aimed at providing stakeholders with opportunities to express their views, so that these can be considered and incorporated into the S&EIR decision-making process. Effective public participation requires the prior disclosure of relevant and adequate project information to enable stakeholders to understand the risks, impacts, and opportunities of the proposed project.

The objectives of the public participation process can be summarised as follows:

- Identify relevant individuals, organisations and communities who may be interested in or affected by the proposed project;
- Clearly outline the scope of the proposed project, including the scale and nature of the existing and proposed activities;
- Identify viable proposed project alternatives that will assist the relevant authorities in making an informed decision;
- Identify shortcomings and gaps in existing information;
- Identify key concerns, raised by stakeholders that should be addressed in the subsequent specialist studies;
- Highlight the potential for environmental impacts, whether positive or negative; and
- To inform and provide the public with information and an understanding of the proposed project, issues and solutions.

11.2 THE ROLES AND RESPONSIBILITIES OF THE STAKEHOLDER

Registered stakeholders have the right to bring to the attention of the competent authority any issues that they believe may be of significance to the consideration of the application. The rights of stakeholder are qualified by certain obligations, namely:

- Stakeholders must ensure that their comments are submitted within the timeframes that have been approved by the NCDENC, or within any extension of a timeframe agreed by the Proponent, EAP or competent authorities;
- Serve a copy of the comments submitted directly to the competent authorities, the Proponent or the EAP; and
- Disclose to the EAP any direct business, financial, personal or other interest that they might have in the approval or refusal of the application.

ROLE OF STAKEHOLDERS

The roles of stakeholders in a public participation process usually include one or more of the following:

- Assisting in the identification and prioritisation of issues that need to be investigated;
- Making suggestions on alternatives and means of preventing, minimising and managing negative impacts and enhancing proposed project benefits;

- Assisting in or commenting on the development of mutually acceptable criteria for the evaluation of decision options;
- Contributing information on public needs, values and expectations;
- Contributing local and traditional knowledge; and
- Verifying that their issues have been considered.

RESPONSIBILITY OF STAKEHOLDERS

In order to participate effectively, stakeholders should:

- Become involved in the process as early as possible;
- Register as a stakeholder;
- Advise the EAP of other stakeholders who should be consulted;
- Contribute towards the design of the public participation process (including timeframes) to ensure that it is acceptable to all stakeholders;
- Follow the process once it has been accepted;
- Read the material provided and actively seek to understand the issues involved
- Give timeous responses to correspondence;
- Be respectful and courteous towards other stakeholders;
- Refrain from making subjective, unfounded or ill-informed statements; and
- Recognise that the process is confined to issues that are directly relevant to the application.

11.3 APPROACH TO PUBLIC PARTICIPATION

Our approach to stakeholder engagement is based on the following principles:

- Undertake meaningful and timely participation with stakeholders;
- Focus on important issues during the S&EIR process;
- Undertake due consideration of alternatives;
- Take accountability for information used;
- Encourage co-regulation, shared responsibility and a sense of ownership over the proposed project lifecycle;
- Apply "due process" particularly with regard to public participation as provided for in the EIA Regulations; and
- Consider the needs, interests and values of stakeholders.

11.4 PUBLIC PARTICIPATION UNDERTAKEN DURING SCOPING PHASE

METHODOLOGY

The following activities were undertaken as part of the Scoping phase:

- Stakeholder identification;
- Authority notification;
- Stakeholder notification;
- Stakeholder meetings;

- Compilation of an Issues Trail;
- Public review of the Draft Scoping Report (DSR); and
- Submission of the Final Scoping Report to Authorities.

STAKEHOLDER IDENTIFICATION

The identification and registration of stakeholders is an ongoing activity during the course of the S&EIR process. It should be noted however that only a registered stakeholder is entitled to comment, in writing, on all written submissions made to the competent authority by the applicant or the EAP managing an application, and to bring to the attention of the competent authority any issues which that party believes may be of significance to the consideration of the application, provided that comments are submitted within the timeframes that have been approved or set by the competent authority or any extension of a timeframe agreed to by the applicant or EAP.

Stakeholders were identified and will continue to be identified through several mechanisms. These include:

- Utilising existing databases from other projects in the area;
- Networking with local business owners, non-governmental agencies, community based organisations, and local council representatives;
- Field work in and around the project area;
- Advertising in the press;
- Placement of community notices;
- Discussions with local community and relevant ward councillors;
- Completed comment sheets; and
- Attendance registers at public meetings.

