Environmental Impact Assessment

Draft Environmental Impact Assessment Report

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Level 2 B-BBEE Contributor
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Indigenous vegetation clearance and the establishment of a Cemetery on a portion of Forty Four hectares of Portion 1 Townlands of Klerksdorp 424 IP

NWP: EIA/16/2021

City of Matlosana Municipality

North West Province

Applicant: CSHELL 264 (PTY) LTD

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ACRONYMS

CBA	Critical Biodiversity Area
DEDECT	Department of Economic Development, Environment, Conservation and Tourism
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
ECA	Environment Conservation Act, 1989 (Act No. 73 of 1989)
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMPr	Environmental Management Programme
ESA	Ecological Support Area
FSR	Final Scoping Report
IDP	Integrated Development Plan
HIA	Heritage Impact Assessment
I&APs	Interested and Affected Parties
IEM	Integrated Environmental Management
LUDS	Land Use Development Support
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEMWA	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
NEMAQA	National Environment Management: Air Quality Act (No.39 of 2004)
NEMPAA	National Environmental Management: Protected Areas Act (Act No. 57 of 2003)
NPAES	National Protected Areas Expansion Strategy
NWA	National Water Act (Act 36 of 1998)
NW DEDECT	North West Department of Economic Development, Environment, Conservation and Tourism
PES	Present Ecological State
PPP	Public Participation Process
PoS	EIA Plan of Study for Environmental Impact Assessment
SDF	Spatial Development Framework
SR	Scoping Report
SAHRA	South African Heritage Resources Agency

GLOSSARY OF TERMS

Activity (Development) – an action either planned or existing that may result in environmental impacts through pollution or resource use.

Alternative – a possible course of action, in place of another, of achieving the same desired goal of the proposed project. Alternatives can refer to any of the following but are not limited to: site alternatives, site layout alternatives, design or technology alternatives, process alternatives or a no-go alternative. All reasonable alternatives must be rigorously explored and objectively evaluated.

Applicant – the project proponent or developer responsible for submitting an environmental application to the relevant environmental authority for environmental authorisation.

Biodiversity – the diversity of animals, plants and other organisms found within and between ecosystems, habitats, and the ecological complexes.

Construction – means the building, erection or establishment of a facility, structure or infrastructure that is necessary for the undertaking of a listed or specified activity but excludes any modification, alteration or expansion of such a facility, structure or infrastructure and excluding the reconstruction of the same facility in the same location, with the same capacity and footprint.

Cumulative Impacts – impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities to produce a greater impact or different impacts.

Direct impacts – impacts that are caused directly by the activity and generally occur at the same time and at the same place of the activity. These impacts are usually associated with the construction, operation or maintenance of an activity and are generally quantifiable.

Ecosystem – a dynamic system of plant, animal (including humans) and micro-organism communities and their non-living physical environment interacting as a functional unit. The basic structural unit of the biosphere, ecosystems are characterised by interdependent interaction between the component species and their physical surroundings. Each ecosystem occupies a space in which macro-scale conditions and interactions are relatively homogenous.

Environment – In terms of the National Environmental Management Act (NEMA) (Act No 107 of 1998) (as amended), "Environment" means the surroundings within which humans exist and that are made up of:
a) the land, water and atmosphere of the earth;
b) micro-organisms, plants and animal life;
c) any part or combination of (i) of (ii) and the interrelationships among and between them; and
d) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing.

Environmental Assessment (EA) – the generic term for all forms of environmental assessment for projects, plans, programmes or policies and includes methodologies or tools such as environmental impact assessments, strategic environmental assessments and risk assessments.

Environmental Authorisation – an authorisation issued by the competent authority in respect of a listed activity, or an activity which takes place within a sensitive environment.

Environmental Assessment Practitioner – the individual responsible for planning, management and coordination of environmental impact assessments, strategic environmental assessments, environmental management programmes or any other appropriate environmental instrument introduced through the EIA Regulations.

Environmental Impact – a change to the environment (biophysical, social and/ or economic), whether adverse or beneficial, wholly or partially, resulting from an organisations, activities, products or services.

Environmental Impact Assessment (EIA) – the process of identifying, predicting, evaluating and mitigating the biophysical, social, and other relevant effects of development proposals prior to major decisions being taken and commitments made.

Environmental Issue – a concern raised by a stakeholder, interested or affected parties about an existing or perceived environmental impact of an activity.

Environmental Management - ensuring that environmental concerns are included in all stages of development, so that development is sustainable and does not exceed the carrying capacity of the environment.

Environmental Management Programme - A detailed plan of action prepared to ensure that recommendations for enhancing or ensuring positive impacts and limiting or preventing negative environmental impacts are implemented during the life cycle of a project. This EMPr focuses on the construction phase, operation (maintenance) phase and decommissioning phase of the proposed project.

Expansion - means the modification, extension, alteration or upgrading of a facility, structure or infrastructure at which an activity takes place in such a manner that the capacity of the facility or the footprint of the activity is increased.

Fatal Flaw – issue or conflict (real or perceived) that could result in developments being rejected or stopped.

General Waste – household water, construction rubble, garden waste and certain dry industrial and commercial waste which does not pose an immediate threat to man or the environment.

Hazardous Waste – waste that may cause ill health or increase mortality in humans, flora and fauna.

Indirect impacts – indirect or induced changes that may occur as a result of the activity. These types if impacts include all of the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.

Integrated Environmental Management – a philosophy that prescribes a code of practice for ensuring that environmental considerations are fully integrated into all stages of the development and decision-making process. The IEM philosophy (and principles) is interpreted as applying to the planning, assessment, implementation and management of any proposal (project, plan, programme or policy) or activity – at local, national and international level - that has a potentially significant effect on the environment. Implementation of this philosophy relies on the selection and application of appropriate tools for a particular proposal or activity. These may include environmental assessment tools (such as strategic environmental assessment and risk assessment), environmental management tools (such as monitoring, auditing and reporting) and decision-making tools (such as multi-criteria decision support systems or advisory councils).

Mitigate – the implementation of practical measures designed to avoid, reduce or remedy adverse impacts or enhance beneficial impacts of an action.

No-Go Option – in this instance the proposed activity would not take place, and the resulting environmental effects from taking no action are compared with the effects of permitting the proposed activity to go forward.

Open Space – environmentally sensitive areas which are not suitable for development and consist of watercourses, buffers, floodplains, steep slopes, sensitive biodiversity and/or areas of cultural or heritage significance.

Registered interested and affected party – in relation to an application, means an interested and affected party whose name is recorded in the register opened for that application in terms of regulation 42 of the 2014 EIA Regulations.

Rehabilitation – a measure aimed at reinstating an ecosystem to its original function and state (or as close as possible to its original function and state) following activities that have disrupted those functions.

Scoping – the process of determining the spatial and temporal boundaries (i.e. extent) and key issues to be addresses in an environmental assessment. The main purpose of scoping is to focus the environmental assessment on a manageable number of important questions. Scoping should also ensure that only significant issues and reasonable alternatives are examined.

Sensitive environment – any environment identified as being sensitive to the impacts of the development.

Significance – significance can be differentiated into impact magnitude and impact significance. Impact magnitude is the measurable change (i.e. magnitude, intensity, duration and likelihood). Impact significance is the value placed on the change by different affected parties (i.e. level of significance and acceptability). It is an anthropocentric concept, which makes use of value judgments and science-based criteria (i.e. biophysical, social and economic).

Stakeholder engagement – the process of engagement between stakeholders (the proponent, authorities and I&APs) during the planning, assessment, implementation and/or management of proposals or activities.

Sustainable Development – development which meets the needs of current generations without hindering future generations from meeting their own needs.

Watercourse – means:
a) a river or spring;
b) a natural channel or depression in which water flows regularly or intermittently;
c) a wetland, lake or dam into which, or from which, water flows; and
d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse as defined in the National Water Act, 1998 (Act No. 36 of 1998) and a reference to a watercourse includes, where relevant, its bed and banks.

Wetland – means land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.

1 INTRODUCTION

1.1 Background

In order to address an articulated need for a new cemetery within the jurisdiction of the City of Matlosana Municipality, CSHELL 264 (Pty) Ltd intends to obtain environmental authorisation for indigenous vegetation clearance and the establishment of a cemetery on a portion of forty four hectares of Portion 1 of the farm Townlands of Klerksdorp 424 IP.

The development implies the following:

1. The clearance of an area of twenty hectares or more of indigenous vegetation (Listing Notice 2, Activity No. 15 of the 2014 EIA Regulations as amended).
2. The development of cemeteries of 2 500 square metres or more in size (Listing Notice 1, Activity No. 23 of the 2014 EIA Regulations as amended.
3. The clearance of an area of 300 square metres or more of indigenous vegetation within critical biodiversity areas identified in bioregional plans (Listing Notice 3 Activity No. 12(h)iv of the 2014 EIA Regulations as amended).

Since the development qualifies as a listed activity in terms of Section 15 of the Environmental Impact Assessment Regulations Listing Notice 2 of 2014 (as amended), environmental authorisation needs to be obtained. It is also stated in Government Notice No. R. 326 dated 7 April 2017 (as amended) that ... "The investigation, assessment and communication of the potential impact of activities must follow the procedure as prescribed in regulations 21 to 24 of the Environmental Impact Assessment Regulations of 2014 as amended (Regulation No. R. 326 of 7 April 2017). This procedure refers to application subject to scoping and environmental impact reporting.

Section 12 (1) of Government Notice 326 dated 7 April 2017 (as amended) stipulates that: "Before submitting an application for environmental authorisation, an applicant must appoint an EAP at own cost to manage the application". To this extent the applicant appointed Envirovision Consulting CC (CK2003/050777/23) as environmental assessment practitioner to administer the application.

Section 21 of Government Notice No. R. 326 of 7 April 2017 provides for the preparation and submission of a scoping report to the competent authority for consideration. The Final Scoping Report submitted by "Envirovision Consulting CC" on 5 August 2021 was accepted by the Department of Economic Development, Environment, Conservation and Tourism (DEDECT), North West Provincial Government, on 31 August 2021.

The client only received notice in December 2021 that the EAP, was diagnosed with a medical condition which had a direct impact on his capacity to perform his work. The applicant communicated with NW DEDECT and was advised that, due to the above exceptional circumstances, a new EAP could be appointed to complete any unfinished environmental work for the proposed development.

It was understood that the newly appointed EAP may continue with the application by submitting the Draft EIAR for comment. On 6 December Ms. Thembekile Makuwa confirmed in writing that a new EAP has to be appointed and that the new EAP may submit the Draft EIAR and the timeframe will be extended by the 50 days in terms of EIA Regulation 3(7) *(refer to Appendix A for Correspondence from Ms. Thembekile Makuwa).*

Subsequently Setala Environmental was appointed by CSHELL 264 (Pty) Ltd as EAP to commence the new process.

1.2 Approach to the Environmental Impact Assessment Process

NW DEDECT is the lead authority for this Environmental Impact Assessment (EIA) process and the development needs to be authorised by this Department in accordance with the National Environmental Management Act 107 of 1998 (NEMA) (as amended).

The required environmental process to be followed is being undertaken in two phases:

- Phase 1: Scoping Phase (Completed)
  Scoping Report (SR) including Plan of Study for EIA
- Phase 2: EIA Phase
  Environmental Impact Assessment Report (EIAR) and Environmental Management Programme (EMPr)

1.2.1 Scoping Phase (Completed)

The SR provided a description of the receiving environment and how the environment may be affected by the proposed development. Desktop studies making use of existing information were used to highlight and assist in the identification of potential significant impacts (both biophysical and social) associated with the proposed project.

Additional issues for consideration were extracted from feedback from the public participation process, which commenced at the beginning of the Scoping Phase, and will continue throughout the duration of the project. All issues identified during this phase of the study were documented within the SR. Thus, the SR provided a record of all issues identified as well as any fatal flaws, in order to make recommendations regarding the project and further studies required to be undertaken within the EIA phase of the proposed project.

The Final Scoping Report (FSR) was approved by NW DEDECT on 31 August 2021. The letter of acceptance authorised the applicant to proceed with undertaking the EIA for the proposed cemetery development, in accordance with the tasks outlined in the Plan of Study for Environmental Impact Assessment. Specific additional conditions were listed in the acceptance letter.

NW DEDECT requested the following information to be addressed in detail in the EIA Phase of the project:

1. Should the proposed development require municipal services (i.e. access, water supply, electricity supply and solid waste collection) City of Matlosana must be consulted to provide confirmation that such services will be provided.
   Refer to Section 3.3.1 and Appendix C for details on services provision.

2. The Department of Water and Sanitation (Potchefstroom Office) was consulted to provide comments instead of Pretoria Office. Kindly contact Dr. Khorommbi or Ms. Aluwani

Muladzi at DWS (Pretoria Office – 012 392 1544) to establish relevant officials who will provide comments on the proposed development.
The Draft EIAR will be submitted to the relevant official at DWS for comments.
Refer to Section 8.2.

3. Detailed mitigation measures for all identified impacts must be presented in the EIAR and the Draft EMPr.
Refer to Section 9 Environmental Impact Assessment and Appendix E, Draft EMPr.

4. All specialist studies identified in the Scoping Report must be undertaken and specialist reports included in EIAR. *Refer to Sections 6.1.3, 6.1.4, 6.2 & 6.3.2 and Appendix D.*

5. Declaration of Interest forms (original forms) must be completed by all specialists who compiled specialist reports for this application. All declarations must be done on the official forms obtainable from the Department.
Refer to Appendix G.

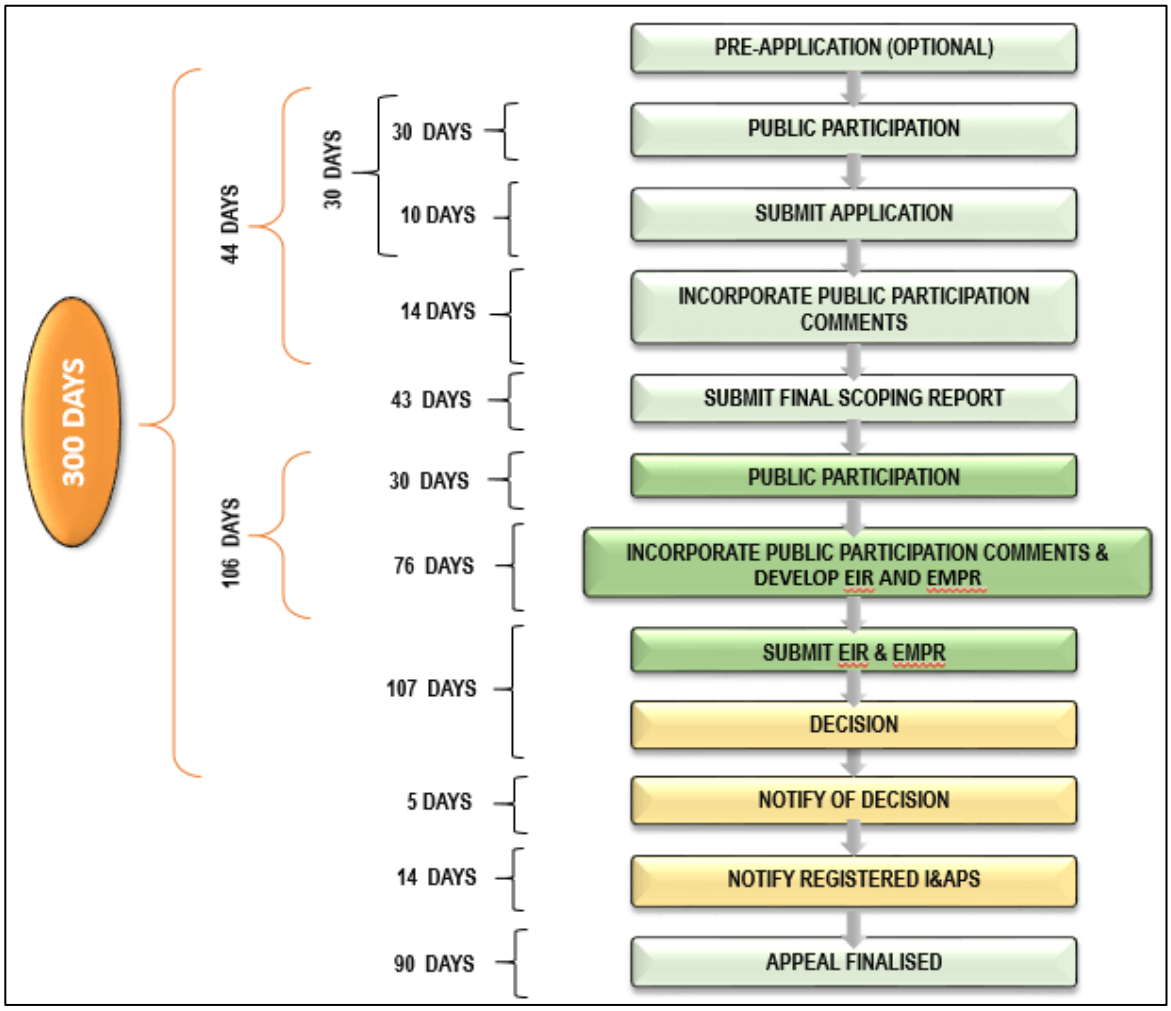
6. The EIAR which includes all specialist studies undertaken must be made available to all registered interested and affected parties (I&AP) for comments, including all organs of state which have a jurisdiction over certain aspects of the proposed development.
Refer to Section 8.2 for details of the Public Participation Process during the EIA Phase.

