

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

In terms of Section 24 and 24(D) of NEMA (Act No. 107 of 1998)

Environmental Impact Assessment for the proposed clearance of 533.64 ha of indigenous vegetation (This area includes the clearance of 1 241 083 square meters of indigenous vegetation that is located within a critical Biodiversity area 2 as identified in the North West Bioregional Plan) in order to establish a township that will be located on a Portion of the Remaining Extent of Portion 8 of the farm Rosendal No. 673-IN, a Portion of the Remaining Extent of Erf 506, Vryburg, a Portion of the Remaining Extent of Portion 3 of the farm Rosendal No. 673-IN and Erven 3455, 4377, the remaining extent of Erf 4378 and Erf 4835, Huhudi, North West Province. The application will also involve the expansion of the existing cemetery at Vryburg by an additional 69 066 square meters, the expansion of the existing cemetery at Huhudi with an additional 36 413 square meters and the development of a new 100 586 square meters cemetery to be located towards the west of the proposed new development.

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Naledi Local Municipality



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EXECUTIVE SUMMARY

The land owner, **Naledi Local Municipality** in co-operation with the Department of Human Settlements has appointed **AB Enviro Consult CC**, an independent environmental consultancy, to undertake an Integrated Environmental Impact Assessment for the proposed clearance of 533,64 ha of indigenous vegetation (This area includes the clearance of 1 241 083 square meters of indigenous vegetation that is located within a critical Biodiversity area 2 as identified in the North West Bioregional Plan) in order to establish a township that will be located on a Portion of the Remaining Extent of Portion 8 of the farm Rosendal No. 673-IN, a Portion of the Remaining Extent of Erf 506, Vryburg, a Portion of the Remaining Extent of Portion 3 of the farm Rosendal No. 673-IN and Erven 3455, 4377, the remaining extent of Erf 4378 and Erf 4835, Huhudi, North West Province. The application will also involve the expansion of the existing cemetery at Vryburg by an additional 69 066 square meters, the expansion of the existing cemetery at Huhudi with an additional 36 413 square meters and the development of a new 100 586 square meters cemetery to be located towards the west of the proposed new development.

The activity is listed in terms of the Regulations (in force since 4 December 2014) in terms of Section 24(M) and 44 made under section 24(5) of the National Environmental Management Act (NEMA) 1998 (Act 107 of 1998) as amended and published in Government Notice No. R 326 of 2017. The proposed development triggers the following regulations and listed activities:

Number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice) :	Listed activity as per project description²:
GN.R. 327, 7 April 2017	23	The development of a cemetery of 100 586 square metres in size.
GN.R. 327, 7 April 2017	44	The expansion of the existing cemetery at Vryburg by an additional 69 066 square meters and the expansion of the existing cemetery at Huhudi with an additional 36 413 square meters.
GN.R. 325, 7 April 2017	15	The clearance of 533,64 ha of indigenous vegetation (This area includes the clearance of 1 241 083 square meters of indigenous vegetation that is located within a critical Biodiversity area 2 as identified in the North West Bioregional Plan) in order to establish a township that will be located on a Portion of the Remaining Extent of Portion 8 of the farm Rosendal No. 673-IN, a Portion of the Remaining Extent of Erf 506, Vryburg, a Portion of the Remaining Extent of Portion 3 of the farm Rosendal No. 673-IN and Erven 3455, 4377, the remaining extent of Erf 4378 and Erf 4835, Huhudi, North West Province..
GN.R. 324, 7 April 2017	12 (h) (iv)(vi)	Clearance of 1 241 083 square meters of indigenous vegetation within a Critical biodiversity area 2 (CBA 2) and the clearance of 60 365 square meters of indigenous vegetation within 100 meters from a Pan.

The purpose of the study is therefore to determine the impacts that the environment may have on the proposed activity, as well as the possible impacts that the activity may have on the environment.

The study is being conducted according to normal scientific practices. A theoretical background review was compiled for the different variables by using available information from the literature. Field verification was undertaken and visits paid to the site to gather further information and/or to verify information. It also includes the identification of *key interest groups*, both governmental and non-governmental, and to establish good lines of communication. Specialist studies were undertaken to determine the impacts on sensitive areas and to determine whether the proposed project can be sustainably implemented. The specialists will also advise on mitigation measures where applicable.

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1. INTRODUCTION

The land owner, **Naledi Local Municipality** in co-operation with the Department of Human Settlements has appointed **AB Enviro Consult CC**, an independent environmental consultancy, to undertake an Integrated Environmental Impact Assessment for the proposed clearance of 533,64 ha of indigenous vegetation (This area includes the clearance of 1 241 083 square meters of indigenous vegetation that is located within a critical Biodiversity area 2 as identified in the North West Bioregional Plan) in order to establish a township that will be located on a Portion of the Remaining Extent of Portion 8 of the farm Rosendal No. 673-IN, a Portion of the Remaining Extent of Erf 506, Vryburg, a Portion of the Remaining Extent of Portion 3 of the farm Rosendal No. 673-IN and Erven 3455, 4377, the remaining extent of Erf 4378 and Erf 4835, Huhudi, North West Province. The application will also involve the expansion of the existing cemetery at Vryburg by an additional 69 066 square meters, the expansion of the existing cemetery at Huhudi with an additional 36 413 square meters and the development of a new 100 586 square meters cemetery to be located towards the west of the proposed new development).

The site is influenced by a number of factors that were considered for the proposed layout plan to be acceptable. These factors include the slope of the site, flood lines, environmental sensitivity, service provision, erf size, access, road layout and community facilities as well as the geotechnical features presented in the Geotechnical Report. To ensure that the proposed development do not infringe on any design principles and the environmental sensitive areas, development of residential units will only be allowed to take place according to the prescribed methods. Subsequently a buffer area has been established and no development may take place beyond the 1:100 year flood line.

1.1 THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

The purpose of this document is to adhere to the requirements for compilation of Environmental Impact Assessment Reports as amended and published in Government Notice R. 326 of 7 April 2017, Appendix 2, and the National Environmental Management Act (Act 107 of 1998) (NEMA).

1.2 DESCRIPTION OF THE PROCESS FOLLOWED

In order to assess a proposed development it is important to take into consideration the principles of NEMA. These principles are outlined in Chapter 1 and read as follows:

- 1) *“The principles set out in this section apply throughout the Republic to the actions of all organs of state that may significantly affect the environment and—*
 - a. *shall apply alongside all other appropriate and relevant considerations, including the State’s responsibility to respect, protect, promote and fulfil the social and economic rights in Chapter 2 of the Constitution and in particular the basic needs of categories of persons disadvantaged by unfair discrimination;*
 - b. *serve as the general framework within which environmental management and implementation plans must be formulated;*
 - c. *serve as guidelines by reference to which any organ of state must exercise any function when taking any decision in terms of this Act or any statutory provision concerning the protection of the environment;*
 - d. *serve as principles by reference to which a conciliator appointed under this Act must make recommendations; and*

- e. *guide the interpretation administration and implementation of this Act, and any other law concerned with the protection or management of the environment.*
- 2) *Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably.*
- 3) *Development must be socially, environmentally and economically sustainable.*
- 4) (a) *Sustainable development requires the consideration of all relevant factors including the following:*
- (i) *That the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied:*
 - (ii) *that pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied;*
 - (iii) *that the disturbance of landscapes and sites that constitute the nation's cultural heritage is avoided, or where it cannot be altogether avoided, is minimised and remedied;*
 - (iv) *that waste is avoided. or where it cannot be altogether avoided, minimised and re-used or recycled where possible and otherwise disposed of in a responsible manner;*
 - (v) *that the use and exploitation of non-renewable natural resources is responsible and equitable, and takes into account the consequences of the depletion of the resource;*
 - (vi) *that the development use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardised;*
 - (vii) *that a risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions; and*
 - (viii) *that negative impacts on the environment and on people's environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied.*
- (b) *Environmental management must be integrated, acknowledging that all elements of the environment are linked and interrelated, and it must take into account the effects of decisions on all aspects of the environment and all people in the environment by pursuing the selection of the best practicable environmental option.*
- (c) *Environmental justice must be pursued so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons.*
- (d) *Equitable access to environmental resources, benefits and services to meet basic human needs and ensure human well-being must be pursued and special measures may be taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination.*
- (e) *Responsibility for the environmental health and safety consequences of a policy, programme, project, product, process, service or activity exists throughout its life cycle.*

- (f) *The participation of all interested and affected parties in environmental governance must be promoted, and all people must have the opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation and participation by vulnerable and disadvantaged persons must be ensured.*
- (g) *Decisions must take into account the interests, needs and values of all interested and affected parties, and this includes recognizing all forms of knowledge, including traditional and ordinary knowledge.*
- (h) *Community wellbeing and empowerment must be promoted through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means.*
- (i) *The social, economic and environmental impacts of activities, including disadvantages and benefits must be considered, assessed and evaluated and decisions must be appropriate in the light of such consideration and assessment.*
- (j) *The right of workers to refuse work that is harmful to human health or the environment and to be informed of dangers must be respected and protected.*
- (k) *Decisions must be taken in an open and transparent manner, and access to information must be provided in accordance with the law.*
- (l) *There must be intergovernmental co-ordination and harmonisation of policies, legislation and actions relating to the environment.*
- (m) *Actual or potential conflicts of interest between organs of state should be resolved through conflict resolution procedures.*
- (n) *Global and international responsibilities relating to the environment must be discharged in the national interest.*
- (o) *The environment is held in public trust for the people, the beneficial use of environmental resources must serve the public interest and the environment must be protected as the people's common heritage.*
- (p) *The costs of remedying pollution, environmental degradation consequent adverse health effects and of preventing, controlling or minimizing further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment.*
- (q) *The vital role of women and youth in environmental management and development must be recognised and their full participation therein must be promoted.*
- (r) *Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure."*

The above mentioned principals and the applicable legislation, Policies and Guidelines as described in Paragraph 5 of this Report were taken into account in the assessment of the Environmental Impacts for the proposed development. The process followed can be described as follows:

- 1) The EAP was contracted by the land owner, **Naledi Local Municipality** in co-operation with the Department of Human Settlements as their Independent Environmental Assessment Practitioner.
- 2) A Geotechnical Engineer was appointed to determine whether the Geology and Soils of the site is suitable for the proposed development
- 3) The Civil Engineer was appointed to determine the capability of existing infrastructure to be linked to proposed development and readily available bulk services. He also designed the proposed infrastructure.
- 4) A SAHRA Specialist has been appointed to determine the possible impact of the development on Archaeological and Cultural features.
- 5) A Fauna and Flora specialist has been appointed to determine the impact of the proposed development on the Fauna and Flora of the area.
- 6) A Wetland specialist has been appointed to determine the impact of the proposed development on the pans that are found on site.
- 7) An Environmental Screening Process was conducted by the EAP to ensure that all the relevant Environmental Legislation is taken into consideration.
- 8) Desk top studies were conducted and alternatives assessed.
- 9) Site inspections were carried out to verify the outcomes of the desktop studies, and the preferred alternative defined.
- 10) A full Public Participation Process is being followed to obtain inputs from interested and affected parties.
- 11) All the information obtained from the above mentioned processes is being used to assess the Environmental Impact that the proposed development may have on the Environment and vice versa.
- 12) The inputs from Specialists, interested and affected parties, together with the knowledge of the EAP is being used to determine measures to avoid, mitigate and manage potential impacts. These measures are described in the Environmental Management Programme.

1.3 SCOPING PHASE

The Scoping phase included the necessary investigations to assess the suitability of the identified site and its surrounding environment, for the development proposal. The scoping phase described the “status quo” of the bio-physical, social, economic and cultural environment, and identifies the anticipated environmental aspects associated with the proposed development. Scoping included the identification of *key interest groups*, (both government and non-government), and strived to establish efficient and effective communication. Identifying and informing Interested and affected parties of the proposed development may have an impact on the focus of the EIA. (*S. Cliff, 2015*)

The purpose of the Scoping Report was to document the outcome of the Scoping Phase of the project. The report fulfilled the requirements of the EIA Regulations (2014) for the documentation of the scoping phase. The Scoping Report was compiled in accordance with Section 21(3) of NEMA's 2014 EIA Regulation (GN R. 982) as amended and published in Government Notice R. 326 of 7 April 2017.

The Draft Scoping Report was submitted to READ on 15 April 2019 and approved on 09 April 2019. The Final Scoping report was submitted to the Department on 13 May 2019 and approved on 10 June 2019.

1.4 EIA PHASE

The EIA phase determines the *significance of the impact* of the proposed activity on the surrounding Environment. During the EIA phase, an Environmental Impact Assessment Report (EIAR) is compiled, and, following public review, is submitted to the approving authority – the READ.

The EIA process is undertaken in accordance with the NEMA's 2014 EIA Regulation (GN R. 982) as amended and published in Government Notice R. 326 of 7 April 2017.

The EIAR (including all specialist reports) will be made available to all registered interested and affected parties (I&APs), providing them an opportunity to comment and to verify that the issues raised through the process have been captured and adequately addressed and considered within the study.

1.4.1 Objective of the environmental impact assessment process

The objective of the environmental impact assessment process is to, through a consultative process-

1. 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;
2. describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the development footprint on the approved site as contemplated in the accepted scoping report;
3. identify the location of the development footprint within the approved site as contemplated in the accepted scoping report; 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;
4. determine the –
 - i. nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and
 - ii. degree to which these impacts-
 - (aa) can be reversed;
 - (bb) may cause irreplaceable loss of resources, and
 - (cc) can be avoided, managed or mitigated;
5. identify the most ideal activity within the development footprint of the approved site as contemplated in the accepted scoping report based on the lowest level of environmental sensitivity identified during the assessment;
6. identify, assess, and rank the impacts the activity will impose on the development footprint on the site as contemplated in the accepted scoping report through the life of the activity;
7. identify suitable measures to avoid, manage or mitigate identified impacts; and identify residual risks that need to be managed and monitored.

1.4.2 Scope of assessment and content of environmental impact assessment reports

The EIA assesses those identified potential environmental impacts and benefits (direct, indirect and cumulative impacts) associated with the project design, construction, and operation phases, and recommends appropriate mitigation measures for potentially significant environmental impacts. The Environmental impacts are assessed both before and after mitigation to determine:

- The significance of the impact despite mitigation; and
- The effectiveness of the proposed mitigation measures.

The EIA addresses potential environmental impacts and benefits associated with all phases of the project, including design, construction and operation, and aims to provide the environmental authorities with sufficient information to make an informed decision regarding the proposed project.

Table 1 below provides a summary of the legislative requirements in terms of an EIA Report as stipulated in Section 23 of the 2014 EIA Regulation (GN R. 982) as amended and published in Government Notice R. 326 of 7 April 2017. Cross-references are provided in terms of the relevant section within this DEIA Report where the NEMA and DEIA Report requirements have been addressed.

Table 1: DEIA Report content as per Section 23 of NEMA’s 2014 EIA Regulation (GN R. 982) as amended and published in Government Notice R. 326 of 7 April 2017 Appendix 3.

3. (1) *An environmental impact assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include:*

Section of the EIA Regulations, 2014	Description of EIA Regulations Requirements for EIA Reports	Location in this EIA report
Appendix 3, section 3 (a)	Details of the EAP who prepared the report; and the expertise of the EAP, including a curriculum vitae;	Paragraph 2
Appendix 3, section 3 (b)	The location of the development footprint of the activity on the approved site as contemplated in the accepted scoping report, including – (i) The 21 digit Surveyor General code of each cadastral land parcel; (ii) Where available, the physical address and farm name; (iii) Where the required information in items (i) and (ii) is not available, coordinates of the boundary of the property or properties	Paragraph 4 Paragraph 4 Paragraph 4
Appendix 3, section 3 (c)	A plan which locates the proposed activity or activities applied for, at an appropriate scale, or, if it is – (i) A linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) On land where the property has not been defined, the coordinates within which the activity is to be undertaken;	Appendix A1 and Appendix A2 Paragraph 4
Appendix 3, section 3 (d)	A description of the scope of the proposed activity, including – (i) all listed and specified activities triggered and being applied for; and (ii) a description of the associated structures and infrastructure related to the development;	Paragraph 3 Paragraph 3
Appendix 3, section 3 (e)	A description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context	Paragraph 5

Section of the EIA Regulations, 2014	Description of EIA Regulations Requirements for EIA Reports	Location in this EIA report
Appendix 3, section 3 (f)	A motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred development footprint within the approved site as contemplated in the accepted scoping report.	Paragraph 6
Appendix 3, section 3 (g)	a motivation for the preferred development footprint within the approved site as contemplated in the accepted scoping report	Paragraph 4
Appendix 3, section 3 (h)	A full description of the process followed to reach the proposed development footprint within the approved site as contemplated in the accepted scoping report, including- <ul style="list-style-type: none"> (i) Details of all alternatives considered; (ii) Details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; (iii) A summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them; (iv) The environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (v) The impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration, and probability of the impacts, including the degree to which the impacts- <ul style="list-style-type: none"> (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed, or mitigated. (vi) The methodology used in deterring and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives; (vii) Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographic, physical, biological, social, economic, heritage and cultural aspects; (viii) The possible mitigation measures that could be applied and level of residual risk; (ix) If no alternatives, including alternative footprints for the activity were investigated, the motivation for not considering such and; (x) A concluding statement indicating the location of the preferred alternatives, including preferred footprint within the approved site as contemplated in the accepted scoping report. 	<p>Paragraph 8</p> <p>Paragraph 10</p> <p>Paragraph 10</p> <p>Paragraph 8</p> <p>Paragraph 9</p> <p>Paragraph 9</p> <p>Paragraph 9</p> <p>Paragraph 9</p> <p>Paragraph 9</p> <p>Paragraph 9</p> <p>Paragraph 9</p> <p>Paragraph 9</p> <p>Not Applicable</p> <p>Paragraph 12</p>
Appendix 3, section 3 (i)	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 development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity, including- <ul style="list-style-type: none"> (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures; 	<p>Paragraph 9</p> <p>Paragraph 8</p> <p>Paragraph 9</p>

Section of the EIA Regulations, 2014	Description of EIA Regulations Requirements for EIA Reports	Location in this EIA report
Appendix 3, section 3 (j)	<p>An assessment of each identified potentially significant impact and risk, including-</p> <ul style="list-style-type: none"> (i) cumulative impacts; (ii) the nature, significance and consequences of the impact and risk; (iii) the extent and duration of the impact and risk; (iv) the probability of the impact and risk occurring; (v) the degree to which the impact and risk can be reversed; (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and (vii) the degree to which the impact and risk can be mitigated; 	<p>Paragraph 9</p> <p>Paragraph 9</p> <p>Paragraph 9</p> <p>Paragraph 9</p> <p>Paragraph 9</p> <p>Paragraph 9</p> <p>Paragraph 9</p>
Appendix 3, section 3 (k)	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;	Paragraph 11
Appendix 3, section 3 (l)	<p>An environmental impact statement which contains-</p> <ul style="list-style-type: none"> (i) a summary of the key findings of the environmental impact assessment; (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred development footprint on the approved site as contemplated in the accepted scoping report indicating any areas that should be avoided, including buffers; and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives; 	<p>Paragraph 12.2 and 12.2 Figure 2</p> <p>Paragraph 12</p>
Appendix 3, section 3 (m)	Based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation	Paragraph 11 and 12
Appendix 3, section 3 (n)	The final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment	Paragraph 12
Appendix 3, section 3 (o)	Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation	Paragraph 3.1.2.1
Appendix 3, section 3 (p)	A description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed	Paragraph 1.4.3
Appendix 3, section 3 (q)	A reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation	Paragraph 12.4
Appendix 3, section 3 (r)	Where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded and the post construction monitoring requirements finalised	Not Applicable
Appendix 3, section 3 (s)	<p>An undertaking under oath or affirmation by the EAP in relation to-</p> <ul style="list-style-type: none"> (i) The correctness of the information provided in the report; (ii) The inclusion of the comments and inputs from stakeholders and interested and affected parties; and (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) Any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties. 	<p>Paragraph 13</p> <p>Paragraph 13</p> <p>Paragraph 13</p> <p>Paragraph 13</p>

Section of the EIA Regulations, 2014	Description of EIA Regulations Requirements for EIA Reports	Location in this EIA report
Appendix 3, section 3 (t)	Where applicable, details of any financial provision for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts.	Not Applicable
Appendix 3, section 3 (u)	An indication of any deviation from the approved scoping report, including the plan of study, including- (i) any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and (ii) a motivation for the deviation;	Not Applicable
Appendix 3, section 3 (v)	Any specific information that may be required by the competent authority.	Not Applicable
Appendix 3, section 3 (w)	Any other matters required in terms of section 24(4)(a) and (b) of the Act	Not Applicable

1.4.3 Assumptions, uncertainties, limitations and gaps in knowledge:

This report is based on current available information and, as a result, the following limitations and assumptions are implicit

—
The report is based on the *project description* provided by the Applicant as a result of reports that was compiled by the following Specialists:

- A Geotechnical Engineer was appointed to determine whether the Geology and Soils of the site is suitable for the proposed development.
- A Town and Regional Planner designed the proposed development in such a way that the layout of the proposed development, takes into account the measures described by the Civil Engineer and that the layout satisfies the needs of future occupiers of the site
- The Civil Engineer was appointed to determine the capability of existing infrastructure to be linked to proposed development and readily available bulk services.
- A SAHRA Specialist has been appointed to determine the possible impact of the development on Archaeological and Cultural features.
- An ecologist as well as a Wetland specialist has been appointed to determine the impact of the proposed development on the Fauna and Flora and wetlands of the area.
- An Environmental Screening Process was conducted by the EAP to ensure that all the relevant Environmental Legislation is taken into consideration.
- Desktop studies were conducted and alternatives assessed.

Descriptions of the biophysical and social environments are based on specialist fieldwork, investigations, and the Public Participation Process.

2. DETAILS AND EXPERTISE OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

AB Enviro Consult (CC) is a registered consultancy, owned and operated as an independent unit by the registered owner and consultant: **Prof. A.B. de Villiers**

- **Mr J.P. De Villiers** joined the consultancy during 2004
- **Mrs J.E. du Plooy** is a consultant since 2001

PERSONAL PARTICULARS AND CAREER HISTORY OF PROF DE VILLIERS

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 Address : 7 LOUIS LEIPOLDT STREET
 POTCHEFSTROOM
 2531

Lecturer & Professor – Potchefstroom University 1969- 2004

ACADEMIC AND PROFESSIONAL QUALIFICATIONS

Post–Matic Qualifications

<u>YEAR</u>	<u>Qualification</u>	<u>Institution</u>	<u>Field of Study</u>
1968	B.Sc.	PU FOR CHE	Geography, Geology
1970	HONNS. B.Sc.	PU FOR CHE	Soil Science
1974	M.Sc.	PU FOR CHE	Geography
1981	Ph.D.	UOFS	Geography

PROFESSIONAL QUALIFICATIONS AND REGISTRATIONS

<u>YEAR</u>	<u>Qualification/ Registration</u>	<u>Institution</u>	<u>Field of Study</u>
1986	Professional Natural Scientist	S.A. Council for Natural Scientists	Environmental Science
1994	Quality Auditor	ESKOM	Auditing
1998	Personnel & Verifying Auditor	SAATCA	Environmental Auditing
2006	Environmental Assessment Practitioner	Interim Certification Board EAPSA	Environmental Science

MEMBERSHIP AND PARTICIPATION IN SOCIETIES, COUNCILS, ETC.

<u>Name of professional societies</u>	<u>YEAR</u>	<u>Capacity</u>
S.A. Geographical Society.	1967-1996	Board Member
Society for Geography	1968-2004	Member
SAGS Western Transvaal	1985-1989 1987-1989 1996	Chairman

Africa Geographical Association	1993-1995	Vice-President.
Society for the Vaal River Catchment	1980-1999	Member
S.A. Society for Photogrammetry, Remote Sensing and Cartography	1984-1996	Member
Dendrological Society	1986-2005	Member
Birdlife South Africa	2003-present	Member
British Geomorphological Research Group	1985-1997	Member
Int Com on Water Resource Systems	1985-1997	Member
Int Com on Continental Erosion	1986-1990	Member
Int Com on Remote Sensing and Data Transmission	1986-1991	Member
Society for S.A. Geographers	1995-2005	Member
SA Photogrammetrical and Geo. Info.	1995-2003	Member
S.A. Association of Geomorphologists	1994-1999	Board Member and member
SADC Mine Dump Study Group	1996-2005	Member

***Chairman of the Committee for Interested and Affected Parties (CIP) (2004-2008)** for International Accreditation by the influential accrediting body of **Price, Waterhouse Coopers- International Environmental Auditors in Southern Africa.**

Member of Price Waterhouse Coopers CIP (2004-2010)

1. ACADEMIC courses taught AT POST-MATRIC LEVEL

- 1.1 The Geography of Economic Activities and Regional Geography (3rd year and honours students)
- 1.2 Weather and Climate (1st, 2nd, and 3rd year students)
- 1.3 Geomorphology (1st year up to PhD level)
- 1.4 Remote Sensing and the Environment (3rd year and Honours)
- 1.5 Quantitative Geography (3rd year up to Masters Level)
- 1.6 Environmental Management (2nd year, up to PhD level)
- 1.7 Environmental Analysis (3rd year and up to Masters Level)
- 1.8 Geography of Soil (3rd year and Honours)
- 1.9 Cartography (1st year to Honours)
- 1.10 As professor, 26 Masters & 4 PhD D students completed their studies in environmentally related subjects under his tutor- and co-tutorship.

2 INVOLVEMENT IN COURSES AND WORKSHOPS

2.1 ENVIRONMENTAL COURSES: Partially responsible for course development and taught various courses for environmental officers employed by the North West Province over a period of 3 years (1998-2001). These courses were aimed at improving their knowledge of the environment as well as their understanding of the environmental interactions specifically related to the North West province.

2.2 STATE OF THE ENVIRONMENT REPORT (SOE) Involved in the first SOE prepared by the North West Province and was responsible for most of the physical geographical aspects (1999).

3 ENVIRONMENTAL PROJECTS

The following projects are typical examples, of such projects which he co-ordinated and managed:

2.3.1 Mooi River Catchment studies: This was a study on the impacts of the mining activities on the quality and quantity of water in the Mooi River catchments and was done for the North West Province. He co-ordinated and managed this project. The team consisted of a PhD student as well as two teams of local and international students; one responsible for the biophysical variables, and the other for socio-cultural aspects.

2.3.2 SADC mine dumps study group: Acted as co-ordinator for the formulation of tools to assess the effects of mine dumps on the environment in the SADC region. One group was involved in the Zimbabwean copper belt region, and the other in the Tanzanian gold mining area. The studies were undertaken for the Carl Duisburg Gesellschaft (Germany). The research team consisted of geographers, ecologists and mining experts. From this study, a pilot program, the “South African Environmental Management System” (SEMS) developed, which was applied successfully by a team of researchers in a pilot study in the Carletonville region.

2.3.3 SADC development of training modules for environmental studies using GIS: Member of the three-person team who developed these training modules. It was applied at the Copper belt University, the University of Dar Es Salaam as well as at the Potchefstroom University as an introduction to the integration of environmental data (both biophysical and socio-economic) for the interpretation of geographical regions.

2.3.4 Environmental degradation - the result of indiscriminate location of slime dams in the SADC Region: Co-ordinated this study in the Far West Rand Area; conducted case studies in Zambia and South Africa. The team consisted of researchers from the Netherlands, Germany, Zambia and Tanzania.

2.3.5 Land use changes in the North West Province: An Environmental Management Support System for SOE North-West University Team leader. This project was undertaken for DACE (NWP) and various students participated – each involved in a specific aspect of the environment. This data was co-ordinated and eventually incorporated into the SOE report.

4 RESEARCH PUBLICATIONS AND CONFERENCES

He published 11 environmentally related articles in peer-reviewed magazines, and appeared professionally at 30 conferences with a direct bearing on environmental work.

ACADEMIC AND PROFESSIONAL QUALIFICATIONS MR J.P. DE VILLIERS

<u>YEAR</u>	<u>Qualification</u>	<u>Institution</u>	<u>Field of Study</u>
1993	BA	PU FOR CHE	Geography, Economics
1994	HED	PU FOR CHE	Geography Economics
2006	B.Sc.(Honns) Cum Laude	North-West University	Environmental Management
2007	M.Sc.	North-West University	Geography

PROFESSIONAL QUALIFICATIONS AND REGISTRATIONS

<u>YEAR</u>	<u>Qualification/ Registration</u>	<u>Institution</u>	<u>Field of Study</u>
2008	Basic Principles of Ecological Rehabilitation and Mine Closure	Centre for Environmental Management (North West University)	Ecological Rehabilitation

ACADEMIC AND PROFESSIONAL QUALIFICATIONS MRS J.E. DU PLOOY

YEAR	Qualification	Institution	Field of Study
1999	BA	PU FOR CHE	Geography, Tourism
2000	BA (Honns) Cum Laude	PU FOR CHE	Geography
2002	Master's degree in Environmental Management	PU FOR CHE	Environmental Management
2001	Aquabase Intro	AQUABASE	Hydrology
2001	Geomedia Professional	INTERTECH	GIS
2001	Map Info	SPATIAL TECHNOLOGY	GIS

EXPERIENCE OF THE CONSULTANCY

Over a period of 23 years (1996-2019) this consultancy has successfully applied for, and obtained positive ROD's and EA's for more than 365 projects. Environmental Control Officer's duties are also performed on various projects.

The company was involved (from 1992-1994) in evaluation of 114 applications for the subdivision of land, 23 applications for resort developments, and 54 applications for business rights for the Department of Agriculture, Conservation and the Environment - North West Province.

The consultancy is qualified to undertake professional studies in waste management and is still involved in the development of waste disposal- (solid and liquid effluent), and emission studies. These studies are conducted both academically and practically. This work relates to mine waste, domestic waste and effluent as well as to the monitoring of waste disposal. Environmental audits in this respect are undertaken on a regular basis.

3. DESCRIPTION OF THE ACTIVITY

The land owner, **Naledi Local Municipality** in co-operation with the Department of Human Settlements has appointed AB Enviro Consult CC, an independent environmental consultancy, to undertake an Environmental Impact Assessment for the proposed clearance of 533,64 ha of indigenous vegetation (This area includes the clearance of 1 241 083 square meters of indigenous vegetation that is located within a critical Biodiversity area 2 as identified in the North West Bioregional Plan) in order to establish a township that will be located on a Portion of the Remaining Extent of Portion 8 of the farm Rosendal No. 673-IN, a Portion of the Remaining Extent of Erf 506, Vryburg, a Portion of the Remaining Extent of Portion 3 of the farm Rosendal No. 673-IN and Erven 3455, 4377, the remaining extent of Erf 4378 and Erf 4835, Huhudi, North West Province. The application will also involve the expansion of the existing cemetery at Vryburg by an additional 69 066 square meters, the expansion of the existing cemetery at Huhudi with an additional 36 413 square meters and the development of a new 100 586 square meters cemetery to be located towards the west of the proposed new development.

The site is influenced by a number of design factors that were considered for the proposed layout plan to be acceptable. These factors include the slope of the site, environmental sensitivity, service provision, erf size, access, road layout, the existing airfield and community facilities as well as the geotechnical features presented in the Geotechnical Report. To ensure that the proposed development do not infringe on any design principles and the environmental sensitive areas, development of residential units will only be allowed to take place according to the prescribed methods.

Public facilities such as shopping areas, social gathering places, crèches, parks and schools can be provided in a close proximity to the residential areas and will contribute to provide the required facilities associated with a housing development.

The township will consist of a mixed use, including: See Figure 1 for a copy of the proposed Layout Plan.

Proposed Zoning	Proposed Land use	No. of Erven
Residential 4:	Dwelling Unit Minimum 300m ²	2 739 erven
	Dwelling Unit Minimum 400m ²	4 594 erven
	Dwelling Unit Minimum 500m ²	1 102 erven
Business 1:	Business	3 erven
	Shop	26 erven
Commercial:	Business/ Light Industry	1 erven
Institutional 1:	Place of Instruction (Primary School)	2 erven
	Place of Instruction (Crèche)	10 erven
	Place of Worship (Church)	16 erven
Institutional 2:	Community Facility	2 erven
	Sports Field	2 erven
Public Open Space 1:	Public Open Space	35 erven
Public Open Space 2:	Private Open Space	1 erven
Authority:	Municipal	2 erven
Transport 1:	Taxi Rank	2 erven
Cemetery:	Cemetery	3 erven

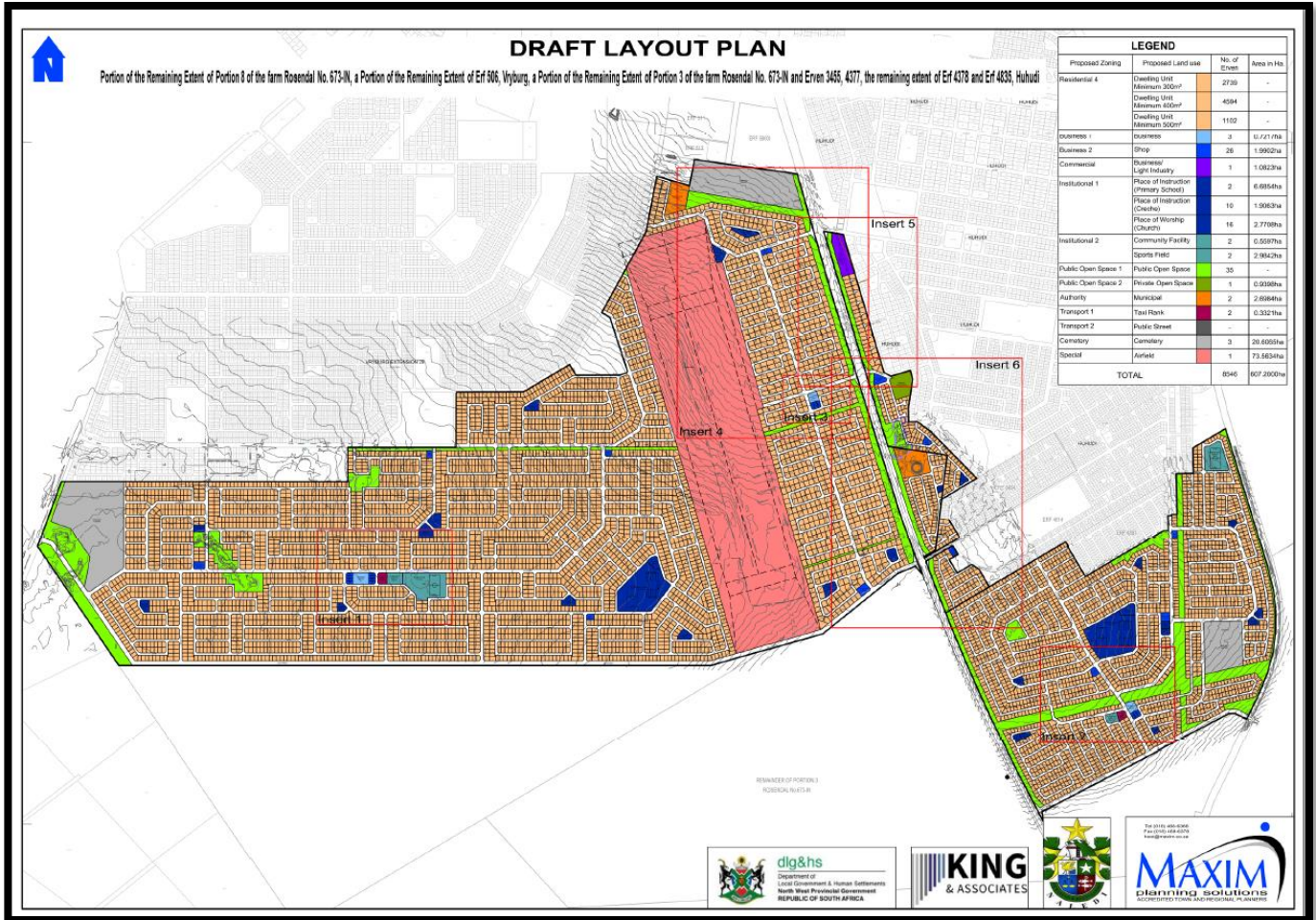


FIGURE 1: Proposed layout plan.