All Stakeholders identified to date have been registered on the project stakeholder database. The EAP endeavoured to ensure that individuals/organisations from referrals and networking were notified of the proposed project. Stakeholders were identified at the horizontal (geographical) and vertical extent (organisations level). Refer to **Appendix 5-1** for a list of stakeholders captured in the project database.

AUTHORITY NOTIFICATION

WSP notified the NCDENC and a number of other national, provisional and local authorities of the proposed project via a notification letter at the start of the public participation process. The comments received from these authorities have been included in a Comment and Response Report **(Appendix 5-2)**. Communication lines will remain in place for the duration of the proposed project to ensure all authorities have the opportunity to comment on the proposed project and the EA processes undertaken.

The Environmental Application form was submitted to the NCDENC on 2 September 2015 and subsequently accepted on 09 September 2015. The NCDENC reference number allocated to this application is NC/EIA/03/ZFM/KHA/UP12/2015. A copy of the application form and the acknowledgement of receipt of the applications are included in **Appendix 5-4** and **Appendix 5-5** respectively.

WSP consulted with the NCDENC at an authority meeting, including a site visit held, on 14 and 16 October 2015 respectively in Upington. The attendance register and meeting minutes have been attached as **Appendix 5-6**. An additional authority meeting which included all relevant commenting authorities was held on 15 October 2015. The attendance register and meeting

minutes have been attached as **Appendix 5-7.** These meetings were undertaken to present the environmental setting, the S&EIR process and proposed way forward.

STAKEHOLDER NOTIFICATION

NEWSPAPER ADVERTISEMENTS

In accordance with the requirements of GNR 982, the proposed project was advertised in local and regional newspapers. The purpose of the advertisement was to notify the public about the proposed project and to invite them to register as stakeholders (see **Appendix 5-9**). The relevant advertisement dates undertaken during the Scoping phase are listed in **Table 11-1** below.

Table 11-1: Date on which the Adverts were published

Newspaper	Publication Date	Language	Local/Regional
Gemsbok	24 July 2015	English and Afrikaans	Local
Die Burger	17 July 2015	Afrikaans	Regional

SITE NOTICES

The site notices were erected as per GNR 982 on the proposed site. **Table 11-2** provides the detail concerning these locations. Copies of the site notices are included in **Appendix 5-10.** The site notices were 60cm by 84m.

Table 11-2: Site Notice Locations

Location	Co-ordinates	Photograph
Proposed Project Location	28°08'53.19"S 21°28'28.02"E	
Upington Airport	28°24'44.00"S 21°14'55.41"E	
//Khara Hais Public Library	28°27'24.65"S 21°14'47.36"E	

LETTER OF INVITE

The purpose of a Letter of Invite is to provide stakeholders with introductory information on the applications, the S&EIR process and the public participation process. The Letter of Invite also provides stakeholders who are interested in the proposed project with the opportunity to register by way of completing the registration sheet distributed with the Letter of Invite. Information on the registration sheet will be used to register stakeholders on a database so that they will receive all future project-related information and invitations to meetings. The registration sheet includes a section for comments and issues, which allows stakeholders an opportunity to provide the EAP with written comments and feedback. A copy of the Letter of Invite is contained in **Appendix 5-11**.

This mechanism of notification is suitable for most stakeholder groupings however, in order to ensure an encompassing notification, email, letter, SMS and fax notifications were sent to all registered stakeholders, including the land owner and adjacent land owners (**Appendix 5-12**).

COMMENT AND RESPONSE REPORT

All concerns, comments, viewpoints and questions (collectively referred to as 'issues') will be documented and responded to adequately in a Comment and Response Report (**Appendix 5-2**). The Comment and Response Report records the following:

- List of all issues raised;
- Record of who raised the issues;
- Record of where the issues were raised;
- Record of the date on which the issue was raised;
- Response to the issues; and
- All comments received from stakeholders have been attached as **Appendix 5-3**.