1.2.2 Environmental Impact Assessment Phase

The EIAR has aimed to achieve the following:

- to provide an overall assessment of the biophysical and social environments of the affected area;
- to undertake a detailed assessment of the preferred site/alternatives in terms of environmental criteria including the rating of significant impacts;
- to identify and recommend appropriate mitigation measures (to be included in an EMPr) for potentially significant environmental impacts; and
- to undertake a fully inclusive public participation process to ensure that I&AP issues and concerns are recorded and commented on and addressed in the EIA process.

The EIA process is represented diagrammatically in the Schedule below:



1.3 Content and Structure of the EIA Report

This report represents the Draft EIAR and was compiled in accordance with Government Notice No. R. 326 of 7 April 2017, Appendix 2(1). In terms of Government Notice No. R. 326 of 7 April 2017, Appendix 2(1) an EIAR must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include—

(a) details of—

- the EAP who prepared the report; and
- the expertise of the EAP, including a curriculum vitae;

(b) the location of the development footprint of the activity on the approved site as contemplated in the accepted scoping report, including:

- the 21 digit Surveyor General code of each cadastral land parcel;
- where available, the physical address and farm name; and
- where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;

(c) a plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is—

- a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken;
- on land where the property has not been defined, the coordinates within which the activity is to be undertaken;

(d) a description of the scope of the proposed activity, including—
- all listed and specified activities triggered and being applied for; and
- a description of the associated structures and infrastructure related to the development;

(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;

(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;

(g) a motivation for the preferred development footprint within the approved site as contemplated in the accepted scoping report;

(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:
- details of the development footprint alternatives considered;
- details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;
- 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;
- the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;
- the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts—
  - can be reversed;
  - may cause irreplaceable loss of resources; and
  - can be avoided, managed or mitigated;
- the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;
- positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;
- the possible mitigation measures that could be applied and level of residual risk;
- if no alternative development footprints for the activity were investigated, the motivation for not considering such; and
- a concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted scoping report;

(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—

- a description of all environmental issues and risks that were identified during the environmental impact assessment process; and
- an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;

(j) an assessment of each identified potentially significant impact and risk, including—
- cumulative impacts;
- the nature, significance and consequences of the impact and risk;
- the extent and duration of the impact and risk;
- the probability of the impact and risk occurring;
- the degree to which the impact and risk can be reversed;
- the degree to which the impact and risk may cause irreplaceable loss of resources; and
- the degree to which the impact and risk can be mitigated;

(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;

(l)an environmental impact statement which contains—
- a summary of the key findings of the environmental impact assessment:
- a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred development footprint on the approved site as contemplated in the accepted scoping report indicating any areas that should be avoided, including buffers; and
- a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;

(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;

(n) the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;

(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;

(p) a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;

(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;

(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;

(s) an undertaking under oath or affirmation by the EAP in relation to
- the correctness of the information provided in the reports;

- the inclusion of comments and inputs from stakeholders and I&APs;
- the inclusion of inputs and recommendations from the specialist reports where relevant; and
- any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;

(t) where applicable, details of any financial provision for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;

(u) an indication of any deviation from the approved scoping report, including the plan of study, including–

- any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and
- a motivation for the deviation;

(v) any specific information that may be required by the competent authority; and

(w) any other matters required in terms of section 24(4)(a) and (b) of the Act.

This report has been structured to comply with the format required by the NEMA. The contents are as follows:

TABLE 1: REPORT STRUCTURE

SECTION	CONTENT
SECTION 1 Introduction	Introduction and background to the project.
SECTION 2 Details of EAP	Presents information regarding the EAP involved in the proposed project.
SECTION 3 Locality and nature of the project	Provides detailed information regarding the proposed project and associated required infrastructure.
SECTION 4 Project motivation	Presents the need and desirability of the proposed project.
SECTION 5 Legal framework	Includes an explanation on all applicable legislation.
SECTION 6 Receiving environment	Provides the baseline information of the biophysical and social environments being impacted by the development proposal. Key findings of the specialist studies conducted.
SECTION 7 Project Alternatives	Consideration of alternatives (locality, land use, layout, designs, energy uses and No-Go) for the project.
SECTION 8 Public participation process	Provides an overview of the Public Participation Process conducted to date.
SECTION 9 Environmental Impact Assessment	The impacts identified are rated by significance.
SECTION 10 Environmental Impact Statement	Conclusions and recommendations of the Environmental Impact Assessment.

2 DETAILS OF ENVIRONMENTAL ASSESSMENT PRACTITIONER

2.1 Legislative requirements for environmental assessment practitioners

Section 13 of Government Notice No. R. 326 of 7 April 2017 provides the following requirements for environmental assessment practitioners (EAPs):

- An EAP must be independent;
- An EAP must have expertise in conducting environmental impact assessments or undertake specialist work as required, including knowledge of the Act, these Regulations and any guidelines that have relevance to the activity.
- An EAP must ensure compliance with these Regulations;
- An EAP must perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- An EAP must take into account, to the extent possible, the matters referred to in regulation 18 of Government Notice No. R. 326 of 7 April 2017 when preparing the application and any report, plan or document relating to the application; and
- An EAP must disclose to the proponent or applicant, registered interested and affected parties and the competent authority all material information in the possession of the EAP and, where applicable, the specialist, that reasonably has or may have the potential of influencing –
    - any decision to be taken with respect to the application by the competent authority in terms of these Regulations; or
    - the objectivity of any report, plan or document to be prepared by the EAP or specialist in terms of these Regulations for submission to the competent authority.

2.2 Details of the expertise of relevant Environmental Assessment Practitioner

The members of Setala Environmental have combined expertise and a proven track record of initiating and completing major projects. We have experience of more than 15 years in EIA applications. We

In order for the company to meet the emerging environmental challenges, Setala has assembled a team of professionals, consisting of a core of environmental experts with extensive experience in environmental assessments. The team includes environmentalists, various specialists, and public participation experts. A range of township development as well as linear projects including water pipelines and power lines, agricultural development, including dams have been successfully completed over the years as indicated in our Experience Record.

The team is especially proficient in assisting the Client in understanding and determining environmental responsibility, potential impacts and giving guidance as to an alternative approaches or identifying unforeseen environmental impacts.

Areas of expertise:

- Environmental Impact Assessment (EIA)
- Strategic Environmental Assessments (SEA)
- Environmental Compliance (incl. ECO)
- Public participation
- Specialist studies (Fauna, Flora, Avifauna, Wetland)

- Water related expertise and services i.e. Water Use Licence Applications, Integrated Water and Waste Management Plans, water use, and water quality assessments.

Refer to Table 2 and Appendix F for EAP details and experience.

TABLE 2: EAP DETAILS AND EXPERIENCE

Company	Setala Environmental (Pty) Ltd
Contact Persons	Mientjie Coetzee
Postal Address	44 Melrose Blvd Melrose Arch Johannesburg 2196
Telephone	083 253 2246
Facsimile	086 689 1515
E-mail	mientjie@peopletexture.co.za
Qualification	Master of Science
Professional Registrations	EAPASA Registration number 2019/1774 IAIAsa Membership number 3359
Experience	Mientjie Coetzee has 18 years' experience in the Environmental Sector and has gained experience as Environmental Assessment Practitioner and Project Manager working on a wide range of projects including residential, mixed land-use, industrial, roads and filling stations. Her primary skills include Environmental Screening Assessments, Environmental Impact Assessments (EIAs), Waste Management License Applications, Public Participation and Environmental Management Programmes (EMPrs).

Setala Environmental has no vested interest in the proposed development and hereby declares its independence as required by the EIA Regulations.

3 LOCALITY AND NATURE OF ACTIVITY

3.1 Project Locality and Extent

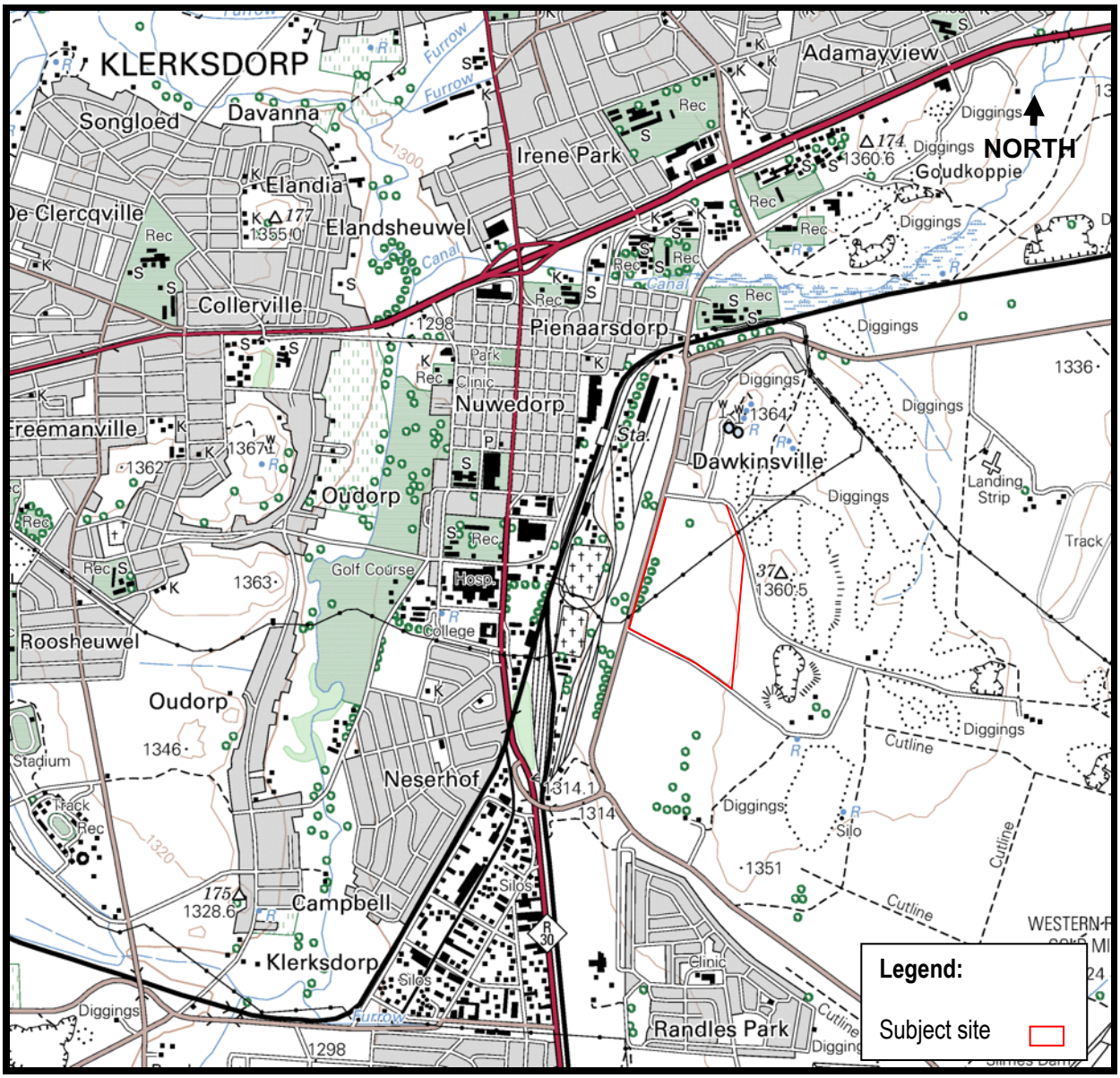


Figure 1: Locality Map Extract of 1:50 000 Topographic Map 2626DC Klerksdorp

21 Digit Surveyor General codes

T0IP00000000042400001

Physical address

The subject site covers an area of 44.2595 hectares and is located to the south of Dawkinsville, Klerksdorp. It is bordered by Golden Way to the west and gravel roads to the north, east and south.

Farm name

Portion 1 of the farm Townlands of Klerksdorp 424 IP.

Coordinates of the centre of the activity (Hartebeesthoek 94, WGS84)

26°52'39.04" South;
26°40'30.95" East.

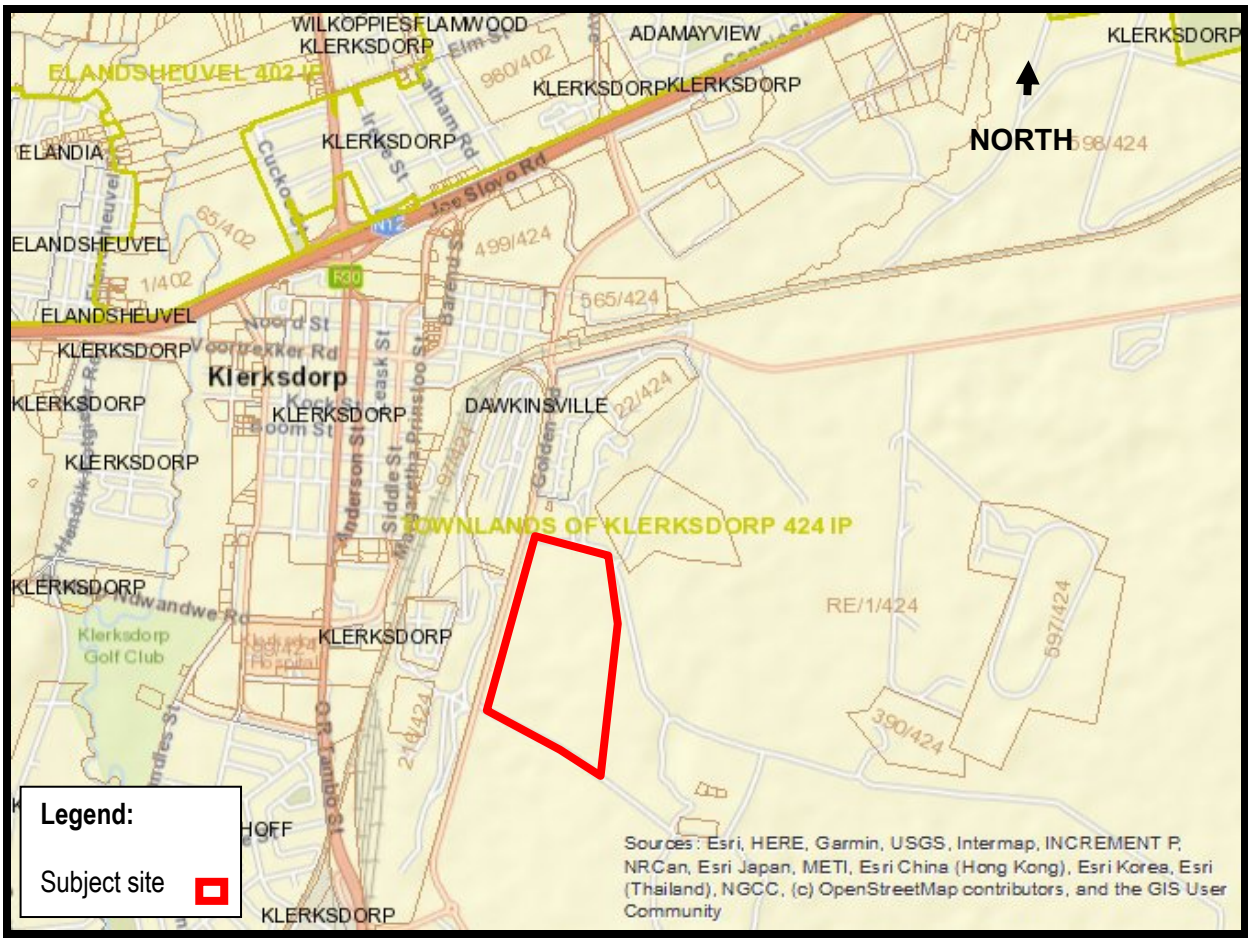


Figure 2: Locality Map (Source: Office of the Chief Surveyor-General) – open street map

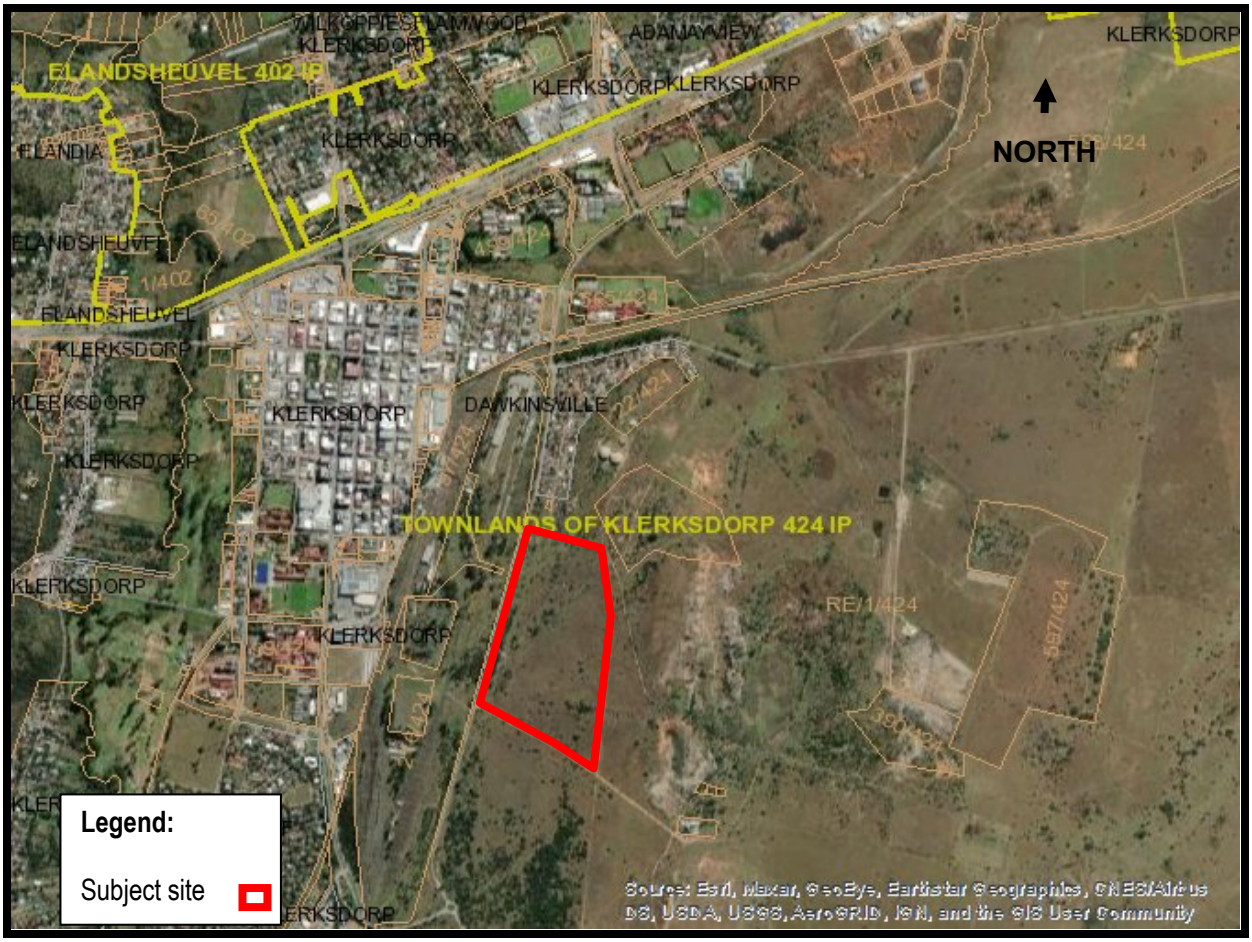


Figure 3: Locality Map (Source: Office of the Chief Surveyor-General) – imagery map

3.2 Description of activity

All listed and specified activities triggered and being applied for

1. The clearance of an area of twenty hectares or more of indigenous vegetation (Listing Notice 2, Activity No. 15 of the 2014 EIA Regulations as amended).
2. The development of cemeteries of 2 500 square metres or more in size (Listing Notice 1, Activity No. 23 of the 2014 EIA Regulations as amended.
3. The clearance of an area of 300 square metres or more of indigenous vegetation within critical biodiversity areas identified in bioregional plans (Listing Notice 3 Activity No. 12(h)iv of the 2014 EIA Regulations as amended).