Cemeteries

The application will also involve the expansion of the existing cemetery at Vryburg by an additional 69 066 square meters, the expansion of the existing cemetery at Huhudi with an additional 36 413 square meters and the development of a new 100 586 square meters cemetery to be located towards the west of the proposed new development.

The property owner is the Naledi Local Municipality and even though the project is financed by the Department of Local Government and Human Settlements, the owner of the township and the developer will still remain the Naledi Local Municipality.

3.1 BULK SERVICES (CIVIL ENGINEERING SERVICES)

3.1.1 WATER

3.1.1.1 Bulk water supply

It is common knowledge and also reported in the media that Vryburg currently experiences severe water supply challenges resulting in water restrictions and regular “drought” periods. The existing ground water supply from the respective wellfield and supplementary water supply from the Pudimoe WTW is inadequate and unreliable to meet the existing water demand of Vryburg. The proposed development demands will further increase the bulk water supply shortfall.

Ground Water

Bulk Water for the Greater Vryburg is abstracted from five individual borehole wellfields (Armoedsvlakte, Biesiesvlakte, Swartfontein, Vegter & Vryburg town). The wellfields are clustered into three supply systems (Northern supply-, Western supply- and Townlands supply mains).

The Northern supply main, conveying water to the Edwin Freyling Reservoir Complex, is supplied by the Swartfontein wellfield. The borehole cluster consist of 5 boreholes having a theoretical combined safe yield of 1.45 Mℓ/day.

The Western supply main, consists of the Armoedsvlakte, BiesiesvlakteVegter wellfields. The supply system comprises of 15 active boreholes having a theoretical combined yield of 4.65 Mℓ/day. This includes the four new Armoedsvlakte boreholes (No’s 3 -6) equipped and connected under the emergency interventions which are being commissioned at the time of this report.

The Townlands supply mains convey abstracted water to the Warren Booster Pumping Station as well as Huhudi and the industrial area. The supply system consists of 4 boreholes having a total theoretical yield 0.85 Mℓ/day.

The combined theoretical yield for all the wellfields in the Greater Vryburg region amounts to 6.95 Mℓ/day. This is based on an average 12 hour per day pumping cycle allowing sufficient recovery time to ensure long term protection and sustained delivery from the production boreholes.

Experience has also shown that the boreholes require regular and continued maintenance and repairs. Damages to electrical components due to power surges and lightning is a general phenomenon in Vryburg. To provide for this, it is recommended that the reliable daily yield for purposes of this report in terms of bulk water supply from the production boreholes be taken at 90% of the total potential yield, assuming that 10% of the boreholes will be under maintenance or repair at any given time. The total reliable yield should therefore be taken as 6.3 Mℓ/day.

Bulk Water from the Pudimoe WTW

The Huhudi Reservoir Complex and Vryburg Extension Reservoir Complex receives bulk water from the Pudimoe WTW located south of Huhudi. Purified water can be pumped either into the Huhudi Reservoir Complex or the Vryburg Extension Reservoir Complex.

Pudimoe-Vryburg Pipeline

Historically bulk water has been pumped to the Naledi district by means of a Ø 355 mm pipe line from the Pudimoe WTW. The Pudimoe-Vryburg Pipeline has been upgraded recently as part of the Taung Regional Bulk Water Supply Scheme (Phase 2B). The total length of the Ø 550 mm new supply line is 56km, with three reservoirs and two pumping stations. These reservoirs and pump stations were strategically placed within the supply system and consists of three distinct sections, namely:

- Section No. 1 – Pumping main from Pudimoe to Dryharts
- Section No. 2 – Gravitation line from Dryharts to Brussels
- Section No. 3 – Pumping main from booster pumping station at Brussels to Vryburg

The supply system is able to deliver 273.4 l/s for a 20 hour a day pumping period and has sufficient spare capacity for the 5 Mℓ/day future water demand of the neighboring towns of Ganyesa and Stella.

Pudimoe WTW

The Pudimoe WTW have a total design capacity of 21 Mℓ/day and consists of 3 modules. The treatment plant receives raw water from the Vaal River via the Vaal-Harts Irrigation Scheme. The network of channels making up the Vaal-Harts Irrigation Scheme originates from Warrenton, Northern Cape and ends at the Pudimoe WTW.

Module 1 of the Pudimoe WTW (known as the “Old Vryburg Water Treatment Works”), has a capacity of 6 Mℓ/day and supplies water to Dry-Harts and Huhudi. An estimated 3.9 Mℓ/day is currently supplied to Huhudi. Module 2 of the Pudimoe WTW (known as the “2003 Water Treatment Works”), has a design capacity of 8 Mℓ/day and supply water to Taung, Pudimoe and the surrounding settlements. The recently constructed Module 3 of the Pudimoe WTW has a capacity of 7 Mℓ/day and was initially established to be a dedicated supply to Huhudi.

The Pudimoe WTW receives a raw water supply ranging from 5 to 13 Mℓ/day. The WTW is currently operating at an estimated 65 % of the design capacity due to limited availability of raw water.

The current inability of the Pudimoe WTW to supply the Huhudi & Vryburg Extension Reservoir Complexes with sufficient bulk water is contributed solely to insufficient inflow of raw water from the Vaal-Harts canal.

The Vaal-Harts canal, supplying raw water to the Pudimoe WTW, is operating at full capacity and will require an extensive upgrade to increase the supply volume. The Department of Water and Sanitation has conducted a preliminary cost estimate to upgrade the Vaal-Harts Irrigation Scheme. The estimated cost to upgrade the Vaal-Harts Irrigation Scheme amounts to R 1.8 billion. The upgrade of the Vaal-Harts Irrigation Scheme is not planned for the foreseeable future.

Taung Regional Bulk Water Supply Scheme

The bulk water supply shortfalls within the DRSDM, especially in the Greater Taung and Naledi Local Municipalities prompted the DRSDM to embark on a regional bulk water supply scheme to augment the supply to the Naledi and Greater Taung Local Municipalities. This involves the implementation of bulk water supply infrastructure as part of a RBIP (Regional Bulk Infrastructure Programme) largely funded by the Department of Water & Sanitation (DWS). The project consists of the following phases:

- Phase 1 Refurbish Old 6Mℓ/day Pudimoe WTW
- Phase 2A Pudimoe New 7Mℓ/day Module
- Phase 2B Refurbish Existing 8Mℓ/day Pudimoe WTW
- Phase 2B 56km Bulk Water Supply Mains and Reservoirs
- Phase 2C 9.5km Bulk Gravity Pipeline from Taung Dam to Taung WTW
- Phase 2D 11Mℓ/day module at new Taung WTW
- Phase 2E Bulk water supply to South Eastern Villages of Taung

The new 11Mℓ/day WTW constructed in Taung will significantly augment the bulk water supply systems of the Greater Taung region once commissioned. Prior to the implementation of the Taung Regional Bulk Water Supply Scheme, the Pudimoe WTW supplied bulk water to 15 villages with a total water demand of 8.3 Mℓ/day. In addition, the Pudimoe WTW supplied an estimated 3.9 Mℓ/day to the Huhudi Reservoir Complex. The total bulk water supplied by the Pudimoe WTW amounted to 12.2 Mℓ/day

Completion of the Taung Regional Bulk Water Supply Scheme will theoretically avail an additional 4 Mℓ/day that can be pumped from the Pudimoe WTW to the Huhudi Reservoir Complex resulting in an estimated total of **7.9 Mℓ /day** to be supplied to Vryburg from the Pudimoe WTW.

Conclusion on bulk water supply vs. demand

Based on the information derived above, the total potential bulk water supply to the greater Vryburg from existing and new infrastructure projects currently under construction is summarized as follows:

- i **(i) Production Boreholes: 6.3 Mℓ/day**
- ii **(ii) Pudimoe WTW: 7.9 Mℓ/day**

Total water supply: 14.2Mℓ/day

Although there is not sufficient bulk water currently available in Vryburg to support the proposed development, the expected future supply appears to meet the projected demand calculated above. Successful supply of sufficient bulk water for Vryburg (including the proposed new development) is however subject to various conditions, namely:

(i) Borehole supply

- That production boreholes are maintained and utilized wisely to ensure sustained long-term yield according to its full potential.
- That Geohydrological studies be commenced with to explore and drill additional production boreholes to augment bulk water supply. It is proposed that a geohydrological investigation be conducted to explore possible further groundwater potential. Historical geohydrological reports hint that unpenetrated aquifers will most likely be found north-west of the town of Vryburg. The drilling and equipping of new boreholes are instrumental to the success of the proposed development - *funding for implementation still to be approved.*
- Boreholes drilled & tested under above-mentioned exploration programme be equipped and connected to the Huhudi town reservoirs. Planning, design and costing can only be undertaken once location and supply potential of new boreholes are known. Target is to establish an additional 25 boreholes for the long term.

(ii) Pudimoe WTW supply

- Sustained supply of sufficient raw water is received from the Vaalharts canal system
- Project to connect the Dry-Harts Reservoir to the new RBIG supply system be implemented. This project requires installation of a 6,8km pipeline and decommissioning of the old leaking pipeline in order for Naledi to receive bulk water from Pudimoe Plant via the new 550mm diameter line. A WSIG business plan with motivation was submitted for the project. Survey and detail design completed and the project is implementation ready – awaiting funding approval
- Deadlock with Ba-Ga-Maidi & Ba-Ga Phudhuhucwana Traditional Authorities be resolved in order for Phases C & D of the Taung RBIG scheme to be commissioned. This will invariably release more water from the Pudimoe WTW, previously used for various villages in the Taung Area, to be pumped directly to the Naledi demand zone. Projects are 99% complete and only need final interventions in order to be commissioned. Cost already provided for under the RBIG project budget.
- Upgrading of the Vaalharts North Canal to augment sustainable long-term supply of raw water from the Vaal River system to the Pudimoe WTP. Conceptual planning & cost estimates completed. Will provide reliability of 7,5Mℓ/day capacity of Module 3 at the Pudimoe WTP dedicated for Huhudi/Vryburg

3.1.1.2 Bulk Water Storage

Bulk water storage is facilitated in three distinctive storage nodes for the Greater Vryburg region (Edwin Freyling, Huhudi and Vryburg Extension reservoir complexes).

The Edwin Freyling Reservoir Complex consist of an 18 Mℓ concrete reservoir and a 360kℓ elevated tower supplying water to the town of Vryburg, CBD, Colridge and the industrial area. The theoretical water demand (AADD) for the supply region amounts to 3.9 Mℓ /day and the 4-hour instantaneous peak demand equates to 1.7 Mℓ.

The Edwin Freyling Reservoir Complex supply water to the Colridge Tower (0.386 Mℓ). Thus, it is not considered as an individual storage node. The proposed development will not directly affect the Edwin Freyling Reservoir Complex.

The Huhudi Reservoir Complex consist of a 4.5Mℓ concrete reservoir and a 0.386 Mℓ elevated tower supplying water to Huhudi, and the industrial area. The theoretical water demand (AADD) for the supply region amounts to 2.6 Mℓ /day and the 4-hour instantaneous peak demand equates to 1.1 Mℓ. The proposed development will increase the theoretical water demand (AADD) of the storage node to 3.9 Mℓ /day and 4-hour instantaneous peak demand to 1.7 Mℓ.

The Vryburg Extension Reservoir Complex consist of a 10Mℓ concrete reservoir and a 0.386 Mℓ elevated tower supplying water to Vryburg Extension 25 & 28. The theoretical water demand (AADD) for the supply region amounts to 2.1 Mℓ /day and the 4-hour instantaneous peak demand equates to 0.9 Mℓ. The proposed development will increase the theoretical water demand (AADD) of the storage node to 4.6 Mℓ /day and 4-hour instantaneous peak demand to 2.0 Mℓ.

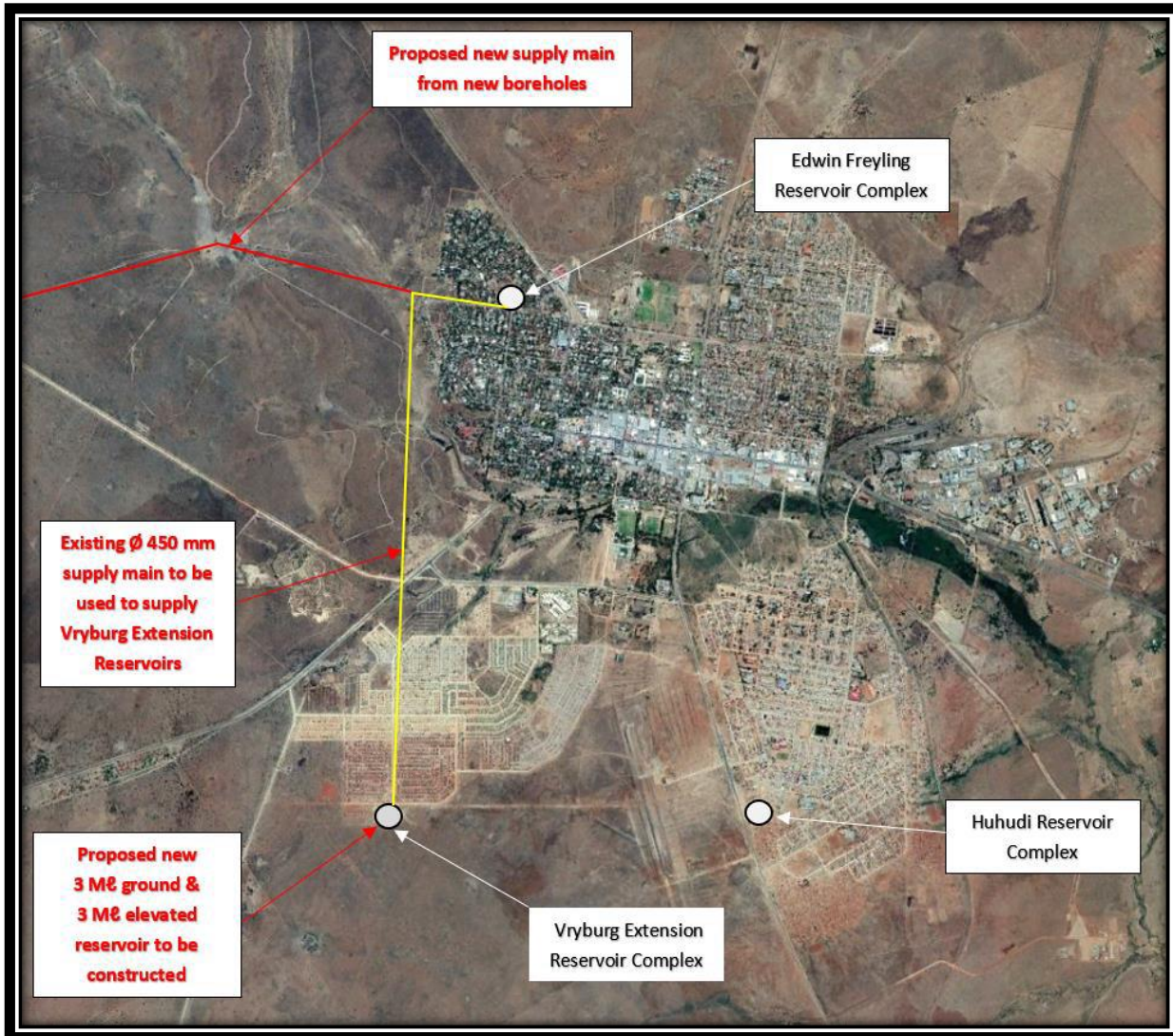
The proposed development will not impact the Edwin Freyling Reservoir Complex.

The Huhudi Reservoir Complex does not comply with total elevated storage required for future water demand scenarios. Topographically the Huhudi Reservoir is lower than the Edwin Freyling and Vryburg Extension Reservoir, thus it is not sensible to increase the storage capacity of the Huhudi Reservoir. It is proposed to increase storage of the adjacent Vryburg Extension Reservoir Complex which can supply the Huhudi Reservoir Complex by utilizing the existing infrastructure.

The Vryburg Extension Reservoir Complex complies in terms of total storage but does not comply with elevated storage guidelines. It is proposed that the total capacity (ground and elevated storage) be increased to compensate for the storage shortfalls of the Huhudi Reservoir Complex.

3.1.1.3 Proposed Water Infrastructure Upgrading

The success of the proposed development is dependent on the provision of adequate water to the proposed new townships by integrating the required new bulk water infrastructure into the existing supply system. The required bulk water infrastructure is comprehensively discussed here-after and graphically illustrated below.



Proposed Bulk Water Infrastructure Augmentation

Bulk Water Supply

Water supply shortages induced by the proposed development will predominantly occur in the region of Vryburg Extension 25/28 and Huhudi. It is therefore proposed that if exploration and drilling of additional new boreholes to the west of Vryburg proves to be successful, a new dedicated supply line be built to connect the new boreholes to the existing Ø 400 mm supply main linking the Vryburg Extension Reservoir to the Edwin Freyling Reservoir. The existing Ø 400 mm supply main will convey bulk water to the Vryburg Extension Reservoir Complex. This will ensure optimal use of existing infrastructure at minimal cost.

Bulk Storage

It is evident from the “Reservoir Capacity Analysis” under section 3.4.1 that neither the Vryburg Extension nor the Huhudi Reservoir Complex complies with the prescribed guidelines. It is proposed that a new 3 Mℓ ground reservoir as well as new elevated 3 Mℓ reservoir be constructed. The additional storage units will eradicate the storage shortfalls of Huhudi and Vryburg Extension’s 25 & 28.

A dynamic hydraulic analysis must be conducted to confirm the required storage capacities when detail design is conducted.

Distribution mains

The supply areas are to be served with connector lines from the elevated water towers varying between 200mm and 315mm in diameter.

The upgrading of Bulk infrastructure does not form part of this application and will be done in a separate application. Occupation of the site will not be allowed until such time as sufficient bulk water supply is available.

3.1.2 SEWER

3.1.2.1 Bulk Sewer

The existing Vryburg WWTW is situated north of the township of Huhudi and south of the industrial area of Vryburg: Geographical co-ordinates: 26°57'52.76" South and 24°44'43.19" East.

The hydraulic capacity of the WWTW is 6.5 Mℓ/day which utilises conventional treatment to produce a stable effluent. The individual treatment components of the WWTW is briefly described hereafter.

Waste water enters the WWTW through an inlet works consisting of two Archimedes screw pumps discharging into an inlet channel. The influent channel houses a venturi flume with an electronic flow meter. Hereafter waste water flows into the biological reactor, the primary function of the reactor is to remove the biodegradable fraction of Biological Oxygen Demand (BOD), Phosphorus compounds and Nitrogen. Mixed liquid flows from the biological reactor into a secondary clarifier - this treatment process is designed to remove biological growth and humus from the waste water. Settling solids accumulate at the bottom of the structure and form a substance referred to as sludge. Fundamentally the secondary clarifier separates waste water (Mixed Liquid) and settling solids (sludge). The effluent flows over the weir plates and gravitates towards the chlorination application unit. Chlorine is applied to the final effluent, from the secondary clarifiers to kill pathogenic micro-organisms before it is discharged into the natural water-course.

Existing WWTW Capacity - Current Sewer Generation

= Design Capacity – Existing Sewer Inflow
= 6.4 – 5.4
= 1 Mℓ/d

The estimated peak influent at the WWTW amounts to 144 ℓ/s. Calculated as follows:
= 45.6 + 43.6 + 37.8 + 5.4 + 11.4 + 0.6
= 144 ℓ/s

Existing WWTW Capacity - Sewer Generation Including Proposed Development

= Design Capacity – Existing Sewer Inflow
= 6.4 – 8.2
= - 1.8 Mℓ/d

The estimated peak influent at the WWTW amounts to 144 ℓ/s. Calculated as follows:

$$= 45.6 + 43.6 + 37.8 + 74.6 + 5.4 + 11.4 + 0.6$$
$$= 218.4 \text{ l/s.}$$

The existing WWTW will not have sufficient capacity to accommodate the increased load created by the proposed development. However, the Dr Ruth S Mompoti District Municipality is currently constructing a new 16.0 Mℓ/day WWTW south east of Huhudi. The first module of the New WWTW with capacity of 9Mℓ/day is expected to be operational by 2020. The new and existing WWTW in tandem will have ample capacity to accommodate the increased sewerage loading induced by the proposed development as evident from the calculations below:

New & existing WWTW Capacity - Current Sewer Generation

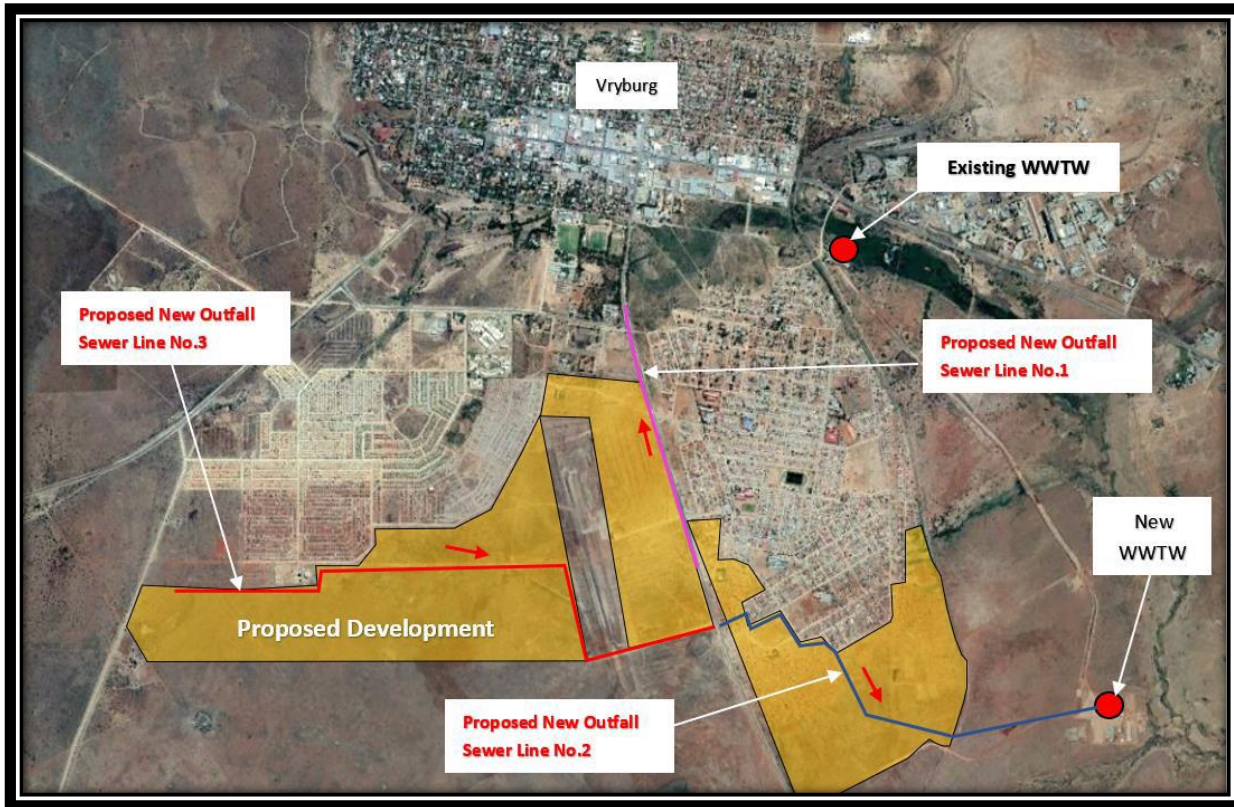
$$= \text{Design Capacity} - \text{Existing Sewer Inflow}$$
$$= (9 + 6.5) - 5.4$$
$$= 10.1 \text{ Mℓ/d}$$

New & existing WWTW Capacity - Sewer Generation Including Proposed Development

$$= \text{Design Capacity} - \text{Existing Sewer Inflow}$$
$$= (9 + 6.5) - 8.2$$
$$= 7.3 \text{ Mℓ/d}$$

3.1.2.2 Proposed Bulk Sewer Infrastructure Augmentation

The successful implementation of the proposed development requires effective integration with the existing and new bulk sewer infrastructure of Vryburg. The proposed new outfall sewer lines, to convey generated sewerage to the respective WWTW's, are graphically displayed below:



Sewer Infrastructure Augmentation

Proposed New Outfall Sewer Line No.1 - Pink

The route of the said outfall sewer line is recommended along the N18 commencing at the southern end of the proposed development and connecting to the existing \varnothing 450 mm outfall sewer line of Vryburg Extension 25 & 28 leading to the existing WWTW. The existing \varnothing 450 mm outfall sewer line has ample capacity to convey the increased sewerage load - flow will increase from 42 ℓ /s to 59 ℓ /s implying that the existing pipe will operate at an estimated 49 % of full-bore capacity. The proposed sewer line design is according to the following parameters:

Dwellings: 1 061 Households
 Slope: 1: 300
 Average Dry Weather Flow: 538 K ℓ /s
 Instantaneous Peak Wet Weather Flow: 17.5 ℓ /s
 Pipe Diameter: 300 mm

Proposed New Outfall Sewer Line No.2 – Blue

This line, intended to convey most of the sewerage generated in Huhudi Extension 1, shall commence in the vicinity of the the of the Huhudi Reservoir Complex and discharge accumulated effluent into the New WWTW. The following parameters is applied in the proposed sewer line design:

Dwellings: 5 923 Households
 Slope: 1: 400
 Average Dry Weather Flow: 1 954 K ℓ /s
 Instantaneous Peak Wet Weather Flow: 56 ℓ /s

Pipe Diameter: 400 mm

Proposed New Outfall Sewer Line No.3 – Red

The proposed sewer line will commence from the north western boundary of Vryburg Extension 29 and connect to Proposed New Outfall Sewer Line No.2 in the vicinity of the Huhudi Reservoir Complex. The sewer line will convey approximately 69% of the waste water generated in Vryburg Extension 29. The following parameters is applied in the proposed sewer line design:

Dwellings: 3 661 Households

Slope: 1: 500

Average Dry Weather Flow: 1 208 Kℓ/s

Instantaneous Peak Wet Weather Flow: 36 ℓ/s

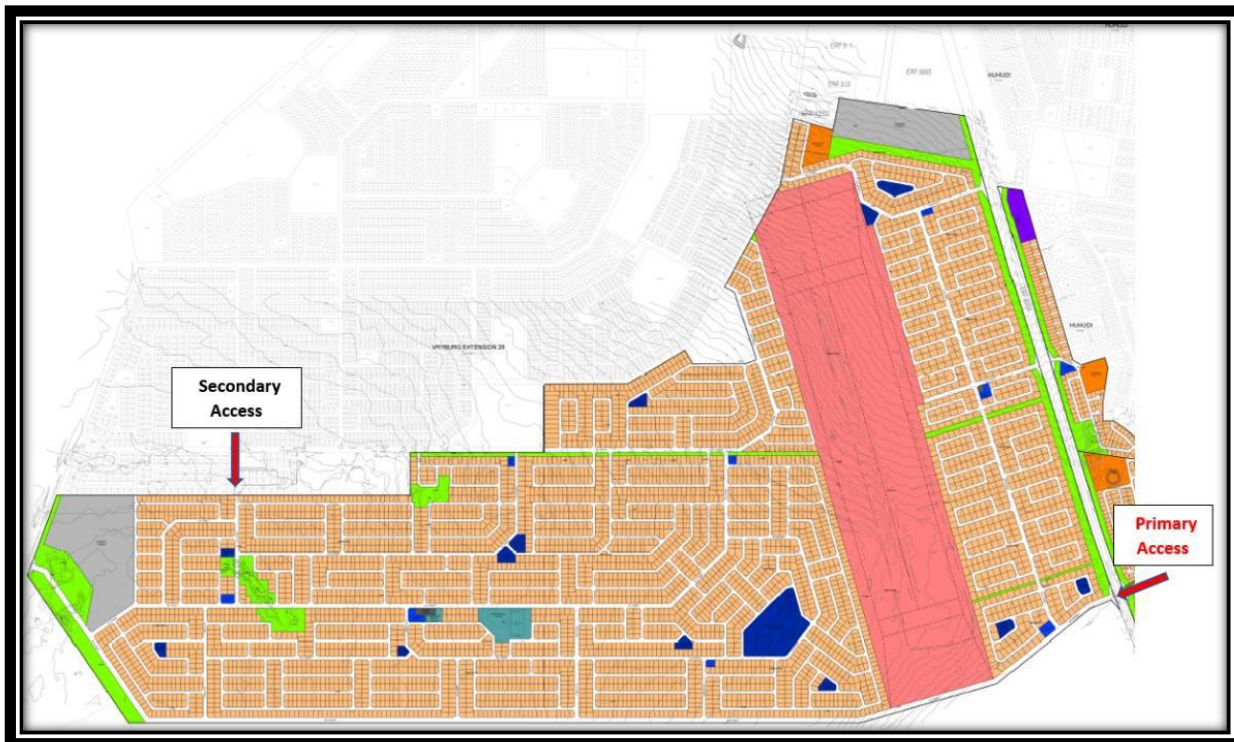
Pipe Diameter: 350 mm

Once again note that the upgrading of Bulk infrastructure does not form part of this application and will be done in a separate application. Occupation of the site will not be allowed until such time as sufficient bulk sewer is available.

3.1.3 ACCESS

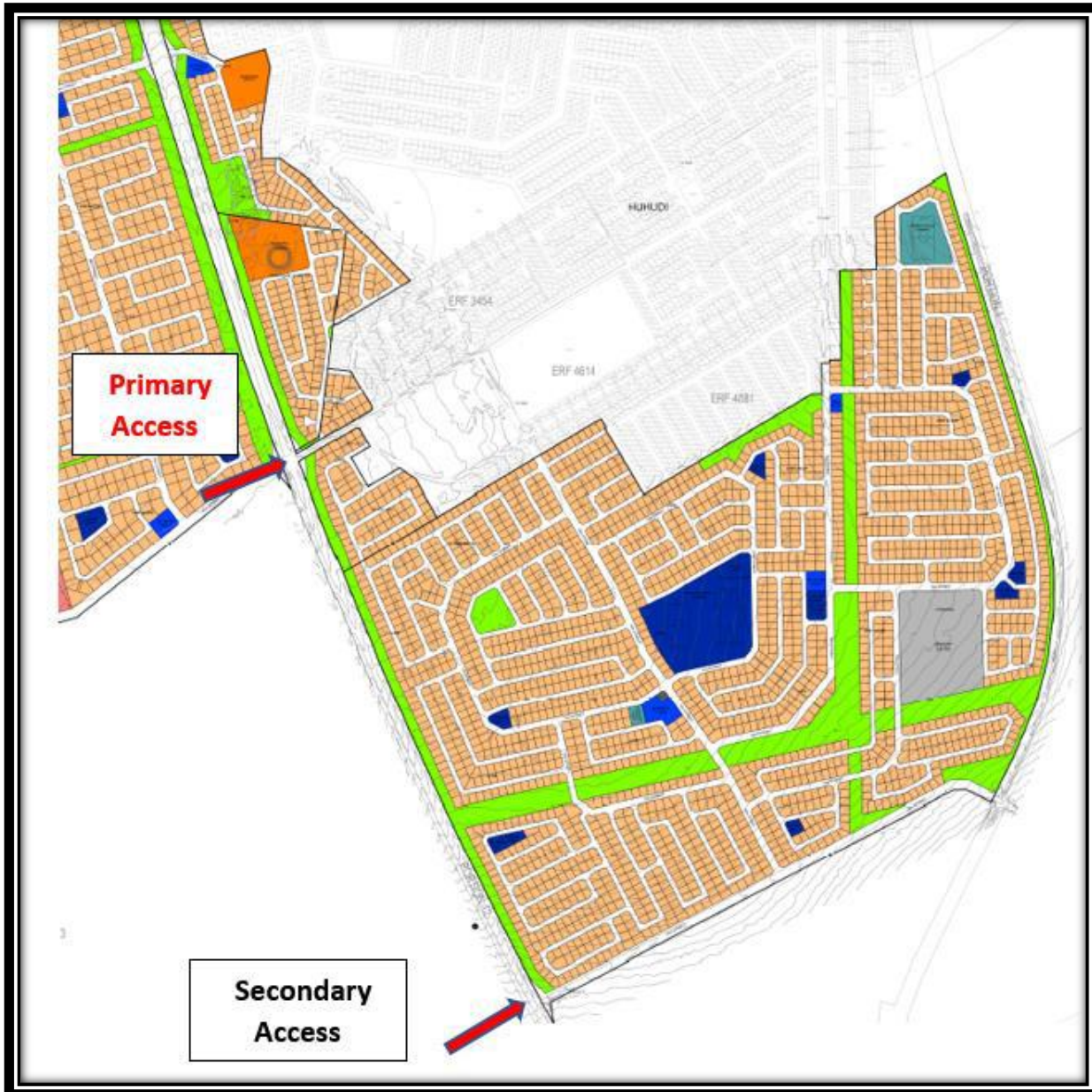
The Proposed Development consists of Vryburg Ext 29 and Huhudi Ext 1. The respective townships are separated by the N18 (Vryburg / Taung road).

Primary access to Vryburg Ext 29 will be from the N18 with secondary access from a prominent existing taxi route - refer map below.