PUBLIC REVIEW OF THE DRAFT SCOPING REPORT

The DSR was placed on public review from **16 September 2015 to 23 October 2015**, at the venues listed in **Table 11-3:**

Table 11-3: Public Review of Draft Scoping Report (Location)

Location	Address	Contact Information
//Khara Hais Public Library	Corner of Scott and Mutual Street Upington 8801	Tel: 054 338 7151
Upington Chambers of Commerce	16 Ribbok St Upington 8801	Tel: 054 333 1312
WSP Website (http://www.wspgroup.com/en/WSP-Africa/What-we-do/Services/All-Services-A-Z/Technical-Reports/)		

All registered stakeholders and authorising/commenting state departments was notified of the public review period as well as the locations of the DSR via email, telephonically and SMS as well as at the stakeholder meeting. WSP did not receive any additional comments / queries regarding the Draft report from stakeholders during the public review process.

SCOPING PUBLIC MEETING

WSP consulted with the stakeholders at a Scoping public meeting which was held on 15 October 2015 in Upington. The meeting outlined the details of the proposed project and provided opportunities for stakeholders to raise issues, concerns and queries. The meeting was utilised to establish a line of communication between stakeholders and the project team. The meeting was facilitated by WSP. The attendance register and meeting minutes have been attached as **Appendix 5-13**.

FINAL SCOPING REPORT SUBMISSION

All issues raised during the Scoping phase of the proposed project were incorporated into the FSR and have been addressed during the EIR phase. Once a decision has been reached, the stakeholders will be informed of the next phase of the public participation process.

11.5 PUBLIC PARTICIPATION UNDERTAKEN DURING EIR PHASE

The public participation process was initiated during the Scoping phase, and has been continued through the EIR phase to ensure stakeholders remain informed of project developments, and to maintain liaison with authorities. During the EIR phase public participation activities the following has been included:

- The registration of any additional I&APs;
- The distribution of notification letters to stakeholders informing them of the public meeting and availability of the Draft EIR for review;
- An open day to dispatch project information to stakeholders and facilitate communication between stakeholders and MBSA; and
- Communication through letters, email, telephonic conversations with authorities and stakeholders throughout the EIR phase until an EA has been issued.

STAKEHOLDER IDENTIFICATION

Stakeholders have and will continue to be identified and notified of the proposed project during this phase (the EIR Phase). This gives each stakeholder a chance to comment and provide relevant information that will be taken into account during the EIR Phase so that an informed decision regarding the proposed project can be made. Refer to **Appendix 5-1** for a list of stakeholders captured in the project database.

STAKEHOLDER NOTIFICATION

Identified stakeholders were notified via SMS, Email and Fax of the acceptance of the FSR by the NCDENC, and the commencement of the EIR Phase. This notification letter included the Draft EIAR public review dates and the public meeting date. The notification letter via email, fax, SMS and post distribution records have been included as **Appendix 5-14**.

ISSUE TRAIL

All concerns, comments, viewpoints and questions (collectively referred to as ‘issues’) received during both the Scoping and EIR Phases (i.e. S&EIR Process to date of this Draft EIAR) have been provided in the Comment and Response report (**Appendix 5-2**).

The following key issues and concerns raised by stakeholders have been listed below:

- Flora and Fauna Permits;
- Forestry Permits;
- Water Availability;
- Fire Control;
- Public Roads/Traffic;
- Noise Issues;
- Mining Activities;

- Social Economic Issues;
- Development and Layout Design;
- Wildlife Control Measures;
- Waste Related Issues;
- Rezoning Permit; and
- Consideration of the Conservation of Agriculture Resources, 1983 (Act 43 of 1983).

PUBLIC REVIEW

The Draft EIAR was placed on public review from **Monday 8 February 2016** to **Friday 11 March 2016**, at the venues listed in **Table 11-4:**

Table 11-4: Public Review of Draft Scoping Report (Location)

Location	Address	Contact Information
//Khara Hais Public Library	Corner of Scott and Mutual Street Upington 8801	Tel: 054 338 7151
Upington Chambers of Commerce	16 Ribbok St Upington 8801	Tel: 054 333 1312
WSP Website (http://www.wspgroup.com/en/WSP-Africa/What-we-do/Services/All-Services-A-Z/Technical-Reports/)		

All issues raised during the EIR Phase of the proposed project have been addressed and incorporated into this the Final EIAR. The Final EIAR have been submitted to the NCDENC as the competent authority for final decision making. Additional reports have ben sent to all relevant and commenting authorities who have been listed in **Table 11-5.**