Project type and description of the activity

The activity comprises indigenous vegetation clearance of forty four hectares as well as the phased establishment of a cemetery.

The total area of forty four hectares complies with the definition for indigenous vegetation as provided for in the 2014 EIA Regulations as amended and the total area will be cleared, albeit in a phased manner.

The proposed project consists of approximately 41 000 gravesites implemented in three phases as indicated on Figure 4: Site Plan. Phase 1 to be implemented in 2022, Phase 2 in 2030 and Phase 3 in 2037. An office block and ablution facilities will be provided. An electrified fence will be provided. *Refer to Appendix B for Site Plans.*

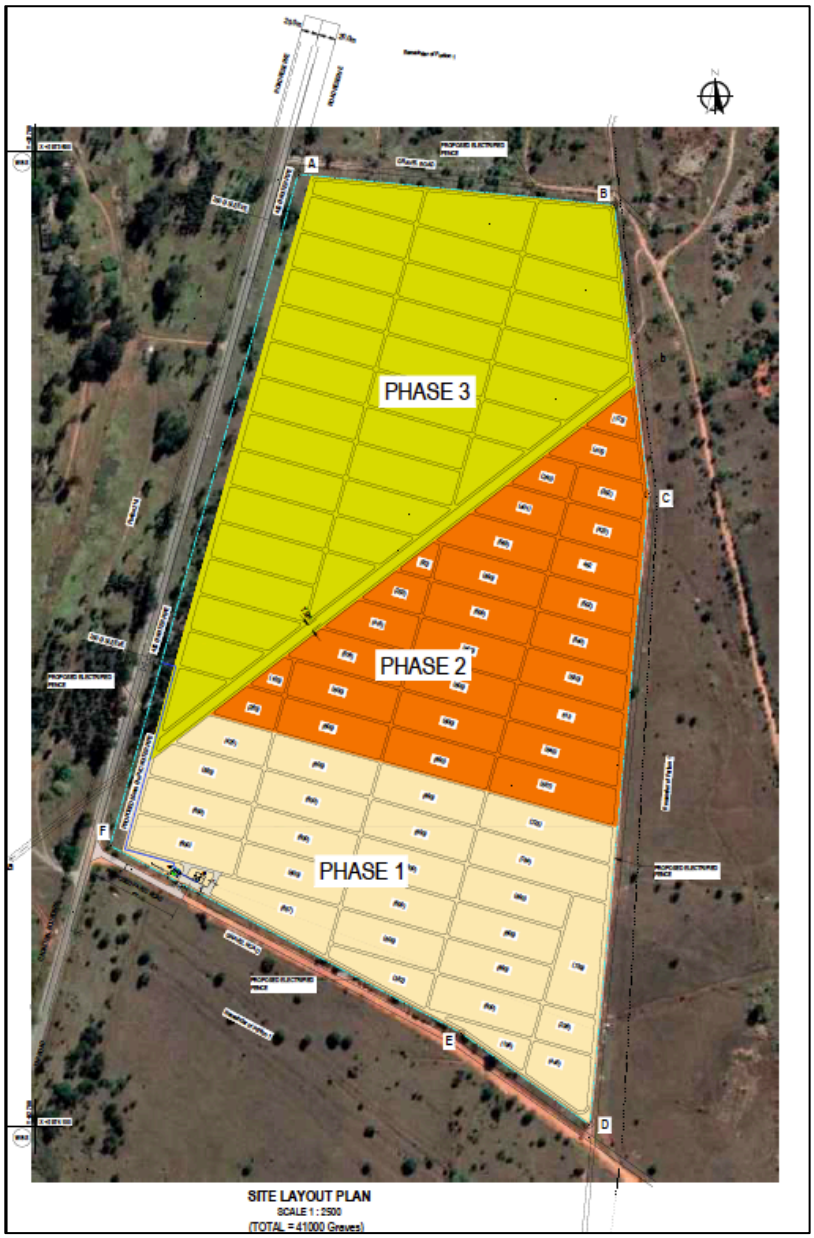


Figure 4: Site Layout

3.3 Civil Services and Infrastructure

3.3.1 Civil Services

Refer to Appendix C for Purchase Agreement and Correspondence regarding Waste Removal

According to the Purchase Agreement with the Matlosana Municipality dated 11 June 2018 the following apply regarding the provision of services:

Water: A water connection shall be provided by the Municipality on request and at the expense of the applicant.

Sewer: The applicant shall at own cost install a septic tank. *Refer to Appendix B for details*

Electricity: No electricity provision from the Municipality. Solar power will be used for electricity.

Solid waste: The applicant will be responsible for waste collection and removal. Waste will be transported to the licensed Klerksdorp Landfill Site which has a H.h classification. *Refer to Appendix C for correspondence from applicant.*

3.3.2 Infrastructure

The following information has been extracted from the Traffic Impact Study Report undertaken by Trafftrans (Pty) Ltd. Refer to Appendix D1.

This assessment is to establish the impact of a zoning for a "Cemetery" on the surrounding road network.

The location of the nearest existing high order intersections are that of Golden Road & Airport Road, approximately 800m from the site, and Golden Road & OR Tambo link approximately 980m from the site. Golden Road is paved, and in a fair to poor physical condition. All effected roads in the area fall under the jurisdiction of, and therefore, the responsibility of the Matlosana Local Municipality.

The objective of this study is to assess the impact of the proposed development on the existing surrounding road network and the intersections in the immediate vicinity and to establish the capacity requirements, if and where required, of the road infrastructure and any additional capacity that would be required to ensure acceptable traffic flow through the affected junctions/intersections.
The property is located in a typical semi-rural mixed-use area, consisting of agricultural land and residential and industrial developments. The total extent of the land under consideration, is 42,85ha of agricultural land, and is to be rezoned for a "Cemetery" land use.

The property is to gain access from Golden Road via the access road to the Klerksdorp Incinerator. This access road is located approximately 35m from the access road to the old cemetery located to the west of Golden Road and east of the railway line. Although both these access roads are T-junctions, the distance between the two is sub-standard as staggered intersections (should be at least 100m according to TMH 16), and should, due to the expected increase in traffic flow on Golden, be combined to form a single four-legged intersection, and thereby reducing the expected unsafe conditions caused by sub-standard staggered intersections.

Golden Road is a two-lane single carriageway road and functions as a Class U4a road (non-residential collector), requiring a minimum 25m road reserve, which is less than the 40m to be provided. The road has gravel shoulders and is currently in a fair to poor physical condition.

The closest intersection is the Golden & Shauder Street junction (minor street junction), located to the north of the site, which will be of no significance for the sake of this report, due to the low volumes on the side road, serving only a few residential dwellings in Dawkinsville.

The closest high-order intersection, is that of Golden & OR Tambo link, located 980m to the south of the site, with the OTR Tambo link also functioning as a Class U4a road and also in a fair to poor physical condition. The OR Tambo link road is a two-lane single carriageway road with 1,5m wide paved shoulders, with non-mountable kerbs protecting the 1,0m wide paved pedestrian walkway on either side of the road. The intersection control is through a roundabout with a 35m inner diameter, which has high mast lighting in its centre.

Recommendations

- The applicant must comply with the access arrangements, parking requirements and road upgrades, which are the applicant's responsibility, as stated in the Traffic Impact Study. This compliance will be in terms of the Matlosana Local Municipality Bylaws (for applications i.t.o. SPLUMA) or the Section 82 or Section 101 requirements (as applicable for applications i.t.o the Ordinance).
- A Site Development Plan regarding the access is to be submitted for approval. If a security gate is to be used at the access point, such a point should be located in such a way that ample storage area is provided in order not to congest the road reserve, as proposed in Section 6.1of the impact study.
- Access points and road upgrading of the road infrastructure will only be valid if all the geometric requirements that might be required by the Divisional: Roads and Stormwater Matlosana Local Municipality can be met. The planning, design and construction of the access and road infrastructure shall be done in accordance with the latest specifications, and no work inside the road reserve may be done before written permission of the Division: Roads and Stormwater Matlosana Local Municipality has been obtained (for work involving municipal roads), Northwest Province (for work involving provincial roads) and Sanral (for work involving national roads).
- All design plans must be submitted to the Division: Roads and Stormwater Matlosana Local Municipality for approval and/or Northwest Province or Sanral as may be required.
- The minimum number of parking spaces to be provided on-site, are to be provided as contained in the *"Parking Standards, PG 3185 (second edition)"* published by the Department of Transport as indicated in Section 6.3.
- The requirements for public transport, as identified in Section 6.4 in the impact study, are to be provided for.
- The needs of pedestrians should be taken into consideration in the planning and the design of the access to the development as well as the design of the road infrastructure as indicated in Section 6.4.
- The applicant will be responsible to obtain any additional road reserve that might be required for the provision of any additional lanes or road widening applicable to this development.

All costs for the upgrading of the roads infrastructure and provision of access will be for the applicant's account, where indicated, as per the mitigation measures as proposed in Section 7 and must be discussed with the relevant section responsible for Infrastructure Planning and Management.

4 NEED AND DESIRABILITY

Government Notice No. 792 of 5 October 2012 provides information and guidance for applicants, authorities and interested and affected parties on requirements for the consideration of need and desirability in terms of the National Environmental Management Act, 2008 (Act No. 107 of 2008), the Environmental Impact Assessment Regulations, the Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) and the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008).

The table below has been compiled and completed in order to present information on the need and desirability of the proposed development in accordance with the information requirements laid down in Government Notice No. 792 of 5 October 2012.

1. Is the activity permitted in terms of the property's existing land use rights?	**YES** ✓	**NO**	**Please explain**
The activity site is currently zoned "Municipal" and the opinion is being expressed that the activity is permitted in terms of the property's existing land use rights.			
2. Will the activity be in line with the following?			
(a) Provincial Spatial Development Framework (PSDF)	**YES** ✓	**NO**	**Please explain**
According to the North West Spatial Development Framework the activity is situated within a "Primary Regional Centre". The proposed activity does not exclude the land uses envisaged for these zones.			
(b) Urban edge / Edge of Built environment for the area	**YES** ✓	**NO**	**Please explain**
The proposed activity is situated within the "urban edge" of the City of Matlosana Municipality.			
(c) Integrated Development Plan (IDP) and Spatial Development Framework (SDF) of the Local Municipality (e.g. would the approval of this application compromise the integrity of the existing approved and credible municipal IDP and SDF?).	**YES** ✓	**NO**	**Please explain**
The relevant Integrated Development Plan (IDP) and Spatial Development Framework (SDF) do not preclude the proposed activity on the proposed activity site			
(d) Approved Structure Plan of the Municipality	**YES**	**NO**	**Please explain**
Not applicable.			
(e) An Environmental Management Framework (EMF) adopted by the Department (e.g. Would the approval of this application compromise the integrity of the existing environmental management priorities for the area and if so, can it be justified in terms of sustainability considerations?)	**YES** ✓	**NO**	**Please explain**
An EMF could not be located for purposes of this assessment.			

(f) Any other Plans (e.g. Guide Plan)	**YES**	**NO** ✓	**Please explain**
Not applicable.			
3. Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing approved SDF agreed to by the relevant environmental authority (i.e. is the proposed development in line with the projects and programmes identified as priorities within the credible IDP)?	**YES**	**NO** ✓	**Please explain**
The proposed activity will not be dependent on Municipal funding and therefore need not be in line with the timeframe intended by the existing SDF or the projects and programmes identified as priorities within the credible IDP.			
4. Does the community/area need the activity and the associated land use concerned (is it a societal priority)? (This refers to the strategic as well as local level (e.g. development is a national priority, but within a specific local context it could be inappropriate.)	**YES** ✓	**NO**	**Please explain**
A need for a strategically placed cemetery within the City of Matlosana Municipality's jurisdiction has been identified by the applicant *inter alia* because existing cemeteries such as the Klerksdorp Cemetery is approaching maximum capacity. It is also stated on the City of Matlosana's website (Cemeteries in the City Of Matlosana) that "Matlosana does currently face the common problem encountered by other local municipalities like the shortage of land …"			
5. Are the necessary services with adequate capacity currently available (at the time of application), or must additional capacity be created to cater for the development	**YES** ✓	**NO**	**Please explain**
The location of the subject site within the Urban Edge presupposes the availability of engineering services. The adequacy of services for the proposed development has been confirmed.			
6. Is this development provided for in the infrastructure planning of the municipality, and if not what will be the implication on the infrastructure planning of the municipality (priority and placement of services and opportunity costs)?	**YES** ✓	**NO**	**Please explain**
The activity is situated within the Urban Edge" that presupposes the prioritisation of infrastructure planning and services provisioning. The adequacy of services for the proposed development has been confirmed.			
7. Is this project part of a national programme to address an issue of national concern or importance?	**YES** ✓	**NO**	**Please explain**
The project will lead to job creation, both during construction and operation as provided for in the 2030 National Development Plan.			
8. Do location factors favour this land use (associated with the activity applied for) at this place? (This relates to the contextualisation of the proposed land use on this site within its broader context.)	**YES** ✓	**NO**	**Please explain**
The subject site is located within the relevant Urban Edge. It is also located on land zoned for municipal purposes in close proximity to the decommissioned Old Klerksdorp Cemetery and the existing Klerksdorp Cemetery.			

9. Is the development the best practicable environmental option for this land/site?	**YES** ✓	**NO**	**Please explain**
Yes. The subject site represents the establishment of a new cemetery that may address an increasing and pending shortage for cemeteries. Furthermore the activity site is favourably and strategically located for purposes of the proposed activity due to the following considerations: • It is strategically well placed on land that has been zoned for municipal uses; • It is strategically well placed on land in close proximity to the decommissioned Old Klerksdorp Cemetery and the existing Klerksdorp Cemetery that is approaching its maximum capacity; • Large parts of the subject site has been subjected to biological degradation over an extended period of time due to sand mining, quarrying, backfilling, illegal dumping and traversing; and • According to the North West Spatial Development Framework the activity is situated within a "Primary Regional Centre". The proposed activity does not contradict the land uses envisaged for these zones. The proposed activity thus represents the best practicable environmental option for this site in that it represents the utilisation of ecologically degraded land to provide a community oriented service and socio-economic spin-offs such as job generation and economic empowerment.			
10. Will the benefits of the proposed land use/development outweigh the negative impacts of it?	**YES** ✓	**NO**	**Please explain**
Kindly refer to *Sections 9 and 10: Impact and risk identification and assessment* of this report.			
11. Will the proposed land use/development set a precedent for similar activities in the area (local municipality)?	**YES**	**NO** ✓	**Please explain**
The activity site is located in close proximity to an existing similar activity namely the Klerksdorp cemetery (approximately four kilometres).			
12. Will any person's rights be negatively affected by the proposed activity/ies?	**YES**	**NO** ✓	**Please explain**
No evidence was recorded during the prescribed public participation process that any person's rights will be negatively affected by the proposed activity.			
13. Will the proposed activity/ies compromise the "urban edge" as defined by the local municipality?	**YES**	**NO** ✓	**Please explain**
The subject site is situated within the relevant Urban Edge.			
14. Will the proposed activity/ies contribute to any of the 17 Strategic Integrated Projects (SIPS)?	**YES**	**NO** ✓	**Please explain**
The proposed activity will not as such contribute towards any of the SIPS			
15. What will the benefits be to society in general and to the local communities?			**Please explain**
• According to the National Development Plan, 11 million jobs must be created in South Africa in the next 15 years (2030). The approval of this application can contribute towards the achievement of this goal. • If approved, the applicant's investment in the activity will also stimulate economic activity for other local businesses. The value of such an investment in terms of local economic development, should not be underestimated. • The municipality will also benefit from the proposed subdivision, because the zoning and value of the property will increase which may result in potentially higher rates and taxes.			
16. Any other need and desirability considerations related to the proposed activity?			**Please explain**
No.			