Access to Vryburg Ext 29

The primary and secondary access to Huhudi Ext 1 will be from the N18 road as illustrated below:



Access to Huhudi Ext 1

3.1.4. STORM-WATER

The natural topography of Vryburg Extension 29 slopes towards the north eastern boundary of the proposed development. The urbanisation of the demarcated area will increase the peak storm-water runoff (1- in - 2 years recurrence interval) from 3.6 m³/s to 12.2 m³/s.

The demarcated area for the proposed development of Huhudi Extension 1 slopes towards the eastern boundary of the site. The development of the township will increase the storm-water runoff (1 – in – 2 years recurrence interval) from 2.1 m³/s to 7.3 m³/s.



Direction of Storm-water Flow

Storm-water infrastructure will be designed to accommodate runoff as surface flow in an open system. This will be achieved by designing internal roadways to disperse storm-water towards the undeveloped green zones located east of Huhudi Ext 1 and north-east of Vryburg Extension 29. Comprehensive information of storm water attenuation should be presented in the detail design report of internal services for approval by the municipality.

3.1.5 SOLID WASTE

Removal of Municipal Solid Waste (MSW) is a function of the Waste & Environmental Management Division of the Naledi Local Municipality. The Greater Vryburg region currently generates an estimated MSW volume of 34.2 tonne per day. The proposed development will increase the daily MSW volume to 51.0 tonne. The table below illustrates the estimated MSW volume as per USAID 2009 publication on Environmental Guidelines for Activities in Africa (EGSAA) literature.

The encouragement of an integrated waste management system will dramatically reduce MSW and promote Reduce, Reuse and Recycle practices. Solid waste handling however is a municipal function and the capacity of the current landfill site must be established and evaluated.

3.1.6. ELECTRICITY

The development separation line of the N18 is also the separation line between the Eskom and Naledi license areas. It is therefore proposed that the electrical supply for the development should also be divided accordingly.

East Development

The development to the East of the N18 has a total estimated load of 6 MVA. It is proposed that this should be included into the Eskom license area as a part of the existing Huhudi network.

This area is currently supplied from the Vryburg Main substation which will have capacity available to supply the new development. It is proposed that this should be done via a new 11kV overhead line, shown in green below.

As this is an Eskom license area the details will have to be confirmed by Eskom.



East Bulk Supply Proposal

West Development

The development to the West of the N18 has a total estimated load of 26MVA.

This area is currently supplied from Naledi substation which is already operating at maximum available capacity. The existing electrical network will not be able to supply the required capacity from Vryburg substation and upgrades to this network will also be very high.

With future developments in mind Naledi substation has been built to the 132/11kV standard with the capacity to accommodate up to three (3) 10 MVA 132/11kV transformers. Eskom has indicated that they will be able to supply additional capacity through their 132kV network from the Mookodi MTS.

Our recommendation is for the existing 22kV line (white) to be extended into Mookodi MTS and upgraded to 132kV (blue). At the same time Naledi substation will have to be upgraded to three (3) 10 MVA 132/11kV transformers.

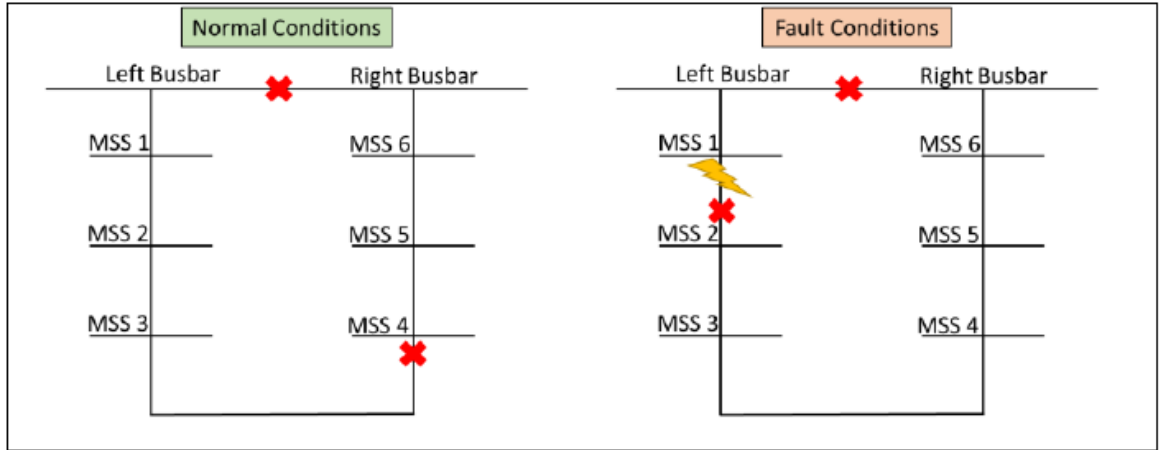
This solution will bring the required capacity into the development area and unlock the full development potential with a stable electrical supply.



West Bulk Supply Proposal

The following electrical services are proposed:

- a. **Bulk Supply:** As per bulk supply proposal.
- b. **MV Distribution:** MV distribution will be done in accordance with the ring design philosophy as shown in the figure below. All MV distribution cables will be underground with miniature-substations.



Ring Design Philosophy

- c. **LV Reticulation:** Electricity will be distributed throughout the development by way of an overhead LV radial network and associated pole top boxes.
- d. **LV Connections:** LV connections (10/16mm², 3 Core, PVC/SWA/PVC/PVC) will be provided for each residential stand and specific sized LV feeders to each larger customer from the various pole top boxes.
- e. **Street & Area Lighting:** Residential roads and public areas will make use of HPS type luminaires installed on wooden poles.
- f. The detail of the above will be determined during the detail design phase of the project, dependant on the final SDP and will be submitted for review and approval.

4. DESCRIPTION OF THE PROPERTY

The property is located on a Portion of the Remaining Extent of Portion 8 of the farm Rosendal No. 673-IN, a Portion of the Remaining Extent of Erf 506, Vryburg, a Portion of the Remaining Extent of Portion 3 of the farm Rosendal No. 673-IN and Erven 3455, 4377, the remaining extent of Erf 4378 and Erf 4835, Huhudi, North West Province. The site is located within the jurisdiction of the in Dr Ruth Segamotsi Mompoti District Municipality in the North West province of South Africa. The application site falls under the jurisdiction of the Naledi Local Municipality. It is located towards the south of Vryburg and Huhudi, and falls within Municipal Wards 4, 6, 7 and 9.

The N18 national route intersects the site and access will be from this road. The site is located to the south of the approved Vryburg Ext 28 and Huhudi. Informal settlers have started to erect shacs towards the south of Huhudi.

Project applicant:	Naledi Local Municipality		
Trading name (if any):			
Contact person:	Mr. Arnold Manamela		
Physical address:	19A Market Street, Vryburg		
Postal address:	P.O. Box 35, Vryburg		
Postal code:	8600	Cell:	N/A
Telephone:	053 928 2200	Fax:	053 927 3482
E-mail:	4makwena@gmail.com		

Landowner:	Naledi Local Municipality		
Contact person:	Mr. Arnold Manamela		
Postal address:	P.O. Box 35, Vryburg		
Postal code:	8600	Cell:	N/A
Telephone:	053 928 2200	Fax:	053 927 3482
E-mail:			

In instances where there is more than one landowner, please attach a list of landowners with their contact details to this application.

Local authority in whose jurisdiction the proposed activity will fall:	Naledi Local Municipality		
Municipal Ward No:	4; 6; 7; 9		
Nearest town or districts:	Vryburg		
Contact person:	Mr. Arnold Manamela		
Postal address:	P.O. Box 35, Vryburg		
Postal code:	8600	Cell:	N/A
Telephone:	053 928 2200	Fax:	053 927 3482
E-mail:			

Site Co-ordinates

Latitude (S):

Longitude (E):

Alternative S1 (preferred or only site alternative) Vryburg	26°	59'	15.90"S	24°	42'	50.35"E
Alternative S1 (preferred or only site alternative) Huhudi	26°	59'	29.70"S	24°	44'	47.11"E
Vryburg Township	26°	58'	19.82"S	24°	43'	57.67"E
	26°	58'	17.75"S	24°	43'	34.9"E
	26°	59'	14.00"S	24°	44'	15.76"E
Huhudi Township	26°	59'	10.63"S	24°	41'	54.89"E
	26°	58'	26.94"S	24°	44'	0.02"E

26°	59'	50.02"S	24°	44'	33.85"E
26°	59'	37.06"S	24°	45'	8.88"E
26°	58'	56.02"S	24°	45'	5.34"E
26°	59'	5.30"S	24°	42'	0.33"E

Cemetery

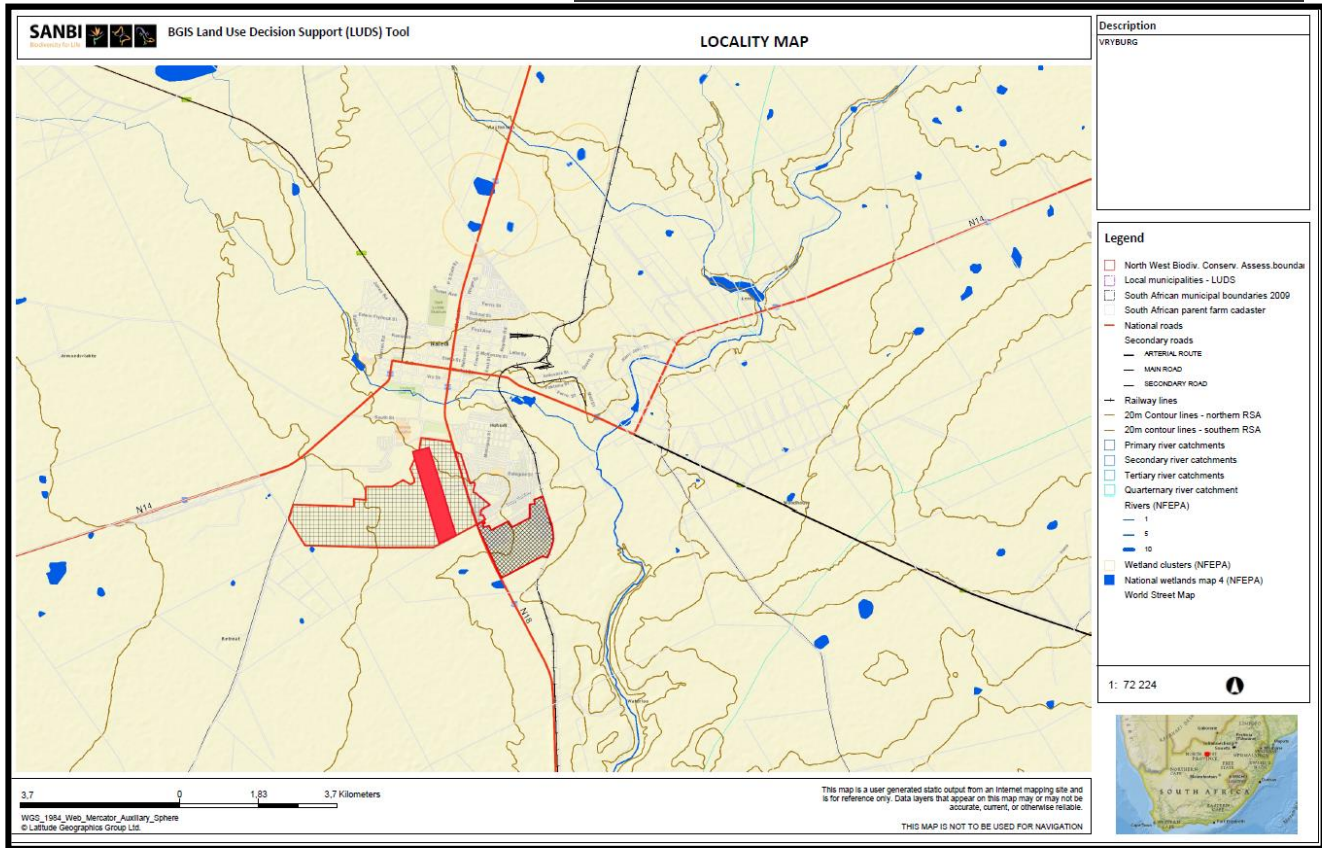
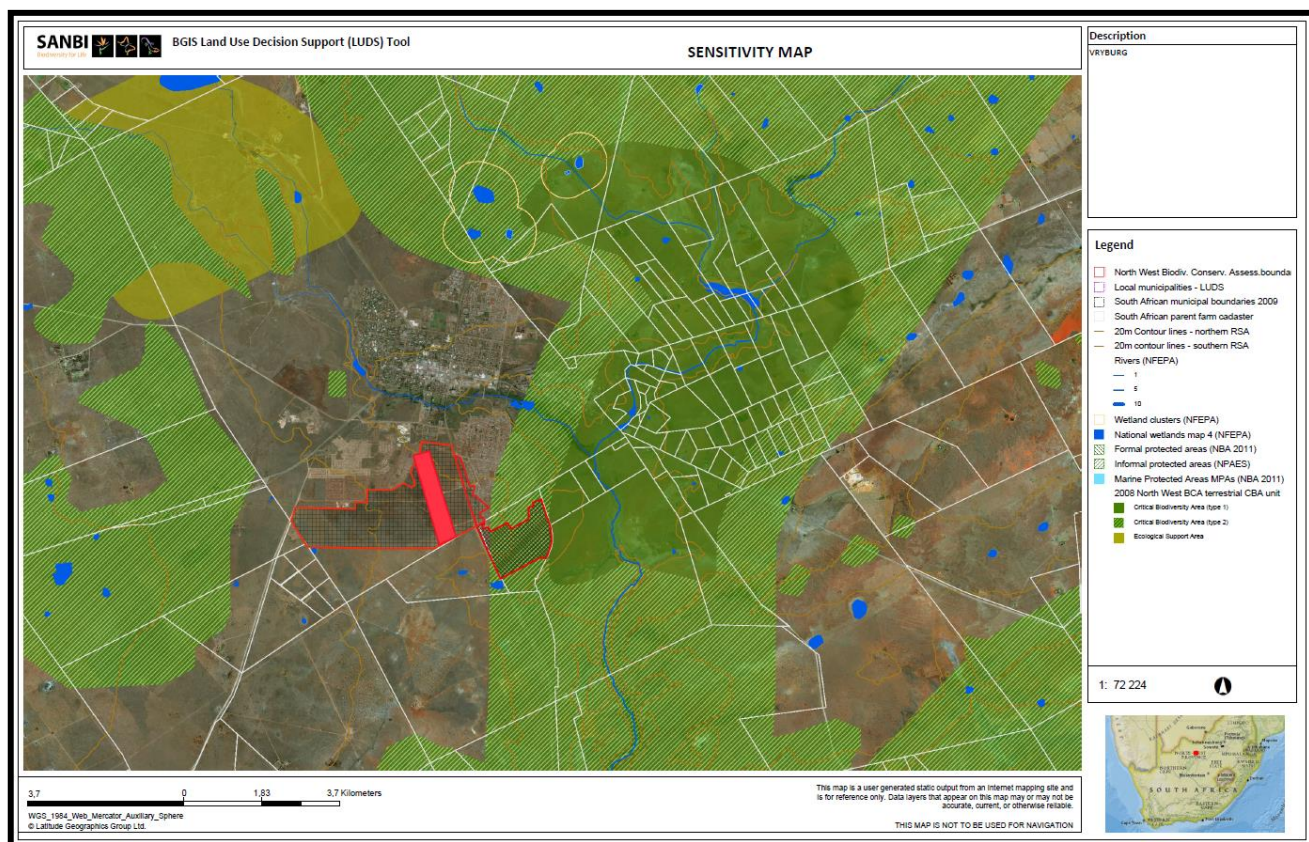


FIGURE 2: LOCALITY MAP: A PORTION OF THE REMAINING EXTENT OF PORTION 8 OF THE FARM ROSENDAL NO. 673-IN, A PORTION OF THE REMAINING EXTENT OF ERF 506, VRYBURG, A PORTION OF THE REMAINING EXTENT OF PORTION 3 OF THE FARM ROSENDAL NO. 673-IN AND ERVEN 3455, 4377, THE REMAINING EXTENT OF ERF 4378 AND ERF 4835, HUHUDI, NORTH WEST PROVINCE

Figure 3: LOCALITY MAP AND SENSITIVITY MAP



5. LEGAL AND OTHER REQUIREMENTS

Title of legislation, policy or guideline	Applicability to the project	Administering authority	Date
National Environmental Management Act No. 107 of 1998 as amended.	NEMA is the guiding legislation that has been considered during the Environmental Impact Assessment process and the compilation of this Scoping Report.	National & Provincial (DEA And North West READ)	27 November 1998
The Bill of Rights, Constitution of South Africa, Section 27 (1)(b)	<p>The Constitution of the Republic of South Africa is the legal source of all law, including environmental law, in South Africa. The Bill of Rights is fundamental to the Constitution of South Africa and in, section 24 of the Act, it is stated that:</p> <p>Everyone has the right (a) to an environment that is not harmful to their health or well-being; and (b) to have the environment protected, for the benefit of present and future generations through reasonable legislative and other measures that (i) prevent pollution and ecological degradation; (ii) promote conservation; and (iii) secure ecologically sustainable development and use of</p>	National Government	1994

Title of legislation, policy or guideline	Applicability to the project	Administering authority	Date
	<p>natural resources while promoting justifiable economic and social development.</p> <p>Given that environmental management is founded partly on the principles of public participation, Section 195 of the Constitution is of primary relevance:</p> <p>(1) Public administration must be governed by the democratic values and principles enshrined in the constitution, including the following principles: (a) (b) (c) (d) (e) Peoples needs must be responded to, and the public must be encouraged to participate in policymaking. (f) Public administration must be accountable. (g) Transparency must be fostered by providing the public with timely, accessible and accurate information (Government Gazette, 1996).</p>		
New Regulations 2014 in terms of NEMA	Legislation consulted during the environmental impact assessment process to determine whether any listed activities would be triggered. The Regulations were also consulted to determine inter alia the requirements regarding the contents of Scoping reports and the public participation process that should be followed.	National & Provincial (DEA And North West READ)	7 April 2017
National Water Act (36 OF 1998)	<p>National Water Act (NWA), 1998 (Act 36 of 1998) is the primary statute providing the legal basis for water management in South Africa and has to ensure ecological integrity, economic growth and social equity when managing and using water.</p> <p>The major objectives of the National Water Act are to:</p> <ul style="list-style-type: none"> •Aid in providing basic human needs; •Meet the growing demand of water in a sustainable manner; •Ensure equal access to water and use of water resources; •Protect the quality of water of natural resources; •Ensure integrated management of water resources; •Foster social and economic development; and •Conserve aquatic and related ecosystems. <p>Section 19 of the National Water Act states that the person responsible for land upon which any activity is or was performed which causes, has caused or is likely to cause, pollution of a water resource, must take all reasonable</p>	Department of water and sanitation	1998

Title of legislation, policy or guideline	Applicability to the project	Administering authority	Date
	measures to prevent any such pollution from occurring, continuing or recurring.		
National Environmental Management: Biodiversity Act (NEMBA) (ACT NO. 10 OF 2004)	<p>The National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004), provides for the management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act, 1998; the protection of species and ecosystems that warrant national protection; the sustainable use of indigenous biological resources; the fair and equitable sharing of benefits arising from bio-prospecting involving indigenous biological resources; the establishment and functions of a South African National Biodiversity Institute; and for matters connected therewith.</p> <p>In terms of Chapter 4 of the Above Act:</p> <p>52. (1) (a) The Minister may, by notice in the Gazette, publish a national list of ecosystems that are threatened and in need of protection.</p> <p>(b) An MEC for environmental affairs in a province may, by notice in the Gazette, publish a provincial list of ecosystems in the province that are threatened and in need of protection.</p> <p>(2) The following categories of ecosystems may be listed in terms of subsection:</p> <p>(a) critically endangered ecosystems, being ecosystems that have undergone severe degradation of ecological structure, function or composition as a result of human intervention and are subject to an extremely high risk of irreversible transformation;</p> <p>(b) endangered ecosystems, being ecosystems that have undergone degradation of ecological structure, function or composition as a result of human intervention, although they are not critically endangered ecosystems;</p> <p>(c) vulnerable ecosystems, being ecosystems that have a high risk of undergoing significant degradation of ecological structure, function or composition as a result of human intervention, although they are not critically endangered ecosystems or endangered ecosystems; and</p>	National & Provincial (DEA And North West READ)	2004

Title of legislation, policy or guideline	Applicability to the project	Administering authority	Date
	<p>(d) protected ecosystems, being ecosystems that are of high conservation value or of high national or provincial importance, although they are not listed in terms of paragraphs (a), (b) or (c).</p> <p>(3) A list referred to in subsection (1) must describe in sufficient detail the location of each ecosystem on the list.</p> <p>53 (1) The Minister may, by notice in the Gazette, identify any process or activity in a listed ecosystem as a threatening process.</p> <p>(2) A threatening process, identified in terms of subsection (1) must be regarded as a specified activity contemplated in section 24(2)(b) of the National Environmental Management Act (1998) and a listed ecosystem must be regarded as an area identified for the purpose of that section.</p>		
National Environmental Management: Protected Areas Act (ACT NO. 57 OF 2003)	<p>This Act aims to provide for a national system of protected areas in South Africa as part of a strategy to manage and conserve its biodiversity. The Protected Areas Act tries to ensure the protection of the entire range of biodiversity, referring to natural landscapes and seascapes. The Act makes express reference to the need to move towards Community Based natural Resource Management (CBNRM) as its objectives include promoting the participation of local communities in the management of protected areas. The purpose of the Act is:</p> <ul style="list-style-type: none"> •To protect ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes and their ecological integrity. •To conserve biodiversity in those areas; •To protect South Africa's rare species; •To protect vulnerable or ecologically sensitive areas; •To assist in ensuring the sustained supply of environmental goods and services; •To provide for the sustainable use of natural and biological resources; •To create or augment destinations for nature-based tourism; •To manage the interrelationship between natural environmental biodiversity, human settlement and economic development; •To contribute to human, social, cultural, spiritual and economic development; 	National & Provincial (DEA And North West READ)	2003

Title of legislation, policy or guideline	Applicability to the project	Administering authority	Date
	<p>•To rehabilitate and restore degraded ecosystems and promote the recovery of endangered and vulnerable species.</p> <p>This Act further stipulates various criteria which must be met before an area can be declared as a special nature reserve, national park, nature reserve and protected environment. It also prescribes a range of procedures, including consultation and public participation procedures which must be followed before any of the kinds of protected areas are declared.</p>		
National Heritage Resources Act, Act No. 25 of 1999	Legislation consulted during the impact assessment process, to determine the legal requirements relating to the management of heritage resources that are present in and around the site.	SAHRA	1999
National Environmental Management: Waste Act, Act No. 59 of 2008, read together with the List of Waste Activities that Have, or are Likely to Have, a Detrimental Effect on the Environment, GN No. 921 of 29 November 2013	Legislation consulted to determine whether a waste licence will have to be obtained for the development.	National & Provincial (DEA And North West READ)	2008
<i>Mineral and Petroleum Resources Development Act (MPRDA), Act 28 of 2002</i>	<p>The Act distinguishes between mining permits and mining rights as follows:</p> <p>Mining Permit: Required where the activity will last less than two years and affects an area of less than 1.5ha in extent (valid for 3 years). In terms of the Act a mining permit requires a submission of an Environmental Management Plan (EMP to DME for approval prior to the onset of activities).</p> <p>Mining Right: Required for larger mining operations (renewable and valid for 30 years). In terms of the Act a mining right requires the submission of an Environmental Management Programme (EMProg) to DME for approval prior to the onset of activities.</p> <p>In light of their limited spatio-temporal extent, borrow pits (for the provision of construction material) and quarry operations would typically require a mining permit.</p> <p>The closure of borrow pits requires the submission of a closure application; this must be submitted within 180 days after ceasing operations. It is important to recognise that the mining right/permit holder's liability persists until such time as</p>	Relevant Provincial Authorities.	2002

Title of legislation, policy or guideline	Applicability to the project	Administering authority	Date
	a Closure Certificate has been issued by DME.		
<i>National Environmental Management: Air Quality Act (Act 39 of 2004)</i>	To protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social Development. Construction activities may cause some air pollution.	Relevant Authorities. Provincial	2004
<i>The Conservation of Agricultural Resources Act (Act 43 of 1983)</i>	This Act regulates the flow pattern of runoff water, control of weeds and invader plants.	Relevant Authorities. Provincial	1983
<i>National Veldt and Forest Fire Act (Act 101 of 1998)</i>	Chapter 4 places a duty on owners to prepare and maintain firebreaks.	Relevant Authorities. Provincial	1998
<i>National Forests Act, Act 84 of 1998 (NFA) read with GN1602 of December 2016.</i>	During the construction phase of the development certain protected trees may be affected. Licences will have to be obtained from the Minister before the affected trees may be cut, disturbed, damaged or destroyed. GN1602 of December 2016 contains the list of protected trees.	National and Provincial authorities.	1998
<i>Occupational Health and Safety Act (Act 85 of 1993)</i>	To provide for the health and safety of persons at work and for the health and safety of persons in connection with the use of plant and machinery and the protection of persons other than persons at work against hazards to health.	Relevant Authorities. Provincial	1993

The study is conducted in such a way as to comply with the instructions regarding such studies and reports (as contained within the above-mentioned documents).

The following aspects have been dealt with:

SCHEDULE

Actions	Timeframe
1. Project Initiation and Scoping Phase	
1.1 Communication with authorities and source and analyse relevant baseline information and undertake site inspections	5 days
1.2 Identify key interested and affected parties (I&APs)	1 day
1.3 Compilation of terms of reference for specialist studies	2 days
1.4 Commission specialist studies	1 day
1.5 Compile Environmental Application Form for the project and submit to the authorities	Once the Environmental Application form has been submitted, the scoping report which has been subject to public participation (30 days) needs to be submitted within 44 days
1.6 Compile draft Scoping Report (SR) and make available to the public for a 30 day commenting period	5 days for compilation and 30 days for commenting period
1.7 Prepare an Information Sheet (summary of the draft SR) and distribute to I&APs	1 day
1.8 Compile and publish media notices (for the EIA) in relevant newspapers	7 days
1.9 Compile and place poster/s along the boundary of the site	1 day

1.10 Receive and address first round of comments from public	3 days
1.11 Should the draft SR require substantial changes, these changes will be incorporated into the final SR and distributed	The competent authority must within 43 days of receipt of the scoping report accept / refuse the report with or without conditions
1.12 Address comments received on the SR, finalise Scoping Report and submit to authorities	As above
1.13 Compile a Plan of Study for the assessment phase and submit to authorities for approval	As above
The total time allowed for the Scoping phase of the application	87 days
2. Assessment Phase	
2.1 Undertake assessment phase by assessing and evaluating potential impacts identified in the Scoping phase.	5 days
2.2 Review and manage specialist studies required.	Ongoing
2.3 Compile a draft Environmental Impact Report (EIR).	5 days
2.4 Compile a draft Environmental Management Plan for the Construction phase.	Included above
2.5 Compile an Information Sheet (summary of EIR) and distribute to identified I&APs	1 day
2.6 Distribute DEIR to I&APs	1 day
2.7 Allow the identified public to provide comment within a 30 day period on above report.	3 days for compilation and 30 days for commenting period
2.8 Address comments received and finalise EIR	3 days
2.9 Should the draft EIR require substantial changes, these changes will be incorporated into the final EIR and distributed for a 21 day commenting	3 days plus 21 day commenting period
2.10 Finalise EIR and update comments and response table for submission to authorities	5 days
2.11 Submit EIR to authorities for a final decision	1 day (The department requires the submission of the Final EIR within 106 days of the approval of the Scoping report)
2.12 Once the decision is issued, all I&Ps must be formally informed of the decision	The Competent Authority has 107 days from the date of receipt of the EIR and EMPr to determine the application
Total number of days allowed for the compilation and consideration of the EIR	213 (may require additional 50 days public participation and consideration)
TOTAL NUMBER OF DAYS:	300-350 days

6. NEED AND DESIRABILITY

As in the rest of South Africa, there is a housing shortage in the area. This is unacceptable as Informal settlements consist of non-conventional housing built without complying with legal building procedures. Broadly, these crude dwellings mostly lack proper indoor infrastructure, such as water supply, sanitation, drainage, waste disposal and proper road access. There is also a bond between poor housing and environmental conditions in informal settlements which also reflects poverty. Linking basic services such as water to health is viewed as a false separation as these services are 'intimately related to housing'. It becomes a housing issue if children playing outside the house contract diarrhoea via ingesting pathogens from faecal matter which contaminates the land on which they play. Otherwise, it is the house which provides for shelter against injury, weather and disease. Improving the surroundings of the house is to limit severe health risks existing within poor quality housing.

The area around Vryburg and Huhudi is earmarked for residential development in order to relieve the existing backlog of housing in the region. Proper planning methods should also be implemented in order to reduce further sprawl to the south of Huhudi. By introducing a formalized township the existing informal settlement will be relocated and further “squatting” will be reduced.

As mentioned, development guidelines from the Guidelines for human settlement planning and design were taken into account to develop a sustainable area for people to have job opportunities and public facilities close to home. This will encourage a sustainable community and by implementing these guidelines, will help contribute to the upliftment of the community as a whole.

All of the above conclude that there is a need for residential development, and that the proposed township is not only favourable by the Department of Housing, but to the counsel as well as the community.

During the construction phase, temporary employment will be created. The increased employment in the area during the construction phase will also result in increased expenditure, which, in addition, will mean that more than just the proposed jobs required for the construction on the site will be created due to economic spin-offs that will result.

7. ALTERNATIVES

One of the objectives of an EIA is to investigate alternatives to the proposed project. The IEM procedure stipulates that the environmental investigation needs to consider feasible alternatives for any proposed development. Therefore, a number of possible proposals or alternatives for accomplishing the same objectives should be identified and investigated. In order to ensure that the proposed development enables sustainable development, feasible alternatives must be explored (S. Cliff, 2015).

The identification, description, evaluation and comparison of alternatives are important for ensuring a sound environmental scoping process. Alternatives should be considered as a norm within the Environmental Process (S. Cliff, 2015).

The alternatives considered for the proposed development includes land use alternatives (including the No-go option). The various alternatives will be assessed in the EIAR, in terms of environmental, social and technical feasibility.

- **7.1 Land Use Alternatives**

- **7.1.1 Mixed land use township (Alternative 1)**

Alternative Site layouts have been developed for the proposed development.

The appointed Town and Regional planner have produced the proposed layout plan.

The proposed Township will consist of the following:

Proposed Zoning	Proposed Land use	No. of Erven
Residential 4:	Dwelling Unit Minimum 300m ²	2 739 erven
	Dwelling Unit Minimum 400m ²	4 594 erven
	Dwelling Unit Minimum 500m ²	1 102 erven

Business 1:	Business	3 erven
	Shop	26 erven
Commercial:	Business/ Light Industry	1 erven
Institutional 1:	Place of Instruction (Primary School)	2 erven
	Place of Instruction (Crèche)	10 erven
	Place of Worship (Church)	16 erven
Institutional 2:	Community Facility	2 erven
	Sports Field	2 erven
Public Open Space 1:	Public Open Space	35 erven
Public Open Space 2:	Private Open Space	1 erven
Authority:	Municipal	2 erven
Transport 1:	Taxi Rank	2 erven
Cemetery:	Cemetery	3 erven

Although the emphasis is on housing, complimentary land uses have been included in the township. People want easy access to job opportunities, shops, schools, banking facilities, clinics, etc. and want their living environment, such as residential townships to be placed at strategic positions with good access routes in close proximity to these amenities.

A mixed land use development is *socially responsible* based on the following:

- It covers the mixed and lower income bracket by providing a higher density housing option;
- The development will inevitably support the use of public transport;
- The development will include supporting social infrastructure (schools), as well as some retail or commercial activities;
- The layout of the development must respond to the future road planning for the area, to facilitate and maximise pedestrianisation and public transport.
- Commercial erven can accommodate a shopping centre, to service the existing formalised and informal settlements in the area. The commercial node will:
 - Promote entrepreneurial services and products;
 - Be within walking distance to places of refreshment and trade for residents;
 - Provide Job opportunities; and
 - Improve neighbourhood quality.

7.1.2 Single land use: Housing only (Alternative 2)

By providing only one land use type (i.e., housing), mixed income development and social integration across race and income levels, cannot be achieved.

A Commercial node on site is commonly utilised as a “Multi-Purpose Community Centre/Rural Service Centre” which is defined as “a focal point at which a range of essential services can be obtained by people living in its vicinity”. In turn, a commercial node acts as a pool of human and physical resources from which the inputs necessary for development can be distributed efficiently, and from which a community can draw to promote their development”.

By restricting a township to one land use only, the above benefits to the local community, and subsequent council area, cannot be realised, and hence, is not a preferred land use option.

7.1.3 No-go Alternative

The only other alternative that exists for the proposed development is the “no-go” option which will imply that the status quo will prevail. This is unacceptable as Informal settlements consist of non-conventional housing built without complying with legal building procedures. Broadly, these crude dwellings mostly lack proper indoor infrastructure, such as water supply, sanitation, drainage, waste disposal and proper road access. There is also a bond between poor housing and environmental conditions in informal settlements which also reflects poverty. Linking basic services such as water to health is viewed as a false separation as these services are ‘intimately related to housing’. It becomes a housing issue if children playing outside the house contract diarrhoea via ingesting pathogens from faecal matter which contaminates the land on which they play. Otherwise, it is the house which provides for shelter against injury, weather and disease. Improving the surroundings of the house is to limit severe health risks existing within poor quality housing.

8. DESCRIPTION OF THE ENVIRONMENT THAT MAY BE AFFECTED BY THE PROJECT

8.1 BIO-PHYSICAL ASPECTS

8.1.1 GEOLOGY

The site is underlain by diamictite and shale of the Dwyka Formation, Karoo Supergroup. Surficial deposits include quaternary diamondiferous gravel and calcrete gravel, covering the lithology. Diamictite is a sedimentary rock that consists of non-sorted to poorly sorted terrigenous sediment containing particles that differ and may range in size from clay to boulders, suspended in a matrix of mudstone or sandstone.

Although dolomite occurs in the greater area around Vryburg, no dolomite was identified on these sites and a dolomite stability investigation will not be required before the commencement of township proclamation.