Table 11-5: Relevant Authority Contact Details

Department/ Stakeholder	Name	Contact Details
NCDENC	Mr O Riba	060 991 4817
DWS (Provincial)	Mr P Meulenbeld	012 336 7663
DWS (Regional)	Mr S Cloete	054 338 5847
DAFF (Tree Permit)	Ms J Mans	054 338 5909
NCDENC (Fauna Permit)	Ms S De la Fontaine	072 860 5478
Khara Hais Local Municipality	Mr D Ngxanga	053 338 7001
ZF Mgcawu District Municipality	Mr. E. Ntoba	054 337 2800

OPEN DAY

WSP consulted with the stakeholders at an EIR open day which was held on 17 February 2016 in Upington. The meeting outlined the details of the proposed project and provided opportunities for stakeholders to raise issues, concerns and queries. The meeting was utilised to establish a line of communication between stakeholders and the project team. The meeting was facilitated by WSP. The attendance register and comment sheets have been attached as **Appendix 5-15**.

FINAL EIAR SUBMISSION

All issues raised during the project have been incorporated into this the Final EIAR and have been addressed. Once a decision has been reached, the stakeholders will be informed of the next phase of the public participation process.

ONGOING CONSULTATION AND ENGAGEMENT

In addition to the public documents distributed to stakeholders, there will be ongoing communication between the proponent, WSP and stakeholders throughout the S&EIR process. These interactions include the following:

- Interactions with stakeholders will take place in English as required;
- Feedback to stakeholders, individually and collectively;
- Written responses (email, faxes or letters) will be provided to stakeholders acknowledging issues and providing information requested (dependent on availability);
- As per the GNR 982, particular attention will be paid to landowners, and neighbouring communities, specifically where literacy levels and language barriers may be an issue; and
- Distribution of all project information and findings to stakeholders.

ANALYSIS OF STAKEHOLDERS

BREAKDOWN OF THE STAKEHOLDERS

Issues that were raised to date by stakeholders have been analysed within this section. **Table 11-6** provides a breakdown of stakeholders currently registered on the database where as **Figure 11-1** illustrates such.

Table 11-6: Breakdown of Stakeholders Currently Registered on the Database

Representative sector	Further explanation	No. of stakeholders
Government departments	All tiers of government, namely, national, provincial, and local government.	40
Business and consultants	Local and neighbouring businesses in the area. Representatives of consulting organisations that provide services in the area	8
Non-governmental organisations (NGOs) and community based organisations	Agricultural unions, churches, and environmental NGOs	3
General public	Local communities, farmers, and other such individuals who may have an interest in the project	8

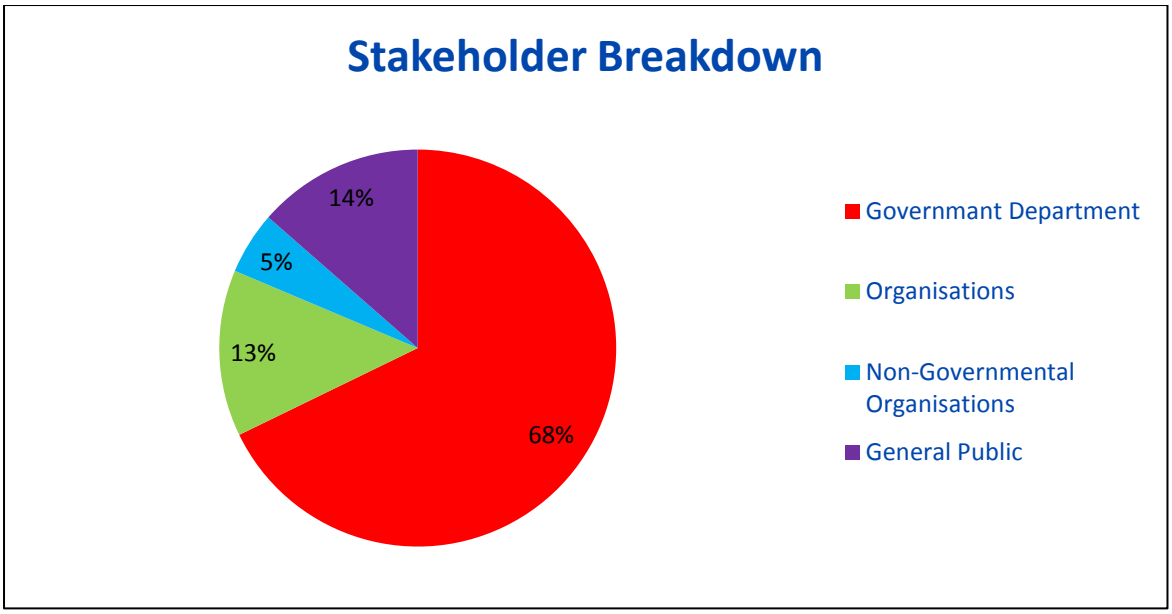

Figure 11-1: Pie chart showing the Breakdown of the Stakeholders currently Registered on the Database