17. How does the project fit into the National Development Plan for 2030?	**Please explain**
It is expected that the project will lead to job creation, both during construction and operation.	
18. Please describe how the general objectives of Integrated Environmental Management as set out in Section 23 of NEMA as amended have been taken into account.	
This report encompasses the general objectives and requirements of Integrated Environmental Management as set out in section 23 of NEMA	
19. Please describe how the principles of environmental management as set out in Section 2 of NEMA as amended have been taken into account.	
People and their needs have been placed at the forefront of this assessment by taking into account the impact of the proposed activity on their physical, psychological, developmental, cultural and social interests. The assessment took into account the proposed development's social, environmental and economic sustainability by *inter alia* avoiding or minimising and remedying the following if and where applicable: • The disturbance of ecosystems, loss of biological diversity and pollution and degradation of the environment (development within an ecologically degraded and increasingly isolated area with no environmentally sensitive features); • Pollution and degradation of the environment (e.g. the specification of SABS approved infrastructure that should not interfere with the groundwater regime); • 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 (e.g. ensuring that no structures or resources with historical value will be affected); • Waste (refer to accountable waste management proposals in the EMPr). • The use of non-renewable natural resources (e.g. energy saving technology alternatives); and • Negative impacts on the environment and on people's environmental rights by assessing potentially negative impacts in the selection of preferred alternatives. The assessment also followed a risk-averse and cautious approach, which takes into account the limits of current knowledge about the consequences of decisions and actions as is reflected in the opinion of the EAP in this report as well as Section 10.3 Assumptions, Uncertainties and Gaps in Knowledge of this report. It has been acknowledged in the assessment 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 / alternative. The following environmental components were subsequently described and assessed in this report: • Economic • Social • Cultural • Physical (land, water & atmosphere) • Biological (micro-organisms, plant & animal life)	

Environmental justice has been pursued in that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons. This has been achieved by ensuring that the proposed activity should not lead to adverse environmental impacts.

Equitable access to environmental resources, benefits and services to meet basic human needs and ensure human well-being has been pursued and special measures have been taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination.

Responsibility for the environmental health and safety consequences of the activity throughout its life cycle will be described and assigned in the relevant EMPr to form part of the relevant EIA report.

The participation of all interested and affected parties in environmental governance has been promoted during the prescribed public participation process described elsewhere in the report.

Recommendations in the report has been informed by the outcome of the public participation process including the articulated interests, needs and values of all interested and affected parties if and where applicable.

The social, economic and environmental impacts of activities, including disadvantages and benefits, have been considered, assessed and evaluated in the report based on specialist input if and where applicable, and decisions are deemed appropriate in the light of such consideration and assessment.

The right of workers to refuse work that is harmful to human health or the environment and to be informed of dangers is being respected and protected in *inter alia* the relevant EMPr to form part of the relevant EIA report.

The regulatory requirement to notify registered Interested and Affected Parties of the Record of Decision and the placement of information within the public domain guarantee transparency and access to information.

Intergovernmental co-ordination and harmonisation of policies, legislation and actions relating to the environment has been promoted by keeping governmental stakeholders informed on the process and providing them with draft reports. In addition, great care has been taken to ensure that the activity conforms to spatial planning initiatives at different tiers of government for the area in question.

It is being understood that actual or potential conflicts of interest between organs of state should be resolved through conflict resolution procedures.

The assessment was also conducted with the underlying understanding that 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.

The relevant EMPr to form part of the relevant EIA report must / will ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment.

5 LEGAL FRAMEWORK

5.1 The Constitution of South Africa (No. 108 of 1996)

Since 1994, South African legislation (including environmental legislation), has undergone a significant transformation and various laws and policies were promulgated with a strong emphasis on environmental concerns and the need for sustainable development. The Constitution of South Africa (No. 108 of 1996) (The Constitution) provides environmental rights (contained in the Bill of Rights, Chapter 2 (section 24)) and includes implications for environmental management. The environmental rights are guaranteed in section 24 of the Constitution, and states that:

"Everyone has the right –

To an environment that is not harmful to their health or well-being; and

To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:

i. Prevent pollution and ecological degradation;

ii. Promote conservation; and

iii. Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development."

The Constitution cannot manage environmental resources as a stand-alone piece of legislation hence additional legislation has been promulgated in order to manage the various spheres of both the social and natural environment. Each promulgated act and associated regulations are designed to focus on various industries or components of the environment to ensure that the objectives of the Constitution are effectively implemented and upheld on an on-going basis throughout the country. In terms of section 7, a positive obligation is placed on the State to give effect to the environmental rights.

5.2 The National Environmental Management Act (No. 107 of 1998)

The NEMA is South Africa's overarching environmental legislation and has, as its primary objective, to provide for co-operative governance by establishing principles for decision making on matters affecting the environment, institutions that will promote co-operative governance and procedures for co-ordinating environmental functions exercised by organs of state and to provide for matters connected therewith. The NEMA provides for the Constitutional right to an environment that is not harmful to the health and well-being of South African citizens, the equitable distribution of natural resources, sustainable development, environmental protection and the formulation of environmental management frameworks.

In terms of the NEMA the Minister of the Department of Forestry, Fisheries and the Environment (DFFE) may identify activities which may not commence without prior authorisation from the Minister or member of the Executive Committee (MEC) and may also identify geographical areas in which specified activities may not commence without prior authorisation from the Minister or MEC. The Minister of the DFFE thus published GNR 983 (Listing Notice 1), 984 (Listing Notice 2), 985 (Listing Notice 3) and 986 (Listing Notice 4) (4 December 2014) listing activities that may not commence prior to authorisation from the Minister or MEC. These

Regulations have been amended on 7 April 2017. Listing Notice 1 (as amended) identifies activities that require a Basic Assessment (BA) process to be undertaken, in terms of the EIA Regulations, prior to commencement of that activity. Listing Notice 2 (as amended) identifies activities that require a S&EIR process to be undertaken, in terms of the EIA Regulations, prior to commencement of that activity. Listing Notice 3 (as amended) identifies activities within specific areas that require a BA process to be undertaken, in terms of the EIA Regulations, prior to commencement of that activity whilst Listing Notice 4 (as amended) provides for the use of spatial development tools adopted in the prescribed manner.

A detailed analysis was undertaken of the listed activities contained in Listing Notices 1, 2, 3 & 4 (as amended) in order to ascertain which of the project components trigger any listed activities. The result of the analysis indicated that the respective project components implies the following listed activities:

1. The clearance of an area of twenty hectares or more of indigenous vegetation (Listing Notice 2, Activity No. 15 of the 2014 EIA Regulations as amended).
2. The development of cemeteries of 2 500 square metres or more in size (Listing Notice 1, Activity No. 23 of the 2014 EIA Regulations as amended.
3. The clearance of an area of 300 square metres or more of indigenous vegetation within critical biodiversity areas identified in bioregional plans (Listing Notice 3 Activity No. 12(h)iv of the 2014 EIA Regulations as amended).

The proposed activity therefore requires environmental authorisation by means of a full scoping and environmental impact reporting process.

5.3 The National Water Act (No. 36 of 1998)

The NWA provides for fundamental reformation of legislation relating to water resources and use. The preamble to the NWA recognises that the ultimate aim of water resource management is to achieve sustainable use of water for the benefit of all users and that the protection of the quality of water resources is necessary to ensure sustainability of the nation's water resources in the interests of all water users. In terms of the NWA, the national government, acting through the Minister of the DFFE, is the public trustee of South Africa's water resources, and must ensure that water is protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner for the benefit of all persons. The Minister of the DFFE is responsible to ensure that water is allocated equitably and used beneficially in the public interest, while promoting environmental values. The national government, acting through the Minister of the DFFE, has the power to regulate the use, flow and control of all water in South Africa.

The majority of the provisions of the NWA came into effect on 1 October 1998 and at the same time various provisions of the Water Act (No. 54 of 1956) (WA) were repealed. The remaining provisions of the NWA commenced on 1st January 1999 and 1 October 1999 (and the remaining provisions of the WA were repealed).

The most fundamental departure from the WA is the removal of the concept of water as private property. Instead, water will be made available through user licences, which may be issued for a maximum period of forty years, subject to renewal. A priority of users has been established for the allocation of licences, with the environment near the top of the list.

Section 21 of the NWA indicates that "water use includes":

- Taking water from a water resource;
- Storing water;
- Impeding or diverting the flow of water in a water course;
- Engaging in a stream flow reduction activity referred to in section 36;
- Engaging in a controlled activity which has either been declared as such or is identified in section 37(1);
- Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall
- or other conduit;
- Disposing of waste in a manner which may detrimentally impact a water resource;
- Disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;
- Altering the bed, banks, course or characteristics of a water course;
- Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and
- Using water for recreational purposes.

Specified water uses, in section 21 of the NWA, must be licensed unless listed in Schedule 1; the continuation of an existing lawful water use; is permissible under a general authorisation issued under section 39 of the NWA, or if a responsible authority waives the need for a license.

The Department of Water Affairs has already been notified in writing about the development (Appendix 7). No feedback has been received to date, either with regard to the recording of any potential water uses that may require registration or licencing in terms of the Act, or otherwise.

Should any water uses requiring registration or licencing in terms of the Act be identified either during the scoping or subsequent EIA process, the necessary licencing application processes in this regard will be initiated by the applicant once environmental authorisation has been obtained.

5.4 National Environmental Management Biodiversity Act (No. 10 of 2004)

The National Environmental Management Biodiversity Act (No. 10 of 2004) (NEM:BA), in line with the Convention on Biological Diversity (CBD), aims to legally provide for biodiversity conservation, sustainable use and equitable access and benefit sharing. The NEM:BA creates a basic legal framework for the formation of a national biodiversity strategy and action plan and the identification of biodiversity hotspots and bio-regions which will then be given legal recognition. The NEM:BA imposes obligations on landowners (state or private) governing alien invasive species as well as regulating the introduction of genetically modified organisms. The South African National Biodiversity Institute (SANBI) was established to enforce the objectives as set out in the NEM:BA.

It is the finding of this report that the National Environmental Management Biodiversity Act (No. 10 of 2004) (NEM:BA) does not apply.

It needs to be recorded that certain portions of the subject site fall within critical biodiversity areas.

5.5 National Environmental Management Air Quality Act (No. 39 of 2004)

The National Environmental Management: Air Quality Act (No. 39 of 2004) (NEM:AQA) allows for national, provincial and local air quality standards to be established as well as the declaration of priority areas. In addition the NEM:AQA requires that Air Quality Management Plans (AQMP) form part of the environmental implementation plan or environmental management plans to be prepared by national departments or the province as required by Chapter 3 of the NEMA. Furthermore the NEM:AQA requires municipalities to include an AQMP into its integrated development plan (IDP).

Key features of the NEM:AQA include:

- A decentralisation of air quality management responsibilities;
- The identification and quantification of significant emission sources that then need to be addressed;
- The development of ambient air quality targets as goals for driving emission reductions;
- The use of source-based (command-and-control) measures in addition to alternative measures, including market incentives and disincentives, voluntary programmes, and education and awareness;
- The promotion of cost-optimised mitigation and management measures;
- Air quality management planning by authorities, and emission reduction and management planning by sources; and
- Access to information and public consultation.

The overall objectives of the NEM: AQA include the following:

- The protection of the environment by providing reasonable measures for the protection of the quality of the air in the country;
- Protection of the environment by the prevention of air pollution and ecological degradation;
- Protecting the environment by securing ecologically sustainable development while promoting justifiable economic and social development; and
- To give effect to the constitution in order to enhance the quality of ambient air in order to secure an environment that is not harmful to the health and well-being of the people of South Africa.

The NEM:AQA requires the Minister of the DFFE to publish a list of activities which results in atmospheric emissions which may have a detrimental effect on the environment, including health, social conditions, economic conditions, ecological conditions, ecological conditions or cultural heritage. The NEM:AQA requires that an Atmospheric Emissions Licence (AEL) be obtained for such listed activities. Such a list of activities was published in GNR 248 (31 March 2010).

Following a detailed analysis of the proposed project against the activities listed in GNR 248, it was concluded that these activities will not be triggered.

5.6 The National Environmental Management Waste Act (No. 59 of 2008)

The National Environmental Management: Waste Act (No. 59 of 2008 (NEM:WA) serves to reform the law regulating waste management in order to protect human health and the environment. This is managed by providing reasonable measures for the prevention of pollution and ecological degradation. The NEM:WA aims to secure ecologically sustainable development while promoting justifiable economic and social development. The NEM:WA provides national norms and standards for regulating the management of waste by all spheres of government, for specific waste management measures and for matters incidental thereto. In terms of the NEM:WA the Minister of the DFFE may publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment. Furthermore, the NEM:WA prohibits any person to commence, undertake or conduct a waste management activity except in accordance with the requirements or standards determined in terms of the NEM:WA for that activity or where a waste management licence (WML) has been issued in respect of that activity.

Following a detailed analysis of the proposed project, it was concluded that the proposed project components will not trigger any activity that will require an application for a WML based on the understanding that waste generated by the activity will feed into the municipal waste stream.

5.7 National Heritage Resources Act (No. 25 of 1999)

The National Heritage Resources Act (No. 25 of 1999) (NHRA) aims to protect heritage resources of national significance. The South African Heritage Resources Agency (SAHRA) was thus established in 1999 to fulfil the objectives of the NHRA. In terms of section 38 of the NHRA a heritage impact assessment (HIA) is required for any development or other activity which will change the character of the site:

- Exceeding 5 000m² in extent;
- Involving three or more existing erven or subdivisions thereof;
- Involving three or more erven or divisions thereof which have been consolidated within the past five years;
- The costs of which will exceed a sum set in terms of regulations by the SAHRA or a provincial heritage resource authority;
- The re-zoning of a site exceeding 10 000m² in extent;
- Any other category of development provided for in regulations by the SAHRA is a provincial heritage resource agency, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

The proposed project implies the following in terms of section 38 of the NHRA, thus an HIA is required:

- It will change the character of a site exceeding 5 000m² in extent;
- It may require the rezoning of a site exceeding 10 000m² in extent.

5.8 Relevant guidelines

- The Guideline Document EIA Regulations (DEAT 1998)

- Overview of Integrated Environmental Management, Information Series 0 (DEAT 2004a)
- Screening, Integrated Environmental Management, Information Series 1 (DEAT 2002)
- Scoping, Integrated Environmental Management, Information Series 2, (DEAT 2002a)
- Stakeholder Engagement, Integrated Environmental Management, Information Series 3 (DEAT 2002b)
- Specialist Studies, Information Series 4. (DEAT 2002c)
- Impact Significance, Integrated Environmental Management, Information Series 5 (DEAT 2002d)
- Ecological Risk Assessment, Integrated Environmental Management, Information Series 6 (DEAT 2002e)
- Cumulative Effects Assessment, Integrated Environmental Management, Information Series 7 (DEAT 2004b)
- Cost Benefit Analysis, Integrated Environmental Management, Information Series 8 (DEAT 2004c)
- Criteria for determining alternatives in EIA, Integrated Environmental Management, Information Series 11 (DEAT 2004d)
- Environmental Management Plans, Integrated Environmental Management, Information Series 12 (DEAT 2004e)
- Review in Environmental Impact Assessment, Integrated Environmental Management, Information Series 13 (DEAT 2004f)
- Environmental Impact Reporting, Integrated Environmental Management, Information Series 15 (DEAT 2004g)

6 DESCRIPTION OF RECEIVING ENVIRONMENT

This chapter provides a description of the receiving environment within the study area. Three components to the environment are recognised:

- Physical Environment;
- Biological Environment; and
- Socio-Economic Environment.

6.1 Physical Environment

6.1.1 Climate

The area is characterised by a warm-temperate, summer-rainfall climate, with overall Mean Annual Precipitation of 530mm. High summer temperatures. Severe frost (37 days per year on average) occurs in winter (Mucina & Rutherford: 2006).

6.1.2 Topography and drainage

The development site is situated at approximately 1346m to 1331m above mean sealevel (Google Earth 2020) on land that is slightly sloping from north east to south west. Drainage takes place *via* sheetwash in a western direction towards Golden Way.

6.1.3 Geology and Soils

*The following information has been extracted from the Engineering Geological Investigation Report undertaken by Andon van der Merwe Consulting Engineering Geologist**.** Refer to Appendix D.2.*

The objective of the geotechnical investigation was to: -

- Determine the engineering properties of the site soils and bedrock including potentially expansive material, low bearing capacity soils, areas difficult to excavate, stability of open trenches, shallow ground water conditions and the quality of the insitu soils in terms of backfilling and permeability as well as for the construction of roads, general fill and parking bays.
- Present appropriate recommendations for the new cemetery development and precautionary measures in accordance with the requirements of the local authorities.

Site Description

An existing old cemetery is located some 300m west of the proposed new cemetery site and opposite Golden Way. The site is roughly trapezoidal in shape and is covered by veld grass and scattered Acacia thorn, Bluegum, Pine and Syringa trees. Manmade features include an overhead electrical line bisecting the central part of the property from north-east to south-west as well as underground wet services with manholes which are located along the eastern perimeter of the site.