Some problems are foreseen regarding the excavatability to 1,5m depth almost across the site. Zoning of the site revealed zones with constraints regarding the **slightly to medium compressibility and expansive potential** of the soil. It was classified as follows:

Geotechnical Zonation

Normal Development with risk:

Site Class CHR/1A1C2F:

This zone represents the majority of the area and comprises of a relative thin top layer less than 0,75m in thickness of moderately collapsible or medium compressible and medium expansive soil underlain by a competent pebble marker and diamictite, with an expected range of total soil movement measured at surface as consolidation calculated to less than 5mm of total settlement, or less than 7,5 mm heave, with a site classification of CHR, underlain by **shallow rock shale and diamictite** and this added a **R site class designation** to the zone with **problems relating to restricted excavation to 1,5m**. Normal foundation techniques will be adequate to enable proper development, with proper compaction within standard strip foundations and drainage provision that will be required

Special Development with expected problems or increased cost

Site Class H3PD:

This small zone is represented by medium to highly expansive soil or turf with estimated total heave of more than 30mm measured at surface. A wet pan area possibly within the 1:50 year flood line may also restrict development. Special foundation techniques will be required to enable proper development. It was classified as H3 in terms of the NHBRC. Split construction with suspended floors, piles with or without suspended floor slabs and ground beams, or even soil replacement with a soil raft, or stiffened or cellular rafts with articulation joints and reinforcement are required for residential development. Development must include site drainage and plumbing and service precautions.

Site Class PQ:

Quarried areas or borrow pits must be backfilled with a controlled fill better than G5 material according to engineers specification before any development can take place.

Normal construction techniques will be adequate to enable proper development. This includes the use of **compaction** techniques in strip footings with slab on the ground foundations with **site drainage provision**.

If the proposed mitigation measures as described in the Geotechnical report are adhered to, it will ensure a sustainable development as far as this variable is concerned.

8.1.2 TOPOGRAPHY

The site is located on a shallow eastern slope of 1186 to 1226 MASL, the lowest point towards the Dry Harts River.

A detailed site survey has been carried out to establish levels. The Engineering report and the Layout plan will address issues regarding storm water. As the proposed development will be in close proximity to residential areas, safety of children and people need to be taken into consideration.

8.1.3 CLIMATE

The climate of the area is typical of the western portion of the North West Province. A summer maximum rainfall and a dry winter normally occur. Extreme climatic events may have an influence on the project during the construction and operational phase and will have to be considered.

8.1.1.1 Rainfall

The monthly rainfall records for the Armoedsvlakte Agricultural Research Station (No. 0432/237) (South Africa, 1988) were used.

This weather station is situated approximately 8km to the west of Vryburg town centre. According to the statistics, the average rainfall for Vryburg is 455mm per year. Thundershowers occur frequently during the summer months - 35, 6 days per year, on average, have thunderstorm activity. During such events heavy showers may occur. The highest 24-hour rainfall event occurred in 1967 when 129 mm was recorded. The highest recorded single monthly rainfall was 265 mm during January 1967. It is however clear from the other statistics obtained from this source that such very high rainfall events are rather infrequent. Prolonged wet spells may affect the site as excess water may accumulate on uneven portions. During extremely dry spells, the possibility of dust generation, as well as the detrimental effects on the vegetation, will have to be considered. Droughts do occur as part of the long-term climatic cycles over the country. The impact of rainfall on the project will usually be short in duration (during single events) and the impact may be negative with a probability of "probable" and a medium significance, the intensity is judged to be medium overall. This categorization of impacts from rainfall is limited to individual rainfall events. In the long term, the yearly average as well as distribution of rainfall will affect the

project. Due to the nature of rainfall, the impact is considered positive. This renders the overall classification as variable. It will be important to plan for extreme events. These measures must be implemented in the construction phase.

The scale of the project will ensure that it will not influence the climate and is therefore “not applicable”.

8.1.1.2 Temperature

The following temperature values are yearly averages and illustrates the basic mildness of the temperature regime for Vryburg:

Average daily maximum = 26, 7 °C

Average daily minimum = 9, 2 °C

Extreme temperatures do however occur. The highest daily maximum recorded was 41,8 °C on 12 January 1927, while the absolute minimum of MINUS 9,3 °C was recorded on the 21st July 1966.

The influence of this variable on the project is considered as very low and of very little significance, while the project cannot influence this variable. In fact, it can be taken that this variable will only play a minor role during the different phases of the project. Because extremely high temperatures may occur (mostly during dry spells) the adverse effects due to temperature will cause this variable to be negative with regard to this project, however the general nature of the average conditions will on the other hand be positive. The impacts should therefore be considered as “variable”. It will be important to ensure proper management steps in the different phases of the project. The influence of the environment on the project during these phases is considered positive because extreme events are rare.

The project itself cannot influence this variable and it must be considered as “not applicable”.

8.1.1.3 Wind

Wind statistics for Armoedsvlakte indicates that the major wind directions for the area are from the north, and the northwest quadrants. The average wind speed for the year is 7 mph (11, 2 kph). These records are for 08h30 and 15h00. The average percentage of calms at these two times is 13, 2%.

Wind could have negative effects on the project. The effects should be local and short-term. Dust generation during dry spells can also have an influence on the project.

High wind speeds, such as those associated with thunderstorm activity or wind normally occurring at the beginning of spring, can have further negative impacts on the project. It is judged that this variable will have an overall negative effect on the project of a medium probability and low impact and significance. The negative effects of wind can be negated. If the steps to curb dust generation are in place these effects can be minimised. The influence of the project on the wind can again be considered negligible, therefore “not applicable”.

Extreme climatic events may have an influence on the project during the construction and operational phase and will have to be taken into consideration.

Climate Change

According to: WIREs Clim Change 2014, 5605-620. Doi:10.1002/wcc.295: “Climate change is a key concern within South Africa. Mean annual temperatures have increased by at least 1.5 times the observed global average of 0.65 °C over the past five decades and extreme rainfall events have increased in frequency. These changes are likely to continue. Climate

change poses a significant threat to South Africa's water resources, food security, health, infrastructure, as well as its ecosystem services and biodiversity. Considering South Africa's high levels of poverty and inequality, these impacts pose critical challenges for national development. In relation to water, impact studies for the water resources sector have begun to look beyond changes in streamflow to changes in the timing of flows and the partitioning of streamflow into baseflows and stormflows, reservoir yields, and extreme hydrological events. Spatially the eastern seaboard and central interior of the country are likely to experience increases in water runoff. Higher frequencies of flooding and drought events are projected for the future. Complexities of the hydrological cycle, influences of land use and management and the linkages to society, health, and the economy indicate far higher levels of complexity in the water resources sector than in other sectors. What has emerged is that land uses that currently have significant impacts on catchment water resources will place proportionally greater demands on the catchment's water resources if the climate were to become drier. The influence of climate change on water quality is an emerging research field in South Africa, with assessments limited to water temperature and non-point source nitrogen and phosphorus movement. A critical interaction that has not been explored is between changes in water quality and quantity and the combined impacts, such changes might have impact on various types of water use, e.g., irrigation, domestic consumption, or aquatic ecosystems support".

Water availability and demand has been calculated by the consulting Civil Engineers, to enable a sustainable waterborne sewage system as well as potable water supply for both the existing and future developments in the area.

8.1.4 SOIL

The laboratory tests indicated a slight to medium collapse potential and compressibility of the hillwash, usually less than 0,75m deep, with a low to medium expansive potential of the material (according to the method of Van der Merwe, 1964). It had an expected range of total soil movement measured at surface as heave calculated to less than 7,5 mm swell or less than 5mm of total settlement, with a site classification of CHR. The laboratory results indicated that 14 samples had a clay content greater than 12%, 11 had a linear shrinkage of more than 8%, 20 had a plasticity index of more than 12, and 12 had a liquid limit of more than 30%, indicating the potential expansiveness of the soil.

The hillwash had clay percentages that ranged from 2 to 19%, with plasticity indexes of slightly plastic to 8 to 23, and linear shrinkage percentages of 0,5 to 10,5%, and very low liquid limits of between too low to determine and from 23 to 36.

One sample taken of turf or sandy clay near a pan from test pit V33 had a high clay percentage of 36% with a plasticity index of 34 and linear shrinkage percentage of 21%, and a liquid limit of 51, with a Unified classification of CH as inorganic clay with high plasticity or fat clay and A-7-6 as highly compressible highly volume change clay with the PRA classification.

The Unified classification was mainly SC (20 samples): clayey sand or sand clay mixtures and mainly (21 samples) as A-6 as low to medium compressible clay to A-2- 4 (3 samples) as sand and gravel with low plasticity silt fines, according to the PRA classification.

No mining activities on site or history of mining or contaminated land in the area were found. The site is located away from any mining activities or active seismic activity.

Due to the level of development surrounding the area, the likelihood for the new development of borrow pits on site are low.

The silty sand on site has a very low clay percentage and may be found fit for use in the building industry, and as backfilling for the placement bedding of service pipes.

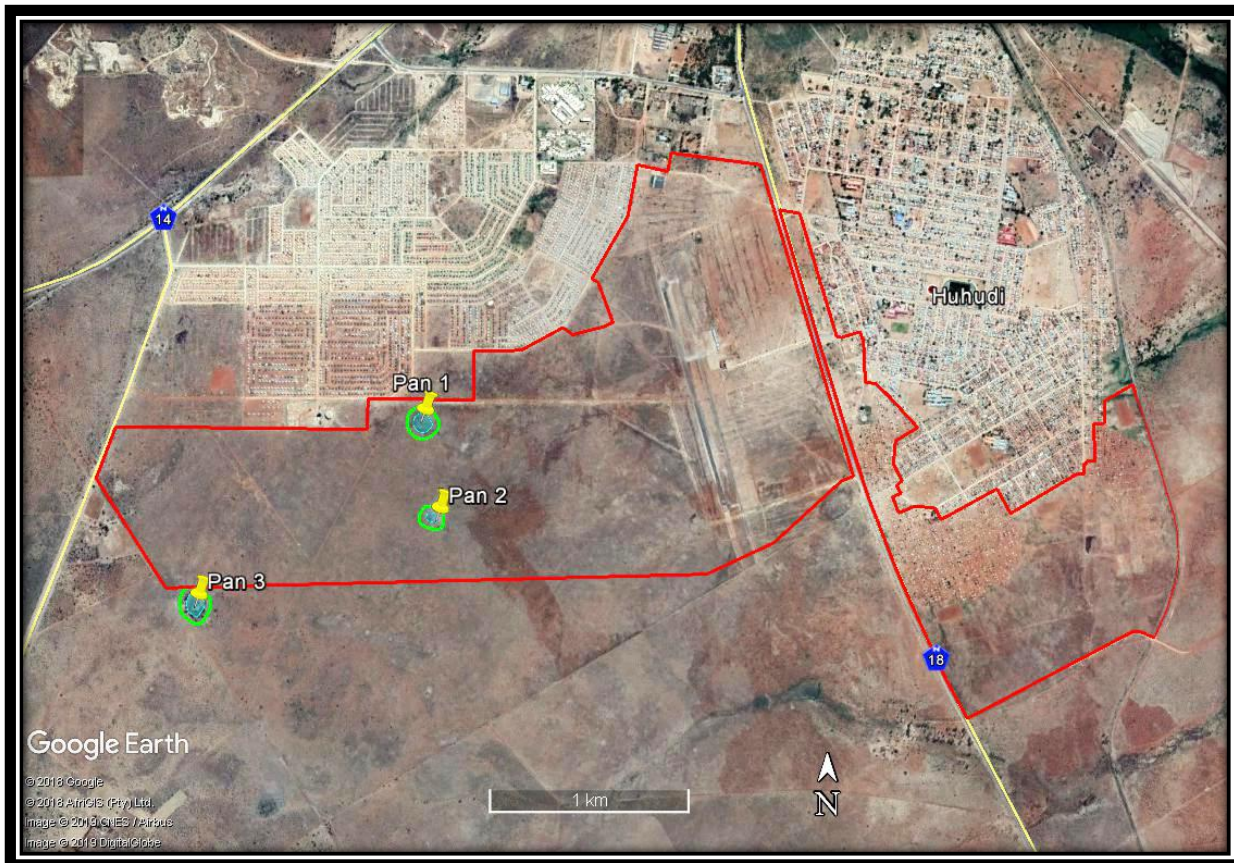
All road building and construction materials will be sourced from established commercial activities in and around Vryburg

8.1.5 SURFACE DRAINAGE

Drainage occurs in a easterly direction towards the Dry Harts River, a tributary to the Vaal River.

Plate flow is the dominant drainage pattern on site, and no prominent drainage channel intersects the site but according to the topography and height contours, the water dissipates into the sandy colluvium or pebble marker or pans on site

Two pan depressions (Pan 1 = 0,7 ha; Pan 2 = 0,2 ha) are present at the site and one pan depression (Pan 3 = 0.7 ha) is found adjacent to the site but within 500 m from the site.



Indication of wetland depressions (small pan) and their buffer zone (30 m) at the site.

- Light blue outline and shading Extent of wetland depression (small pan) at the site
- Green outline Outer edge of buffer zone

Grid references and altitudes were taken at site with a GPS Garmin E-trex 20 ® instrument. Map information were analysed and depicted on Google images with the aid of Google Earth Pro (US Dept. of State Geographer, MapLink/ Tele Atlas, Google, 2018).

Assessment and classification of wetland depression Pan 1 at the site

A small wetland depression (ephemeral pan), **Pan 1**, with a surface area of approximately 0,7 ha and longest diameter of approximately 100 m, is found at the central part of the site (Table 1).

Vegetation at the restricted wetland area consists of a permanent, seasonal and temporary zone. Obligate wetland plant species appear to be rare. The small depression is endorheic, where the water that flows in during rainfall events mostly leaves through evapotranspiration and infiltration in a low rainfall area (Mean Annual Precipitation < 500 mm).

The wetland appears to be modified. There is a leak from nearby, probably from an existing pipe system, that feeds water into the wetland. There were some diggings and some landscaping at and nearby the wetland which have modified the wetland.

Some shrub-height *Vachellia karroo* (Sweet Thorn), *Leptochloa fusca* (Swamp Grass), *Cynodon dactylon* (Couch Grass) as well as the alien invasive *Opuntia engelmannii* (Small Round-leaved Prickly Pear) are found at parts of the wetland.

Present ecological status (PES) of the wetland depression **Pan 1** at the site is CATEGORY D which means the wetland is largely modified and a large loss of natural habitats and basic ecosystem functions that has occurred (Table 2 and Table 3). Ecological importance and sensitivity (EIS) of the wetland is Low/marginal which means the wetland is not ecologically important and sensitive at any scale. The biodiversity of the wetland is ubiquitous and not sensitive to flow and habitat modifications. The wetland plays an insignificant role in moderating the quantity and quality of water of major rivers (Table 4 and Table 5).



View of Pan 1 and surrounding area at the site.
Photo: R.F. Terblanche

Table 1 Classification and outline of characteristics of wetland depression **Pan 1** at the site according to the Classification System for Wetlands and other Aquatic Ecosystems in South Africa (Ollis *et al.*, 2013).

CHARACTERISTIC TYPE WETLAND DISCRIMINATORS AND DESCRIPTORS	DESCRIPTION
System (level 1)	Inland wetland
Regional setting (level 2)	Southern Kalahari Ecoregion (Kleynhans <i>et al.</i> 2005)
Landscape unit (level 3)	Plain
Hydrogeomorphic unit (level 4)	Depression
Hydrological regime (Level 5)	Wetland occurs at plain on gentle slopes. Conspicuous inlet or outlet could not noticeable. This depression is probably endorheic, so that water that flows in during rainfall events probably leaves mostly through evaporation and infiltration. Currently the wetland appears to be modified. There is a leak nearby from a pipeline system which feeds into the wetland.
Additional descriptors (Levels 5,6)	Shallow brown-greyish soils are present in at the wetland. A permanent zone appears to be enhanced by the leak that currently feeds water into the small wetland. Megagraminoids or sedges are absent. Overall distinct wetland vegetation is poorly developed/ absent.

Table 2 Scoresheet with criteria for assessing habitat integrity of the wetland depression **Pan 1** at the site to DWAF (1999) such as adapted from Kleynhans (1996).

Criteria and attributes	Relevance	Score	Confidence
Hydrologic			
Flow modification	Consequence of abstraction, regulation by impoundments or increased runoff from human settlements or agricultural land. Changes in flow regime (timing, duration, frequency), volumes, velocity which affect inundation of wetland habitats resulting in floristic changes or incorrect cues to biota. Abstraction of groundwater flows to the wetland.	2	4
Permanent inundation	Consequence of impoundment resulting in destruction of natural wetland habitat and cues for wetland biota.	2	4
Water Quality			

Water quality modification	From point or diffuse sources. Measure directly by laboratory analysis or assessed indirectly from upstream agricultural activities, human settlements and industrial activities. Aggravated by volumetric decrease in flow delivered to the wetland.	2	3
Sediment load modification	Consequence of reduction due to entrapment by impoundments or increase due to land use practices such as overgrazing. Cause of unnatural rates of erosion, accretion or infilling of wetlands and change in habitats.	2	3
Hydraulic/Geomorphic			
Canalisation	Results in desiccation or changes to inundation patterns of wetland and thus changes in habitats. River diversions or drainage.	2	4
Topographic alteration	Consequence of infilling, ploughing, dykes, trampling, bridges, roads, railway lines and other substrate disruptive activities which reduce or change wetland habitat directly or through changes in inundation patterns.	2	4
Biota			
Terrestrial encroachment	Consequence of desiccation of wetland and encroachment of terrestrial plant species due to changes in hydrology or geomorphology. Change from wetland to terrestrial habitat and loss of wetland functions.	2	4
Indigenous vegetation removal	Direct destruction of habitat through farming activities, grazing or firewood collection affecting wildlife habitat and flow attenuation functions, organic matter inputs and increases potential for erosion.	2	4
Invasive plant encroachment	Affect habitat characteristics through changes in community structure and water quality changes (oxygen reduction and shading).	2	4
Alien fauna	Presence of alien fauna affecting faunal community structure.	2	4
Overutilisation of biota	Overgrazing, over-fishing etc.	2	4
TOTAL MEAN		22 x=2.0	42 x=2.0

Scoring guidelines per attribute:

natural, unmodified = 5; Largely natural = 4, Moderately modified = 3; largely modified = 2; seriously modified = 1; Critically modified = 0.

Relative confidence of score:

Very high confidence = 4; High confidence = 3; Moderate confidence = 2; Marginal/low confidence = 1.

Table 3 Interpretation of scores for determining present ecological status (PES) of the wetland depression **Pan 1** at the site according to DWAF (1999) such as adapted from Kleynhans (1999). Present ecological status of the wetland is indicated in blue font.

Interpretation of Mean* of Scores for all Attributes: Rating of Present Ecological Status Category (PES Category)
WITHIN GENERALLY ACCEPTABLE RANGE

<p>CATEGORY A >4; Unmodified, or approximates natural condition.</p>
<p>CATEGORY B >3 and <=4; Largely natural with few modifications, but with some loss of natural habitats.</p>
<p>CATEGORY C >2 and <=3; moderately modified, but with some loss of natural habitats.</p>
<p>CATEGORY D =2; largely modified. A large loss of natural habitats and basic ecosystem functions has occurred.</p>
<p>OUTSIDE GENERAL ACCEPTABLE RANGE</p>
<p>CATEGORY E >0 and <2; seriously modified. The losses of natural habitats and basic ecosystem functions are extensive.</p>
<p>CATEGORY F 0; critically modified. Modifications have reached a critical level and the system has been modified completely with an almost complete loss of natural habitat.</p>

* If any of the attributes are rated <2, then the lowest rating for the attribute should be taken as indicative of the PES category and not the mean.

Table 4 Score sheet for determining ecological importance and sensitivity for floodplains at wetland depression **Pan 1** (DWAf 1999, adapted from Kleynhans 1996, 1999).

Determinant	Score	Confidence
PRIMARY DETERMINANTS		
1. Rare & Endangered Species	0	3
2. Populations of Unique Species	0	3
3. Species/taxon Richness	1	3
4. Diversity of Habitat Types or Features	1	3
5. Migration route/breeding and feeding site for wetland species	1	3
6. Sensitivity to Changes in the Natural Hydrological Regime	2	3

7. Sensitivity to Water Quality Changes	2	3
8. Flood Storage, Energy Dissipation & Particulate/Element Removal	1	3
MODIFYING DETERMINANTS		
9. Protected Status	0	4
10. Ecological Integrity	1	4
TOTAL	9	32
MEAN	0.9	3.2

Score guideline Very high = 4; High = 3, Moderate = 2; Marginal/Low = 1; None = 0
Confidence rating Very high confidence = 4; High confidence = 3; Moderate confidence = 2; Marginal/low confidence = 1

Table 5 Ecological importance and sensitivity categories. Interpretation of median scores for biotic and habitat determinants (DWAF 1999, adapted from Kleynhans 1996, 1999). Ecological Importance and Sensitivity (EIS) of wetland depression **Pan 1** at the site is indicated in blue font.

Ecological Importance and Sensitivity Category (EIS)	Range of Median	Recommended Ecological Management Class
<u>Very high</u> Floodplains that are considered ecologically important and sensitive on a national or even international level. The biodiversity of these floodplains is usually very sensitive to flow and habitat modifications. They play a major role in moderating the quantity and quality of water of major rivers.	>3 and <=4	A
<u>High</u> Floodplains that are considered to be ecologically important and sensitive. The biodiversity of these floodplains may be sensitive to flow and habitat modifications. They play a role in moderating the quantity and quality of water of major rivers.	>2 and <=3	B
<u>Moderate</u> Floodplains that are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these floodplains is not usually sensitive to flow and habitat modifications. They play a small role in moderating the quantity and quality of water of major rivers.	>1 and <=2	C
<u>Low/marginal</u>	>0 and <=1	D

<p>Floodplains which are not ecologically important and sensitive at any scale. The biodiversity of these floodplains is ubiquitous and not sensitive to flow and habitat modifications. They play an insignificant role in moderating the quantity and quality of water of major rivers.</p>		
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Assessment and classification of small wetland depression Pan 2 at the site

A small wetland depression (ephemeral pan), **Pan 2**, with a surface area of approximately 0,2 ha and longest diameter of approximately 65 m, is found at the central part of the site (Table 6).

Vegetation at the restricted wetland area consists of a seasonal and temporary zone. Obligate wetland plant species appear to be rare. The small depression is endorheic, where the water that flows in during rainfall events mostly leaves through evapotranspiration and infiltration in a low rainfall area (Mean Annual Precipitation < 500 mm).

The wetland appears to be degraded and trampled. Some shrub-height *Vachellia karroo* (Sweet Thorn), *Cynodon dactylon* (Couch Grass) as well as an alien invasive *Opuntia engelmannii* are found at parts of the wetland.

Present ecological status (PES) of the wetland depression **Pan 2** at the site is CATEGORY D which means the wetland is largely modified and a large loss of natural habitats and basic ecosystem functions that has occurred (Table 7 and Table 8). Ecological importance and sensitivity (EIS) of the wetland is Low/marginal which means the wetland is not ecologically important and sensitive at any scale. The biodiversity of the wetland is ubiquitous and not sensitive to flow and habitat modifications. The wetland plays an insignificant role in moderating the quantity and quality of water of major rivers (Table 9 and Table 10).



View of small Pan 2 and surrounding vegetation at the site.

Table 6 Classification and outline of characteristics of wetland depression **Pan 2** at the site according to the Classification System for Wetlands and other Aquatic Ecosystems in South Africa (Ollis *et al.*, 2013).

CHARACTERISTIC TYPE WETLAND DISCRIMINATORS AND DESCRIPTORS	DESCRIPTION
System (level 1)	Inland wetland
Regional setting (level 2)	Southern Kalahari Ecoregion (Kleynhans <i>et al.</i> 2005)
Landscape unit (level 3)	Plain
Hydrogeomorphic unit (level 4)	Depression
Hydrological regime (Level 5)	Wetland occurs at plain on gentle slopes. Conspicuous inlet or outlet could not noticeable. This depression is probably endorheic, so that water that flows in during rainfall events probably leaves mostly through evaporation and infiltration. Currently the wetland appears to be degraded and trampled.
Additional descriptors (Levels 5,6)	Shallow brown-greyish soils are present in at the wetland. A permanent zone appears to be enhanced by the leak that currently feeds water into the small wetland. Megagraminoids or sedges are absent. Overall distinct wetland vegetation is poorly developed/ absent.

Table 7 Scoresheet with criteria for assessing habitat integrity of the wetland depression **Pan 2** at the site to DWAF (1999) such as adapted from Kleynhans (1996).

Criteria and attributes	Relevance	Score	Confidence
Hydrologic			
Flow modification	Consequence of abstraction, regulation by impoundments or increased runoff from human settlements or agricultural land. Changes in flow regime (timing, duration, frequency), volumes, velocity which affect inundation of wetland habitats resulting in floristic changes or incorrect cues to biota. Abstraction of groundwater flows to the wetland.	2	4
Permanent inundation	Consequence of impoundment resulting in destruction of natural wetland habitat and cues for wetland biota.	3	4
Water Quality			

Water quality modification	From point or diffuse sources. Measure directly by laboratory analysis or assessed indirectly from upstream agricultural activities, human settlements and industrial activities. Aggravated by volumetric decrease in flow delivered to the wetland.	2	3
Sediment load modification	Consequence of reduction due to entrapment by impoundments or increase due to land use practices such as overgrazing. Cause of unnatural rates of erosion, accretion or infilling of wetlands and change in habitats.	2	3
Hydraulic/Geomorphic			
Canalisation	Results in desiccation or changes to inundation patterns of wetland and thus changes in habitats. River diversions or drainage.	3	4
Topographic alteration	Consequence of infilling, ploughing, dykes, trampling, bridges, roads, railway lines and other substrate disruptive activities which reduce or change wetland habitat directly or through changes in inundation patterns.	2	4
Biota			
Terrestrial encroachment	Consequence of desiccation of wetland and encroachment of terrestrial plant species due to changes in hydrology or geomorphology. Change from wetland to terrestrial habitat and loss of wetland functions.	1	4
Indigenous vegetation removal	Direct destruction of habitat through farming activities, grazing or firewood collection affecting wildlife habitat and flow attenuation functions, organic matter inputs and increases potential for erosion.	1	4
Invasive plant encroachment	Affect habitat characteristics through changes in community structure and water quality changes (oxygen reduction and shading).	2	4
Alien fauna	Presence of alien fauna affecting faunal community structure.	2	4
Overutilisation of biota	Overgrazing, over-fishing etc.	2	4
TOTAL		22	42
MEAN		x=2.0	x=2.0

Scoring guidelines per attribute:

natural, unmodified = 5; Largely natural = 4, Moderately modified = 3; largely modified = 2; seriously modified = 1; Critically modified = 0.

Relative confidence of score:

Very high confidence = 4; High confidence = 3; Moderate confidence = 2; Marginal/low confidence = 1.

Table 8 Interpretation of scores for determining present ecological status (PES) of the wetland depression **Pan 2** at the site according to DWAF (1999) such as adapted from Kleynhans (1999). Present ecological status of the wetland is indicated in blue font.

Interpretation of Mean* of Scores for all Attributes: Rating of Present Ecological Status Category (PES Category)
WITHIN GENERALLY ACCEPTABLE RANGE

<p>CATEGORY A >4; Unmodified, or approximates natural condition.</p>
<p>CATEGORY B >3 and <=4; Largely natural with few modifications, but with some loss of natural habitats.</p>
<p>CATEGORY C >2 and <=3; moderately modified, but with some loss of natural habitats.</p>
<p>CATEGORY D =2; largely modified. A large loss of natural habitats and basic ecosystem functions has occurred.</p>
<p>OUTSIDE GENERAL ACCEPTABLE RANGE</p>
<p>CATEGORY E >0 and <2; seriously modified. The losses of natural habitats and basic ecosystem functions are extensive.</p>
<p>CATEGORY F 0; critically modified. Modifications have reached a critical level and the system has been modified completely with an almost complete loss of natural habitat.</p>

* If any of the attributes are rated <2, then the lowest rating for the attribute should be taken as indicative of the PES category and not the mean.

Table 9 Score sheet for determining ecological importance and sensitivity for floodplains at wetland depression **Pan 2** (DWA 1999, adapted from Kleynhans 1996, 1999).

Determinant	Score	Confidence
PRIMARY DETERMINANTS		
1. Rare & Endangered Species	0	3
2. Populations of Unique Species	0	3
3. Species/taxon Richness	1	3
4. Diversity of Habitat Types or Features	1	3
5. Migration route/breeding and feeding site for wetland species	1	3
6. Sensitivity to Changes in the Natural Hydrological Regime	2	3

7. Sensitivity to Water Quality Changes	2	3
8. Flood Storage, Energy Dissipation & Particulate/Element Removal	1	3
MODIFYING DETERMINANTS		
9. Protected Status	0	4
10. Ecological Integrity	1	4
TOTAL	9	32
MEAN	0.9	3.2

Score guideline Very high = 4; High = 3, Moderate = 2; Marginal/Low = 1; None = 0
Confidence rating Very high confidence = 4; High confidence = 3; Moderate confidence = 2; Marginal/low confidence = 1

Table 10 Ecological importance and sensitivity categories. Interpretation of median scores for biotic and habitat determinants (DWAF 1999, adapted from Kleynhans 1996, 1999). Ecological Importance and Sensitivity (EIS) of wetland depression **Pan 2** at the site is indicated in blue font.

Ecological Importance and Sensitivity Category (EIS)	Range of Median	Recommended Ecological Management Class
<u>Very high</u> Floodplains that are considered ecologically important and sensitive on a national or even international level. The biodiversity of these floodplains is usually very sensitive to flow and habitat modifications. They play a major role in moderating the quantity and quality of water of major rivers.	>3 and <=4	A
<u>High</u> Floodplains that are considered to be ecologically important and sensitive. The biodiversity of these floodplains may be sensitive to flow and habitat modifications. They play a role in moderating the quantity and quality of water of major rivers.	>2 and <=3	B
<u>Moderate</u> Floodplains that are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these floodplains is not usually sensitive to flow and habitat modifications. They play a small role in moderating the quantity and quality of water of major rivers.	>1 and <=2	C
		D

<p><u>Low/marginal</u> Floodplains which are not ecologically important and sensitive at any scale. The biodiversity of these floodplains is ubiquitous and not sensitive to flow and habitat modifications. They play an insignificant role in moderating the quantity and quality of water of major rivers.</p>	<p>>0 and <=1</p>	
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Assessment and classification of small wetland depression Pan 3 adjacent to the site, but within 500 m from the site

A small wetland depression (ephemeral pan), **Pan 3**, with a surface area of approximately 0,7 ha and longest diameter of approximately 115 m, is found adjacent to the site, but within 500 m from the site (Table 11).

Vegetation at the restricted wetland area consists of a seasonal and temporary zone. Obligate wetland plant species appear to be rare. The small depression is endorheic, where the water that flows in during rainfall events mostly leaves through evapotranspiration and infiltration in a low rainfall area (Mean Annual Precipitation < 500 mm).

There are tracks at the wetland and the wetland seems to be modified to some extent. Some shrub-height *Vachellia karroo* (Sweet Thorn), *Leptochloa fusca* (Swamp Grass) and *Panicum schinzii* (Sweet Grass) are found at parts of the wetland.

Present ecological status (PES) of the wetland Pan 3 adjacent to the site is CATEGORY C which means the wetland is moderately modified, but with some loss of natural habitats (Table 12 and Table 13). Ecological importance and sensitivity (EIS) of the wetland is Moderate which means the wetland is considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of the wetland is not usually sensitive to flow and habitat modifications. The wetland plays a small role in moderating the quantity and quality of water of major rivers (Table 14 and Table 15).



**View of Pan 3 outside the site.
Photo: R.F. Terblanche**

Table 11 Classification and outline of characteristics of wetland depression **Pan 3** at the site according to the Classification System for Wetlands and other Aquatic Ecosystems in South Africa (Ollis *et al.*, 2013).

CHARACTERISTIC TYPE WETLAND DISCRIMINATORS AND DESCRIPTORS	DESCRIPTION
System (level 1)	Inland wetland
Regional setting (level 2)	Southern Kalahari Ecoregion (Kleynhans <i>et al.</i> 2005)
Landscape unit (level 3)	Plain
Hydrogeomorphic unit (level 4)	Depression
Hydrological regime (Level 5)	Wetland occurs at plain on gentle slopes. Conspicuous inlet or outlet could not noticeable. This depression is probably endorheic, so that water that flows in during rainfall events probably leaves mostly through evaporation and infiltration.
Additional descriptors (Levels 5,6)	Shallow brown-greyish soils are present in at the wetland. A permanent zone appears to be enhanced by the leak that currently feeds water into the small wetland. Megagraminoids or sedges are absent. Pan is surrounded by fringe of trees, including <i>Searsia lancea</i> (Karee) and <i>Ziziphus mucronata</i> (Buffalo Thorn).

Table 12 Scoresheet with criteria for assessing habitat integrity of the wetland depression **Pan 3** at the site to DWAF (1999) such as adapted from Kleynhans (1996).

Criteria and attributes	Relevance	Score	Confidence
Hydrologic			
Flow modification	Consequence of abstraction, regulation by impoundments or increased runoff from human settlements or agricultural land. Changes in flow regime (timing, duration, frequency), volumes, velocity which affect inundation of wetland habitats resulting in floristic changes or incorrect cues to biota. Abstraction of groundwater flows to the wetland.	3	4
Permanent inundation	Consequence of impoundment resulting in destruction of natural wetland habitat and cues for wetland biota.	3	4
Water Quality			

Water quality modification	From point or diffuse sources. Measure directly by laboratory analysis or assessed indirectly from upstream agricultural activities, human settlements and industrial activities. Aggravated by volumetric decrease in flow delivered to the wetland.	3	3
Sediment load modification	Consequence of reduction due to entrapment by impoundments or increase due to land use practices such as overgrazing. Cause of unnatural rates of erosion, accretion or infilling of wetlands and change in habitats.	3	3
Hydraulic/Geomorphic			
Canalisation	Results in desiccation or changes to inundation patterns of wetland and thus changes in habitats. River diversions or drainage.	3	4
Topographic alteration	Consequence of infilling, ploughing, dykes, trampling, bridges, roads, railway lines and other substrate disruptive activities which reduce or change wetland habitat directly or through changes in inundation patterns.	2	4
Biota			
Terrestrial encroachment	Consequence of desiccation of wetland and encroachment of terrestrial plant species due to changes in hydrology or geomorphology. Change from wetland to terrestrial habitat and loss of wetland functions.	2	4
Indigenous vegetation removal	Direct destruction of habitat through farming activities, grazing or firewood collection affecting wildlife habitat and flow attenuation functions, organic matter inputs and increases potential for erosion.	3	4
Invasive plant encroachment	Affect habitat characteristics through changes in community structure and water quality changes (oxygen reduction and shading).	3	4
Alien fauna	Presence of alien fauna affecting faunal community structure.	3	4
Overutilisation of biota	Overgrazing, over-fishing etc.	3	4
TOTAL MEAN		31 x=2.8	42 x=2.0

Scoring guidelines per attribute:

natural, unmodified = 5; Largely natural = 4, Moderately modified = 3; largely modified = 2; seriously modified = 1; Critically modified = 0.