12 IMPLEMENTATION OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME

12.1 IMPACT MONITORING AND MANAGEMENT

MBSA will establish, implement and maintain a procedure(s) to monitor and measure, on a regular basis, the key characteristics of the operation that may have a significant environmental impact. The procedure(s) shall include the documenting of information to monitor performance, applicable operational controls and conformity with the operation's environmental objectives and targets.

MBSA will ensure that all instruments and devices used for the measurement or monitoring are calibrated and appropriately operated and maintained. Calibration records must be kept on site or in close proximity to the equipment for ease of availability.

MBSA will establish, implement and maintain a procedure(s) for periodically evaluating compliance with applicable legal requirements at the operation. MBSA will also evaluate compliance with other requirements to which it subscribes. Records of findings, observations, etc. of the evaluation shall be maintained.

MBSA will establish, implement and maintain a procedure(s) for dealing with actual and potential non-conformities identified and will develop a procedure(s) for taking corrective and preventive action. The procedure(s) shall define requirements for the following:

- Identifying and correcting non-conformities and taking actions to mitigate their environmental impact;
- Investigating non-conformities, determining their causes and taking actions in order to avoid their recurrence;
- Evaluating the need for actions to prevent non-conformities and implementing appropriate actions designed to avoid their occurrence;
- Recording the results of corrective actions and preventive actions undertaken; and
- Reviewing the effectiveness of corrective actions and preventive actions undertaken.

MBSA will ensure that any necessary changes are made and adequately documented and recorded. MBSA will establish and maintain records as necessary to demonstrate conformity to the requirements of the EMPr and relevant procedures.

MBSA will also ensure that internal audits of the conditions within the EMPr are conducted at planned intervals. Audit procedures will be established, implemented and maintained that address the responsibilities and requirements for planning and conducting audits, reporting results and retaining associated reports. The procedure(s) will also address the determination of the audit criteria, scope, frequency and methods. Internal auditors will ensure objectivity of the audit process.

The specific procedures and standard operating procedures will be compiled and finalised, incorporating EMPr commitments, licence conditions and EA added conditions once the Project is in operation.

13 ENVIRONMENTAL IMPACT STATEMENT

The essence of any EIA process is aimed at ensuring informed decision-making and environmental accountability, and to assist in achieving environmentally sound and sustainable development. In terms of the NEMA, the commitment to sustainable development is evident in the provision that "development must be socially, environmentally and economically sustainable…. and requires the consideration of all relevant factors…". NEMA also imposes a duty of care, which places a positive obligation on any person who has caused, is causing, or is likely to cause damage to the environment to take reasonable steps to prevent such damage. In terms of NEMA's preventative principle, potentially negative impacts on the environment and on people's environmental rights (in terms of the Constitution of the Republic of South Africa, Act No. 108 of 1996) should be anticipated and prevented, and where they cannot be altogether prevented, they must be minimised and remedied in terms of "reasonable measures".

In assessing the environmental feasibility of the HSPG, the requirements of all relevant legislation have been considered. This relevant legislation has informed the identification and development of appropriate management and mitigation measures that should be implemented in order to minimise potentially significant impacts associated with the project.

The conclusions of this EIA are the result of comprehensive assessments. These assessments were based on issues identified through the S&EIR process and the parallel process of public participation. The public consultation process has been extensive, and every effort has been made to include representatives of all stakeholders within the process.

13.1 IMPACT ASSESSMENT SUMMARY

SIGNIFICANT IMPACTS

The significant impact analysis included in **Section 10** above is summarised in **Table 13-1** and **Table 13-2** below.