A borrow area for sand is located at the central part of the site and borrowing has commenced previously to a maximum depth of some 3m below natural ground surface level. A linear area where borrowing commenced (7m to 10m wide) stretches from the north-eastern corner of the old borrow area to some 165m in a north-eastern direction. This area has been backfilled with hard quartzite cobbles, boulders and other fill materials. A 6m (or more) deep shaft was encountered directly to the north-east of this linear feature and hard rock quartzite was encountered at 1,2m depth, dipping steeply (400 from horizontal) to the south-west whilst slight ground water seepage was encountered within the quartzite bedrock at 5m below surface. The shaft is therefore characterized as local undermining for gold in this portion of the property and the property is possibly undermined in some areas. This area and the area at the north-eastern corner of the property contains outcrops and sub-outcrops of hard quartzite bedrock and boulder outcrops. Drainage furrows to a depth of between 0,5m and 0,8m below surface were encountered as linear features at the south-eastern part of the site and has a strike of east to west, these were probably done for drainage measures at the site where farming activities were practiced previously.

Isolated areas of disturbed ground conditions and areas of rubbish were encountered throughout the site.

The site slopes in a western direction and equals a slope of roughly 2% to 3% or 1,150 to 1,720 according to Google Earth Imagery. According to the “Risk Assessment, Monitoring and Managing of Cemeteries, WRC Report No. 2449/1/18, May 2018”, a cemetery site should have a slope of preferably between 20 and 60 (90 in exceptional cases) and therefore the slope is a bit flatter (1,150 to 1,720) than desired. Drainage takes place via sheetwash in a western direction towards Golden Way.

Geotechnical Considerations

Expansive Soils

The Van der Merwe (1964) method indicates that the sandy and gravelly site soils in excess of 3,4m below surface tested potentially “low” in the degree of potential expansiveness. A total surface heave value of less than 7,5mm is predicted across the site, should the moisture condition of the soils change from dry to saturated.

Ground Water and Soil Chemistry

Slight ground water seepage was only encountered in the shaft at KS/41 in the northeastern corner of the site at a depth of 5m below natural ground surface level. The ferricrete-rich soils encountered in isolated areas of the site towards the north-east may be indicative of a seasonal perched water table in the wet season.

The foundation materials are expected to be potentially highly to very highly chemically corrosive with regards to buried ferrous pipes or buried tanks (pH values ranging from 5,17 to 6,6 and electrical conductivity values ranging from 79 to 154,3 mS/m) and the use of nonferrous metal pipes or plastic pipes are recommended for underground wet services.

Compressible and Collapsible Soils

Six undisturbed soil samples, representative of the sandy colluvium, which blankets the property to a depth of between 0,2m and depths exceeding 3,4m below surface, were tested to determine the consolidation potential of the material.

An analysis of the above results indicates that the sandy colluvium is potentially highly collapsible and moderately compressible should it be subject to a load of 200 kPa and becoming saturated. The collapse rating of the materials classifies as “Trouble” in terms of collapse settlement, according to Jennings.

From visual observations from the test pit profiles it is anticipated that the loose fill, gravelly ferruginised colluvium and gravelly residual quartzite materials may also be potentially collapsible and compressible.

Earthworks

The upper site soils were tested to determine their compaction characteristics.

Based on the results of the compaction tests, it is apparent that the upper sandy colluvium and gravelly residual quartzite have moderate to poor compaction characteristics and tested as G8/G9 quality materials according to the TRH14 Classification. The materials will be suitable for selected fill in the construction of possible paved areas and roads but basecourse materials (G5/G6 quality) will have to be imported from a commercial source should they be required. The upper materials at the proposed cemetery site have high Modified AASHTO dry densities (MDD) of between 2 020kg/m3 and 2 110kg/m3. Cognizance should be taken in the design of paved areas and roads of the potentially collapsible and compressible nature of the upper soil horizons.

Soil Permeability

Falling head permeability laboratory tests were carried out by Civilab on four undisturbed soil samples at the proposed cemetery site whilst nine in situ falling head percolation tests were carried out some of the test pits.

The results of the falling head permeability test (on four samples) carried out on the undisturbed soil samples as well as the in-situ percolation tests (nine tests) have shown that the sandy colluvium is generally relatively impermeable to impermeable with a coefficient of permeability varying between E-04 and E-06 cm/s. The quartzite bedrock underlying the residual soils is regarded highly impermeable.

Excavation Characteristics

A grave should be excavatable either by hand tools or a backactor down to a depth of at least 1,8m below surface and this is probably the most important initial item in the selection of a site for use as a cemetery. A depth of between 2,1m and 2,2m below ground surface will be required in cases where double burial is necessary.

Soft excavation by hand tools or backactor to a depth of between 1,8m and a depth exceeding 3,4m (generally 3m or deeper over the soil zone) was possible during the investigation in Soil Zone A. Excavation by hand tools or backactor may only be possible to a depth of between 0,8m (or shallower) and 1,2m below surface as the area contains shallow quartzite bedrock. Very hard excavations by means of large excavators, hydraulic pecking, jackhammer work and blasting will be required to remove the very soft to hard rock quartzite.

Unstable sidewall conditions were encountered in the loose to medium dense sandy colluvium and 19 of the 41 test pit (46%) sidewalls collapsed during the excavation or shortly thereafter. The investigation was carried out at the middle of the wet season. The instability of the sidewalls is a major concern for the cemetery development unless it is treated.

Foundations

No structures are proposed at the cemetery site according to the client, however the following foundation recommendations are provided for the different soil zones if future structures are to be erected:-

Soil Zone “A”

In view of the thick horizon of potentially collapsible and compressible soils which blanket this portion of the site, one of the following foundation solutions may be adopted for the construction of single-storey masonry structures: -

Compaction of in situ soils below individual footings

- Remove in situ material below foundations to a depth and width of 1,5 times the foundation width or to a competent horizon and replace with material compacted to 93% Mod AASHTO density at -1% to +2% of optimum moisture content.
- Normal construction with lightly reinforced strip footings.
- Light reinforcement in masonry.
- Site drainage and plumbing/service precautions to be taken.

Soil Raft

- Remove in situ material to 1m beyond perimeter of building to a depth of 1,5 times the widest foundation or to a competent horizon and replace with material compacted to 93% Mod AASHTO density at -1% to +2% of optimum moisture content.
- Normal construction with lightly reinforced strip footings.
- Light reinforcement in masonry.
- Site drainage and plumbing/service precautions to be taken.

Stiffened or Cellular Raft

- Stiffened or cellular raft with articulation joints or solid lightly reinforced masonry
- Site drainage and plumbing/service precautions to be taken.
- Foundation Pressure not to exceed 50 kPa.

The design and construction of raft foundations (whether soil or concrete) should be done in accordance with and under supervision of a civil or structural engineer.

Soil Zone “B”

In view of the thin to moderate horizon of potentially collapsible and compressible soils that are present here, conventional spread or strip footings are envisaged for proposed rigid, single-storey structures, founded onto the quartzite bedrock at depths ranging from near surface occurrences down to 1,2m below surface and adopting a safe allowable bearing pressure of 500 kPa.

Soil Zone “C”

It is recommended that possible future structures not be erected in this soil zone as it contains disturbed ground conditions.

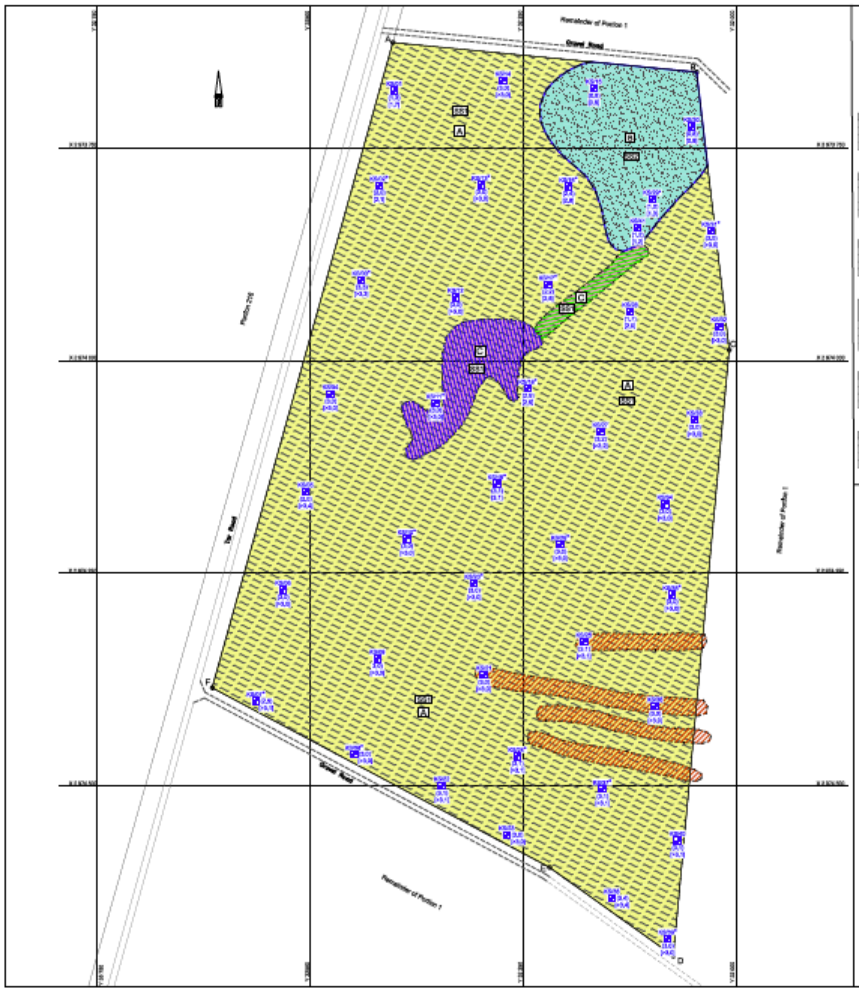


Figure 5: Geotechnical Map

Suitability of site for establishment of cemetery site

In assessing a site for the establishment of a cemetery, the following geotechnical parameters (after Hall & Hanbury 1990) are taken into consideration and used to achieve a rating system:-

- Ease of excavation of the of the in-situ material
- Stability of the open excavation
- Workability of the soil removed from the excavation
- Presence or not of a water table
- Subsoil permeability
- Permeability of backfill

Additional specifications for a cemetery site in terms of the Environmental Risk Assessment, Monitoring and Managing of Cemeteries (WRC Report No. 2449/1/18, May 2018) is given below:-

- Deep water table (>4,0m below surface)
- Absence of perched water tables.
- Soil permeability E-07 to E-05 cm/s.
- Thick excavatable soil.
- River, well, spring > 30m – 100m from cemetery site.
- Drinking water source > 250m – 500m from cemetery site.
- Stable sidewalls.

• Surface gradient 20 – 60 (90 in exceptional cases).
• Space for adequate future expansion.

The rating was carried out by analyzing each test pit and assigning a value to it by taking into consideration the ease of excavation by machine or hand tools down to a depth of at least 1,8m below surface, shallow, densely ferruginised soils are less favourable than deep, unconsolidated soils. The stability of the open excavation is important and the open grave should be able to stand unsupported for quite some time after it has been excavated during both dry and wet conditions. The workability of the material is of importance since it determines how easy or difficult it will be to backfill the grave using the material that was removed from it and how well it can be compacted, clayey soils will be much harder to backfill and compact than sandy and gravelly material. Compaction tests proved good workability of the upper 3m of soils due to Modified AASHTO dry density values of above 2 000 kg/m3.

The presence of a water table – a deep water table is favourable since it reduces the risk of ground water contamination caused by leachate from the cemetery. Drilling information with static water tables were not available and no existing boreholes are present on the property. Slight water seepage was encountered in the shaft at 5m below surface located at the north-eastern corner of the site. The shaft was estimated at 6m or deeper and it is therefore anticipated that the static water table is located at a depth of greater than 6m below surface. The subsoil permeability of the soil below the burial depth is important and the material should preferably be relatively impermeable, permeable soil is given a very low rating. The permeability of the backfill should be low in order to reduce the ingress of ground water and the subsequent generation of leachates.

Based on the results of the rating system, the site has been apportioned into two major Suitability Zones, Zone SS1 and Zone SS2 as follows:

• **Zone SS1** occupies the largest part of the property and excludes the north-eastern corner and includes geotechnical Zones “A” and “C”. Generally easy excavation down to at least 1,8m; no ground water seepage was encountered in the wet season; in situ soils is generally impermeable to relatively impermeable; sandy and gravelly materials are fair workable; sidewalls of open excavations are unstable. This zone is characterized as ***“Poor/Satisfactory to Unacceptable” with a Rating of between 70 and 83 or F.*** “F” abbreviates for “Fatal Flaw” due to the fact that 46% of the test pits excavated collapsed during or shortly after the excavation. This problem can possibly be overcome if impact rolling is done over this soil zone or the side slopes of the grave excavations are cut back to prevent collapse of sidewalls. Additional geotechnical testing is recommended after the impact rolling has been conducted. These tests include limited test pitting and DPL tests to confirm dense soil conditions and stable sidewalls of open trenches.

• **Zone SS2** occupies the north-eastern corner of the property and include Soil Zone “B”. Very hard excavation by large machines and light blasting are foreseen below a depth of between 0,8m and 1,3m below surface; slight water seepage was encountered at 5m below surface in KS/41; in situ soils is generally impermeable to relatively impermeable; sandy and gravelly materials are fair workable; sidewalls of open excavations are unstable. ***This zone is characterized as “Unacceptable” with a Rating of between 45 and 58 or F***. The sidewalls of the shallow test pits were also regarded unstable and collapsed after excavation.

Other important factors for the development of a cemetery site according to the WRC Report (No. 2449/1/18, May 2018) include the following:-

- SURFACE WATER BODYS - with regards to surface water bodies a river, well or spring must be located further than 30m to 100m from a cemetery site. The Palmietspruit is the closest water source located to the site at some 1,3km due to the north and is therefore considered a safe distance according to the WRC Report.

- DRINKING WATER SOURCE - drinking water sources should be located further than 250m to 500m from a cemetery site. This measure will probably be determined during the hydro census and geohydrological investigation. It is recommended that possible water extraction from boreholes on the cemetery site only be used for irrigation and not for drinking.

- SURFACE GRADIENT - the surface gradient should vary between 20 and 60 (90 in exceptional cases) and the surface gradient at the proposed cemetery site equals 1,150 to 1,720 which is a bit flatter than desired. Surface drainage measures should be in place according to the engineer's design to ensure good site drainage without ponding of water after precipitation.

General

The above observations and recommendations are based on the project as described with the assumption that geological conditions will not vary drastically from those encountered during the investigation. It should be pointed out that the investigation was carried out using present day and the latest state-of-the-art techniques. Certain assumptions and extrapolations have had to be made and consequently, conditions at variance to those described may occur.

All disturbed areas (Soil Zone "C") should be properly re-instated to its original state prior to the development if the client wish to develop graves in these areas. The placement of fill must be controlled with suitable field tests to confirm that the required densities are achieved during compaction and that the quality of fill material is within specification.

6.1.4 Geohydrology

The following information has been extracted from the Hydrogeological Basic Assessment Report undertaken by Noa Agencies (Pty) Ltd. Refer to Appendix D.3.

Noa Agencies (Pty) Ltd has been appointed by Stratalab Material Laboratory to undertake a basic groundwater assessment in support of the proposed new cemetery along Golden Way Road, Klerksdorp, North West Province.

The proposed cemetery site occupies a total of 44.2595 hectares, and it is located approximately 1 kilometre southeast of the Klerksdorp Central Business District. Other points of interest in the study area includes:

1. Transnet Depot along the western boundary of the proposed cemetery. This area includes the old Klerksdorp Concentration Camp Memorial and Cemetery;
2. The Averda Klerksdorp Incinerator, 400 meters from the south-eastern corner of the proposed cemetery site;
3. Old open cast mining operations, along the eastern boundary of the proposed cemetery and directly north of the Averda Incinerator;
4. The nearest private and occupied houses:

   a. Gold Estates no 4 and 5 (downstream), approximately 900 m south;
   b. Dawkinsville (upstream), approximately 200 m north;
   c. An informal settlement between Dawkinsville and the proposed cemetery site; and
5. The Klerksdorp Waste Landfill Site, approximately 1.5 kilometres to the east. The landfill site is however on the opposite side of the quartz ridge.

Potential Groundwater Impacts

Potential environmental impacts associated with the cemetery were assessed. These impacts are only preliminary and were concluded based on baseline data for in the area. Groundwater related risks at cemeteries are mostly focused on groundwater contamination, plus safety issues in terms of stability of the excavations.

The following risk definition comes from a WRC report by Matthys Dippenaar, et al (May 2018) –

Environmental Risk Assessment, Monitoring and Management of Cemeteries.

1. Bodies decompose and during this process, leachates that contain bacteria, viruses and organic and inorganic chemical decomposition products are produced. Pathogens such as Anthrax, Smallpox and TB are known to survive in soil and water and some are able to multiply if soil conditions are favourable.
   (Dent, www.science.uts.edu.au/des/StaffPages/BoydDent/story).
2. Other contaminants include arsenate pentachlorophenol and formaldehyde (a known carcinogen) released from burial materials and embalming fluids (Best Available Science, 2004; Goodman, 2006; WHO, 1998).
3. Furthermore, coffins also decompose, and are usually fitted with metal handles, hinges and accessories, and many are varnished or painted. A wide range of heavy metals and other potentially harmful compounds may be released from coffins to eventually seep into the groundwater, and from there to boreholes or streams (Bitton et al., 1983; Dent, n.d.; Rogers, 2004; Vass, 2001).
   a. For example – at the Zandfontein Cemetery in Tshwane, Jonker and Olivier (2012) found that cemetery soils and groundwater in the vicinity of the cemetery were contaminated with high levels of a variety of minerals (there was more than eight times more manganese, cobalt, titanium, caesium and nickel in soils in cemetery soil compared with soils outside the cemetery boundaries.