Relative confidence of score:

Very high confidence = 4; High confidence = 3; Moderate confidence = 2; Marginal/low confidence = 1.

Table13 Interpretation of scores for determining present ecological status (PES) of the wetland depression **Pan 3** at the site according to DWAF (1999) such as adapted from Kleynhans (1999). Present ecological status of the wetland is indicated in blue font.

<p>Interpretation of Mean* of Scores for all Attributes: Rating of Present Ecological Status Category (PES Category)</p>
<p>WITHIN GENERALLY ACCEPTABLE RANGE</p>

<p>CATEGORY A</p> <p>>4; Unmodified, or approximates natural condition.</p>
<p>CATEGORY B</p> <p>>3 and <=4; Largely natural with few modifications, but with some loss of natural habitats.</p>
<p>CATEGORY C</p> <p>>2 and <=3; moderately modified, but with some loss of natural habitats.</p>
<p>CATEGORY D</p> <p>=2; largely modified. A large loss of natural habitats and basic ecosystem functions has occurred.</p>
<p>OUTSIDE GENERAL ACCEPTABLE RANGE</p>
<p>CATEGORY E</p> <p>>0 and <2; seriously modified. The losses of natural habitats and basic ecosystem functions are extensive.</p>
<p>CATEGORY F</p> <p>0; critically modified. Modifications have reached a critical level and the system has been modified completely with an almost complete loss of natural habitat.</p>

* If any of the attributes are rated <2, then the lowest rating for the attribute should be taken as indicative of the PES category and not the mean.

Table 14 Score sheet for determining ecological importance and sensitivity for floodplains at wetland depression **Pan 3** (DWA 1999, adapted from Kleynhans 1996, 1999).

Determinant	Score	Confidence
PRIMARY DETERMINANTS		
1. Rare & Endangered Species	0	3
2. Populations of Unique Species	0	3
3. Species/taxon Richness	2	3
4. Diversity of Habitat Types or Features	2	3
5. Migration route/breeding and feeding site for wetland species	1	3
6. Sensitivity to Changes in the Natural Hydrological Regime	2	3

7. Sensitivity to Water Quality Changes	2	3
8. Flood Storage, Energy Dissipation & Particulate/Element Removal	2	3
MODIFYING DETERMINANTS		
9. Protected Status	1	4
10. Ecological Integrity	2	4
TOTAL	14	32
MEAN	1.4	3.2

Score guideline Very high = 4; High = 3, Moderate = 2; Marginal/Low = 1; None = 0

Confidence rating Very high confidence = 4; High confidence = 3; Moderate confidence = 2; Marginal/low confidence = 1

Table 15 Ecological importance and sensitivity categories. Interpretation of median scores for biotic and habitat determinants (DWAF 1999, adapted from Kleynhans 1996, 1999). Ecological Importance and Sensitivity (EIS) of wetland depression **Pan 3** at the site is indicated in blue font.

Ecological Importance and Sensitivity Category (EIS)	Range of Median	Recommended Ecological Management Class
<u>Very high</u> Floodplains that are considered ecologically important and sensitive on a national or even international level. The biodiversity of these floodplains is usually very sensitive to flow and habitat modifications. They play a major role in moderating the quantity and quality of water of major rivers.	>3 and <=4	A
<u>High</u> Floodplains that are considered to be ecologically important and sensitive. The biodiversity of these floodplains may be sensitive to flow and habitat modifications. They play a role in moderating the quantity and quality of water of major rivers.	>2 and <=3	B
<u>Moderate</u> Floodplains that are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these floodplains is not usually sensitive to flow and habitat modifications. They play a small role in moderating the quantity and quality of water of major rivers.	>1 and <=2	C

<p><u>Low/marginal</u> Floodplains which are not ecologically important and sensitive at any scale. The biodiversity of these floodplains is ubiquitous and not sensitive to flow and habitat modifications. They play an insignificant role in moderating the quantity and quality of water of major rivers.</p>	<p>>0 and <=1</p>	<p>D</p>
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Risks and possible impacts on the small wetlands, if its buffer zones are upheld, are not expected to be significant. The small wetlands are at gentle slopes (flat) in a low rainfall area so that excessive or significant surface flow, erosion and loss of wetland habitat, are unlikely. Features such as interflow do not appear to play an important role at maintaining the wetland. Significant impact on the flow regime of the wetland depression at the site is unlikely to be altered. Proposed development implies no changes to the geomorphological setting of the small wetland depression. Small depressions at the site are conspicuously poor in wetland animal and plant species and unlikely to be a particular habitat for resident any wetland species of particular conservation concern. In summary it appears that an application for a Water Use License given the buffer zone of 30 m around the outer edge of the small wetland depression would not be necessary in the case of this study

8.1.6 GROUND WATER

The permanent or perched water table on site is deeper than 1,5 m below ground surface. The underground water table in the area is normally very deep because of the geology of the area. The likelihood of problems arising from it is not very large if proper steps are taken to prevent possible pollution infiltration into the groundwater.

The impact and significance of this variable is considered low, probable but with a low significance.

The project could adversely affect ground water if proper steps are not implemented in order to prevent pollution from reaching the groundwater. If proper mitigation and pollution prevention steps are taken during the planning, implementation and post-construction phases it is highly unlikely that the groundwater will be affected. The eventual influence should therefore be one of low significance, probability and intensity.

Possible infiltration into the groundwater have been taken into account. During the construction phase, no spills of lubricants or construction worker sewage should be allowed to pollute the ground water. Special care must be taken to ensure adequate surface drainage to prevent the accumulation of water next to structures, especially within these relative flat areas.

8.1.7 FLORA

Vegetation at the site contains a visibly poor cover of grass-layer and conspicuous high frequency of shrub-height trees. Shrub-height thorn trees such as *Vachellia karroo*, *Vachellia tortilis* and *Vachellia hebeclada* are prominent in some areas and in other areas visible concentrations of *Tarchonanthus camphoratus* (Camphor Bush) are noted.



Part of the site where a high frequency of *Tarchonanthus camphoratus* is noticeable.

Photo: R. F. Terblanche

The entire site is visibly degraded or transformed. Large cleared or trampled areas with partial cover of exotic plant species or weeds are present. Tracks, roads and old buildings are found at the site. Informal dumping is extensive at the site.



Extreme ecological degradation visible at Huhudi section of the site.

Photo: R.F. Terblanche

One individual of a protected tree species, *Vachellia erioloba* (Camel Thorn) is found at the site. Protected Tree species are listed under the National Forests Act No. 84 of 1998. In terms of a part of section 15(1) of Act No. 84 of 1998, no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a license granted by the Minister.



A single *Vachellia erioloba* (Camel Thorn) has been found at the Huhudi section of the site.

Photo: R.F. Terblanche

Poor cover of grass and high frequency of shrub-height trees are conspicuous at the site. Shrub-height thorn trees such as *Vachellia karroo*, *Vachellia tortilis* and *Vachellia hebeclada* are prominent in some areas and in other areas visible concentrations of *Tarchonanthus camphoratus* (Camphor Bush) are noted. Other indigenous tree species at the site include *Searsia lancea* (Karee) and *Ziziphus mucronata* (Buffalo-thorn). The declared alien invasive plant species, *Prosopis glandulosa* (Mesquite) are encountered at some parts of the site. Shrublet *Ziziphus zeyheriana* (Dwarf Buffalo-thorn) is present at the site. Dwarf shrub *Pentzia calcarea* is widespread at the site. Indigenous herbaceous plant species at the site include *Helichrysum cerastoides* and *Barleria macrostegia*. Indigenous grass species include *Eragrostis lehmanniana*, *Aristida congesta*, *Cymbopogon pospischilii*, *Cynodon dactylon*, *Aristida adscensionis*, *Enneapogon cenchroides*, *Elionurus muticus* and *Tragus racemosus*. High frequency of alien invasive weeds is noticeable. Such alien invasive weeds at the site include *Argemone ochroleuca* (Mexican Poppy), *Schkuhria pinnata* (Dwarf Marigold), *Tagetes minuta* (Khaki Weed), *Bidens bipinnata* (Black Jack), *Datura* (Thorn-apples), *Xanthium spinosum* (Spiny Cocklebur), *Xanthium strumarium* (Large Cocklebur), *Solanum eleagnifolium* (Silver-leaf Bitter Apple), *Chenopodium album* (White Goosefoot), *Chenopodium ambrosioides* (Wormseed Goosefoot), *Chenopodium carinatum* (Green Goosefoot), *Verbesina encelioides* (Wild Sunflower), *Flaveria bidentis* (Smelter's Bush), *Salsola kali* (Russian Tumbleweed), *Alternanthera pungens* (Paper Thorn), *Guilleminea densa* (Small Mat Weed) and *Datura ferox* (Large Thorn-apple).

Ecological disturbances: The entire site is visibly degraded or transformed. Large cleared or trampled areas with partial cover of exotic plant species or weeds are present. Tracks, roads and old buildings are found at the site. Informal dumping is extensive at the site.



Informal dumping at Huhudi section of the site.

Photo: R. F. Terblanche

Connectivity: Scope for the site to be part of a biodiversity conservation corridor of particular importance is small. If the development is approved the small wetlands if rehabilitated or conserved as open green areas in an urban area could be important as part of a stepping stone corridor system.



Site is on gentle slopes (flat). Shrub-height *Vachellia karroo*, *Vachellia tortilis* and *Vachellia hebeclada* as well as bare areas with poor grass cover are conspicuous at many parts of the site.

Photo: R.F. Terblanche

The study area is south of Vryburg in the North West Province. The site is situated at the Savanna Biome which is represented by the Ghaap Plateau Vaalbosveld vegetation type (Mucina & Rutherford 2006). A brief overview of SVk 7, the Ghaap Plateau Vaalbosveld vegetation type in which the site is located, follows:

SVk 7 Ghaap Plateau Vaalbosveld

Distribution: In South Africa the Ghaap Plateau Vaalbosveld is found in the Northern Cape and North-West Provinces: Flat plateau from around Campbell in the south, east of Danielskuil through Reivilo to around Vryburg in the north. Altitude at the Ghaap Plateau Vaalbosveld is 1100 – 1500 m.

Vegetation and landscape features: Flat plateau with well-developed shrub layer with *Tarchonanthus camphoratus* and *Vachellia karroo* [*Acacia karroo*]. Open tree layer has *Olea europaea* subsp. *africana*, *Vachellia tortilis* [*Acacia tortilis*], *Ziziphus mucronata* and *Searsia lancea* [*Rhus lancea*]. *Olea europaea* subsp. *africana* is more important in the southern parts of the unit, while *Vachellia tortilis* [*Acacia tortilis*], *Vachellia hebeclada* [*Acacia hebeclada*] and *Senegalia mellifera* [*Acacia mellifera*] are more important in the north and part of the west of the unit. Much of the south-central part of this unit has remarkably low cover of *Vachellia* [*Acacia*] and *Senegalia* [*Acacia*] species for an arid savanna and is dominated by the nonthorny *Tarchonanthus camphoratus*, *Searsia lancea*, and *Olea europaea* subsp. *africana* (Mucina & Rutherford 2006).

Geology and soils: Surface limestone of Tertiary to Recent age, and dolomite and chert of the Campbell Group (Griqualand West Supergroup, Vaalian Erathem) support shallow soils (0.1-0.25 m) of Mispah and Hutton soil forms. Land types mainly Fc with some Ae and Ag (Mucina & Rutherford, 2006).

Climate: Climate is characterized by summer and autumn rainfall and very dry winters. Mean annual precipitation from about 300 mm in the southwest to about 500 mm in the northeast. Frost is frequent to very frequent in winter (Mucina & Rutherford 2006).

Important taxa of the Ghaap Plateau Vaalbosveld listed by Mucina & Rutherford (2006): Tall Tree: *Vachellia erioloba* [*Acacia erioloba*]. Small Trees: *Senegalia mellifera* subsp. *detinens* [*Acacia mellifera* subsp. *detinens*], *Searsia lancea*, *Vachellia karroo* [*Acacia karroo*], *Vachellia tortilis* subsp. *heteracantha* [*Acacia tortilis* subsp. *heteracantha*], *Boscia albitrunca*. Tall Shrubs: *Olea europaea* subsp. *africana*, *Rhigozum trichotomum*, *Tarchonanthus camphoratus*, *Ziziphus mucronata*, *Diospyros pallens*, *Ehretia rigida* subsp. *rigida* (this species complex has been revised and the *Ehretia alba* is the species that occurs at the vegetation type, R.F. Terblanche pers. obs.), *Euclea crispa* subsp. *ovata*, *Grewia flava*, *Gymnosporia buxifolia*, *Lessertia frutescens*, *Searsia tridactyla*. Low Shrubs: *Acacia hebeclada* subsp. *hebeclada*, *Aptosimum procumbens*, *Chrysocoma ciliata*, *Helichrysum zeyheri*, *Hermannia comosa*, *Lantana rugosa*, *Leucas capensis*, *Melolobium microphyllum*, *Peliostomum leucorrhizum*, *Pentzia globosa*, *Pentzia viridis*, *Zygophyllum pubescens*. Succulent Shrubs: *Hertia pallens*, *Lycium cinereum*. Semi-parasitic Shrub: *Thesium hystrix*. Woody Climber: *Asparagus africanus*. Graminoids: *Anthephora pubescens*, *Cenchrus ciliaris*, *Digitaria eriantha* subsp. *eriantha*, *Enneapogon scoparius*, *Eragrostis lehmanniana*, *Schmidtia pappophoroides*, *Themeda triandra*, *Aristida adscensionis*, *Aristida congesta*, *Aristida diffusa*, *Cymbopogon pospischilii*, *Enneapogon cenchroides*, *Enneapogon desvauxii*, *Eragrostis echinocloidea*, *Eragrostis obtusa*, *Eragrostis rigidior*, *Eragrostis superba*, *Fingerhutia africana*, *Heteropogon contortus*, *Sporobolus fimbriatus*, *Stipagrostis uniplumis*, *Tragus racemosus*. Herbs: *Barleria macrostegia*, *Geigeria filifolia*, *Geigeria ornativa*, *Gisekia africana*, *Helichrysum cerastoides*, *Heliotropium ciliatum*, *Hermbstaedtia odorata*, *Hibiscus marlothianus*, *Hibiscus pusillus*, *Jamesbrittenia aurantiaca*, *Limeum fenestratum*, *Lippia scaberrima*, *Selago densiflora*, *Vahlia capensis* subsp. *vulgaris*. Succulent herb: *Aloe grandidentata*.

Note: Though many of the above plant species occur at the site, not all of them necessarily occur at the site

8.1.8 FAUNA

Mammals of particular conservation concern

Threatened, Endangered mammal species of the North West Province. Main source: Child, Roxburgh, Do Linh San, Raimondo & Davies-Mostert (2016) with updates by several authors per species. With mammal species which normally needs a large range their residential status does not implicate that they are exclusively dependent on the site or use the site as important shelter or for reproduction. No = Not recorded at site/ Unlikely to be resident at the site. Yes: Recorded at the site/ Likely to be resident at the site.

Species	Threatened Status (Regional)	Recorded at site during survey	Likely to be found based on habitat assessment
<i>Cloeotis percivali</i> Short-eared Trident Bat	Endangered	No	No
<i>Diceros bicornis</i> Black Rhinocerus	Endangered	No	No
<i>Lycaon pictus</i> African Wild Dog	Endangered	No	No
<i>Redunca fulvorufula fulvorufula</i> Southern Mountain Reedbuck	Endangered	No	No

Threatened, Vulnerable mammal species of the North West Province. Main source: Child, Roxburgh, Do Linh San, Raimondo & Davies-Mostert (2016) with updates by several authors per species. With mammal species which normally needs a large range their residential status does not implicate that they are exclusively dependent on the site or use the site as important shelter or for reproduction. No = Not recorded at site/ Unlikely to be resident at the site. Yes: Recorded at the site/ Likely to be resident at the site.

Species	Threatened Status (Regional)	Recorded at site during survey	Likely to be found based on habitat assessment
<i>Acinonyx jubatus</i> Cheetah	Vulnerable	No	No
<i>Felis nigripes</i> Black-footed Cat	Vulnerable	No	No

<i>Hydrictis maculicollis</i> Spotted-necked Otter	Vulnerable	No	No
<i>Mystromys albicaudatus</i> White-tailed Rat	Vulnerable	No	No
<i>Panthera pardus</i> Leopard	Vulnerable	No	No
<i>Smutsia temminckii</i> Temminck's Ground Pangolin	Vulnerable	No	No

Near Threatened mammal species of the North West Province. Main source: Child, Roxburgh, Do Linh San, Raimondo & Davies-Mostert (2016) with updates by several authors per species. With mammal species which normally needs a large range their residential status does not implicate that they are exclusively dependent on the site or use the site as important shelter or for reproduction. No = Not recorded at site/ Unlikely to be resident at the site. Yes: Recorded at the site/ Likely to be resident at the site.

Species	Threatened Status (Regional)	Recorded at site during survey	Likely to be found based on habitat assessment
<i>Aonyx capensis</i> Cape Clawless Otter	Near Threatened	No	No
<i>Atelerix frontalis</i> Southern African Hedgehog	Near Threatened	No	No
<i>Ceratotherium simum simum</i> Southern White Rhinoceros	Near Threatened	No	No
<i>Crocuta crocuta</i> Spotted Hyaena	Near Threatened	No	No
<i>Leptailurus serval</i> Serval	Near Threatened	No	No
<i>Parahyaena brunnea</i> Brown Hyaena	Near Threatened	No	No
<i>Pelea capreolus</i> Grey Rhebok	Near Threatened	No	No
<i>Poecilogale albinucha</i> African Striped Weasel	Near Threatened	No	No

Bird species of particular conservation concern

Threatened bird species of the North West Province. Literature sources Barnes (2000), Hockey, Dean & Ryan, P.G. (2005) and Chittenden (2007). No = Not recorded at site/ Unlikely to use site as breeding area or particular habitat on which the species depends. Yes = Recorded at site/ Likely to use site as breeding area or particular habitat on which the species depends.

Species	Common name	Threatened Status	Recorded at site during survey	Likely to use site as breeding area or habitat
<i>Aegypius tracheliotos</i>	Lappet-faced Vulture	Vulnerable	No	No
<i>Anthropoides paradiseus</i>	Blue Crane	Vulnerable	No	No
<i>Aquila rapax</i>	Tawny Eagle	Vulnerable	No	No
<i>Ardeotis kori</i>	Kori Bustard	Vulnerable	No	No
<i>Balearica regulorum</i>	Grey Crowned Crane (Mahem)	Vulnerable	No	No
<i>Botaurus stellaris</i>	Eurasian Bittern	Critically Endangered	No	No
<i>Circus ranivorus</i>	African Marsh-Harrier	Vulnerable	No	No
<i>Crex crex</i>	Corn Crane	Vulnerable	No	No
<i>Eupodotis senegalensis</i>	White-bellied Korhaan	Vulnerable	No	No
<i>Falco naumanni</i>	Lesser Kestrel	Vulnerable	No	No
<i>Geronticus calvus</i>	Southern Bald Ibis	Vulnerable	No	No
<i>Gorsachius leuconotus</i>	White-backed Night-heron	Vulnerable	No	No
<i>Gypaetus barbatus</i>	Bearded Vulture	Endangered	No	No
<i>Gyps africanus</i>	White-backed Vulture	Vulnerable	No	No
<i>Gyps coprotheres</i>	Cape Vulture	Vulnerable	No	No
<i>Pelecanus rufescens</i>	Pink-backed Pelican	Vulnerable	No	No
<i>Polemaetus bellicosus</i>	Martial Eagle	Vulnerable	No	No
<i>Rhynchops flavirostris</i>	African Skimmer	Endangered	No	No
<i>Sarothrura ayresi</i>	White-winged Flufftail	Critically Endangered	No	No
<i>Tyto capensis</i>	African Grass-Owl	Vulnerable	No	No

* Though some of the above bird species that roams over large areas may occasionally be found at the site, the site does not appear to be a habitat of particular importance to these birds, and these birds also do not use the site as particular breeding area.

Near threatened bird species of the North West Province. Literature sources Barnes (2000), Hockey, Dean & Ryan, P.G. (2005) and Chittenden (2007). No = Not recorded at site/ Unlikely to be particularly dependent on the site as breeding area or habitat. Yes = Recorded at site/ Likely to be particularly dependant on the site as breeding area or habitat.

Species	Common name	Threatened Status	Recorded at site during survey	Likely to use site breeding area or habitat
<i>Certhilauda chuana</i>	Short-clawed Lark	Near threatened	No	No
<i>Charadrius pallidus</i>	Chestnut-banded Plover	Near threatened	No	No
<i>Ciconia nigra</i>	Black Stork	Near threatened	No	No
<i>Circus macrourus</i>	Pallid Harrier	Near threatened	No	No
<i>Eupodotis caerulescens</i>	Blue Korhaan	Near threatened	No	No
<i>Falco biarmicus</i>	Lanner Falcon	Near threatened	No	No
<i>Falco peregrinus</i>	Peregrine Falcon	Near threatened	No	No
<i>Glareola nordmanni</i>	Black-winged Pratincole	Near threatened	No	No
<i>Leptoptilos crumeniferus</i>	Marabou Stork	Near threatened	No	No
<i>Mirafra cheniana</i>	Melodious lark	Near threatened	No	No
<i>Mycteria ibis</i>	Yellow-billed Stork	Near threatened	No	No
<i>Phoenicopterus minor</i>	Lesser Flamingo	Near threatened	No	No
<i>Phoenicopterus ruber</i>	Greater Flamingo	Near threatened	No	No
<i>Rostratula benghalensis</i>	Greater Painted-snipe	Near threatened	No	No
<i>Sagittarius serpentarius</i>	Secretarybird	Near threatened*	No	No
<i>Sterna caspia</i>	Caspian Tern	Near threatened	No	No

* Most recent extinction risk assessment for the secretary bird is vulnerable.

** Though some of the above bird species that roams over large areas may occasionally be found at the site, the site does not appear to be a habitat of particular importance to these birds, and these birds also do not use the site as breeding area.

Reptiles of particular conservation concern

The following tables list possible presence or absence of threatened reptile or near threatened reptile species in the study area. The Atlas and Red List of Reptiles of South Africa, Lesotho and South Africa (Bates, Branch, Bauer, Burger, Marais, Alexander & de Villiers, 2014) has been used as the main source to compile the list for assessment.

Threatened reptile species in North West Province. Main Source: (Bates, Branch, Bauer, Burger, Marais, Alexander & de Villiers, 2014). No = Reptile species is not a resident on the site; Yes = Reptile species is found to be resident on the site.

Species	Threatened Status	Resident at site	Recorded at site during survey	Likely to be found based on habitat assessment
<i>Crocodylus niloticus</i> Nile Crocodile	Vulnerable	No	No	No

Near threatened reptile species in North West Province. Main Source: Bates, Branch, Bauer, Burger, Marais, Alexander & de Villiers (2014). Though *Homoroselaps dorsalis* has not yet been recorded from the North West Province, its presence in some areas or the Province is anticipated. No = Reptile species is not a resident on the site; Yes = Reptile species is found to be resident on the site.

Species	Threatened Status	Resident at site	Recorded at site during survey	Likely to be found based on habitat assessment
<i>Homoroselaps dorsalis</i> Striped Harlequin Snake	Near threatened	No	No	No

Amphibians of particular conservation concern

Near threatened amphibian species in North West Province. No = Amphibian species is not a resident on the site; Yes = Amphibian species is found to be resident on the site.

Species	Threatened Status	Resident at site	Recorded at site during survey	Likely to be found based on habitat assessment
<i>Pyxicephalus adspersus</i> Giant Bullfrog	Near threatened (Currently Least Concern)	No	No	No

Assessment of invertebrate species of particular conservation concern

Butterflies of particular conservation concern

Threatened butterfly species in North West Province and Gauteng Province. Sources: Henning, Terblanche & Ball (2009), Mecenero *et al.* (2013). Invertebrates such as threatened butterfly species are often very habitat specific and residential status imply a unique ecosystem that is at stake.

Species	Threatened Status	Recorded at site during survey	Residential status at the site: Yes confirmed, Highly likely, Likely, Medium possibility, Unlikely, Highly unlikely
<i>Aloeides dentatis dentatis</i> Roodepoort Copper	Endangered	No	Highly unlikely
<i>Chrysoritis aureus</i> Golden Copper	Endangered	No	Highly unlikely
<i>Lepidochrysops praeterita</i> Highveld Blue	Endangered	No	Highly unlikely
<i>Orachrysops mijburghi</i> Mijburgh's Blue	Endangered	No	Highly unlikely

Butterfly species of the North West Province and Gauteng Province that are not threatened and not near threatened but of which are of particular conservation concern and listed in the **Rare** category (Mecenero *et al.*, 2013). No = Butterfly species is unlikely to be a resident at the study area; Yes = Butterfly species is a resident at the study area.

Species	Threatened Status	Recorded at site during survey	Residential status at the site: Yes confirmed, Highly likely, Likely, Medium possibility, Unlikely, Highly unlikely
<i>Colotis celimene amina</i> Lilac Tip	Rare (Low density)	No	Highly unlikely
<i>Lepidochrysops procera</i> Savanna Blue	Rare (Habitat specialist)	No	Highly unlikely

<i>Metisella meninx</i> Marsh Sylph	Rare (Habitat specialist)	No	Highly unlikely
<i>Platylesches dolomitica</i> Hilltop Hopper	Rare (low density)	No	Highly unlikely

Beetles of particular conservation priority

Fruit chafer species (Coleoptera: Scarabaeidae: Cetoninae) in the Gauteng Province and North-West Province which are of known high conservation priority.

Species	Threatened Status	Recorded at site during survey	Likely to be resident based on habitat assessment
<i>Ichneustoma stobbiai</i>	Uncertain	No	No
<i>Trichocephala brincki</i>	Uncertain	No	No

Scorpion species of particular conservation priority

Rock scorpion species (Scorpiones: Ischnuridae) species that are of known high conservation priority in the Gauteng Province and North-West Province.

Species	Threatened Status	Recorded at site during survey	Likely to be resident at site based on habitat assessment
<i>Hadogenes gracilis</i>	Uncertain	No	No
<i>Hadogenes gunningi</i>	Uncertain	No	No

8.1.9 AIR QUALITY

Air quality will have no influence on the project. The project will however create a certain amount of dust during the construction phase. If proper dust suppression measures are implemented this variable will have very little impact (low in intensity and significance during the construction phase).

8.1.10 NOISE

It is a fact that a certain amount of noise will be generated during the construction phase of the project. Noise levels should however rarely exceed the allowable limits. It is unlikely that the project will create any more noise during the operational phase than that already experienced on site.

8.1.11 ARCHAEOLOGY

A number of sites with Stone Age tools (individual tools and some denser scatters) were identified in the study area during the assessment. This includes some stone tools to the south of Area F (Huhudi Extension 1). These tools were identified in areas close to sections of disturbances (pipeline excavations) and roads, as well as open patches of soil. Although only a few areas were inspected for the possibility of the presence of archaeological material, these finds does indicate that there is a high likelihood of more sites being present in the total development area.

The following mitigation measures are recommended based on the superficial findings during the Phase 1 assessment:

1. Detailed mapping of the stone tools and possible scatters of material in the study area
2. Surface sampling of representative material from the sits to assist with the dating of the Stone Age archaeology of the area and to interpret it within the Stone Age archaeology of the larger geographical area
3. Test Trenching in selected areas to determine if there is any "in situ" archaeological deposits in areas where township development will be taking place

From a cultural heritage point of view the development can therefore continue, taking cognizance of the above recommendations.

8.2 SOCIO ECONOMIC FACTORS

8.2.1 CULTURAL SITES

A number of known cultural heritage sites (archaeological and/or historical) exist in the larger geographical area within which the study area falls. There are no known sites on the specific land parcel, although some were identified in the study area during the assessment

A number of old (recent) structures associated with the Vryburg Airfield (that formed part of the assessment) were identified during the field survey, but none of the current structures are of historical significance and less than 60 years of age. Some of the structures are in a state of disrepair as well, while some hangars here are in use by the Vryburg Vlieg Klub. No mitigation measures are recommended.

8.2.2 AESTHETICS

Aesthetics have very little influence as the area is already highly disturbed. The study areas are surrounded by existing urban residential developments including housing, roads and other urban infrastructure such as commercial/industrial areas. The defunct Vryburg Airfield formed part of the study and is located in between Areas A, B & E that comprises the proposed Vryburg Extension 29 Township. Parts of the proposed Huhudi Extension 1 development contain informal housing. Informal refuse & building material dumping is also evident throughout the study areas, while old ploughing furrows are visible on Area B (Vryburg Extension 29).

8.2.3 AGRICULTURAL POTENTIAL

There is no irrigated land or water licences issued for abstraction from a registered source and will therefore not automatically qualify as high potential in terms of the *National policy on the protection of high potential and unique agricultural land*.

9. ENVIRONMENTAL IMPACT ASSESSMENT

1. 9.1 ASSESSMENT CRITERIA

Impacts were rated using the following methodology:

Nature of the potential impact		Description of the effect, and the affected aspect of the environment
Duration (time scale)	Short term	Up to 5 years
	Medium term	6 – 15 years
	Long term	More than 15 years
Extent (area)	Local	Confined to study area and its immediate surroundings
	Regional	Region (cadastral, catchment, topographic)
	National	Nationally (The country)
	International	Neighboring countries and the rest of the world.
Magnitude (Intensity)	Low	Site-specific and wider natural and/or social functions and processes are negligibly altered. ((A low intensity impact will not affect the natural, cultural, or social functions of the environment).
	Medium	Site-specific and wider natural and/or social functions and processes continue albeit in a modified way. (Medium scale impact will alter the different functions slightly).
	High	Site-specific and wider natural and/or social functions and processes are severely altered. (A High intensity impact will influence these functions to such an extent that it will temporarily or permanently cease to exist).
Probability	Improbable	Possibility of occurrence is very low. (Such an impact will have a very slight possibility to materialise, because of design or experience).
	Possible	There is a possibility that the impact will occur
	Probable	It is most likely that the impact will occur
	Definite	The impact will definitely occur
Significance	Insignificant	Impact is negligible and will not have an influence on the decision regarding the proposed activity (No mitigation is necessary)
	Very Low	Impact is very small and should not have any meaningful influence on the decision

Nature of the potential impact		Description of the effect, and the affected aspect of the environment
		regarding the proposed activity (No mitigation is necessary)
	Low	The impact may not have a meaningful influence on the decision regarding the proposed activity (No mitigation is necessary)
	Medium	The impact should influence the decision regarding the proposed activity (The project can only be carried through if certain mitigatory steps are taken)
	High	The impact will influence the decision regarding the proposed activity
	Very High	The proposed activity should only be approved under special circumstances
Reversibility	Low	There is little chance of correcting the adverse impact
	Medium	There is a moderate chance of correcting the adverse impact
	High	There is a high chance in correcting the adverse impact
Risk	Low	Assessing a risk involves an analysis of the consequences and likelihood of a hazard being realized. In decision-making, low-consequence / low-probability risks (green) are typically perceived as acceptable and therefore only require monitoring.
	Medium	Other risks (amber) may require structured risk assessment to better understand the features that contribute most to the risk. These features may be candidates for management
	High	High-consequence / high-probability risks (red) are perceived as unacceptable and a strategy is required to manage the risk.

Attributes associated with the alternatives were assessed and is outlined below:

Geographical attributes

The Geographical attributes of an area relates to the characteristics of a particular region, area or place. It influences the determination of site alternatives as it relates to the location of a site in relation to relevant features in the area.

Physical attributes

Physical attributes of an area relates to the processes and patterns in the natural environment. For the purpose of this assessment, the following processes and patterns have been investigated. Geology, soil, topography and landforms, climate and meteorology, surface water and ground water.

Biological attributes

Biological attributes for the purpose of this study includes the distribution of species and ecosystems in geographic space and through geological time. Organisms and biological communities often vary in a regular fashion along geographic gradients of latitude, elevation, isolation and habitat area. The two main branches assessed will be:

Phytogeography is the branch of biogeography that studies the distribution of plants.

Zoogeography is the branch that studies distribution of animals.

Social attributes

Social attributes is closely related to social theory in general and sociology in particular, dealing with the relation of social phenomena and its spatial components.

Economic attributes

Economic attributes includes the location, distribution and spatial organization of economic activities and also takes into account social, cultural, and institutional factors in the spatial economy of the development.

Heritage attributes

The broad generic term Cultural Heritage Resources refers to any physical and spiritual property associated with past and present human use or occupation of the environment, cultural activities and history. The term includes sites, structures, places, natural features and material of paleontological, archaeological, historical, aesthetic, scientific, architectural, religious, symbolic or traditional importance to specific individuals or groups, traditional systems of cultural practice, belief or social interaction.

Cultural attributes

Cultural attributes relates to the specific characteristics such as language, religion, ethnic and racial identity, and cultural history & traditions of people. These attributes influences family life, education, economic and political structures, and, of course, business practices.

It should be noted that the above mentioned attributes do not occur in isolation and it is not uncommon for an identified impact to overlap with two or more of these attributes. Also note, not all risks require comprehensive and detailed assessment. Solid problem formulation should allow decision-makers to evaluate the extent of subsequent analysis required. The level of effort put into assessing each risk should be proportionate to its significance and priority in relation to other risks, as well as its complexity, by reference to the likely impacts. Consideration should be given to stakeholders' perceptions of the nature of the risk.