Table 13-1: Anticipated Significant Impacts Associated with the Construction of the HSPG

Ref.	Aspect	Impact Description	Significance Without Mitigation	Significance With Mitigation
	Geology	The sourcing of the material for the construction of the HSPG may have a permanent impact on the mineral potential and geology of the Kalahari Group.	**Medium (-)**	**Medium (-)**
		Excavation may influence the underlying Kalahari Group of the site as a void may be created, that will have a steep gradient or stepped walls.	**Medium (-)**	**Medium (-)**
		Resultant impacts from blasting and vibrations may impact on Kalahari Group.	**Medium (-)**	**Medium (-)**
	Topography	The development of the HSPG will alter the linear dunes and inter-dune straaten of the area.	**High (-)**	**Medium (-)**
	Biodiversity	The construction of the HSPG may have a direct impact on the protected flora species of the area and may result in the loss / degradation of these species.	**High (-)**	**Medium (-)**
		Fauna species may be disturbed during the construction phase and may need to be relocated	**High (-)**	**Medium (-)**

Ref.	Aspect	Impact Description	Significance Without Mitigation	Significance With Mitigation
		away from the proposed HSPG.		
		The extract of material (Granite outcrop) required for the construction of the HSPG may have a direct impact on the smaller fauna species (Reptiles, Rodents) due to a loss in habitat.	**Medium (-)**	**Medium (-)**
		Facilitation of alien invasive species resulting from excavation activities as people and vehicles are brought onto site. This can cause the displacement of indigenous species, transformation of terrestrial habitats and altering ecosystem functioning and services.	**Medium (-)**	**High (+)**
	Socio-economic	Creation of employment and business opportunities and opportunity for skills development and on-site training.	**Medium (+)**	**High (+)**

Table 13-2: Anticipated Significant Impacts Associated with the Operation of the HSPG

Ref.	Aspect	Impact Description	Significance Without Mitigation	Significance With Mitigation
	Socio-economic	Creation of opportunities for the hospitality and tourism sector associated with the operational phase.	**Medium (+)**	**High (+)**
		Creation of employment and business opportunities associated with the operational phase.	**Medium (+)**	**High (+)**
		Raise profile of Upington and benefit town.	**Medium (-)**	**Medium (+)**

A risk based closure assessment has not been assessed as decommissioning/closure of the HSPG is not anticipated in the foreseeable future. A closure impact assessment will only be completed once a closure date is established to identify the ideal scenario for closure planning taking into account prevailing legislation at that time. A multidisciplinary closure team will be established in order to identify different aspects that need to be considered for closure.

CUMULATIVE IMPACTS

GEOLOGY

Material extracted from the quarry and borrow pit which will be utilised for the construction of the HSPG is predicted to have an irreplaceable impact on the geology and as such no mitigation measure will aid in the prevention or rehabilitation of this area. As the mining area is limited to only a small portion of the farm the cumulative impact is anticipated to be low (-) and will not have a direct impact on the remaining geology of the area.

TOPOGRAPHY

The development of the HSPG is predicted to alter the linear dunes and inter-dune straaten of the area. As this area falls within the Kalahari Duneveld Bioregion which is considered to have a least threated conservation status and therefore all effort should be made to reduce the impact

associated with the construction of the HSPG. The proposed project will have a permanent but localised and relatively small impact. It is considered unlikely that the proposed project will have any significant impacts on local or regional conservation targets. It might in fact add to regional conservation targets as the remaining natural veld will be protected from stock grazing practices. The cumulative impact of the topography is considered to be Low (-).

BIODIVERSITY

The proposed project will have a permanent but localised impact. However, it is considered unlikely that the cumulative impact will result in significant additional impact on local or regional biodiversity targets, but it will have a localised impact on protected plant species (and might have an impact on protected reptile species). The cumulative impact is thus considered to have a medium (-) impact.

SOCIO-ECONOMIC

It is anticipated that the construction and operation of the HSPG will add to the creation of employment and business opportunities and therefore will provide:

- An overall opportunity to up-grade and improve skills levels in the area;
- Promotion of social and economic development and improvement in the overall well-being of the community;
- Creation of additional employment, business and economic opportunities in the area; and
- Raise profile of Upington and attract visitors and business to the area.

The cumulative impact is thus considered to be Medium (+).

IMPACT ASSESSMENT STATEMENT

The EIR phase of this project identified and assessed the potential impacts that the HSPG may have on the proposed site and on the surrounding areas. Through this assessment mitigation measures have been recommended in order to reduce or eliminate any impacts that were identified.