Therefore, chemicals that may be released to groundwater include substances such as arsenic and mercury which were used in embalming and burial practices in the past, varnishes, sealers and preservatives used on wooden coffins and metals such as lead, zinc, copper and steel from metal coffins, from handles, hinges and for decorative purposes (Spongberg and Becks, 2000). The possibility exists that harmful toxins and heavy metals may be transported from the graves through seepage into the saturated / groundwater zone, posing environmental and human health risk.

Rainwater plays a major role in transporting contaminants from the graves to the deeper saturated zone. However, the risk of groundwater contamination through leachate from cemeteries is not uniform as it is influenced by a number of physical and other factors (as listed above), the most important being the soil characteristics (type of soil, depth, pH, permeability and porosity), climate (rainfall and temperature), geology, the hydrological setting, and terrain features.

Different contaminants will be transported differently. In general, transport with the movement of groundwater is termed advection. Dilution of contamination can occur mechanically through dispersion or chemically through diffusion.

Apart from the decomposition of the body, additional contaminants can include (Dippenaar May 2018):

M	**Metals**	Ti, Cr, Cd, Pb, Fe, Mn, Ni, Zn, As
N	**Nutrients**	NO_3, PO_4, Cl, salts of Ca, Na, K, Mg
O	**Organics**	formaldehyde, methanol
P	**Pathogens**	bacteria, viruses, microorganisms, fungi

These leach from:

1. Chemical substances such as those used in chemotherapy or the embalming process e.g. arsenic, formaldehyde and methanol;
2. Makeup such as cosmetics, pigments and other chemical compounds.
3. Items such as cardiac pacemakers, paints, varnishes, metal hardware, batteries and dentures.
4. Microorganisms such as bacteria, viruses, intentinal fungi, protozoa and other pathogens.

Water quality determinants during the last phase of site assessment and groundwater monitoring should incorporate major and trace element chemistry, microbiology, physical determinants, and, if possible, selected organics such as formaldehyde. For monitoring purposes or to possibly aid in the earlier detection of potential contamination, the following analytical parameters are recommended:

1. Metals used in coffin ornaments or jewellery, or those historically used in embalming: e.g. aluminium, arsenic, cadmium, chrome, copper, iron, lead, mercury, nickel, vanadium, zinc.
2. Nutrients and compounds associated with both the landscaping processes as well as the breakdown of the skeleton: e.g. sodium, potassium, calcium, magnesium, chloride, fluoride, sulphate, nitrate, phosphate.
3. Organics associated with embalming or daughter products of expected other organic compounds: e.g. formaldehyde.
4. Pathogens associated with the breakdown of biological materials; where appropriate, other pathogens expected: e.g. E. coli.
5. Other fundamental physical parameters such as pH, hardness, TDS and electrical conductivity.

Water affects cemeteries in both its presence or absence, and in terms of what the quality of the available water is. Shallow groundwater results in partial saturation and may flood the graves, resulting in waterlogging of the coffin. This results in oxidizing conditions becoming more reducing. In the latter instance, the aggressiveness of the subsurface differs based on moisture content.

The following is also recommended at cemetery sites:

1. A reduction in irrigation for landscaping is proposed as a generic mitigation measure. Graves will likely cause zones of preferential infiltration if somewhat depressed, or will

likely increase erosion or obstruct runoff if mounded. Optimal landscaping practices with minimal irrigation at low intensity will ensure that grass can grow without extensive mobilisation of possible contaminants.
2. Planting larger and indigenous trees with deeper root systems may aid in redistributing subsurface moisture and preventing waterlogging of graves and backfill. Where possible, natural vegetation and trees should not be removed, or should be replanted to aid in the natural management of subsurface waters.
3. Minimal accessories should be buried and coffins should preferably not contain too many artificial metals and plastics. These do, over time, mobilise, to the likely detriment of the receiving environment and groundwater and surface water resources.
4. Hardness tends to immobilise some contaminants such as metals and reduce corrosion. If possible, small amounts of lime or dolomite may contribute to attenuating contaminants on-site.

In terms of cumulative impacts other possible sources of contamination in the project area include:

1. The old, open cast mining works and zama zama activities in the area. The extent of the old (and possibly new) mine activities are not known and the old mine adits could be water logged or act as groundwater flow paths. The connectivity between the underlaying colluvial soils and andesite rock and the older quartz reef is not known. Based on topography and defined groundwater flow direction the old mine working could have an impact on the groundwater quality and levels underlying the cemetery site and not vice versa. The quartz also dips away from the cemetery site; towards the southeast.
2. Possible spills or storm water management system failure / overflows at the Averda incinerator, during heavy rainfall events.
3. Leaking sewer systems at Dawkinsville.
4. Possible groundwater quality impacts associated with the Transnet facility.
5. The existing, but very old war memorial and concentration camp cemetery on the western boundary (downstream side) of the proposed new cemetery. The old cemetery dates from the 1900's.

Site specific groundwater level or quality data was not available because there are no boreholes on site. Based on available literature and NGA data it was concluded that negative impacts are not expected on the groundwater environment, primarily based on a groundwater table depth in excess of 6 m – thick vadose zone, as well as the lack of groundwater use in the area. No boreholes were found within the 500 m study zone. Within a 1-kilometre radius downstream boreholes are listed at:

1. Land owned by Mr Marius Boshoff, Gold Estates no 4 and 5. The boreholes are however not in use as they use municipal supply.
2. Based on the NGA data, boreholes are located at the Klerksdorp hospital and also the Klerksdorp High School. The current use could not be determined.

On site groundwater assessment and monitoring boreholes are recommended to better define the local groundwater level depths and flow directions, but also to define the current groundwater quality characteristics. One upstream and two downstream boreholes are recommended:

- upstream between the cemetery site and the Averda incinerator; and
- downstream – one borehole along the southern boundary (possibly on the fault) and one borehole to the west, in the Transnet property.

Conclusions

Based on the WRC Report by Mr Dippenaar (May 2018) the following minimum requirements were presented in terms of the positioning of a cemetery:

1. The cemetery must not be closer than 250 to 500 m from any drinking water source – this was confirmed.
2. The cemetery must not be closer than 30 to 100 m from any surface water bodies e.g., a river, well or spring – this was confirmed.
3. The cemetery must not be positioned in areas where the groundwater table is closer than 4.0 m from surface – based on the soil study and old mine shaft the water table appears to be in excess of 3 meters, possible more than 6 m (based on dry shaft depth).
4. There should be an absence in terms of perched aquifers – none identified in first 3 m below surface.
5. The soil conductivities should be in the order of $1x10^{-7}$ to $5x10^{-5}$ cm/s - K value of 10^{-5} cm/s calculated.
6. Thick excavatable soils – this was confirmed. See soil study results for more details.
7. Stable sidewalls – see soil study results for more details.
8. Surface gradient of 2° to 6° – see soil study results for more details. The topography is generally flat, with a low gradient towards the west. The regional surface water drainage is in a southerly direction; locally drainage will be west to southwest.

These requirements were considered during the groundwater basic assessment and are not the only prescribed minimum requirements associated with groundwater or other specialist environmental assessments and the placement of a new cemetery.

The proposed cemetery site is in the C24H quaternary catchment, and is associated with the Schoonspruit, which is approximately 1.6 km downstream from the proposed cemetery site.

On surface, the area is covered by colluvial soil. Below the soil / sandy colluvium is amygdaloidal lava (andesite), agglomerate and tuff of the Rietgat Formation, Ventersdorp Supergroup. The ridge along the eastern boundary of the proposed cemetery consists of quartz, conglomerate and shale from the Central Rand Group, Witwatersrand Supergroup. Old, open cast mining / excavation works are visible along the length of this ridge.

The soil study found that the project area is covered by a thick layer of colluvium (moist, brownish, loose, intact, silty sand), with soil depths exceeding 3 m in most of the test pits. No water seepage was observed in any of the test pits. This confirms a water table in excess of 3 m below surface, on site. An old vertical shaft was found on site (near test pit KS/41). The shaft was however dry, that confirmed a water table depth (saturated zone) in excess of 6 m below surface.

A hydrocensus was completed in January 20201 across the study area. Only 2 boreholes were identified in a 1.5 km radius – borehole NOA1 is on the property of Mr Marius Boshoff (Gold Estates no 4 & 5), approximately 900 m south of the proposed cemetery site and the second borehole was found at the Klerksdorp waste landfill site; approximately 1.4 km to the east.

A groundwater level measurement was possible at the landfill site borehole (KD11 – 3.6 m below surface). Borehole NOA1 at Mr Boshoff's farm was dry, up to a depth of 22 m below surface. According to the NGA, 23 registered boreholes are located within a 5-kilometer radius of the proposed cemetery in Golden Way, Klerksdorp. Based on the NGA data the groundwater levels vary between 1.5 m and 17.8 metres below surface, with a geometric mean depth of 6.87 m below

surface. Borehole yields vary between 0.3 L/s and 4.4 L/s, with an average yield of 1.24 L/s. The ratio between surface elevation and the groundwater elevation is approximately 99.9%. This means that the depth to groundwater table correlates well with the topography, indicating that on a local scale groundwater flow follows topography.

A groundwater sample was collected from borehole KD11. The laboratory analysis indicates that most of the salts and metals were present in concentrations below the SANS241 guideline limits. The laboratory results present elevated aluminium and iron concentrations; turbidity value and heterotrophic plate count.

The risk of groundwater contamination through leachate from cemeteries is not uniform as it is influenced by a number of physical and other factors, the most important being the soil characteristics (type of soil, depth, pH, permeability and porosity), climate (rainfall and temperature), geology, the hydrological setting, and terrain features.

Groundwater related risks at cemeteries are mostly focussed on groundwater contamination, plus safety issues in terms of stability of the excavations. The following groundwater quality impacts are possible (from WRC report by Matthys A. Dippenaar, et al. May 2018 – Environmental Risk Assessment, Monitoring and Management of Cemeteries).

1. Bodies decompose and during this process, leachates that contain bacteria, viruses and organic and inorganic chemical decomposition products are produced. Pathogens such as Anthrax, Smallpox and TB are known to survive in soil and water and some are able to multiply if soil conditions are favourable.
   (Dent, www.science.uts.edu.au/des/StaffPages/BoydDent/story).
2. Other contaminants include arsenate pentachlorophenol and formaldehyde (a known carcinogen) released from burial materials and embalming fluids (Best Available Science, 2004; Goodman, 2006; WHO, 1998).
3. Furthermore, coffins also decompose, and are usually fitted with metal handles, hinges and accessories, and many are varnished or painted. A wide range of heavy metals and other potentially harmful compounds may be released from coffins to eventually seep into the groundwater, and from there to boreholes or streams (Bitton et al., 1983; Dent, n.d.; Rogers, 2004; Vass, 2001).

With respect to the decomposition process itself, it is estimated that water, salts (N, P, Cl, HCO_3, Ca, Na and compounds of metals such as Ti, Cr, Cd, Pb, Fe, Mn and Ni), and organic substances leach from the burial cavity (Żychowski and Bryndal, 2015).

In terms of cumulative impacts other possible sources of contamination in the project area include:

1. The old, open cast mining works and zama zama activities in the area. The extent of the old (and possibly new) mine activities are not known and the old mine adits could be water logged or act as groundwater flow paths. The connectivity between the underlaying colluvial soils and andesite rock and the older quartz reef is not known. Based on topography and defined groundwater flow direction the old mine working could have an impact on the groundwater quality and levels underlying the cemetery site and not vice versa. The quartz also dips away from the cemetery site; towards the southeast.
2. Possible spills or storm water management system failure / overflows at the Averda incinerator, during heavy rainfall events.
3. Leaking sewer systems at Dawkinsville.
4. Possible groundwater quality impacts associated with the Transnet facility.

5. The existing, but very old war memorial and concentration camp cemetery on the western boundary (downstream side) of the proposed new cemetery. The old cemetery dates from the 1900's.

Site specific groundwater level or quality data was not available because there are no boreholes on site. Based on available literature and NGA data it was concluded that negative impacts are not expected on the groundwater environment, primarily based on a groundwater table depth in excess of 6 m – thick vadose zone, as well as the lack of groundwater use in the area. No boreholes were found within the 500 m study zone. Within a 1-kilometre radius downstream boreholes are listed at:

1. Land owned by Mr Marius Boshoff, Gold Estates no 4 and 5. They are however not using the boreholes and use municipal supply.
2. Based on the NGA data boreholes are located at the Klerksdorp hospital and also the Klerksdorp High School. The current use could not be determined.

Recommendations

On site groundwater assessment and monitoring boreholes are recommended to better define the local groundwater level depths and flow direction, but also to define the current groundwater quality characteristics. One upstream and two downstream boreholes are recommended – upstream between the cemetery site and the Averda incinerator and downstream – one borehole along the southern boundary (possibly on the fault) and one borehole to the west, in the Transnet property.

Mapping of the fault on site is recommended and should be done by applying geophysical surveying techniques.

Water quality determinants during the last phase of site assessment and groundwater monitoring should incorporate major and trace element chemistry, microbiology, physical determinants, and, if possible, selected organics such as formaldehyde.

For monitoring purposes or to possibly aid in the earlier detection of potential contamination, the following analytical parameters are recommended:

- Metals used in coffin ornaments or jewellery, or those historically used in embalming: e.g. aluminium, arsenic, cadmium, chrome, copper, iron, lead, mercury, nickel, vanadium, zinc.
- Nutrients and compounds associated with both the landscaping processes as well as the breakdown of the skeleton: e.g. sodium, potassium, calcium, magnesium, chloride, fluoride, sulphate, nitrate, phosphate.
- Organics associated with embalming or daughter products of expected other organic compounds: e.g. formaldehyde.
- Pathogens associated with the breakdown of biological materials; where appropriate, other pathogens expected: e.g. E. coli.
- Other fundamental physical parameters such as pH, hardness, TDS and electrical conductivity.

The following is also recommended at cemetery sites:

- A reduction in irrigation for landscaping is proposed as a generic mitigation measure. Graves will likely cause zones of preferential infiltration if somewhat depressed, or will likely increase erosion or obstruct runoff if mounded. Optimal landscaping practices with minimal irrigation

at low intensity will ensure that grass can grow without extensive mobilisation of possible contaminants.
- Planting larger and indigenous trees with deeper root systems may aid in redistributing subsurface moisture and preventing waterlogging of graves and backfill. Where possible, natural vegetation and trees should not be removed, or should be replanted to aid in the natural management of subsurface waters.
- Minimal accessories should be buried and coffins should preferably not contain too many artificial metals and plastics. These do, over time, mobilise, to the likely detriment of the receiving environment and groundwater and surface water resources.
- Hardness tends to immobilise some contaminants such as metals and reduce corrosion. If possible, small amounts of lime or dolomite may contribute to attenuating contaminants on-site.

6.2 BIOLOGICAL ENVIRONMENT

The following information has been extracted from the Ecological Fauna and Flora Habitat Survey undertaken by Anthene Ecological CC. Refer to Appendix D4.

6.2.1 Ecological Fauna and Flora Habitat

Introduction

An ecological habitat survey is required for a proposed development at Dawkinsville at the southeastern parts of Klerksdorp, Matlosana Local Municipality, North West Province, South Africa (elsewhere referred to as the site). The 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.

Objectives of the habitat study

- 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.
- Recording of possible host plants or foodplants of fauna such as butterflies.
- 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.
- Integration of literature investigation and field observations to make recommendations to reduce or minimise impacts, should the development be approved.

Study Area

The study area is located at Dawkinsville at the southeastern parts of Klerksdorp, Matlosana Local Municipality, North West Province. Site is situated at the Grassland Biome which is represented by the Vaal-Vet Sandy Grassland vegetation type (Mucina & Rutherford, 2006). A brief overview of the vegetation type, which serves as an outline of the ecological context of the site, follows.

Gh 10 Vaal-Vet Sandy Grassland

Distribution: In South Africa the Vaal-Vet Sandy Grassland is present in the North-West Province and Free State Province. Vaal-Vet Sandy Grassland ranges from south of Lichtenburg and Ventersdorp to Klerksdorp, Leeudoringstad, Bothaville and to the Brandfort areas north of Bloemfontein. Altitude ranges from 1 220 – 1560 m for the entire vegetation type (Mucina & Rutherford 2006).

Vegetation and landscape features: Plains-dominated landscape with some scattered, slightly undulating plains and hills. Mainly low-tussock grasslands with an abundant karroid element are present. Dominance of *Themeda triandra* is an important feature of this vegetation unit. Locally low cover of *Themeda triandra* and the associated increase in *Elionurus muticus*, *Cymbopogon pospischilii* and *Aristida congesta* is attributed to heavy grazing and/or erratic rainfall. Geology and soils: Aeolian and colluvial sand overlying sandstone, mudstone, and shale of the Karoo Supergroup (mostly the Ecca group) as well as older Ventersdorp Supergroup and basement gneiss in the north (Mucina & Rutherford 2006).

Climate: Warm-temperate, summer-rainfall climate, with overall mean annual precipitation of 530 mm. High summer temperatures. Severe frost (37 days per year on average) occurs in winter (Mucina & Rutherford 2006).