ENVIRONMENTAL IMPACT ASSESSMENT (Planning and design phase)					
ALTERNATIVE 1: Mixed land use township (Preferred Alternative)					
Environmental Attribute	Potential impacts and risks	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)
DIRECT IMPACTS:					
Geographical Physical Social Economic	533,64 hectares of indigenous vegetation will be eradicated in order to establish the development.	Duration	Long term	Obtain the necessary environmental authorization for the development.	Long term
		Extent	Local		Local
		Magnitude (Intensity)	High		High
		Probability	Definite	Conduct a Fauna and Flora Habitat survey to determine the sensitivity of the area.	Definite
		Significance	Medium		Medium
		Reversibility	Low		Low
		Risk	Low		Medium
	1 241 083 square meters of the proposed development area is located within a CBA 2 and the vegetation will be eradicated.	Duration	Long term	Obtain the necessary environmental authorization for the development.	Long term
		Extent	Local		Local
		Magnitude (Intensity)	High		High
		Probability	Definite	Conduct a Fauna and Flora Habitat survey to determine the sensitivity of the area.	Definite
		Significance	Medium		Medium
		Reversibility	Low		Low
		Risk	Low		Medium
	Plan for the provision of services for the development.	Duration	Long term	Appoint a Civil Engineer to assess the availability and design of services to ensure a sustainable development.	Long term
		Extent	Local		Local
		Magnitude (Intensity)	High		High
		Probability	Definite	Ensure that bulk services is available before occupation can take place	Definite
Significance		Medium	Medium		
Reversibility		Low	Low		

ENVIRONMENTAL IMPACT ASSESSMENT (Planning and design phase)

ALTERNATIVE 1: Mixed land use township (Preferred Alternative)

Environmental Attribute	Potential impacts and risks	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)
		Risk	Low		High
	Plan to rehabilitate disturbed surfaces which can lead to erosion and dust pollution. Prepare method statements to this effect.	Duration	Short term	Start the rehabilitation of disturbed surfaces as soon as possible. Spray bare surfaces with water to prevent dust pollution.	Medium term
		Extent	Local		Local
		Magnitude (Intensity)	Low		Medium
		Probability	Definite		Definite
		Significance	Medium		Medium
		Reversibility	High		High
		Risk	Low		Medium
	Plan for the eradication of foreign and invader plant species which are likely to invade disturbed areas.	Duration	Short term	Start the extermination of any invasive species as soon as possible and maintain the eradication programme.	Medium term
		Extent	Local		Local
		Magnitude (Intensity)	Low		Low
		Probability	Definite		Definite
		Significance	Medium		Medium
		Reversibility	High		High
		Risk	Low		Medium
	Plan for the provision and maintenance of ablution facilities for construction workers to prevent pollution of surface and underground water.	Duration	Short term	Provide portable ablution facilities that will not cause pollution during the construction phase. There should be 1 Chemical toilet for every 30 workers on site.	Short term
		Extent	Local		Local
		Magnitude (Intensity)	Medium		Medium
		Probability	Definite		Definite
		Significance	Medium		Medium
		Reversibility	High		High
		Risk	Low		Medium
	Plan to manage possible impacts that the project can have on the soil and geology.	Duration	Long term	Properly plan the construction phase in such a manner that impacts on the soil and geology of the area can be minimised. The findings of the Geotechnical Engineer must be incorporated into the design of the project. Plan to prevent spills of lubricants/oils that can take place on bare soil. This will include the use of drip trays for vehicles that are standing for more than 24 hours.	Long term
		Extent	Local		Local
		Magnitude (Intensity)	Low		Medium
		Probability	Definite		Definite
		Significance	Medium		Medium
		Reversibility	High		High
		Risk	Low		Medium
	Plan for the removal of vegetation (which will lead to the destruction of faunal and floral habitats) during the construction phase.	Duration	Short term	Start with the rehabilitation of vegetation to minimize the negative effects of the removal of plants. The rule must be to minimize the disturbance of animal life by keeping the footprint as small as possible. No snares may be set.	Short term
		Extent	Local		Local
		Magnitude (Intensity)	Medium		Medium
		Probability	Definite		Definite
		Significance	Medium		Medium
		Reversibility	High		High
		Risk	Low		Medium
	The development might have an impact on graveyards that was found adjacent to the site.	Duration	Permanent	The site is located fairly close to the boundary (footprint) of the study area and care should be taken to not	Permanent
		Extent	Local		Local
		Magnitude (Intensity)	Medium		Medium

ENVIRONMENTAL IMPACT ASSESSMENT (Planning and design phase)						
ALTERNATIVE 1: Mixed land use township (Preferred Alternative)						
Environmental Attribute	Potential impacts and risks	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)	
		Probability	Definite	negatively impact the site and graves situated on it.	Definite	
		Significance	Medium		Medium	
		Reversibility	High		High	
		Risk	Low		Medium	
	Plan to safeguard open trenches in order to alleviate the danger of collapse on people or on equipment and people- especially small children who may fall into it.	Duration	Short term	Ensure that the trenches are dug according to specifications as prescribed by the Civil Engineer.	Short term	
		Extent	Local		Local	
		Magnitude (Intensity)	Medium		Medium	
		Probability	Definite	Ensure that the trenches stay open for as short a time as possible.	Definite	
		Significance	Medium		Medium	
		Reversibility	High		High	
		Risk	Low		Medium	
						Ensure that open trenches are demarcated as required by the Occupational Health and Safety Act.
	Indirect impacts:					
Geographical Physical Social Economic	Plan to control dust generation from the proposed project which could impact on the surrounding area.	Duration	Short term	Spray water on open surfaces to ensure that dust does not cause air pollution during construction. Start the rehabilitation of disturbed surfaces as soon as possible	Short term	
		Extent	Local		Local	
		Magnitude (Intensity)	Low		Low	
		Probability	Probable		Probable	
		Significance	Medium		Medium	
		Reversibility	High		High	
		Risk	Low		Medium	
	Plan and compile method statements to implement measures for the prevention and or handling of spills of lubricants / oils that can take place on bare soil.	Extent	Local	Prevent spills of lubricants/oils that can take place on bare soil. This will include the use of drip trays for vehicles that are standing for more than 24 hours. Ensure that all construction vehicles are in good working order and not leaking oil and or fuel. No vehicles may be serviced on site.	Local	
		Magnitude (Intensity)	Low		Low	
		Probability	Probable		Probable	
		Significance	Medium		Medium	
		Reversibility	High		High	
	Risk	Low	Medium			
	Plan to provide method statements on the handling of waste materials such as glass, plastic, metal or paper which may present a possible pollution hazard	Extent	Local	Implement the management plan to ensure that: All construction rubble is disposed of in a safe and environmentally acceptable manner. NO concrete, gravel or other rubbish will be allowed to remain on site after the construction phase. All cement is housed as to prevent spills (due to rain and or handling errors). NO glass, plastic, metal, or paper shall be allowed to pollute the area.	Local	
		Magnitude (Intensity)	Low		Low	
		Probability	Probable		Probable	
		Significance	Medium		Medium	
		Reversibility	High		High	
	Risk	Low	Medium			
	Plan to ensure all involved is aware of the possible social and environmental problems that may be experienced as a	Extent	Local	Ensure that contractors (construction phase) abide by all the requirements of the Occupational Health and Safety Act.	Local	
		Magnitude (Intensity)	Medium		Medium	
		Probability	Probable		Probable	
		Significance	Medium		Medium	

ENVIRONMENTAL IMPACT ASSESSMENT (Planning and design phase)

ALTERNATIVE 1: Mixed land use township (Preferred Alternative)

Environmental Attribute	Potential impacts and risks	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)
	result of non-compliance to the relevant legislation.	Reversibility	High	Ensure that all contractors are aware of the consequences of non-compliance to the relevant legislation regarding the above-mentioned act as well as with regard to the environment (acts, regulations, and special guidelines).	High
		Risk	Low		Medium
	A number of sites with Stone Age tools (individual tools and some denser scatters) were identified	Extent	Local	Plan for: Detailed mapping of the stone tools and possible scatters of material in the study area Surface sampling of representative material from the sites to assist with the dating of the Stone Age archaeology of the area and to interpret it within the Stone Age archaeology of the larger geographical area Test Trenching in selected areas to determine if there is any "in situ" archaeological deposits in areas where township development will be taking place.	Local
		Magnitude (Intensity)	Medium		Medium
		Probability	Probable		Probable
		Significance	Low		Medium
		Reversibility	High		Low
		Risk	Low		Medium
	Plan to create new employment opportunities. Plan to use local labour to ensure local skills development will take place.	Extent	Local	No mitigation measures needed apart from the fact that contractors will have to ensure that they abide to the requirements of the Occupational Health and Safety Act and the Employment Equity Act.	Local
		Magnitude (Intensity)	Medium		Medium
		Probability	Definite		Definite
		Significance	Medium		Medium
		Reversibility	Medium		Medium
		Risk	Low		Medium

Cumulative impacts:

Geographical Physical Social Economic	Plan the development to ensure the social well-being of the community for which the development is intended	Extent	Local	Ensure that the development is constructed as planned. The demand for housing will be partially addressed in the area.	Local
		Magnitude (Intensity)	Medium		Medium
		Probability	Definite		Definite
		Significance	Medium		Medium
		Reversibility	Medium		Medium
		Risk	Low		Medium
	Plan to ensure that the services (Solid waste, bulk water supply water, sewage, electricity and storm water) are designed and constructed in such a manner that it will not cause Environmental degradation.	Extent	Local	Appoint a Civil Engineer to assess the availability and design of services to ensure a sustainable development. Ensure that bulk services is available before occupation can take place Ensure that the development is constructed as planned.	Local
		Magnitude (Intensity)	Medium		Medium
		Probability	Definite		Definite
		Significance	High		High
		Reversibility	High		High
		Risk	Low		Medium
	Plan for the increase in traffic volumes that will result from the proposed development	Extent	Local	The Town and Regional Planner will have to design the layout of the development in such a way that accessibility will not become a problem.	Local
		Magnitude (Intensity)	Medium		Medium
		Probability	Definite		Definite
		Significance	Medium		High

ENVIRONMENTAL IMPACT ASSESSMENT (Planning and design phase)					
ALTERNATIVE 1: Mixed land use township (Preferred Alternative)					
Environmental Attribute	Potential impacts and risks	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)
		Reversibility	Low	No mitigation measures possible.	Low
		Risk	Medium		Medium
	Loss of indigenous vegetation.	Extent	Local		Local
		Magnitude (Intensity)	Medium		Medium
		Probability	Definite		Definite
		Significance	High		High
		Reversibility	Low		Low
		Risk	Medium		Medium

ENVIRONMENTAL IMPACT ASSESSMENT (Planning and design phase)						
ALTERNATIVE 2: Single land use: Housing only						
Environmental Attribute	Potential impacts and risks	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)	
DIRECT IMPACTS:						
Geographical Physical Social Economic	533,64 hectares of indigenous vegetation will be eradicated in order to establish the development.	Duration	Long term	Obtain the necessary environmental authorization for the development.	Long term	
		Extent	Local		Local	
		Magnitude (Intensity)	High		High	
		1 241 083 square meters of the proposed development area is located within a CBA 2 and the vegetation will be eradicated.	Probability	Definite	Conduct a Fauna and Flora Habitat survey to determine the sensitivity of the area.	Definite
			Significance	Medium		Medium
			Reversibility	Low		Low
			Risk	Low	Implement the mitigation measures as described in the Environmental Management Plan.	Medium
	Plan for the provision of services for the development.		Duration	Long term	Obtain the necessary environmental authorization for the development.	Long term
			Extent	Local		Local
			Magnitude (Intensity)	High		High
		Probability	Definite	Conduct a Fauna and Flora Habitat survey to determine the sensitivity of the area.	Definite	
		Significance	Medium		Medium	
		Reversibility	Low		Low	
		Risk	Low	Implement the mitigation measures as described in the Environmental Management Plan.	Medium	
	Plan to rehabilitate disturbed surfaces which can lead to erosion and dust pollution. Prepare method statements to this effect.	Duration	Long term	Appoint a Civil Engineer to assess the availability and design of services to ensure a sustainable development.	Long term	
		Extent	Local		Local	
		Magnitude (Intensity)	High		High	
		Probability	Definite	Ensure that bulk services is available before occupation can take place	Definite	
		Significance	Medium		High	
		Reversibility	Low		Low	
		Risk	Low	High		
			Duration	Short term	Start the rehabilitation of disturbed surfaces as soon as possible.	Medium term
			Extent	Local		Local
			Magnitude (Intensity)	Low		Medium
Probability			Definite	Definite		
Significance			Medium	Medium		
Reversibility			High	High		

ENVIRONMENTAL IMPACT ASSESSMENT (Planning and design phase)					
ALTERNATIVE 2: Single land use: Housing only					
Environmental Attribute	Potential impacts and risks	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)
		Risk	Low		Medium
	Plan for the eradication of foreign and invader plant species which are likely to invade disturbed areas.	Duration	Short term	Start the extermination of any invasive species as soon as possible and maintain the eradication programme.	Medium term
		Extent	Local		Local
		Magnitude (Intensity)	Low		Low
		Probability	Definite		Definite
		Significance	Medium		Medium
		Reversibility	High		High
		Risk	Low		Medium
	Plan for the provision and maintenance of ablution facilities for construction workers to prevent pollution of surface and underground water.	Duration	Short term	Provide portable ablution facilities that will not cause pollution during the construction phase.	Short term
		Extent	Local		Local
		Magnitude (Intensity)	Medium		Medium
		Probability	Definite		Definite
		Significance	Medium		Medium
		Reversibility	High		High
		Risk	Low		Medium
	Plan to manage possible impacts that the project can have on the soil and geology.	Duration	Long term	Properly plan the construction phase in such a manner that impacts on the soil and geology of the area can be minimised. The findings of the Geotechnical Engineer must be incorporated into the design of the project. Plan to prevent spills of lubricants/oils that can take place on bare soil. This will include the use of drip trays for vehicles that are standing for more than 24 hours. The findings of the Geotechnical Engineer must be incorporated into the design of the project. Plan to prevent spills of lubricants/oils that can take place on bare soil. This will include the use of drip trays for vehicles that are standing for more than 24 hours.	Long term
		Extent	Local		Local
		Magnitude (Intensity)	Low		Medium
		Probability	Definite		Definite
		Significance	Medium		Medium
		Reversibility	High		High
		Risk	Low		Medium
	Plan for the removal of vegetation (which will lead to the destruction of faunal and floral habitats) during the construction phase.	Duration	Short term	Start with the rehabilitation of vegetation to minimize the negative effects of the removal of plants. The rule must be to minimize the disturbance of animal life by keeping the footprint as small as possible. No snares may be set.	Short term
		Extent	Local		Local
		Magnitude (Intensity)	Medium		Medium
		Probability	Definite		Definite
		Significance	Medium		Medium
		Reversibility	High		High
		Risk	Low		Medium
	Plan to safeguard open trenches in order to alleviate the danger of collapse on people or on equipment and	Duration	Short term	Ensure that the trenches are dug according to specifications as prescribed by the Civil Engineer.	Short term
		Extent	Local		Local
		Magnitude (Intensity)	Medium		Medium

ENVIRONMENTAL IMPACT ASSESSMENT (Planning and design phase)						
ALTERNATIVE 2: Single land use: Housing only						
Environmental Attribute	Potential impacts and risks	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)	
	people- especially small children who may fall into it.	Probability	Definite	Ensure that the trenches stay open for as short a time as possible.	Definite	
		Significance	Medium		Medium	
		Reversibility	High		High	
		Risk	Low		Medium	
	The development might have an impact on graveyard that was found adjacent to the site.	Duration	Permanent	The site is located fairly close to the boundary (footprint) of the study area and care should be taken to not negatively impact the site and graves situated on it..	Permanent	
		Extent	Local		Local	
		Magnitude (Intensity)	Medium		Medium	
		Probability	Definite		Definite	
		Significance	Medium		Medium	
		Reversibility	High		High	
		Risk	Low		Medium	
	Indirect impacts:					
	Geographical Physical Social Economic	Plan to control dust generation from the proposed project which could impact on the surrounding area.	Duration	Short term	Spray water on open surfaces to ensure that dust does not cause air pollution during construction. Start the rehabilitation of disturbed surfaces as soon as possible	Short term
			Extent	Local		Local
Magnitude (Intensity)			Low	Low		
Probability			Probable	Probable		
Significance			Medium	Medium		
Reversibility			High	High		
Risk			Low	Medium		
Plan and compile method statements to implement measures for the prevention and or handling of spills of lubricants / oils that can take place on bare soil.		Extent	Local	Prevent spills of lubricants/oils that can take place on bare soil. This will include the use of drip trays for vehicles that are standing for more than 24 hours. Ensure that all construction vehicles are in good working order and not leaking oil and or fuel. No vehicles may be serviced on site.	Local	
		Magnitude (Intensity)	Low		Low	
		Probability	Probable		Probable	
		Significance	Medium		Medium	
		Reversibility	High		High	
		Risk	Low		Medium	
Plan to provide method statements on the handling of waste materials such as glass, plastic, metal or paper which may present a possible pollution hazard		Extent	Local	Implement the management plan to ensure that: All construction rubble is disposed of in a safe and environmentally acceptable manner. NO concrete, gravel or other rubbish will be allowed to remain on site after the construction phase. All cement is housed as to prevent spills (due to rain and or handling errors). NO glass, plastic, metal, or paper shall be allowed to pollute the area.	Local	
		Magnitude (Intensity)	Low		Low	
		Probability	Probable		Probable	
		Significance	Medium		Medium	
		Reversibility	High		High	
		Risk	Low		Medium	
Plan to ensure all involved is aware of the possible social and environmental problems that may be experienced as a		Extent	Local	Ensure that contractors (construction phase) abide by all the requirements of the Occupational Health and Safety Act.	Local	
		Magnitude (Intensity)	Medium		Medium	
		Probability	Probable		Probable	
		Significance	Medium		Medium	

ENVIRONMENTAL IMPACT ASSESSMENT (Planning and design phase)						
ALTERNATIVE 2: Single land use: Housing only						
Environmental Attribute	Potential impacts and risks	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)	
	result of non-compliance to the relevant legislation.	Reversibility	High	Ensure that all contractors are aware of the consequences of non-compliance to the relevant legislation regarding the above-mentioned act as well as with regard to the environment (acts, regulations, and special guidelines).	High	
		Risk	Low		Medium	
	Plan to create new employment opportunities. Plan to use local labour to ensure local skills development will take place.	Extent	Local	No mitigation measures needed apart from the fact that contractors will have to ensure that they abide to the requirements of the Occupational Health and Safety Act and the Employment Equity Act.	Local	
		Magnitude (Intensity)	Medium		Medium	
		Probability	Definite		Definite	
		Significance	Medium		Medium	
		Reversibility	Medium		Medium	
	Risk	Low	Medium			
	Cumulative impacts:					
	Geographical Physical Social Economic	Plan the development to ensure the social well-being of the community for which the development is intended	Extent	Local	Ensure that the development is constructed as planned.	Local
Magnitude (Intensity)			Medium	Medium		
Probability			Definite	The demand for housing will be partially addressed in the area.	Definite	
Significance			Medium		Medium	
Reversibility			Medium		Medium	
Risk			Low		Medium	
Plan to ensure that the services (Solid waste, bulk water supply water, sewage, electricity and storm water) are designed and constructed in such a manner that it will not cause Environmental degradation.		Extent	Local	Appoint a Civil Engineer to assess the availability and design of services to ensure a sustainable development.	Local	
		Magnitude (Intensity)	Medium		Medium	
		Probability	Definite	Ensure that the development is constructed as planned.	Definite	
		Significance	High		High	
		Reversibility	High		High	
		Risk	Low		Medium	
Plan for the increase in traffic volumes that will result from the proposed development		Extent	Local	The Town and Regional Planner will have to design the layout of the development in such a way that accessibility will not become a problem.	Local	
		Magnitude (Intensity)	Medium		Medium	
		Probability	Definite		Definite	
		Significance	Medium		High	
		Reversibility	Low		Low	
		Risk	Medium		Medium	
Loss of indigenous vegetation.	Extent	Local	No mitigation measures possible.	Local		
	Magnitude (Intensity)	Medium		Medium		
	Probability	Definite		Definite		
	Significance	High		High		
	Reversibility	Low		Low		
	Risk	Medium		Medium		

ENVIRONMENTAL IMPACT ASSESSMENT (Planning and design phase)					
ALTERNATIVE 3: (No-Go Option)					
Environmental Attribute	Potential impacts and risks	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)
DIRECT IMPACTS:					
Geographical Physical Social Economic Cultural	No indigenous vegetation will be removed.	Duration	Long term	No mitigation measures required.	Long term
		Extent	Local		Local
		Magnitude (Intensity)	Medium		Medium
		Probability	Definite		Definite
		Significance	High		High
		Reversibility	Low		Low
		Risk	Medium		Medium
Indirect impacts:					
Geographical Physical Social Economic Cultural	No new employment opportunities will be created during the planning and design phase. No skills enhancement will take place If this option is implemented, the projected boost to the local and regional economy will not take place.	Extent	Local	Ensure that the development is constructed and operated as planned.	Local
		Magnitude (Intensity)	Medium		Medium
		Probability	Definite		Definite
		Significance	Medium		Medium
		Reversibility	Medium		Medium
		Risk	High		High
Cumulative impacts:					
Geographical Physical Social Economic Cultural	If this option is implemented, the projected boost to the local and regional economy will not take place. No new employment opportunities will be created. No improvement to local skills development will take place. No broadened Tax base for the Naledi Local Municipality.	Extent	Local	Ensure that the development is constructed and operated as planned.	Local
		Magnitude (Intensity)	Medium		Medium
		Probability	Definite		Definite
		Significance	High		High
		Reversibility	High		High
		Risk	Medium		Medium

ENVIRONMENTAL IMPACT ASSESSMENT (Construction phase)					
ALTERNATIVE 1: Mixed land use township (Preferred Alternative)					
Environmental Attribute	Environmental Attribute	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)
DIRECT IMPACTS:					
Geographical Physical Social Economic	533,64 hectares of indigenous vegetation will be eradicated in order to establish the development.	Duration	Long term	Obtain the necessary environmental authorization for the development. Implement the findings of the Fauna and Flora Habitat survey. Implement the mitigation measures as	Long term
		Extent	Local		Local
		Magnitude (Intensity)	High		High
		Probability	Definite		Definite
		Significance	Medium		Medium
		Reversibility	Low		Low
		Risk	Low		Medium

ENVIRONMENTAL IMPACT ASSESSMENT (Construction phase)

ALTERNATIVE 1: Mixed land use township (Preferred Alternative)

Environmental Attribute	Environmental Attribute	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)
				described in the Environmental Management Plan.	
	1 241 083 square meters of the proposed development area is located within a CBA 2 and the vegetation will be eradicated.	Duration	Long term	Obtain the necessary environmental authorization for the development.	Long term
		Extent	Local		Local
		Magnitude (Intensity)	High		High
		Probability	Definite	Implement the findings of the Fauna and Flora Habitat survey.	Definite
		Significance	Medium		Medium
		Reversibility	Low		Low
		Risk	Low		Medium
	Un-rehabilitated, disturbed surfaces can lead to erosion and dust pollution.	Duration	Short term	Start the rehabilitation of disturbed surfaces as soon as possible.	Medium term
		Extent	Local		Local
		Magnitude (Intensity)	Low		Medium
		Probability	Definite	Spray bare surfaces with water to prevent dust pollution.	Definite
		Significance	Medium		Medium
		Reversibility	High		High
		Risk	Low		Medium
	Foreign plant species are likely to invade disturbed areas.	Duration	Short term	Start the extermination of any invasive species as soon as possible and maintain the eradication programme.	Medium term
		Extent	Local		Local
		Magnitude (Intensity)	Low		Low
		Probability	Definite		Definite
		Significance	Medium		Medium
		Reversibility	High		High
		Risk	Low		Medium
	Poorly planned ablation facilities for construction workers may cause pollution of surface and underground water.	Duration	Short term	Provide portable ablation facilities that will not cause pollution during the construction phase.	Short term
		Extent	Local		Local
		Magnitude (Intensity)	Medium		Medium
		Probability	Definite		Definite
		Significance	Medium		Medium
		Reversibility	High		High
		Risk	Low		Medium
	The proposed project can impact on the soil and geology.	Duration	Long term	Implement the findings of the Geo-Technical Engineer.	Long term
		Extent	Local		Local
		Magnitude (Intensity)	Low		Medium
		Probability	Definite	Prevent spills of lubricants/oils that can take place on bare soil. This will include the use of drip trays for vehicles that are standing for more than 24 hours.	Definite
		Significance	Medium		Medium
		Reversibility	High		High
		Risk	Low		Medium

ENVIRONMENTAL IMPACT ASSESSMENT (Construction phase)

ALTERNATIVE 1: Mixed land use township (Preferred Alternative)

Environmental Attribute	Environmental Attribute	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)
	The vegetation of the area will be removed during the construction phase, which will destroy floral and faunal habitats.	Duration	Short term	Start with the rehabilitation of vegetation to minimize the negative effects of the removal of plants. The rule must be to minimize the disturbance of animal life by keeping the footprint as small as possible. No snares may be set.	Short term
		Extent	Local		Local
		Magnitude (Intensity)	Medium		Medium
		Probability	Definite		Definite
		Significance	Medium		Medium
		Reversibility	High		High
		Risk	Low		Medium
	Open trenches can be dangerous as they can either collapse on people or on equipment and people- especially small children, can fall into them.	Duration	Short term	Ensure that the trenches are dug according to specifications as prescribed by the Civil Engineer. Ensure that the trenches stay open for as short a time as possible. Ensure that open trenches are demarcated as required by the Occupational Health and Safety Act.	Short term
		Extent	Local		Local
		Magnitude (Intensity)	Medium		Medium
		Probability	Definite		Definite
		Significance	Medium		Medium
		Reversibility	High		High
		Risk	Low		Medium
Indirect impacts:					
Geographical Physical Social Economic	Dust generation from the proposed project could impact on the surrounding area.	Duration	Short term	Spray water on open surfaces to ensure that dust does not cause air pollution during construction. Start the rehabilitation of disturbed surfaces as soon as possible	Short term
		Extent	Local		Local
		Magnitude (Intensity)	Low		Low
		Probability	Probable		Probable
		Significance	Medium		Medium
		Reversibility	High		High
		Risk	Low		Medium
	Spills of lubricants / oils can take place on bare soil.	Extent	Local	Prevent spills of lubricants/oils that can take place on bare soil. This will include the use of drip trays for vehicles that are standing for more than 24 hours. Ensure that all construction vehicles are in good working order and not leaking oil and or fuel.	Local
		Magnitude (Intensity)	Low		Low
		Probability	Probable		Probable
		Significance	Medium		Medium
		Reversibility	High		High
		Risk	Low		Medium

ENVIRONMENTAL IMPACT ASSESSMENT (Construction phase)

ALTERNATIVE 1: Mixed land use township (Preferred Alternative)

Environmental Attribute	Environmental Attribute	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)
				No vehicles may be serviced on site.	
	Waste materials such as glass, plastic, metal or paper present a possible pollution hazard	Extent	Local	Implement the management plan to ensure that: All construction rubble is disposed of in a safe and environmentally acceptable manner. NO concrete, gravel or other rubbish will be allowed to remain on site after the construction phase. All cement is housed as to prevent spills (due to rain and or handling errors). NO glass, plastic, metal, or paper shall be allowed to pollute the area.	Local
		Magnitude (Intensity)	Low		Low
		Probability	Probable		Probable
		Significance	Medium		Medium
		Reversibility	High		High
		Risk	Low		Medium
	Non-compliance to the relevant legislation may cause social and environmental problems.	Extent	Local	Ensure that contractors (construction phase) abide by all the requirements of the Occupational Health and Safety Act. Ensure that all contractors are aware of the consequences of non-compliance to the relevant legislation regarding the above-mentioned act as well as with regard to the environment (acts, regulations, and special guidelines).	Local
		Magnitude (Intensity)	Medium		Medium
		Probability	Probable		Probable
		Significance	Medium		Medium
		Reversibility	High		High
		Risk	Low		Medium
	New employment opportunities will be created. Local skills development will take place.	Extent	Local	No mitigation measures needed apart from the fact that contractors will have to ensure that they abide to the requirements of the Occupational Health and Safety Act and the Employment Equity Act.	Local
		Magnitude (Intensity)	Medium		Medium
		Probability	Definite		Definite
		Significance	Medium		Medium
		Reversibility	Medium		Medium
		Risk	Low		Medium
Cumulative impacts:					
Geographical Physical Social	Enhancement of the social well-being of the local	Extent	Local	Ensure that the development is constructed as planned.	Local
		Magnitude (Intensity)	Medium		Medium

ENVIRONMENTAL IMPACT ASSESSMENT (Construction phase)					
ALTERNATIVE 1: Mixed land use township (Preferred Alternative)					
Environmental Attribute	Environmental Attribute	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)
Economic	communities for which the development is intended	Probability	Definite	The demand for housing will be partially addressed in the area.	Definite
		Significance	Medium		Medium
		Reversibility	Medium		Medium
		Risk	Low		Medium
	<u>Solid waste</u> : The proposed development will add additional solid waste into the existing waste stream of the Naledi Local Municipality. <u>Sewage</u> : The proposed development will add additional sewage into the existing sewage stream of the Naledi Local Municipality. <u>Water supply</u> : The proposed development will add pressure to the water supply of Naledi Local Municipality's Water.	Extent	Local	Ensure that the development is constructed as planned by the Civil Engineer.	Local
		Magnitude (Intensity)	Medium		Medium
		Probability	Definite		Definite
		Significance	High		High
		Reversibility	High		High
		Risk	Low		Medium
		Extent	Local		Ensure that the development is constructed as planned by the Town and Regional Planner
	Magnitude (Intensity)	Medium	Medium		
	Probability	Definite	Definite		
	Significance	Medium	High		
	Reversibility	Low	Low		
	Risk	Medium	Medium		
	Indigenous vegetation will be removed.	Extent	Local	No mitigation measures possible.	Local
		Magnitude (Intensity)	Medium		Medium
		Probability	Definite		Definite
		Significance	High		High
		Reversibility	Low		Low
Risk		Medium	Medium		
Extent	Local		Local		

ENVIRONMENTAL IMPACT ASSESSMENT (Construction phase)					
ALTERNATIVE 2: Single land use: Housing only					
Environmental Attribute	Environmental Attribute	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)
DIRECT IMPACTS:					
Geographical Physical Social Economic	533,64 hectares of indigenous vegetation will be eradicated in order to establish the development.	Duration	Long term	Obtain the necessary environmental authorization for the development.	Long term
		Extent	Local		Local
		Magnitude (Intensity)	High		High
		Probability	Definite		Definite
		Significance	Medium		Medium
		Reversibility	Low		Low

ENVIRONMENTAL IMPACT ASSESSMENT (Construction phase)

ALTERNATIVE 2: Single land use: Housing only

Environmental Attribute	Environmental Attribute	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)
		Risk	Low	Implement the findings of the Fauna and Flora Habitat survey. Implement the mitigation measures as described in the Environmental Management Plan.	Medium
	1 241 083 square meters of the proposed development area is located within a CBA 2 and the vegetation will be eradicated.	Duration	Long term	Obtain the necessary environmental authorization for the development.	Long term
		Extent	Local		Local
		Magnitude (Intensity)	High		High
		Probability	Definite	Implement the findings of the Fauna and Flora Habitat survey. Implement the mitigation measures as described in the Environmental Management Plan.	Definite
		Significance	Medium		Medium
		Reversibility	Low		Low
		Risk	Low		Medium
	Un-rehabilitated, disturbed surfaces can lead to erosion and dust pollution.	Duration	Short term	Start the rehabilitation of disturbed surfaces as soon as possible.	Medium term
		Extent	Local		Local
		Magnitude (Intensity)	Low	Spray bare surfaces with water to prevent dust pollution.	Medium
		Probability	Definite		Definite
		Significance	Medium		Medium
		Reversibility	High		High
	Risk	Low	Medium		
	Foreign plant species are likely to invade disturbed areas.	Duration	Short term	Start the extermination of any invasive species as soon as possible and maintain the eradication programme.	Medium term
		Extent	Local		Local
		Magnitude (Intensity)	Low		Low
		Probability	Definite		Definite
		Significance	Medium		Medium
		Reversibility	High		High
	Risk	Low	Medium		
	Poorly planned ablation facilities for construction workers may cause pollution of surface and underground water.	Duration	Short term	Provide portable ablation facilities that will not cause pollution during the construction phase.	Short term
		Extent	Local		Local
		Magnitude (Intensity)	Medium		Medium
		Probability	Definite		Definite
		Significance	Medium		Medium
		Reversibility	High		High
	Risk	Low	Medium		
	The proposed project can impact on the soil and geology.	Duration	Long term	The findings of the Geo-Technical Engineer must be adhered to.	Long term
		Extent	Local		Local
		Magnitude (Intensity)	Low	Prevent spills of lubricants/oils that can	Medium
		Probability	Definite		Definite
		Significance	Medium		Medium

ENVIRONMENTAL IMPACT ASSESSMENT (Construction phase)

ALTERNATIVE 2: Single land use: Housing only

Environmental Attribute	Environmental Attribute	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)	
		Reversibility	High	take place on bare soil. This will include the use of drip trays for vehicles that are standing for more than 24 hours.	High	
		Risk	Low		Medium	
	The vegetation of the area will be removed during the construction phase, which will destroy floral and faunal habitats.	Duration	Short term	Start with the rehabilitation of vegetation to minimize the negative effects of the removal of plants. The rule must be to minimize the disturbance of animal life by keeping the footprint as small as possible. No snares may be set.	Short term	
		Extent	Local		Local	
		Magnitude (Intensity)	Medium		Medium	
		Probability	Definite		Definite	
		Significance	Medium		Medium	
		Reversibility	High		High	
		Risk	Low		Medium	
	Open trenches can be dangerous as they can either collapse on people or on equipment and people-especially small children, can fall into them.	Duration	Short term	Ensure that the trenches are dug according to specifications as prescribed by the Civil Engineer. Ensure that the trenches stay open for as short a time as possible. Ensure that open trenches are demarcated as required by the Occupational Health and Safety Act.	Short term	
		Extent	Local		Local	
		Magnitude (Intensity)	Medium		Medium	
		Probability	Definite		Definite	
		Significance	Medium		Medium	
		Reversibility	High		High	
		Risk	Low		Medium	
	Indirect impacts:					
	Geographical Physical Social Economic	Dust generation from the proposed project could impact on the surrounding area.	Duration	Short term	Spray water on open surfaces to ensure that dust does not cause air pollution during construction. Start the rehabilitation of disturbed surfaces as soon as possible	Short term
			Extent	Local		Local
			Magnitude (Intensity)	Low		Low
Probability			Probable	Probable		
Significance			Medium	Medium		
Reversibility			High	High		
Risk			Low	Medium		
Spills of lubricants / oils can take place on bare soil.		Extent	Local	Prevent spills of lubricants/oils that can take place on bare soil. This will include the use of drip trays for vehicles that are standing for more than 24 hours. Ensure that all construction vehicles are in good working order and not leaking oil and or fuel.	Local	
		Magnitude (Intensity)	Low		Low	
		Probability	Probable		Probable	
		Significance	Medium		Medium	
		Reversibility	High		High	
		Risk	Low		Medium	

ENVIRONMENTAL IMPACT ASSESSMENT (Construction phase)