The EIA has concluded that the legislative requirement to consider alternatives during the S&EIR process is focussed strongly on feasible and reasonable alternatives that meet the requirements of the HSPG. A more detailed discussion of the alternatives relative to this project is included in **Section 6** of this report.

The final site layout and location is illustrated in **Figure 13-1** has been selected in order to optimise the operation of the HSPG as well as to minimise the potential impacts to the environment. A wetland was identified, as a result it was determined that minimal impact to the wetland would occur if the oval testing track was shorted from 19km to 17km to avoid the 500m wetland buffer.

The topography of the site is shaped by sandy areas and sand dunes. The dunes are situated lengthwise in the property, from North north-west to South south-east and are highly developed especially in the northern half of the property. The southern half of the property is notably flatter and less covered by sand and sand dunes. The rectangular stretched shape and the existing topography of site only allows for an oval testing track positioned lengthwise of the property. This shape and position of the oval testing track also would consider the existing sand dunes and so would reduce the impact to the immediate environment.

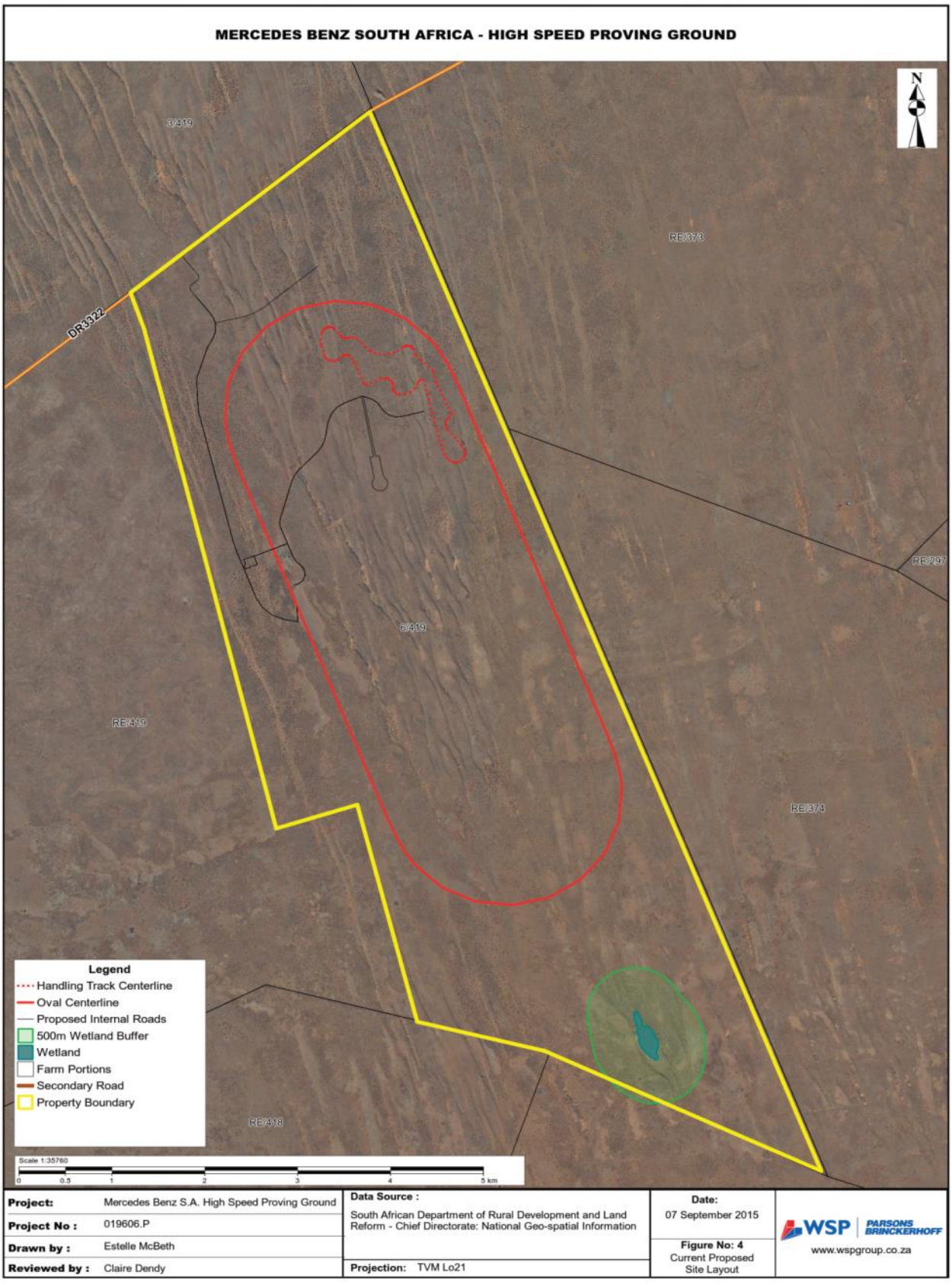

Figure 13-1: Final Site Plan for the Development of the MBSA High Speed Proving Ground