Discussion

Habitat and vegetation characteristics

An outline of the habitat and vegetation characteristics is given in Table 4.1. of the Ecological Fauna and Flora Habitat Survey *(refer to Appendix D4 for referenced tables).*

Plants

Threatened, Near Threatened and other plant species of high conservation priority in North West Province are listed in Tables 4.2 – 4.8. Protected tree species are listed in Table 4.9. The presence or not of all the species listed in the tables were investigated during the survey.

None of the Threatened and Near Threatened plant species are likely to occur on the site. The site contains few individuals of the Protected Tree species *Vachellia erioloba* (Camel Thorn). In terms of a part of section 15(1) of the National Forests 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.

Apart from *Vachellia erioloba* which is a Protected Tree species, none of the other plant species of particular conservation priority appear to occur at the site.

Vertebrates

Mammals

Table 4.10, Table 4.11 and Table 4.12 list the possible presence or absence of threatened mammal species, near threatened mammal species and mammal species of which the status is uncertain, respectively, at the site. Literature sources that were used are Friedman & Daly (2004), Skinner & Chimimba (2005) and Child *et al.* (2017). Since the site falls outside reserves, threatened species such as the black rhinoceros (*Diceros bicornis*) and the African wild dog (*Lycaon pictus*) are obviously not present. No smaller mammals of particular high conservation significance are likely to be found on the site as well.

Birds

Table 4.13 and Table 4.14 list the possible presence or absence of threatened bird species and near threatened bird species at the site. With bird species which often have a large distributional range, their presence does not imply that they are particularly dependent on a site as breeding location. Therefore, the emphasis in the right-hand columns of Table 4.12 and Table 4.13 are on the particular likely dependance or not of bird species on the site. Literature sources that were mainly consulted are Barnes (2000), Hockey, Dean & Ryan (2005) and Chittenden et. al. (2016). No threat to any threatened bird species or any bird species of particular conservation importance are foreseen.

Reptiles

Table 4.15 and Table 4.16 list the possible presence or absence of Threatened and Near Threatened reptile species on the site. Main Source used for the conservation status and identification of reptiles are Bates, Branch, Bauer, Burger, Marais, Alexander & de Villiers (2014). Alexander & Marais (2007) as well as Tolley & Burger 2007) give useful indications of distributions, habitats and identification of the reptile species. There appears to be no threat to any reptile species of particular high conservation importance if the site is developed.

Amphibians

No frog species that occur in the North West are listed as Threatened species (Vulnerable, Endangered or Critically Endangered) or Near Threatened species according to IUCN Amphibian Specialist Group (2013). Table 4.17 lists *Pyxicephalus adspersus* (Giant Bullfrog) as Least Concern globally. According to the Biodiversity Management Directorate of GDARD (Gauteng Department of Agriculture and Rural Development) (2014) there are no amphibians in Gauteng that qualify for red listed status (red listed here indicates a catecory of special conservation concern such as threatened or near threatened). Suitable habitat for Giant Bullfrog at site appears to be absent.

Invertebrates

Butterflies

Studies about the vegetation and habitat of threatened butterfly species in South Africa showed that ecosystems with a unique combination of features are selected by these often localised threatened butterfly species (Deutschländer and Bredenkamp 1999; Edge 2002, 2005; Terblanche, Morgenthal & Cilliers 2003; Lubke, Hoare, Victor & Ketelaar 2003; Edge, Cilliers & Terblanche,

2008). Threatened butterfly species in South Africa can then be regarded as bio-indicators of rare ecosystems.

Four species of butterfly in Gauteng Province and North West Province combined are listed as threatened in the recent butterfly conservation assessment of South Africa (Mecenero *et al*., 2013). The expected presence or not of these threatened butterfly species as well as species of high conservation priority that are not threatened, at the site (Table 4.18 and Table 4.19) follows.

Assessment of threatened butterfly species

*Aloeides dentatis dentatis (*Roodepoort Copper)

The proposed global red list status for *Aloeides dentatis dentatis* according to the most recent IUCN criteria and categories is Endangered (Mecenero *et al.,* 2013). *Aloeides dentatis dentatis* colonies are found where one of its host plants *Hermannia depressa* or *Lotononis eriantha* is present. Larval ant association is with *Lepisiota capensis* (S.F. Henning 1983; S.F. Henning & G.A. Henning 1989). The habitat requirements of *Aloeides dentatis dentatis* are complex and not fully understood yet. See Deutschländer and Bredenkamp (1999) for the description of the vegetation and habitat characteristics of one locality of *Aloeides dentatis* subsp. *dentatis* at Ruimsig, Roodepoort, Gauteng Province. There is not an ideal habitat of *Aloeides dentatis* subsp. *dentatis* on the site and it is unlikely that the butterfly is present at the site.

Chrysoritis aureus (Golden Opal/ Heidelberg Copper)

The proposed global red list status for *Chrysoritis aureus* according to the most recent IUCN criteria and categories is Endangered (Mecenero *et al.,* 2013) *Chrysoritis aureus* (Golden Opal/ Heidelberg Copper) is a resident where the larval host plant, *Clutia pulchella* is present. However, the distribution of the butterfly is much more restricted than that of the larval host plant (S.F. Henning 1983; Terblanche, Morgenthal & Cilliers 2003). One of the reasons for the localised distribution of *Chrysoritis aureus* is that a specific host ant *Crematogaster liengmei* must also be present at the habitat. Fire appears to be an essential factor for the maintenance of suitable habitat (Terblanche, Morgenthal & Cilliers 2003). Research revealed that *Chrysorits aureus* (Golden Opal/ Heidelberg Copper) has very specific habitat requirements, which include rocky ridges with a steep slope and a southern aspect (Terblanche, Morgenthal & Cilliers 2003). Owing to a lack of habitat requirements and ideal habitat the presence of the taxon is highly unlikely.

Lepidochrysops praeterita (Highveld Blue)

The proposed global red list status for *Lepidochrysops praeterita* according to the most recent IUCN criteria and categories is Endangered (G.A. Henning, Terblanche & Ball, 2009; Mecenero *et al.,* 2013). *Lepidochrysops praeterita* is a butterfly that occurs where the larval host plant *Ocimum obovatum* (= *Becium obovatum*) is present (Pringle, G.A. Henning & Ball, 1994), but the distribution of the butterfly is much more restricted than the distribution of the host plant. *Lepidochrysops praeterita* is found on selected rocky ridges and rocky hillsides in parts of Gauteng, the extreme northern Free State and the south-eastern Gauteng Province. No ideal habitat appears to be present for the butterfly on the site. It is unlikely that *Lepidochrysops praeterita* would be present on the site and at the footprint proposed for the development.

Orachrysops mijburghi (Mijburgh's Blue)

The proposed global red status for *Orachrysops mijburghi* according to the most recent IUCN criteria and categories is Endangered (Mecenero *et al.,* 2013). *Orachrysops mijburghi* favours grassland depressions where specific *Indigofera* plant species occur (Terblanche & Edge 2007). The Heilbron population of *Orachrysops mijburghi* in the Free State uses *Indigofera evansiana* as a larval host plant (Edge, 2005) while the Suikerbosrand population in Gauteng uses *Indigofera dimidiata* as a larval host plant (Terblanche & Edge 2007). There is no suitable habitat for *Orachrysops mijburghi* on the site and it is unlikely that *Orachrysops mijburghi* would be present on the site.

Conclusion on threatened butterfly species

There appears to be no threat to any threatened butterfly species if the site is developed.

Assessment of butterfly species that are not threatened but also of high conservation priority

Colotis celimene amina (Lilac tip)
Colotis celimene amina is listed as Rare (Low density) by Mecenero *et al.* (2013). In South Africa *Colotis celimene amina* is present from Pietermaritzburg in the south and northwards into parts of Kwa-Zulu Natal, Gauteng, Limpopo, Mpumalanga and the North West Provinces (Mecenero *et al.* In press.). Reasons for its rarity are poorly understood. It is highly unlikely that *Colotis celimene amina* would be resident at the site.

Lepidochrysops procera (Savanna Blue)
Lepidochrysops procera is listed as Rare (Habitat specialist) by Mecenero *et al.* (2013). *Lepidochrysops procera* is endemic to South Africa and found in Gauteng, KwaZulu-Natal, Mpumalanga and North West (Mecenero *et al.,* 2013). Owing to a lack of habitat requirements and ideal habitat the presence of the taxon at the site is highly unlikely.

Metisella meninx (Marsh Sylph)
Henning and Henning (1989) in the first South African Red Data Book of Butterflies, listed *Metisella meninx* as threatened under the former IUCN category Indeterminate. Even earlier in the 20th century Swanepoel (1953) raised concern about vanishing wetlands leading to habitat loss and loss of populations of *Metisella meninx*. According to the second South African Red Data Book of butterflies (Henning, Terblanche & Ball, 2009) the proposed global red list status of *Metisella meninx* has been Vulnerable. During a recent large scale atlassing project the *Conservation Assessment of Butterflies of South Africa, Lesotho and Swaziland: Red List and Atlas* (Mecenero *et al.,* 2013) it was found that more *Metisella meninx* populations are present than thought before. Based on this valid new information, the conservation status of *Metisella meninx* is now regarded as Rare (Habitat specialist) (Mecenero *et al.,* 2013). Though *Metisella meninx* is more widespread and less threatened than perceived before, it should be regarded as a localised rare habitat specialist of conservation priority, which is dependent on wetlands with suitable patches of grass at wetlands (Terblanche In prep.). Another important factor to keep in mind for the conservation of *Metisella meninx* is that based on very recent discoveries of new taxa in the group the present *Metisella meninx* is species complex consisting of at least three taxa (Terblanche In prep., Terblanche & Henning In prep.). The ideal habitat of *Metisella meninx* is treeless marshy areas where *Leersia hexandra* (rice grass) is abundant (Terblanche *In Prep*.). The larval host plant of *Metisella meninx* is wild rice grass, *Leersia hexandra* (G.A. Henning & Roos, 2001). Owing to a lack of habitat requirements and ideal habitat the presence of the taxon at the site is highly unlikely.

Platylesches dolomitica (Hilltop Hopper)
Platylesches dolomitica is listed as Rare (Low density) by Mecenero *et al.* (2013). Historically the conservation status of *Platylesches dolomitica* was proposed to be Vulnerable (Henning, Terblanche & Ball 2009). However this butterfly which is easily overlooked and has a wider distribution than percieved before. *Platylesches dolomitica* has a patchy distribution and is found on rocky ledges where *Parinari capensis* occurs, between 1300 m and 1800m (Mecenero *et al*. 2013, Dobson Pers comm.). Owing to a lack of habitat requirements and ideal habitat the presence of the taxon at the site is highly unlikely.

Fruit chafer beetles

Table 4.20 lists the fruit chafer beetle species (Coleoptera: Scarabaeidae: Cetoninae) that are of known high conservation priority in the North West Province. No *Ichnestoma stobbiai* or *Trichocephala brincki* were found during the surveys. There appears to be no suitable habitat for *Ichnestoma stobbiai* or *Trichocephala brincki* at the site. There appears to be no threat to any of the fruit chafer beetles of particular high conservation priority if the site were developed.

Scorpions

Table 4.21 lists the rock scorpion species (Scorpiones: Ischnuridae) that are of known high conservation priority in the North West Province. None of these rock scorpions have been found at the site and the habitat does not appear to be optimal.

<u>Ecological Sensitivity at the site</u>

Ecological sensitivity at the site is medium-low (Figure 6).

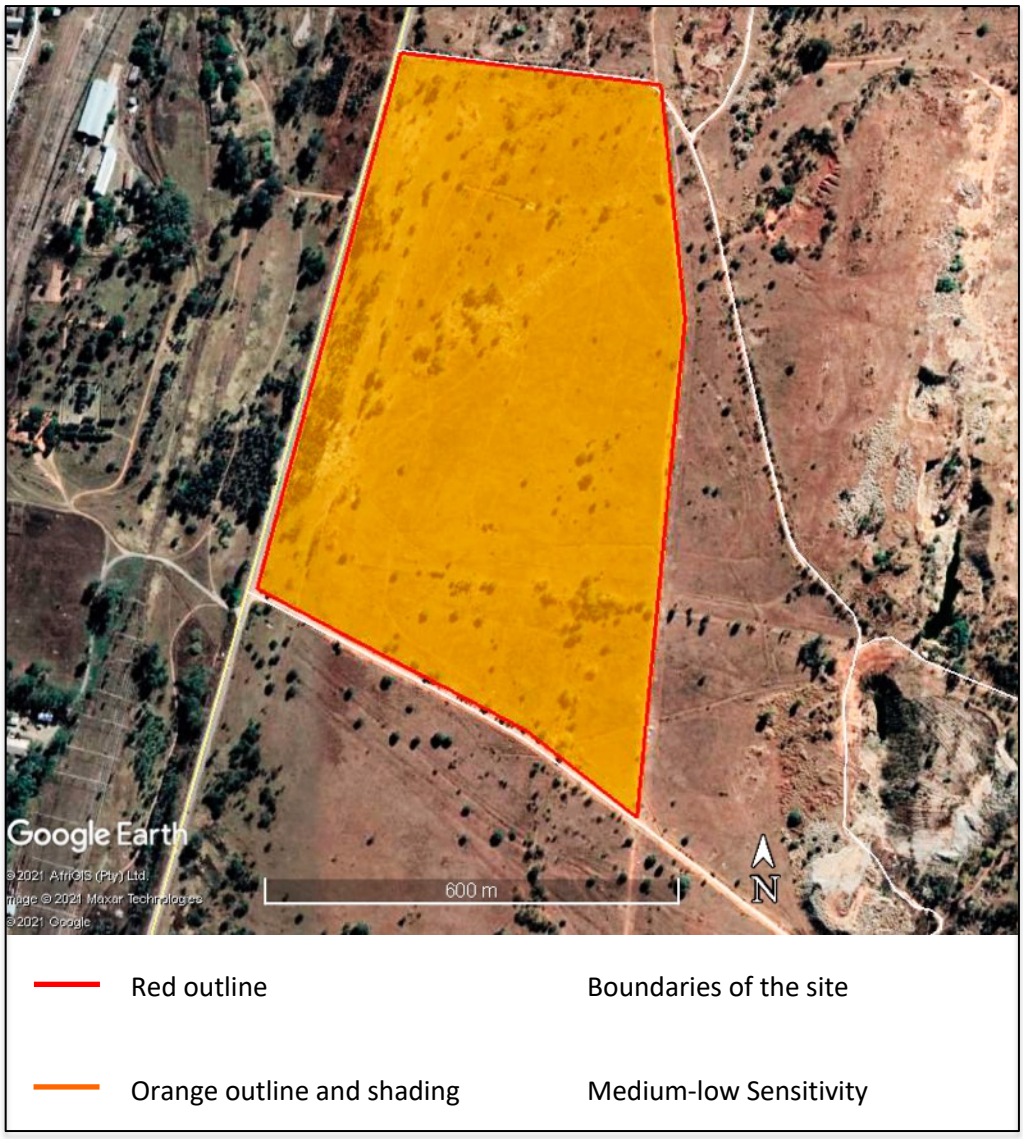


Figure 6: Ecological sensitivity Map

RISKS, IMPACTS AND MITIGATION

Background:

Habitats of threatened plants are in danger most often due to urban developments such as is the case for the Gauteng Province (Pfab & Victor, 2002). Habitat conservation is the key to the conservation of invertebrates such as threatened butterflies (Deutschländer and Bredenkamp 1999; Edge 2002, 2005; Terblanche, Morgenthal & Cilliers 2003; Lubke, Hoare, Victor & Ketelaar 2003; Edge, Cilliers & Terblanche, 2008). Furthermore, corridors and linkages may play a significant role in insect conservation (Pryke & Samways, 2003, Samways, 2005).

Urbanisation is a major additional influence on the loss of natural areas (Rutherford & Westfall 1994). In the South Africa the pressure to develop areas are high since its infrastructure allows for improvement of human well-being. Urban nature conservation issues in South Africa are overshadowed by the goal to improve human well-being, which focuses on aspects such as poverty, equity, redistribution of wealth and wealth creation (Cilliers, Müller & Drewes 2004).

Nevertheless, the conservation of habitats is the key to invertebrate conservation, especially for those threatened species that are very habitat specific. This is also true for any detailed planning of corridors and buffer zones for invertebrates. Though proper management plans for habitats are not in place, setting aside special ecosystems is in line with the resent Biodiversity Act (2004) of the Republic of South Africa.

Corridors are important to link ecosystems of high conservation priority. Such corridors or linkages are there to improve the chances of survival of otherwise isolated populations (Samways, 2005). How wide should corridors be? The answer to this question depends on the conservation goal and the focal species (Samways, 2005). For an African butterfly assemblage this is about 250m when the corridor is for movement as well as being a habitat source (Pryke and Samways 2003). Hill (1995) found a figure of 200m for dung beetles in tropical Australian forest. In the agricultural context, and at least for some common insects, even small corridors can play a valuable role (Samways, 2005). Much more research remains to be done to find refined answers to the width of grassland corridors in South Africa. The width of corridors will also depend on the type of development, for instance the effects of the shade of multiple story buildings will be quite different from that of small houses.

To summarise: In practice, as far as developments are concerned, the key would be to prioritise and plan according to sensitive species and special ecosystems.

<u>In the case of this study:</u>

Owing to excavations of the past, present extensive informal dumping, free-roaming cattle, scraped areas, tracks and footpaths much of the vegetation at the site is conspicuously disturbed. Alien invasive wees and tree species are visible at these disturbed areas. Indigenous trees, forbs and grasses are present at remaining grassland patches. Indigenous tree species that are present include *Vachellia karroo* (Sweet Thorn) and *Vachellia erioloba* (Camel Thorn). Indigenous grass species at the site include *Aristida congesta*, *Melinis repens*, *Cynodon dactylon*, *Eragrostis curvula*, *Eragrostis lehmanniana*, *Eragrostis superba* and *Pogonarthria squarrosa*. Indigenous forbs such as *Gazania krebsiana*, *Chamaesyce inaequilatera, Hibiscus pusillus, Monsonia burkeana* and *Hilliardiella oligocephala* are found at the site.