ALTERNATIVE 2: Single land use: Housing only

Environmental Attribute	Environmental Attribute	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)
				No vehicles may be serviced on site.	
	Waste materials such as glass, plastic, metal or paper present a possible pollution hazard	Extent	Local	Implement the management plan to ensure that: All construction rubble is disposed of in a safe and environmentally acceptable manner. NO concrete, gravel or other rubbish will be allowed to remain on site after the construction phase. All cement is housed as to prevent spills (due to rain and or handling errors). NO glass, plastic, metal, or paper shall be allowed to pollute the area.	Local
		Magnitude (Intensity)	Low		Low
		Probability	Probable		Probable
		Significance	Medium		Medium
		Reversibility	High		High
		Risk	Low		Medium
	Non-compliance to the relevant legislation may cause social and environmental problems.	Extent	Local	Ensure that contractors (construction phase) abide by all the requirements of the Occupational Health and Safety Act. Ensure that all contractors are aware of the consequences of non-compliance to the relevant legislation regarding the above-mentioned act as well as with regard to the environment (acts, regulations, and special guidelines).	Local
		Magnitude (Intensity)	Medium		Medium
		Probability	Probable		Probable
		Significance	Medium		Medium
		Reversibility	High		High
		Risk	Low		Medium
	New employment opportunities will be created. Local skills development will take place.	Extent	Local	No mitigation measures needed apart from the fact that contractors will have to ensure that they abide to the requirements of the Occupational Health and Safety Act and the Employment Equity Act.	Local
		Magnitude (Intensity)	Medium		Medium
		Probability	Definite		Definite
		Significance	Medium		Medium
		Reversibility	Medium		Medium
		Risk	Low		Medium
Cumulative impacts:					
Geographical Physical Social Economic	Enhancement of the social well-being of the local communities for which the development is intended	Extent	Local	Ensure that the development is constructed as planned.	Local
		Magnitude (Intensity)	Medium		Medium
		Probability	Definite		Definite
		Significance	Medium		Medium
		Reversibility	Medium		Medium

ENVIRONMENTAL IMPACT ASSESSMENT (Construction phase)					
ALTERNATIVE 2: Single land use: Housing only					
Environmental Attribute	Environmental Attribute	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)
		Risk	Low	The demand for housing will be partially addressed in the area.	Medium
	<p><u>Solid waste:</u> The proposed development will add additional solid waste into the existing waste stream of the Naledi Local Municipality.</p> <p><u>Sewage:</u> The proposed development will add additional sewage into the existing sewage stream of the Naledi Local Municipality.</p> <p><u>Water supply:</u> The proposed development will add pressure to the water supply of Naledi Local Municipality's Water.</p>	Extent	Local	Ensure that the development is constructed as planned by the Civil Engineer.	Local
		Magnitude (Intensity)	Medium		Medium
		Probability	Definite		Definite
		Significance	High		High
		Reversibility	High		High
		Risk	Low		Medium
	<p><u>Traffic:</u> The proposed development will result in an increase in traffic in the immediate surroundings of the proposed development.</p>	Extent	Local	Ensure that the development is constructed as planned by the Town and Regional Planner	Local
		Magnitude (Intensity)	Medium		Medium
		Probability	Definite		Definite
		Significance	Medium		High
		Reversibility	Low		Low
		Risk	Medium		Medium
	Indigenous vegetation will be removed	Extent	Local	No mitigation measures possible.	Local
		Magnitude (Intensity)	Medium		Medium
		Probability	Definite		Definite
		Significance	High		High
		Reversibility	Low		Low
		Risk	Medium		Medium

ENVIRONMENTAL IMPACT ASSESSMENT (Construction phase)					
ALTERNATIVE 3: (No-Go Option)					
Environmental Attribute	Potential impacts and risks	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)
DIRECT IMPACTS:					
Geographical Physical Social Economic Cultural	No loss of agricultural land.	Duration	Long term	No mitigation measures required.	Long term
		Extent	Local		Local
		Magnitude (Intensity)	Medium		Medium
		Probability	Definite		Definite
		Significance	High		High
		Reversibility	Low		Low
		Risk	Medium		Medium
Indirect impacts:					
Geographical		Extent	Local		Local

ENVIRONMENTAL IMPACT ASSESSMENT (Construction phase)					
ALTERNATIVE 3: (No-Go Option)					
Environmental Attribute	Potential impacts and risks	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)
Physical Social Economic Cultural	No new employment opportunities will be created during the planning and design phase. No skills enhancement will take place If this option is implemented, the projected boost to the local and regional economy will not take place.	Magnitude (Intensity)	Medium	Ensure that the development is constructed and operated as planned.	Medium
		Probability	Definite		Definite
		Significance	Medium		Medium
		Reversibility	Medium		Medium
		Risk	High		High
Cumulative impacts:					
Geographical Physical Social Economic Cultural	If this option is implemented, the projected boost to the local and regional economy will not take place. No new employment opportunities will be created. No improvement to local skills development will take place. No broadened Tax base for the Naledi Local Municipality.	Extent	Local	Ensure that the development is constructed and operated as planned.	Local
		Magnitude (Intensity)	Medium		Medium
		Probability	Definite		Definite
		Significance	High		High
		Reversibility	High		High
Risk	Medium	Medium			

ENVIRONMENTAL IMPACT ASSESSMENT (Operational Phase)					
ALTERNATIVE 1: Mixed land use township (Preferred Alternative)					
Environmental Attribute	Environmental Attribute	Environmental Attribute	Environmental Attribute	Environmental Attribute	Environmental Attribute
DIRECT IMPACTS:					
Geographical Physical Social Economic Cultural	Poorly maintained and serviced infrastructure may cause environmental problems.	Extent	Local	It will be the responsibility of the Local Municipality to maintain the infrastructure.	Local
		Magnitude (Intensity)	Medium		Medium
		Probability	Definite		Definite
		Significance	Medium- high		High
		Reversibility	High		Medium
Risk	High	High			
Indirect impacts:					
Geographical Physical Social Economic Cultural	Lack of rehabilitation may cause problems	Extent	Local	It will be the responsibility of the Local Municipality to ensure that the rehabilitation plan is implemented	Local
		Magnitude (Intensity)	Medium		Medium
		Probability	Definite		Definite
		Significance	Medium- high		High
		Reversibility	High		Medium
Risk	High	High			
Cumulative impacts:					
Geographical Physical Social Economic Cultural	Enhancement of the social well-being of the local communities for which the development is intended	Extent	Local	No mitigation measures required.	Local
		Magnitude (Intensity)	Medium		Medium
		Probability	Definite		Definite
		Significance	High		High
		Reversibility	High		High

ENVIRONMENTAL IMPACT ASSESSMENT (Operational Phase)

ALTERNATIVE 1: Mixed land use township (Preferred Alternative)

Environmental Attribute	Environmental Attribute	Environmental Attribute	Environmental Attribute	Environmental Attribute	Environmental Attribute
		Risk	Medium		Medium
Geographical Physical Social Economic Cultural	Broadened tax base: The proposed development will generate more income for the Naledi Local Municipality.	Extent	Local	No mitigation measures required.	Local
		Magnitude (Intensity)	Medium		Medium
		Probability	Definite		Definite
		Significance	High		High
		Reversibility	High		High
		Risk	Medium		Medium

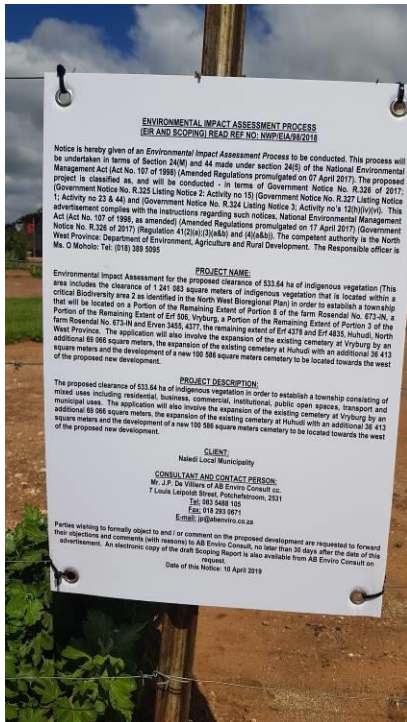
10. PUBLIC PARTICIPATION.

10.1 ADVERTISEMENT AND NOTICE

Publication name	Stellalander	
Date published	10/04/2019	
	Latitude	Longitude
Site notice 1 position	26°58'55.49"S	24°42'0.58"E
Site notice 2 position	26°58'57.70"S	24°42'39.27"E
	26°58'19.37"S	24°43'33.29"E
Site notice 3 position	26°58'21.68"S	24°43'57.67"E
Site notice 4 position	26°58'47.16"S	24°44'6.76"E
	26°59'0.74"S	24°44'11.55"E
Site notice 5 position	26°59'14.12"S	24°44'16.58"E
Site notice 6 position	26°59'50.02"S	24°44'34.44"E
Site notice 7 position		
Site notice 8 position		
Date placed	09/12/2019	

PLEASE SEE PROOF BELOW





**ENVIRONMENTAL IMPACT ASSESSMENT PROCESS
(EIR AND SCOPING) READ REF NO: NWP/EIA/R/2018**

Notice is hereby given of an Environmental Impact Assessment Process to be conducted. This process will be undertaken in terms of Section 24(M) and 44 made under section 24(5) of the National Environmental Management Act (Act No. 107 of 1998) (Amended Regulations promulgated on 07 April 2017). The proposed project is classified as, and will be conducted - in terms of Government Notice No. R.326 of 2017; (Government Notice No. R.325 Listing Notice 2; Activity no 15) (Government Notice No. R.327 Listing Notice 1; Activity no 23 & 44) and (Government Notice No. R.324 Listing Notice 2; Activity no 12)(iv)(vi). This advertisement complies with the instructions regarding such notices, National Environmental Management Act (Act No. 107 of 1998, as amended) (Amended Regulations promulgated on 17 April 2017) (Government Notice No. R.326 of 2017) (Regulation 41(2)(a)(3)(a&b) and (4)(a&b)). The competent authority is the North West Province, Department of Environment, Agriculture and Rural Development. The Responsible officer is Ms. O Moholo: Tel: (018) 389 5095

PROJECT NAME:

Environmental Impact Assessment for the proposed clearance of 533,64 ha of indigenous vegetation (This area includes the clearance of 1 241 083 square meters of indigenous vegetation that is located within a critical Biodiversity area 2 as identified in the North West Bioregional Plan) in order to establish a township that will be located on a Portion of the Remaining Extent of Portion 8 of the farm Rosendal No. 673-PA, a farm Rosendal No. 673-PA and Erfen 3453, 4277, a Portion of the Remaining Extent of Portion 3 of the farm Rosendal No. 673-PA, a Portion of the Remaining Extent of Erf 506, Vryburg, a Portion of the Remaining Extent of Erf 4379 and Erf 4835, Huhudi, North West Province. The application will also involve the expansion of the existing cemetery at Vryburg by an additional 69 586 square meters, the expansion of the existing cemetery at Huhudi with an additional 36 413 square meters and the development of a new 100 586 square meters cemetery to be located towards the west of the proposed new development.

PROJECT DESCRIPTION:

The proposed clearance of 533,64 ha of indigenous vegetation in order to establish a township consisting of mixed uses including residential, business, commercial, institutional, public open spaces, transport and municipal uses. The application will also involve the expansion of the existing cemetery at Vryburg by an additional 69 586 square meters, the expansion of the existing cemetery at Huhudi with an additional 36 413 square meters and the development of a new 100 586 square meters cemetery to be located towards the west of the proposed new development.

CLIENT:

Naledi Local Municipality

CONSULTANT AND CONTACT PERSON:

Mr. J.P. De Villiers of AB Enviro Consult cc.
7 Louis Leipold Street, Potchefstroom, 2381
Tel: 053 5488 105
Fax: 018 262 9671
Email: j@abenviro.co.za

Parties wishing to formally object to and / or comment on the proposed development are requested to forward their objections and comments (with reasons) to AB Enviro Consult, no later than 30 days after the date of this advertisement. An electronic copy of the draft Scoping Report is also available from AB Enviro Consult on request.

Date of this Notice: 10 April 2019

**ENVIRONMENTAL IMPACT ASSESSMENT PROCESS
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CLIENT:

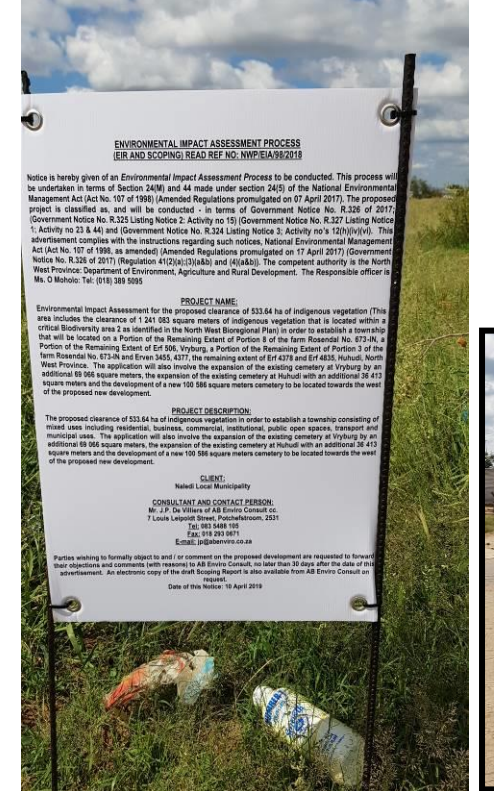
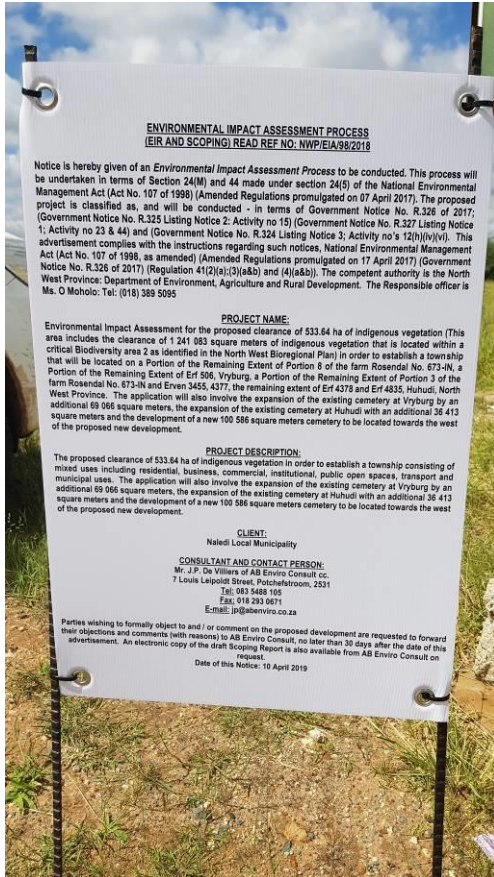
Naledi Local Municipality

CONSULTANT AND CONTACT PERSON:

Mr. J.P. De Villiers of AB Enviro Consult cc.
7 Louis Leipold Street, Potchefstroom, 2381
Tel: 053 5488 105
Fax: 018 262 9671
Email: j@abenviro.co.za

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Date of this Notice: 10 April 2019





PROOF OF NEWSPAPER ADVERTISEMENT:

PAGE 10

STELLANDER

10 APRIL 2018

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15 AGENTE TE KOOP

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17 VOERTUIG TE KOOP

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23 SPESIALE DIENSTE

SPESIALE DIENSTE
SPESIALE DIENSTE

Professional Maths & Science Tuition

Professional Maths & Science Tuition
Professional Maths & Science Tuition

REALFIX Enlig HERSTELWERK

REALFIX Enlig HERSTELWERK
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24 VAKANSIE-ORDE

VAKANSIE-ORDE
VAKANSIE-ORDE

20 DIERE ANIMALS

DIERE ANIMALS
DIERE ANIMALS

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-----K9 10/4
NOTICE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS.
(EIR AND SCOPING) READ REF NO: NWP/EIA/98/2018. Notice is hereby given of an Environmental Impact Assessment Process to be conducted. This process will be undertaken in terms of Section 24(M) and 44 made under section 24(5) of the National Environmental Management Act (Act No. 107 of 1998) (Amended Regulations promulgated on 07 April 2017). The proposed project is classified as, and will be conducted - in terms of Government Notice No. R.326 of 2017; (Government Notice No. R.325 Listing Notice 2: Activity no 15) (Government Notice No. R.327 Listing Notice 1; Activity no 23 & 44) and (Government Notice No. R.324 Listing Notice 3; Activity no's 12(h)(iv)(vi). This advertisement complies with the instructions regarding such notices, National Environmental Management Act (Act No. 107 of 1998, as amended) (Amended Regulations promulgated on 17 April 2017) (Government Notice No. R.326 of 2017) (Regulation 41(2)(c)(d)). The competent authority is the North West Province: Department of Environment, Agriculture and Rural Development. The Responsible officer is Ms. O Moholo: Tel: (018) 389 5095. PROJECT NAME: Environmental Impact Assessment for the proposed clearance of 533.64 ha of indigenous vegetation (This are includes the clearance of 1 241 083 square meters of indigenous vegetation that is located within a critical Biodiversity area 2 as identified in the North West Bioregional Plan) in order to establish a township that will be located on a Portion of the Remaining Extent of Portion 8 of the farm Rosendal No. 673-IN, a Portion of the Remaining Extent of Erf 506, Vryburg, a Portion of the Remaining Extent of Portion 3 of the farm Rosendal No. 673-IN and Erven 3455, 4377, the remaining extent of Erf 4378 and Erf 4835, Huhudi North West Province. The application will also involve the expansion of the existing cemetery at Vryburg by an additional 69 066 square meters, the expansion of the existing cemetery at Huhudi with an additional 36 413 square meters and the development of a new 100 586 square meters cemetery to be located towards the west of the proposed new development. PROJECT DESCRIPTION: The proposed clearance of 533.64 ha of indigenous vegetation in order to establish a township consisting of mixed uses including residential, business, commercial institutional, public open spaces, transport and municipal uses. The application will also involve the expansion of the existing cemetery at Vryburg by an additional 69 066 square meters, the expansion of the existing cemetery at Huhudi with an additional 36 413 square meters and the development of a new 100 586 square meters cemetery to be located towards the west of the proposed new development. CLIENT: Naledi Local Municipality. CONSULTANT AND CONTACT PERSON: Mr. J.P. De Villiers of AB Enviro Consult cc. 7 Louis Leipoldt Street, Potchefstroom, 2531 Tel: 083 548 8105. Fax: 018 293 0671 E-mail: jp@abenviro.co.za Parties wishing to formally object to and / or comment on the proposed development are requested to forward their objections and comments (with reasons) to AB Enviro Consult, no later than 30 days after the the date of this advertisement. An electronic copy of the draft Scoping Report is also available from AB Enviro Consult on request. Date of this Notice: 10 April 2019.
-----K10 10/4

10.2 DETERMINATION OF APPROPRIATE MEASURES

Details of the measures taken to include all potential I&APs as required by Regulation 41(2)(e) and 41(6) of GN R.982.

Key stakeholders (other than organs of state) identified in terms of Regulation 40(2)(d) of GN R.982:

Title, Name and Surname	Affiliation/ stakeholder status	key Contact details (tel number or e-mail address)
N/A	Neighbour	See photo evidence
Vryburg Airport	Neighbour	See Photo evidence



AB ENVIRO-CONSULT CC

Reg no. 2000/016653/23

7 Louis Leipoldt Street,
Potchefstroom, 2531
Tel: + 27 83 5488 105
Fax: + 27 (18) 293 0671
E-mail: jp@abenviro.co.za

10/04/2019

Vryburg Airport (VRU)
Vryburg
8601

Dear Sir/Madam

Environmental Impact Assessment for the proposed clearance of 533.64 ha of indigenous vegetation (This area includes the clearance of 1 241 083 square meters of indigenous vegetation that is located within a critical Biodiversity area 2 as identified in the North West Bioregional Plan) in order to establish a township that will be located on a Portion of the Remaining Extent of Portion 8 of the farm Rosendal No. 673-IN, a Portion of the Remaining Extent of Erf 506, Vryburg, a Portion of the Remaining Extent of Portion 3 of the farm Rosendal No. 673-IN and Erven 3455, 4377, the remaining extent of Erf 4378 and Erf 4835, Huhudi, North West Province. The application will also involve the expansion of the existing cemetery at Vryburg by an additional 69 066 square meters, the expansion of the existing cemetery at Huhudi with an additional 36 413 square meters and the development of a new 100 586 square meters cemetery to be located towards the west of the proposed new development.

AB ENVIRO CONSULT was appointed by Naledi Local Municipality to submit an application to the Department of Rural, Environment and Agricultural Development, North West Province for the above mentioned development.

Attached please find a notification of the development as well as an electronic copy of the draft Scoping report for your comments. We must receive your comments within a period of 30 days from the date of this letter. In the event of your organisation/department not wishing to comment on this matter, it would be appreciated if we could receive written confirmation thereof to enable us to continue with the finalisation of the application.

If no response is however received from your Department/organisation within the said time, it will be assumed that your department/organisation does not wish to comment on this matter and the application will be processed further.

Please do not hesitate to contact us should any further information or clarification be required.

Yours sincerely,

PROF. A.B. DE VILLIERS

PROF A B DE VILLIERS (M Sc, Ph D, JCD, Pr Sci Nat, EAP-EAPSA)
MR.J.P. DE VILLIERS (M Sc,HED, IAIA); MRS.J.E. DU PLOOY (M.E.M)





















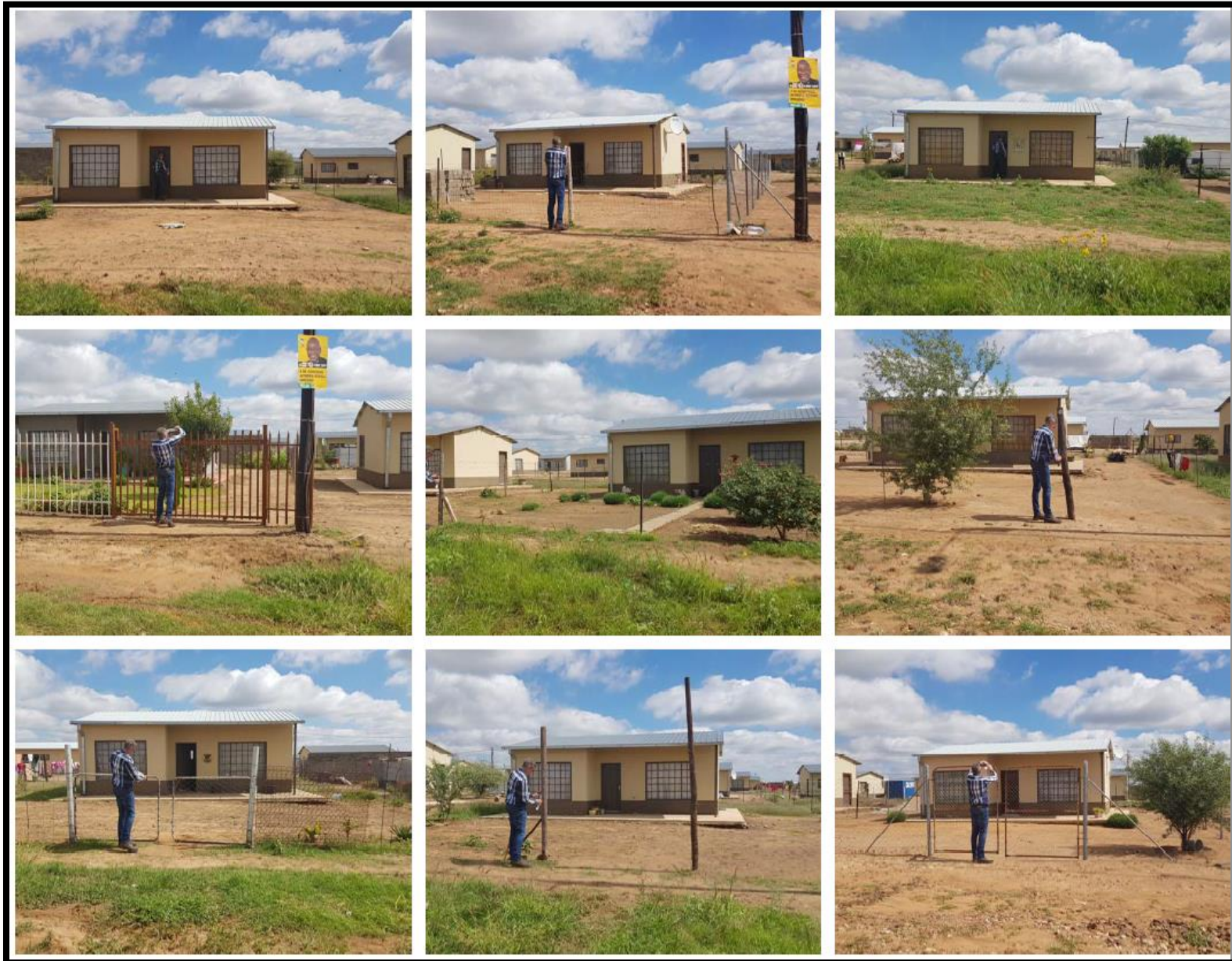
















































10.3 AUTHORITY PARTICIPATION

Authorities and organs of state identified as key stakeholders. Key stakeholders identified in terms of Regulation 7(1) and (2) and Regulation 40(2) (a)-(c) of GN R.982:

Authority/Organ of State	Contact person (Title, Name and Surname)	Tel No	Fax No	e-mail	Postal address
Department of Water and Sanitation	Dr. Abe Abrahams	053 836 7610	(053) 831 4534		Department of Water and Sanitation Chief Director: Northern Cape Private Bag X6101 KIMBERLEY 8300
Head of Department: North-West Department of Agriculture and Rural Development	Dr. P. Mokaila	(018) 389 5146/5104	(018) 392 4377		Department Agriculture and Rural Development Private Bag X2039 Mmabatho 2735
North West Department of Biodiversity	Head of Department	018 389 5719/ 5431/ 5688	018 392 4377		Private Bag X2039 Mmabatho 2735
Dr. Ruth Segomotsi Mompoti District Municipality	The District Municipal Manager: Mr. Jerry Mononela	053 928 4700 / 053 927 0858	053 927 2401		PO Box 21, Vryburg, 8600
Naledi Local Municipality	The Municipal Manager: Mr Tshepo Bloom	053 928 2200	053 927 3482		PO Box 35, Vryburg, 8600
Ward 4 Naledi Local Municipality	Ward 6	053 928 2200	053 927 3482		PO Box 35, Vryburg, 8600
Ward 6 Naledi Local Municipality	Ward 6	053 928 2200	053 927 3482		PO Box 35, Vryburg, 8600

Ward 7 Naledi Local Municipality	Ward 6	053 928 2200	053 927 3482		PO Box 35, Vryburg, 8600
Ward 9 Naledi Local Municipality	Ward 6	053 928 2200	053 927 3482		PO Box 35, Vryburg, 8600
SANRAL	Ms I Mulder	012 844 8000	012 844 8200		PO Box 415 Pretoria 0001
Eskom	Mr. Dala	078 795 1188		dalaME @eskom. co.za	

*List of parcels posted:

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Ordinary**

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Versekerde
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Sender's reference no. Afseerder se verwysingsno.	Addressee's name and address Naam en adres van geadresseerde	Trade-charge/Value of ordinary/insured parcel Handelsbedrag/waarde van gewone/versekerde pakket R e	COD/Insurance fee KBA/versekeringskoste R c	Parcel no. Pakketto.
	Dr. P. Mooka H.O.D.: M.W. Dept. of Agric. & Rural Dev., Private Bag X2039 Mmabatho 2735			INTERNATIONAL INSURED PARCEL Customer 080 111 301 www.spo.co.za CV 003 935 135 Z.A. CUSTOMER COPY (03/08/01)
	Mr. R. Schaller N.W. Dept. of Biodiversity P. Bag X2039 Mmabatho 2735			INTERNATIONAL INSURED PARCEL Customer 080 111 301 www.spo.co.za CV 003 935 149 Z.A. CUSTOMER COPY (03/08/01)
	The councillor Ward 4 Maledi Local Mun. P.O. Box 35 Uryburg 8600			INTERNATIONAL INSURED PARCEL Customer 080 111 301 www.spo.co.za CV 003 935 118 Z.A. CUSTOMER COPY (03/08/01)
	The councillor Ward 6 Maledi Local Mun. P.O. Box 35 Uryburg 8600			INTERNATIONAL INSURED PARCEL Customer 080 111 301 www.spo.co.za CV 003 935 171 Z.A. CUSTOMER COPY (03/08/01)
	The councillor Ward 7 Maledi Local Mun. P.O. Box 35 Uryburg 8600			INTERNATIONAL INSURED PARCEL Customer 080 111 301 www.spo.co.za CV 003 935 095 Z.A. CUSTOMER COPY (03/08/01)
	The councillor Ward 9 Maledi Local Mun. P.O. Box 35 Uryburg 8600			INTERNATIONAL INSURED PARCEL Customer 080 111 301 www.spo.co.za CV 003 935 104 Z.A. CUSTOMER COPY (03/08/01)
	Dist. Hq. Mun. Manager Mr. John Magono Mr. R. Kgomo Mun. P.O. Box 21 Uryburg 8600			INTERNATIONAL INSURED PARCEL Customer 080 111 301 www.spo.co.za CV 003 935 078 Z.A. CUSTOMER COPY (03/08/01)
	The Mun. Manager Mr. John Magono Maledi Local Mun. P.O. Box 35 Uryburg 8600			INTERNATIONAL INSURED PARCEL Customer 080 111 301 www.spo.co.za CV 003 935 081 Z.A. CUSTOMER COPY (03/08/01)

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Naam en adres van afseerder

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		R	c	R	c	
	SENRAAL Ms. J. Muddat P.O. Box 415 Pretoria 0001					INTERNATIONAL INSURED PARCEL INTERNASIONEEL versekerde Pakkele CV 001 955 055 Z.A. CUSTOMER COPY

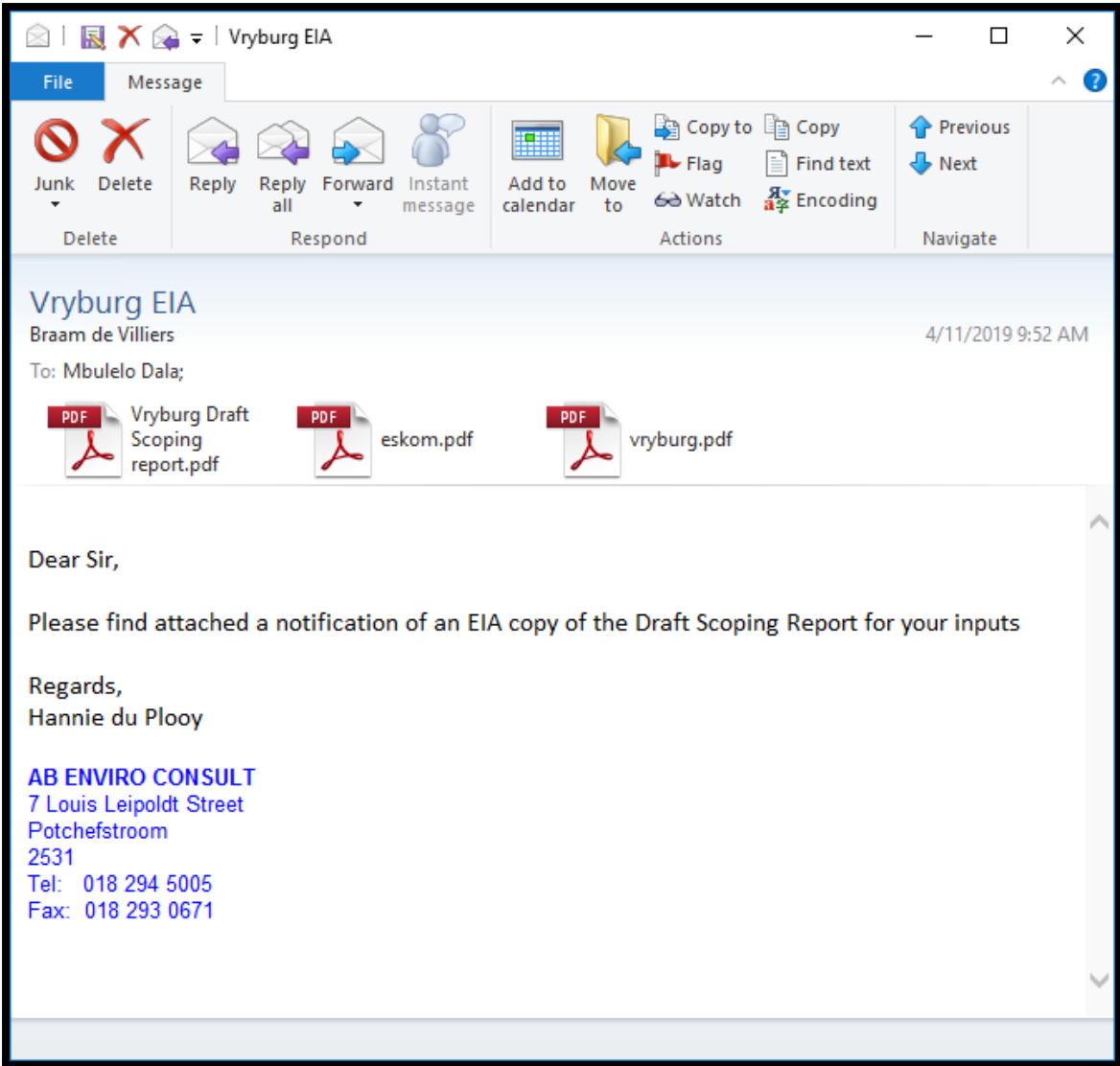


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P.C.T.

309000





AB ENVIRO-CONSULT CC

Reg no. 2000/016653/23

7 Louis Leipoldt Street,
Potchefstroom, 2531
Tel: + 27 83 5488 105
Fax: + 27 (18) 293 0671
E-mail: jp@abenviro.co.za

10/04/2019

Department of Water and Sanitation
Regional Chief Director: Northern Cape
Mr Abe Abrahams
28 Central Rd,
Beaconsfield,
Kimberley,
8315

Tel: (053) 830 8800/6 7600

Dear Sir/Madam

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PROF. A.B. DE VILLIERS

PROF A B DE VILLIERS (M Sc, Ph D, JCD, Pr Sci Nat, EAP-EAPSA)
MR.J.P. DE VILLIERS (M Sc,HED, IAIA); MRS.J.E. DU PLOOY (M.E.M)



AB ENVIRO-CONSULT CC

Reg no. 2000/016653/23

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10/04/2019

Dr. P. Mokaila
Head of Department: North-West Department of Agriculture and Rural Development
Private Bag X2039
Mmabatho
2735

Dear Sir/Madam

Environmental Impact Assessment for the proposed clearance of 533.64 ha of indigenous vegetation (This area includes the clearance of 1 241 083 square meters of indigenous vegetation that is located within a critical Biodiversity area 2 as identified in the North West Bioregional Plan) in order to establish a township that will be located on a Portion of the Remaining Extent of Portion 8 of the farm Rosendal No. 673-IN, a Portion of the Remaining Extent of Erf 506, Vryburg, a Portion of the Remaining Extent of Portion 3 of the farm Rosendal No. 673-IN and Erven 3455, 4377, the remaining extent of Erf 4378 and Erf 4835, Huhudi, North West Province. The application will also involve the expansion of the existing cemetery at Vryburg by an additional 69 066 square meters, the expansion of the existing cemetery at Huhudi with an additional 36 413 square meters and the development of a new 100 586 square meters cemetery to be located towards the west of the proposed new development.