In the event that MBSA HSPG is a No-Go option, the positive impacts that would have arisen as a result of this development would not occur and as such the current status quo would remain. The positive impacts could include an increase in employment and business opportunities, benefit to local hospitality and tourism sector, investment in local development initiatives and raise profile of the Upington region. The No-Go option would therefore represent in a lost opportunity for Upington and the local economy. MBSA might potentially have to consider alternative locations outside of South Africa for the testing of the vehicles if Upington and surrounding is no longer considered an option.

In terms of local support, the KHLM Council passed a resolution at a meeting held on 27 January 2015 supporting the proposed project. Resolution 14/06/215 notes:

- That Council pledge its support to the construction of the proposed test track by MBSA in the jurisdiction area of //Khara Hais, near Upington;
- That Council intervene by requesting the Department of Land and Rural Development to sign the access agreement to the proposed test site, as requested by MBSA;

The proposed project is also strongly supported by the Upington Chamber of Commerce represented by Mr McMinn. The implementation of the proposed enhancement measures listed in the report would also enable the establishment of the proposed HSPG to support co-operation between the public and private sectors and the development of SMMEs in the KHLM.

The majority of impacts associated with the construction and operational phases are considered to be of low to medium significance in the event that the appropriate mitigation measures are implemented. All identified impacts have been based on normal operation conditions and all impacts identified were analysed according the following criteria, a summary of which is included in **Section 10**.

In the view of the environmental assessment practitioner, the information contained in this report (once final) and the documentation attached thereto will be sufficient for the NCDENC to make a decision in respect of the activities applied for with respect to the proposed HSPG.

This EIA provides an assessment of both the positive and negative impacts anticipated as a result of the HSPG. The findings of the assessment conclude that identified significant impacts can be addressed with relevant mitigation measures, therefore, in the view of the EAP, no environmental fatal flaws should prevent the HSPG from proceeding.

In order to achieve appropriate environmental management standards and ensure that the findings of the environmental studies are implemented through practical measures, the recommendations from this EIA have been included within an Environmental Management Programme (EMPr) which has been included in **Appendix 4**. The EMPr would be used to ensure compliance with environmental specifications and management measures. The implementation of this EMPr for key life cycle phases (i.e. construction, operation and decommissioning) of the HSPG is considered to be fundamental in achieving the appropriate environmental management standards as detailed for this project.

14 CONCLUSION

MBSA proposes to develop a HSPG for vehicle testing for the Mercedes-Benz Research and Development Team, in the Northern Cape Province of South Africa. The site is located on property Steenkamps Pan, Farm 419/06 in the //Khara Hais Municipality, approximately 38 km North-east of Upington.

The anticipated environmental impacts associated with the HSPG have been evaluated according to their intensity, extent, duration, probability and confidence of the impact. All impacts were assessed with and without management measures in place. Where the overall environmental impact was determined to be significant relevant management measures were recommended.

This EIR has been structured to comply with the requirements of the NEMA. The report provides a description of the HSPG and details the aspects associated with the construction and operation. The report also includes the methodology followed to undertake the S&EIR process. A detailed description on the existing environment (bio-physical as well as socio-economic) is provided based on findings from the specialist surveys. Stakeholder engagement was undertaken from the onset of the project in a transparent and comprehensive manner. Outcomes of all meetings and comments received from the public review periods were recorded and responded to in the EIR.

In summary, the S&EIR process assessed both biophysical and socio-economic environments and identified appropriate management and mitigation measures. No environmental fatal flaws were identified. In addition, overall socio-economic impacts associated with the project are positive and include the creation of job opportunities and contributions to the local, regional and national economies.

WSP is of the opinion that should the identified mitigation and management measures be implemented, the Project ought to proceed.