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10/04/2019

Directorate: Biodiversity Management and Conservation
North West Department: Rural, Environment and Agricultural Development
Mr. R. Schaller
Private Bag X2039
Mmabatho
2735

Dear Sir/Madam

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10/04/2019

The District Municipal Manager: Mr. Jerry Mononela
Dr. Ruth Segomotsi Mompati District Municipality
PO Box 21
Vryburg
8600

Dear Sir/Madam

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10/04/2019

The Municipal Manager: Mr Tshepo Bloom
Naledi Local Municipality
PO BOX 35
Vryburg
8600

Dear Sir/Madam

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10/04/2019

The Councillor Ward: 4
Naledi Local Municipality
PO BOX 35
Vryburg
8600

Dear Sir/Madam

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The Councillor Ward: 6
Naledi Local Municipality
PO BOX 35
Vryburg
8600

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The Councillor Ward: 7
Naledi Local Municipality
PO BOX 35
Vryburg
8600

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10/04/2019

The Councillor Ward: 9
Naledi Local Municipality
PO BOX 35
Vryburg
8600

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10/04/2019

SANRAL
Ms. I. Mulder
PO Box 415
Pretoria
0001

Dear Sir/Madam

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10/04/2019

Eskom
dalaME@eskom.co.za

Dear Sir/Madam

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10.4 ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES

Summary of main issues raised by I&APs	Summary of response from EAP
None received to date	NA

2. 10.5 COMMENTS AND RESPONSE REPORT

I&AP registered:	Comment received:	Response by the EAP:
None received to date	NA	NA

11. SUMMARY OF THE FINDINGS AND RECOMMENDATIONS OF SPECIALISTS

11.1 GEO-TECHNICAL REPORT (See Appendix A for a copy of this report)

11.1.1 Terms of Reference

An engineering geological investigation was conducted for the proposed development on the property between Vryburg and Kuruman and Taung, named Vryburg X 29 & Huhudi X1, Vryburg, Northwest Province, and communication between ourselves and the abovementioned parties lead to the field work, commencing on 21 August 2018.

The aim of this investigation was to identify and evaluate any possible engineering geological problems before commencement of proper township proclamation.

11.1.2 Methodology

The following was consulted during the investigation:

- 1 The geological map 2624 Vryburg. Scale 1:250 000. The Geological Survey of South Africa.
- 1.3.2 The topography map 2624DC Vryburg. Scale 1:50 000. The Chief Directorate: Surveys and Land Information, Mowbray.
- 1.3.3 Report GS200903D from GEOSET for Vryburg Extension 28, dated March 2009.

SITE INVESTIGATION

All available information was studied before and during the site visit.

The investigation commenced with a desk study, where all relevant information is collected and compiled on a base map. The site was divided into land forms, after which the accuracy of the information was verified by means of a field visit.

Test pits were dug and representative disturbed samples collected and tested. The position of the test pits are represented in Figures 3 & 4 (Appendix A) of the Geotechnical Report. The soil profiles were described according to the methods described by Jennings *et al* (Jennings 1973). This method describes each horizon in terms of moisture content, colour, consistency, structure, type of soil and origin of the soil.

Disturbed samples of the soil materials were taken for laboratory analysis. The grading of the soils was determined by sieve and hydrometer analysis, resulting in cumulative grading curves.

The mechanical properties of the soil material are described in terms of the liquid limit and plasticity index (determined by means of the Atterberg Limit tests) and the linear shrinkage. These values can be used to calculate the potential expansiveness of the soils, and to evaluate the materials for use as construction material. The consistency of a soil is described by means of its Atterberg limits, where the effect of a change in the moisture content on the consistency of a cohesive soil is measured. According to Cernica (1982) these tests are useful "mostly for soil identification and classification". It can also be used to determine the mechanical properties of cohesive soil material. Note that cohesionless soils (i.e. sandy material) cannot be tested for plasticity or collapse potential as this material does not contain enough fines to exhibit consistency, and the taking of undisturbed samples is not possible due to disintegration.

The linear shrinkage test to determine the percentage shrinkage that can be expected, is performed by wetting a soil to approximately its liquid limit and drying the resultant paste in a linear shrinkage mould.

The potential expansiveness of a soil depends upon its clay content, the type of clay mineral, its chemical composition and mechanical character. A material is potentially expansive if it exhibits the following properties (Kantey and Brink, 1952):

- clay content greater than 12 percent,
- plasticity index of more than 12,
- liquid limit of more than 30 percent, and
- linear shrinkage of more than 8 percent.

The potential expansiveness (low, medium, high, very high) is calculated by means of Van der Merwe's method (Van der Merwe, 1964), where the equivalent plasticity index versus the clay content of the material is plotted on a graph divided into heave categories.

If any sample in the study area classifies as potentially expansive, the amount of heave or mobilization in mm measured on the surface will be calculated

LABORATORY TESTS

We consulted the guidelines of the minimum requirements for an area 461ha large regarding the required trial pits and samples for foundation indicator tests (GFSH-2), and the investigation was done according to the limited variability of the geotechnical character and simplicity of the entire site, and 27 new samples were tested.

No free swell tests were done as no areas containing high clay percentages were identified or falls outside the planned development.

No consolidometer or potential collapse tests were done as it was impossible to secure any undisturbed soil sample required for these tests.

No soil chemistry samples were tested as all new developments use synthetic pipes not reactive to soil aggressiveness.

The disturbed samples taken during the investigation were tested by the accredited laboratory of Specialised Testing Laboratory to determine their physical properties. Indicator tests include a grading analyses, the determination of Atterberg limits and linear shrinkages.

11.1.3 Recommendations and Conclusions

1. The proposed development sites are situated on three adjacent portions approximately 461 hectares in total size on portions of the farm Vryburg 506 and a portion of Portion 8 of the farm Rosendal 673, south of Vryburg & Huhudi, Northwest Province was investigated to determine the engineering geological properties that will influence township proclamation.
2. The site is underlain by diamictite and shale of the Dwyka Formation, Karoo Supergroup. Surficial deposits include quaternary diamondiferous gravel and calcrete gravel, covering the lithology.
3. No dolomite occurs on site and no stability investigation is required.
4. Some problems are foreseen regarding the excavatability to 1,5m depth almost across the site.

5. Zoning of the site revealed zones with constraints regarding the slightly to medium compressibility and expansive potential of the soil. It was classified as follows:

Geotechnical Zonation

Normal Development with risk:

Site Class CHR/1A1C2F:

This zone represents the majority of the area and comprises of a relative thin top layer less than 0,75m in thickness of moderately collapsible or medium compressible and medium expansive soil underlain by a competent pebble marker and diamictite, with an expected range of total soil movement measured at surface as consolidation calculated to less than 5mm of total settlement, or less than 7,5 mm heave, with a site classification of CHR, underlain by shallow rock shale and diamictite and this added a R site class designation to the zone with problems relating to restricted excavation to 1,5m. Normal foundation techniques will be adequate to enable proper development, with proper compaction within standard strip foundations and drainage provision that will be required.

Special Development with expected problems or increased cost

Site Class H3PD:

This small zone is represented by medium to highly expansive soil or turf with estimated total heave of more than 30mm measured at surface. A wet pan area possibly within the 1:50 year flood line may also restrict development. Special foundation techniques will be required to enable proper development. It was classified as H3 in terms of the NHBRC. Split construction with suspended floors, piles with or without suspended floor slabs and ground beams, or even soil replacement with a soil raft, or stiffened or cellular rafts with articulation joints and reinforcement are required for residential development. Development must include site drainage and plumbing and service precautions.

Site Class PQ:

Quarried areas or borrow pits must be backfilled with a controlled fill better than G5 material according to engineers specification before any development can take place.

6. Normal construction techniques will be adequate to enable proper development. This includes the use of compaction techniques in strip footings with slab on the ground foundations with site drainage provision as described.

11.2 BULK SERVICES (See Appendix B for a copy of this report)

11.2.1 Terms of Reference

Moedi Consulting Engineers (Pty) Ltd. have been requested to investigate and report on the Civil Engineering services requirements for the proposed development of Vryburg Extension 29 and Huhudi Extension 1 in Vryburg.

11.1.2 Recommendations and Conclusions

Water

Bulk Water Supply

Water supply shortages induced by the proposed development will predominantly occur in the region of Vryburg Extension 25/28 and Huhudi. It is therefore proposed that if exploration and drilling of additional new boreholes to the west of Vryburg proves to be successful, a new dedicated supply line be built to connect the new boreholes to the existing Ø 400 mm supply main linking the Vryburg Extension Reservoir to the Edwin Freyling Reservoir. The existing Ø 400 mm supply main will convey bulk water to the Vryburg Extension Reservoir Complex. This will ensure optimal use of existing infrastructure at minimal cost.

Bulk Storage

It is evident from the “Reservoir Capacity Analysis” under section 3.4.1 that neither the Vryburg Extension nor the Huhudi Reservoir Complex complies with the prescribed guidelines. It is proposed that a new 3 Mℓ ground reservoir as well as new elevated 3 Mℓ reservoir be constructed. The additional storage units will eradicate the storage shortfalls of Huhudi and Vryburg Extension’s 25 & 28.

A dynamic hydraulic analysis must be conducted to confirm the required storage capacities when detail design is conducted.

Distribution mains

The supply areas are to be served with connector lines from the elevated water towers varying between 200mm and 315mm in diameter

Sanitation

The existing WWTW will not have sufficient capacity to accommodate the increased load created by the proposed development. However, the Dr Ruth S Mompoti District Municipality is currently constructing a new 16.0 Mℓ/day WWTW south east of Huhudi. The first module of the New WWTW with capacity of 9Mℓ/day is expected to be operational by 2020. The new and existing WWTW in tandem will have ample capacity to accommodate the increased sewerage loading induced by the proposed development.

11.3 HERITAGE IMPACT ASSESSMENT (HIA) (See Appendix C for a copy of this report)

11.4.1 Terms of Reference for Heritage Impact Assessment

The Terms of Reference for the study was to:

1. Identify all objects, sites, occurrences and structures of an archaeological or historical nature (cultural heritage sites) located on the portion of land that will be impacted upon by the proposed development;
2. Assess the significance of the cultural resources in terms of their archaeological, historical, scientific, social, religious, aesthetic and tourism value;

3. Describe the possible impact of the proposed development on these cultural remains, according to a standard set of conventions;
4. Propose suitable mitigation measures to minimize possible negative impacts on the cultural resources;
5. Review applicable legislative requirements;

11.4.2 Methodology

Survey of literature

A survey of available literature was undertaken in order to place the development area in an archaeological and historical context. The sources utilized in this regard are indicated in the bibliography.

Field survey

The field assessment section of the study is conducted according to generally accepted HIA practices and aimed at locating all possible objects, sites and features of heritage significance in the area of the proposed development. The location/position of all sites, features and objects is determined by means of a Global Positioning System (GPS) where possible, while detailed photographs are also taken where needed.

Oral histories

People from local communities are sometimes interviewed in order to obtain information relating to the surveyed area. It needs to be stated that this is not applicable under all circumstances. When applicable, the information is included in the text and referred to in the bibliography.

Documentation

All sites, objects, features and structures identified are documented according to a general set of minimum standards. Co-ordinates of individual localities are determined by means of the Global Positioning System (GPS). The information is added to the description in order to facilitate the identification of each locality.

11.4.2 Recommendations and Conclusions

A number of known cultural heritage sites (archaeological and/or historical) exist in the larger geographical area within which the study area falls. There are no known sites on the specific land parcel, although some were identified in the study area during the assessment.

A number of old (recent) structures associated with the Vryburg Airfield (that formed part of the assessment) were identified during the field survey, but none of the current structures are of historical significance and less than 60 years of age. Some of the structures are in a state of disrepair as well, while some hangars here are in use by the Vryburg Vlieg Klub. No mitigation measures are recommended.

A number of sites with Stone Age tools (individual tools and some denser scatters) were identified in the study area during the assessment. This includes some stone tools to the south of Area F (Huhudi Extension 1). These tools were identified in areas close to sections of disturbances (pipeline excavations)

and roads, as well as open patches of soil. Although only a few areas were inspected for the possibility of the presence of archaeological material, these finds do indicate that there is a high likelihood of more sites being present in the total development area.

The following mitigation measures are recommended based on the superficial findings during the Phase 1 assessment:

1. Detailed mapping of the stone tools and possible scatters of material in the study area
2. Surface sampling of representative material from the sites to assist with the dating of the Stone Age archaeology of the area and to interpret it within the Stone Age archaeology of the larger geographical area
3. Test Trenching in selected areas to determine if there is any "in situ" archaeological deposits in areas where township development will be taking place.

Finally, it should be noted that although all efforts are made to locate, identify and record all possible cultural heritage sites and features (including archaeological remains) there is always a possibility that some might have been missed as a result of grass cover and other factors. The subterranean nature of these resources (including low stone-packed or unmarked graves) should also be taken into consideration. Should any previously unknown or invisible sites, features or material be uncovered during any development actions then an expert should be contacted to investigate and provide recommendations on the way forward.

From a cultural heritage point of view the development should be allowed to continue once the recommended mitigation measures have been implemented.

11.5 FAUNA AND FLORA HABITAT AND WETLAND REPORT (See Appendix D for a copy of this report)

11.5.1 Terms of Reference for Fauna and Flora Habitat Report

The ecological habitat survey focused on the possibility that threatened fauna or flora known to occur in North West Province are likely to occur within the proposed development or not. Species of known high conservation priority that do not qualify for threatened status also received attention in the survey.

The wetland assessment focuses on the possible presence of wetlands and if such wetlands are present on the hydro-geomorphic setting, an estimate of the properties of the wetlands, an assessment of the functional aspects of wetlands and an impact assessment to wetlands, should the development be approved

The objectives of the study are to provide:

- A detailed fauna and flora habitat survey;
- A detailed habitat survey of possible threatened or localized plant species, vertebrates and invertebrates;
- Evaluate the conservation importance and significance of the site with special emphasis on the current status of threatened species;
- Recording of possible host plants or foodplants of fauna such as butterflies
- Literature investigation of possible species that may occur on site;
- Identification of potential ecological impacts on fauna and flora that could occur as a result of the development; and
- Make recommendations to reduce or minimize impacts, should the development be approved

Scope of study

- A description of the terrestrial and aquatic ecology features of the project area, with focus on features that are potentially impacted by the proposed project. The description includes the major habitat forms within the study site, giving due consideration to terrestrial ecology (flora), terrestrial ecology (fauna) and freshwater ecosystems/wetlands.
- Surveys to investigate key elements of habitats on the site, relevant to the conservation of fauna and flora.
- Recording of any sightings and/or evidence of existing fauna and flora.
- The selective and careful collecting of voucher specimens of invertebrates where deemed necessary.
- An evaluation of the conservation importance and significance of the site with special emphasis on the current status of threatened species.
- Identification of wetlands if these are present.
- If wetlands are present delineation and assessment of these wetlands according to relevant protocols (DAAF, 2005).
- Consideration of seasonal changes and long-term trends, such as due to climate change.
- Recording of resources such as host-plant species for butterfly larvae.
- Literature investigation of possible species that might occur on site.
- Integration of the literature investigation and field observations to identify potential ecological impacts that could occur as a result of the development.
- Providing a map of the sensitive ecological features within the proposed project area, showing any “no go” areas (i.e. “very high” sensitivity). Indication of buffer zones and reasons for these buffer zones. Indication of disturbance and transformation along with the ecological sensitivity at the site.
- Integration of literature investigation and field observations to make recommendations to reduce or minimise impacts, should the development be approved.

11.5.2 Methodology

A desktop study comprised not only an initial phase, but also it was used throughout the study to accommodate and integrate all the data that become available during the field observations.

Site visits by R.F. Terblanche were conducted on 23 January 2019 and 25 January 2019.

Notes and experience from earlier surveys at the larger study area of the Taung-Vryburg area by R.F. Terblanche that had taken place since 2011 were also taken into account where applicable. Experience from visits or research at areas where Camel Thorn forests are found such as Kathu and Witsand Nature Reserve are also taken into account. The main purpose of the site visits was ultimately to serve as habitat surveys that concentrated on the possible presence or not of threatened species and other species of high conservation priority.

11.5.3 Recommendations and Conclusions

- Vegetation at the site contains a visibly poor cover of grass-layer and conspicuous high frequency of shrub-height trees. Shrub-height thorn trees such as *Vachellia karroo*, *Vachellia tortilis* and *Vachellia hebeclada* are prominent in some areas and in other areas visible concentrations of *Tarchonanthus camphoratus* (Camphor Bush) are noted.
- The site is on very gentle slopes (flat area).
- Two degraded very small pan depressions (less than 1 ha) are present at the site.

- One small degraded pan depression (less than 1 ha) is present adjacent to the site but within 500 m from the boundary of the site.
- Present ecological status (PES) of the wetland depression Pan 1 (surface area approximately 0,7 ha) at the site is CATEGORY D which means the wetland is largely modified and a large loss of natural habitats and basic ecosystem functions that has occurred (Table 3.22 and Table 3.23). Ecological importance and sensitivity (EIS) of the wetland is Low/marginal which means the wetland is not ecologically important and sensitive at any scale. The biodiversity of the wetland is ubiquitous and not sensitive to flow and habitat modifications. The wetland plays an insignificant role in moderating the quantity and quality of water of major rivers (Table 3.24 and Table 3.25).
- Present ecological status (PES) of the wetland depression Pan 2 (surface area approximately 0,2 ha) at the site is CATEGORY D which means the wetland is largely modified and a large loss of natural habitats and basic ecosystem functions that has occurred (Table 3.27 and Table 3.28). Ecological importance and sensitivity (EIS) of the wetland is Low/marginal which means the wetland is not ecologically important and sensitive at any scale. The biodiversity of the wetland is ubiquitous and not sensitive to flow and habitat modifications. The wetland plays an insignificant role in moderating the quantity and quality of water of major rivers (Table 3.29 and Table 3.30).
- Present ecological status (PES) of the wetland Pan 3 (approximately 0,7 ha) outside the site is CATEGORY C which means the wetland is moderately modified, but with some loss of natural habitats (Table 3.32 and Table 3.33). Ecological importance and sensitivity (EIS) of the wetland is Moderate which means the wetland is considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of the wetland is not usually sensitive to flow and habitat modifications. The wetland plays a small role in moderating the quantity and quality of water of major rivers (Table 3.34 and Table 3.35).
- The entire site is visibly degraded or transformed. Large cleared or trampled areas with partial cover of exotic plant species or weeds are present. Tracks, roads and old buildings are found at the site. Informal dumping is extensive at the site.
- The vegetation type that represents the Savanna Biome at the site, Ghaap Plateau Vaalbosveld (SVk 7), is not listed as threatened ecosystem according to the National List of Threatened Ecosystems (2011).
- Presence of Threatened or Near Threatened animal or plant species are unlikely.
- One individual of a Protected tree species, *Vachellia erioloba* (Camel Thorn) is found at the site.
- Protected Tree species are listed under the National Forests Act No. 84 of 1998. In terms of a part of section 15(1) of Act No. 84 of 1998, no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a license granted by the Minister.
- Ecological sensitivity at the site is medium-low, apart from the degraded and modified small wetlands which are regarded as of medium sensitivity.
- The footprint proposed for the proposed development is not part of a corridor of particular conservation importance. Small and restricted pan depressions at the site could be important in a stepping stone conservation corridor system.

12. CONCLUSIONS AND RECOMMENDATIONS

The land owner, **Naledi Local Municipality** in co-operation with the Department of Human Settlements has appointed **AB Enviro Consult CC**, an independent environmental consultancy, to undertake an Integrated Environmental Impact Assessment for the proposed clearance of 533,64 ha of indigenous vegetation (This area includes the clearance of 1 241 083 square meters of indigenous vegetation that is located within a critical Biodiversity area 2 as identified in the North West Bioregional Plan) in order to establish a township that will be located on a Portion of the Remaining Extent of Portion 8 of the farm Rosendal No. 673-IN, a Portion of the Remaining Extent of Erf 506, Vryburg, a Portion of the Remaining Extent of Portion 3 of the farm Rosendal No. 673-IN and Erven 3455, 4377, the remaining extent of Erf 4378 and Erf 4835, Huhudi, North West Province. The application will also involve the expansion of the existing cemetery at Vryburg by an additional 69 066 square meters, the expansion of the existing cemetery at Huhudi with an additional 36 413 square meters and the development of a new 100 586 square meters cemetery to be located towards the west of the proposed new development.

This Chapter of the EIR provides a summary of the findings of the EIA process, including the EAP's opinion as to whether the activity should or should not be authorised.

12.1 ENVIRONMENTAL IMPACT STATEMENT

The detailed environmental assessment for the proposed development, has not found any environmental impacts that *cannot* be mitigated to acceptable and manageable levels.

In the National Framework for Sustainable Development (NFSD) it is stated that *"the achievement of sustainable development is not a once-off occurrence and its objectives cannot be achieved by a single action or decision. It is an ongoing process that requires a particular set of values and attitudes in which economic, social and environmental assets that society has at its disposal, are managed in a manner that sustains human well-being without compromising the ability of future generations to meet their own need. The NFSD further continues to emphasize that South Africa's current development path in certain instances reflects signs of being unsustainable in the long-term. It highlights that a large percentage of growth in economic activity (measured in terms of its contribution to the GDP) is achieved by "consuming" natural resources and degrading our habitat at accelerating rates with the inevitable consequence that future economic growth and development objectives will be prejudiced. "*

Consistent with national priorities, environmental authorities must support *"increased economic growth and promote social inclusion"*, whilst ensuring that such growth is *"ecologically sustainable"*. In the National Spatial Development Perspective (NSDP) it is highlighted that, to achieve the goal of stimulating sustainable economic activities and to create long-term employment opportunities, it is required that spending on economic infrastructure is focused in priority areas with potential for economic development, with development to serve the broader societies' needs equitably.

As in the rest of South Africa, there is a housing shortage in the area.

The identification, description, evaluation and comparison of alternatives are important for ensuring a sound environmental scoping process.

The alternatives considered for the proposed development includes "Mixed land use township" (Alternative 1), "Single land use: Housing only" (Alternative 2) and the "No-go option" (Alternative 3).

Although the emphasis is on housing, complimentary land uses have been included in the township. People want easy access to job opportunities shops, banking facilities, clinics, etc. and want their living environment, such as residential townships to be placed at strategic positions with good access routes in close proximity to these amenities.

A mixed land use development is *socially responsible* based on the following:

- It covers the mixed and lower income bracket by providing a higher density housing option;
- The development will inevitably support the use of public transport;
- The development will include supporting social infrastructure (schools), as well as some retail or commercial activities;
- The layout of the development must respond to the future road planning for the area, to facilitate and maximise pedestrianisation and public transport.
- Commercial erven can accommodate a shopping centre, to service the existing formalised and informal settlements in the area. The commercial node will:
 - Promote entrepreneurial services and products;
 - Be within walking distance to places of refreshment and trade for residents;
 - Provide Job opportunities; and
 - Improve neighbourhood quality.

By providing only one land use type (i.e., housing), mixed income development and social integration across race and income levels, *cannot be achieved*. By restricting a township to one land use only, the above benefits to the local community, and subsequent council area, cannot be realised, and hence, is not a preferred land use option.

The only other alternative that exists for the proposed development is the “no-go” option which will imply that the status quo will prevail. This is unacceptable as Informal settlements consist of non-conventional housing built without complying with legal building procedures. Broadly, these crude dwellings mostly lack proper indoor infrastructure, such as water supply, sanitation, drainage, waste disposal and proper road access. There is also a bond between poor housing and environmental conditions in informal settlements which also reflects poverty. Linking basic services such as water to health is viewed as a false separation as these services are ‘intimately related to housing’. It becomes a housing issue if children playing outside the house contract diarrhoea via ingesting pathogens from faecal matter which contaminates the land on which they play. Otherwise, it is the house which provides for shelter against injury, weather and disease. Improving the surroundings of the house is to limit severe health risks existing within poor quality housing.

The proposed development will address this shortage.

Specialist studies were conducted and a full Public Participation Process was followed. This information was used to generate a sensitivity map that was used to assess the sustainability of the design and layout plan for the proposed development.

The **Geo-Technical Engineer** has identified some severe problems regarding the excavatability to 1,5m depth. Zoning of the site revealed zones with constraints regarding the slightly to medium compressibility and expansive potential of the soil. He stated that **Normal construction** techniques will be adequate to enable proper development. This includes the use of compaction techniques in strip footings with slab on the ground foundations with site drainage provision as described.

The **Civil Engineer** noted that Bulk Services in the form of Water and sewer will have to be planned for. Water supply shortages induced by the proposed development will predominantly occur in the region of

Vryburg Extension 25/28 and Huhudi. It is therefore proposed that if exploration and drilling of additional new boreholes to the west of Vryburg proves to be successful, a new dedicated supply line be built to connect the new boreholes to the existing Ø 400 mm supply main linking the Vryburg Extension Reservoir to the Edwin Freyling Reservoir. The existing Ø 400 mm supply main will convey bulk water to the Vryburg Extension Reservoir Complex. This will ensure optimal use of existing infrastructure at minimal cost.

It is evident from the “Reservoir Capacity Analysis” that neither the Vryburg Extension nor the Huhudi Reservoir Complex complies with the prescribed guidelines. It is proposed that a new 3 Mℓ ground reservoir as well as new elevated 3 Mℓ reservoir be constructed. The additional storage units will eradicate the storage shortfalls of Huhudi and Vryburg Extension’s 25 & 28.

The existing WWTW will not have sufficient capacity to accommodate the increased load created by the proposed development. However, the Dr Ruth S Mompoti District Municipality is currently constructing a new 16.0 Mℓ/day WWTW south east of Huhudi. The first module of the New WWTW with capacity of 9Mℓ/day is expected to be operational by 2020. The new and existing WWTW in tandem will have ample capacity to accommodate the increased sewerage loading induced by the proposed development.

Installation of Bulk Services will form part of a separate Bulk Services Environmental Impact Assessment that will be submitted in the near future and does not form part of this application

The **Fauna and Flora Habitat and Wetland** study conducted revealed that the vegetation at the site contains a visibly poor cover of grass-layer and conspicuous high frequency of shrub-height trees. Shrub-height thorn trees such as *Vachellia karroo*, *Vachellia tortilis* and *Vachellia hebeclada* are prominent in some areas and in other areas visible concentrations of *Tarchonanthus camphoratus* (Camphor Bush) are noted.

Two degraded very small pan depressions (less than 1 ha) are present at the site and one small degraded pan depression (less than 1 ha) is present adjacent to the site but within 500 m from the boundary of the site.

The present ecological status (PES) of the wetland depression Pan 1 (surface area approximately 0,7 ha) at the site is CATEGORY D which means the wetland is largely modified and a large loss of natural habitats and basic ecosystem functions that has occurred. Ecological importance and sensitivity (EIS) of the wetland is Low/marginal which means the wetland is not ecologically important and sensitive at any scale. The biodiversity of the wetland is ubiquitous and not sensitive to flow and habitat modifications. The wetland plays an insignificant role in moderating the quantity and quality of water of major rivers.

Present ecological status (PES) of the wetland depression Pan 2 (surface area approximately 0,2 ha) at the site is CATEGORY D which means the wetland is largely modified and a large loss of natural habitats and basic ecosystem functions that has occurred. Ecological importance and sensitivity (EIS) of the wetland is Low/marginal which means the wetland is not ecologically important and sensitive at any scale. The biodiversity of the wetland is ubiquitous and not sensitive to flow and habitat modifications. The wetland plays an insignificant role in moderating the quantity and quality of water of major rivers.

Present ecological status (PES) of the wetland Pan 3 (approximately 0,7 ha) outside the site is CATEGORY C which means the wetland is moderately modified, but with some loss of natural habitats. Ecological importance and sensitivity (EIS) of the wetland is Moderate which means the wetland is considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of

the wetland is not usually sensitive to flow and habitat modifications. The wetland plays a small role in moderating the quantity and quality of water of major rivers.

The entire site is visibly degraded or transformed. Large cleared or trampled areas with partial cover of exotic plant species or weeds are present. Tracks, roads and old buildings are found at the site. Informal dumping is extensive at the site. The vegetation type that represents the Savanna Biome at the site, Ghaap Plateau Vaalbosveld (SVk 7), is not listed as threatened ecosystem according to the National List of Threatened Ecosystems (2011).

The presence of Threatened or Near Threatened animal or plant species are unlikely although one individual of a Protected tree species, *Vachellia erioloba* (Camel Thorn) is found at the site.

He concluded that the ecological sensitivity at the site is medium-low, apart from the degraded and modified small wetlands which are regarded as of medium sensitivity.

The **Heritage impact assessment** found a number of sites with Stone Age tools (individual tools and some denser scatters) and the specialist concluded that these finds does indicate that there is a high likelihood of more sites being present in the total development area. He recommended mitigation measures.

12.2 ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPR)

EMPR's aim to identify and minimise the potential impacts that the proposed construction and operational phases of the project may have on the receiving environment. An EMPR has been developed which is contained in Appendix E and includes detailed mitigatory measures for the construction phase.

As a general guideline, the EMPR should be based on a comprehensive set of environmental aspects (elements of the facility that can interact with the environment), and hence, the EMPR compiled for this application includes the following key components:

- Mechanisms for the on-going identification and assessment of environmental aspects and impacts;
- Environmental management programmes; objectives and targets;
- Environmental monitoring and reporting framework;
- Environmental management procedures; and,
- Mechanisms for the recording of environmental incidents and implementing corrective and preventative actions.

12.3 EAP OPINION

The information contained in this DEIAR and Specialist Studies, provides a detailed and comprehensive description of the proposed project, baseline environment and potential environmental impacts associated with the proposed development. As no significant impacts that cannot be mitigated were identified, AB Enviro Consult is of the opinion that the project should proceed, provided that the necessary mitigation and management measures are implemented.

Under South African environmental legislation, the Applicant is accountable for the potential impacts of the activities that are undertaken and is responsible for managing these impacts. The Applicant therefore has overall and total environmental responsibility to ensure that the implementation of the construction

phase of the EMPR complies with the relevant legislation and the conditions of the environmental authorisation. The applicant will thus be responsible for the implementation of the EMPR.

The environmental management programme (EMPR) should form part of the contract between the construction company and the applicant. This will help ensure that the EMPR is adhered to. It is suggested that a suitably qualified Environmental Control Officer (ECO) be appointed for the construction phase.

12.4 CONDITIONS RECOMMENDED TO BE INCLUDED IN ANY AUTHORISATION THAT MAY BE GRANTED BY THE COMPETENT AUTHORITY IN RESPECT OF THE APPLICATION

1. The mitigation measures as described in this report must be implemented
2. The mitigation measures contained in this report are legally binding
3. Mitigation measures must be made known to personnel, contractors and sub-contractors associated with this project
4. Erosion control measures as specified in the Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) must be controlled as specified in the act.
5. In the event that protected trees cannot be avoided, the developer must apply for a Forest Act License.
6. Bulk services will have to be planned for and the relevant authorizations must be obtained for the installation thereof. Occupation of the site will not be allowed if sufficient Bulk Services is not available.
7. If during the construction phase any artefacts are discovered, the work in the direct vicinity of the find must be stopped. Under no circumstances shall any artefacts be destroyed. Such a site must be demarcated and fenced off and SAHRA notified within 48 hours
8. Weeds and invader plants that are declared in terms of the Conservation of Agricultural Resource Act (Act 43 of 1983) must be controlled as prescribed in the act
9. An environmental control officer must ensure that conditions stipulated in the Environmental Authorization are complied by. The name and contact details must be supplied to The Department of Environmental Affairs - prior to the commencement of the activities
10. The contractor/s responsible for the construction must leave the site free from erosion, pollution and/or unwanted material. The affected areas must be rehabilitated to the satisfaction of the department
11. As far as possible, employment opportunities should be given to the local labour force in order to stimulate growth in the local and regional economy
12. In the event of non-compliance to any of the conditions contained in the EA, the contractor / applicant will be held responsible
13. The applicant is responsible for all costs necessary to comply with the above conditions unless otherwise specified in the contracts of the contractor/s
14. The operational maintenance plan will form part of an approved maintenance plan as described in the Act

13. AFFIRMATION BY EAP

- I **AB De Villiers** declare under oath that I:
- a. act as the independent environmental practitioner in this application ;
 - b. do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed;
 - c. do not have and will not have a vested interest in the proposed activity proceeding;
 - d. have no, and will not engage in, conflicting interests in the undertaking of the activity;
 - e. undertake to disclose, to the competent authority, any material information that has or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required;
 - f. will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
 - g. will ensure that the comments of all interested and affected parties are considered and recorded in reports that are submitted to the competent authority in respect of the application, provided that comments that are made by interested and affected parties in respect of a final report that will be submitted to the competent authority may be attached to the report without further amendment to the report;
 - h. will keep a register of all interested and affected parties that participated in a public participation process; and
 - i. will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not.

Signature of the Environmental Assessment Practitioner:

Name of company: AB Enviro Consult CC

Date:

Signature of the Commissioner of Oaths:

Date

Designation

Official stamp:

14. LIST OF REFERENCES

Department of Environmental Affairs and Tourism. 1992. Integrated Environmental Management. Pretoria, DEAT.

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S. Cliff. 2015. Environmental Scoping report for the proposed high density residential township "Tanganani extension 7", to be located on a part of Portion 119 of the farm Diepsloot 388 JR, City of Johannesburg Municipality, Gauteng

**APPENDIX A:
GEOTECHNICAL REPORT**

**APPENDIX B:
BULK SERVICE REPORT**

**APPENDIX C:
HERITAGE IMPACT ASSESSMENT (HIA)**

**APPENDIX D:
FAUNA AND FLORA HABITAT AND WETLAND REPORT**

**APPENDIX E:
ENVIRONMENTAL MANAGEMENT PROGRAMME**

**APPENDIX F:
SPECIALIST DECLARATION OF INDEPENDENCE**