Extensive clumps of the alien invasive tree *Eucalyptus camaldulensis* occur at the site. Other alien invasive tree species include *Melia azedarach* and *Gleditsia triacanthos*. Alien invasive weeds are widespread at disturbed areas at the site and include *Tagetes minuta*, *Datura ferox*, *Bidens pilosa*, *Conyza bonariensis*, *Verbena aristigera* and *Sonchus oleraceus*.

There are no rocky ridges at the site.

No wetlands or rivers are present at the site.

Grassland at the site is represented by the Vaal-Vet Sandy Grassland vegetation type (Gh 10) which is listed as a Threatened Ecosystem, Endangered, according to the National List of Threatened Ecosystems (2011). Vegetation at the site has been disturbed, modified and in some areas transformed. The site is isolated in a larger area of which the vegetation is disturbed, modified or transformed. The scope for the restoration and conservation of a natural grassland representative of the vegetation type is small.

No Threatened or Near Threatened plant or animal species appear to be resident at the site.

The site contains the widespread Protected Tree species *Vachellia erioloba* (Camel Thorn). In terms of a part of section 15(1) of the National Forests 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 (Figure 6).

There is little scope site to be part of a corridor of particular conservation importance.

The following potential risks, impacts and mitigation measures apply to the proposed development:

Identification of potential impacts and risks

The potential impacts identified are:

Summary of Issues identified during the Project Notification Phase

The potential botanical issues identified include:

- Loss of habitat owing to the removal of vegetation at the proposed footprint.
- Loss of sensitive species (Threatened, Near Threatened, Rare, Declining or Protected species).
- Loss of connectivity and conservation corridor networks in the landscape.
- An increased infestation of exotic or alien invasive plant species owing to disturbance.
- Contamination of soil during construction.

Identification of Potential Impacts/Risks

The potential impacts identified are:

Construction Phase
- Potential impact 1: Loss of habitat owing to the removal of vegetation at the proposed footprint.
- Potential impact 2: Loss of sensitive species (Threatened, Near Threatened, Rare, Declining or Protected species) during the construction phase.
- Potential impact 3: Loss of connectivity and conservation corridor networks in the landscape.
- Potential impact 4: Contamination of soil during construction in particular by hydrocarbon spills.
- Potential impact 5: Killing of vertebrate fauna during the construction phase.

Operational Phase
- Potential impact 6: An increased infestation of exotic or alien invasive plant species owing to disturbance.

Potential Impacts during the Construction Phase

Aspect/Activity	**Removal of vegetation at the proposed footprint.**
Type of Impact (i.e. Impact Status)	Direct
Potential Impact	Clearing of vegetation at habitat of medium and low sensitivity at the proposed footprint.
Status	Negative
Mitigation Required	Cultivation of indigenous plant species at the site is imperative. Control of alien invasive plant species should be applied.
Impact Significance (Pre-Mitigation)	Moderate

Impact Significance (Post-Mitigation)	Moderate

Aspect/Activity	**Removal of sensitive species**
Type of Impact (i.e. Impact Status)	Direct
Potential Impact	Sensitive species: Presence of Threatened or Near Threatened Mammals, Reptiles, Amphibians and Invertebrates at the site appear to be unlikely. A widespread Protected tree species at the site, *Vachellia erioloba* (Camel Thorn), is listed as a Declining (not Threatened) plant species. *Vachellia erioloba* occurs in relatively low numbers at the site. Camel Thorn forests containing particularly large *Vachellia erioloba* individuals are absent at the site (Reference sites for such special Camel Thorn trees are Witsand Nature Reserve and Kathu Camel Thorn Forest visited/ researched in the past by the specialist).
Status	Negative
Mitigation Required	Avoidance of individual *Vachellia erioloba* trees where practical (Application for permits when *Vachellia erioloba* trees will be damaged or removed, if the development is approved, is essential).
Impact Significance (Pre-Mitigation)	Moderate
Impact Significance (Post-Mitigation)	Low

Aspect/Activity	**Fragmentation of corridors of particular conservation concern**
Type of Impact (i.e. Impact Status)	Direct
Potential Impact	The scope for the site to be a corridor of particular conservation concern at the site is small.
Status	Negative
Mitigation Required	Cultivation of indigenous plant species at the site is imperative.
Impact Significance (Pre-Mitigation)	Moderate
Impact Significance (Post-Mitigation)	Low

Aspect/Activity	**Contamination of soil by leaving rubble/ waste or spilling petroleum fuels or any pollutants on soil which could infiltrate the soil**
Type of Impact (i.e. Impact Status)	Direct
Potential Impact	Rubble or waste could lead to infiltration of unwanted pollutants into the soil. Spilling of petroleum fuels and unwanted chemicals onto the soils that infiltrate these soils could lead to pollution of soils.
Status	Negative
Mitigation Required	Rubble or waste that could accompany the construction effort, if the development is approved, should be removed during and after construction. Measures should be taken to avoid any spills and infiltration of petroleum fuels or any chemical pollutants into the soil during construction phase.
Impact Significance (Pre-Mitigation)	Moderate
Impact Significance (Post-Mitigation)	Low

Aspect/Activity	**Possible disturbance, trapping, hunting and killing of vertebrates during construction phase**
Type of Impact (i.e. Impact Status)	Direct
Potential Impact	During the construction phase animal species could be disturbed, trapped, hunted or killed.
Status	Negative
Mitigation Required	If the development is approved, contractors must ensure that no animal species are disturbed, trapped, hunted or killed during the construction phase.
Impact Significance (Pre-Mitigation)	Moderate
Impact Significance (Post-Mitigation)	Low

Potential Impacts during the Operational Phase

Aspect/Activity	An increased infestation of exotic or alien invasive plant species owing to clearance or disturbance where the footprint took place.
Type of Impact	Direct
Potential Impact	Infestation by alien invasive species could replace indigenous vegetation or potential areas where indigenous vegetation could recover. It is in particular declared alien invasive species such as Melia azedarach (Syringa Berrytree) and Australian *Acacia* species that should not be allowed to establish because once established these combating these alien invasive plant species may become very expensive in the long term.
Status	Negative
Mitigation Required	Continued monitoring and eradication of alien invasive plant species are imperative. It is in particular declared alien invasive species such as alien inasive Australian *Acacia* species, *Melia azedarach* (Syringa Berrytree) and *Prosopis glandulosa* (Honey Mesquite) that should not be allowed to establish.
Impact Significance (Pre-Mitigation)	Moderate
Impact Significance (Post-Mitigation)	Low

Summary of risks and impacts

Ecological sensitivity at the site is medium-low (Figure 6).

No Threatened or Near Threatened plant or animal species appear to be resident at the site. No other plant or animal species of particular conservation importance appear to be present at the site, apart from the widespread tree species *Vachellia erioloba* which is a Protected Tree species. Where practical individual *Vachellia erioloba* trees are to be avoided at the site otherwis a permit should be applied for if any *Vachellia erioloba* trees will be damaged or destroyed at the proposed footprint, if the development is approved. In terms of a part of section 15(1) of the National Forests 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.

Following the mitigations which will be upheld and planned footprint for development all the impact risks listed above are moderate or low.

CONCLUSION

- Owing to excavations of the past, present extensive informal dumping, free-roaming cattle, scraped areas, tracks and footpaths much of the vegetation at the site is conspicuously disturbed. Alien invasive wees and tree species are visible at these disturbed areas. Indigenous trees, forbs and grasses are present at remaining grassland patches. At some areas individual trees are chopped. Indigenuous tree species that are present include *Vachellia karroo* (Sweet Thorn) and *Vachellia erioloba* (Camel Thorn). Indigenous grass species at the site include *Aristida congesta*, *Melinis repens*, *Cynodon dactylon*, *Eragrostis curvula*, *Eragrostis lehmanniana*, *Eragrostis superba* and *Pogonarthria squarrosa*. Indigenous forbs such as *Gazania krebsiana*, *Chamaesyce inaequilatera, Hibiscus pusillus, Monsonia burkeana* and *Hilliardiella oligocephala* are found at the site.
- Extensive clumps of the alien invasive tree *Eucalyptus camaldulensis* occur at the site. Other alien invasive tree species include *Melia azedarach* and *Gleditsia triacanthos*. Alien invasive

weeds are widespread at disturbed areas at the site and include *Tagetes minuta*, *Datura ferox*, *Bidens pilosa*, *Conyza bonariensis*, *Verbena aristigera* and *Sonchus oleraceus*.

- There are no rocky ridges at the site.
- No wetlands or rivers are present at the site.
- Grassland at the site is represented by the Vaal-Vet Sandy Grassland vegetation type (Gh 10) which is listed as a Threatened Ecosystem, Endangered, according to the National List of Threatened Ecosystems (2011). Vegetation at the site has been disturbed, modified and in some areas transformed. The site is isolated in a larger area of which the vegetation is disturbed, modified or transformed. The scope for the restoration and conservation of a natural grassland representative of the vegetation type is small.
- No Threatened or Near Threatened plant or animal species appear to be resident at the site.
- The site contains the widespread Protected Tree species *Vachellia erioloba* (Camel Thorn). In terms of a part of section 15(1) of the National Forests 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 (Figure 6).
- Following the mitigations which will be upheld and planned footprint for development all the impact risks listed above are moderate or low.
- If the development is approved a key issue would be continued monitoring and eradication of alien invasive plant species. It is in particular alien invasive species such as *Melia azedarach* (Syringa Berrytree) and alien invasive Australian *Acacia* species, which should not be allowed to establish.
- If the development is approved an opportunity presents itself to cultivate indigenous plant species which would benefit urban nature conservation.

6.3 SOCIAL ENVIRONMENT

6.3.1 Social and land use characteristics

Land use in the vicinity predominantly consists of the following:

Residential
The suburb of Dawkinsville is located to the north of the subject site.

Municipal
The decommissioned Old Klerksdorp Cemetery is located some 300 metres due west of the activity site and opposite Golden Way.

The existing Klerksdorp Cemetery that is currently approaching full capacity is located approximately four kilometres due north east along the old Stilfontein road.

The subject site is being surrounded by land zoned for municipal purposes of municipal land use (Portion 1 of the farm Townlands of Klerksdorp 424 IP).

Infrastructural
The subject site is being bordered to the west by Gold Way.

An overhead electrical line bisects the central section of the subject site from north east to south west.

Underground wet services with manholes are located along the eastern perimeter of the site.

In view of the above considerations the area in question can no longer be described as a traditionally agricultural node but rather a mixed land use area with municipal overtones.

Since the receiving environment is already being characterised by mixed land uses, it is not envisaged that the development will significantly affect the social characteristics of the immediate environment.

Economic

The subject property is not at present being utilised for any specific economic gain.

The development will in all probability lead to employment opportunities during the construction and operational phases, the strengthening of the local business sector during the construction and operational phases as well as increased municipal revenue during the operational phase.

6.3.2 Heritage and Cultural Value

The following information has been extracted from the Heritage Impact Assessment Report undertaken by APelser Archaeological Consulting. Refer to Appendix D.5.

Introduction

APelser Archaeological Consulting (APAC) was appointed by EnviroVision Consulting cc, on behalf of Malankane Consulting Engineers (Pty) Ltd, to conduct a Phase 1 HIA for the proposed establishment of a new cemetery (Dawkinsville Cemetery) on the Remainder of Portion 1 of the farm Townlands of Klerksdorp 424IP. The study area is located in the City of Matlosana Local Municipality (Klerksdorp) of the Northwest Province.

Background research indicates that there are some cultural heritage sites and features in the larger geographical area within which the study area falls. The assessment of the specific study area did not identify any sites, features or material of cultural heritage (archaeological and/or historical) origin or significance.

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;

Description of the Area

The study & proposed Dawkinsville Cemetery establishment area is situated on the Remainder of the original farm Townlands of Klerksdorp 424IP, in the City of Matlosana Local Municipality of the Northwest Province.

The topography of the study area is mostly flat and open with no rocky outcrops, ridges or hills present. Vegetation (grass and tree cover) was not dense during the field assessment and visibility on the ground was therefore good. The informal dumping of residential refuse and building rubble occurs throughout the area as well. The area would have been used in the past for agricultural purposes and if any sites, features or material of cultural heritage (archaeological and/or historical) origin or significance existed here in the past it would have been extensively disturbed or destroyed as a result. Other recent impacts include an Eskom Powerline and servitude that crosses through the area, as well as some dirt roads and tracks.

The area surrounding the proposed development has been substantially impacted in the recent past through urban residential, business & industrial related developments and as a result the original natural and historical landscape has been completely altered.

Discussion

The Stone Age is the period in human history when lithic (stone) material was mainly used to produce tools. In South Africa the Stone Age can be divided basically into three periods. It is however important to note that dates are relative and only provide a broad framework for interpretation. A basic sequence for the South African Stone Age (Lombard et.al 2012) is as follows:

Earlier Stone Age (ESA) up to 2 million – more than 200 000 years ago
Middle Stone Age (MSA) less than 300 000 – 20 000 years ago
Later Stone Age (LSA) 40 000 years ago – 2000 years ago

It should also be noted that these dates are not a neat fit because of variability and overlapping ages between sites (Lombard et.al 2012: 125).

According to Bergh there are no known Stone Age sites close to Klerksdorp, although a number of rock engraving sites are known to occur in the larger geographical area (Bergh 1999: 4-5).

No Stone Age sites or material (stone tools) were identified in the study area during the September 2021 assessment. If any are to be present it would be more likely out-of context individual tools or small scatters of artifacts.

The Iron Age is the name given to the period of human history when metal was mainly used to produce artifacts. In South Africa it can be divided in two separate phases (Bergh 1999: 96-98), namely:

Early Iron Age (EIA) 200 – 1000 A.D.
Late Iron Age (LIA) 1000 – 1850 A.D.

Huffman (2007: xiii) indicates that a Middle Iron Age should be included. His dates, which are widely accepted in archaeological circles, are:

Early Iron Age (EIA) 250 – 900 A.D.
Middle Iron Age (MIA) 900 – 1300 A.D.
Late Iron Age (LIA) 1300 – 1840 A.D.

There are no known EIA/MIA sites in the area, although there are some Late Iron Age sites in the larger geographical area north and west of the town (Bergh 1999: 6-7). One such site is Palmietfontein (around 30km north of the town), excavated in 1975 by D.A.White. In an article on this work it is also indicated that the area north of Klerksdorp is relatively rich in terms of Late Iron Age sites, and that the Rolong capital of Thabeng lies within this area (White 1977: 89).

Based on the research by Huffman it is possible that sites related to the so-called Olifantspoort facies of the Urewe Tradition, dating to around AD1500-1700, and the Thabeng facies of the same tradition (AD1700-1840) could possibly be found in the area (Huffman 2007: 207). No Iron Age sites, features or cultural material was found during the assessment of the area.

No Iron Age occurrences were identified in the study area during the assessment.

The historical age generally starts with the first recorded oral histories in an area. It includes the moving into the area of people that were able to read and write. The earliest traveller through this area was Cornwallis Harris in 1836, followed by missionaries and the Voortrekkers (Bergh 1999: 13-14).

Information from Wikipedia (www.wikipedia.org.za).

Klerksdorp was founded in 1837 when the Voortrekkers settled on the banks of the Schoonspruit which flows through the town. Most prominent of the first settlers was C.M. du Plooy who claimed a large farm called Elandsheuwel. He gave plots of land and communal grazing rights on this farm to other Voortrekkers in return for their labor in building a dam and an irrigation canal. This collection of smallholdings was later given the name of Klerksdorp in honor of the first landdrost (magistrate) of the area, Jacob de Clerq.

In August 1886 gold was discovered in the Klerksdorp district by M.G. Jansen van Vuuren as well as on the Witwatersrand, which lies about 160 km to the east. As a consequence, thousands of fortune-seekers descended on the small village, turning it into a town with 70 taverns and even a stock exchange of its own. However, the nature of the gold reef demanded expensive and sophisticated equipment to mine and extract the gold, causing the majority of diggers to move away in the late 1890s and leading to a decline in the gold mining industry.

During the Second Boer War (1899-1902), heavy fighting occurred in the area, which also housed a large concentration camp. The most famous of the battles around Klerksdorp, is that of the Battle of Ysterspruit during which the Boers under General Koos de la Rey achieved a great victory. On April 11, 1902, the Battle of Rooiwal, the last major engagement of the war, was fought near Klerksdorp during which a Boer charge was beaten off by entrenched British troops. The graves of the victims of the British Concentration Camps near Klerksdorp are located in the old cemetery just outside of town.

Klerksdorp was connected by rail to Krugersdorp on 3 August 1897 and to Kimberley in 1906. The gold mining industry was revived by large mining companies in 1932, causing the town to undergo an economic revival, which accelerated after World War II.

No historical sites, features or material were found in the area during the assessment.

Results of the June 2021 study area assessment

No sites, features or cultural material were found in the study area during the assessment. The area would have been used in the past for agricultural purposes and as a result if any sites, features or material of cultural heritage (archaeological and/or historical) origin or significance did exist here in the past it would have been extensively disturbed or destroyed as a result. Other recent developments such as the Eskom Powerline & servitudes would also have impacted on any archaeological and historical sites and features that might have been present here.

Based on the desktop research & physical field assessment of the area it is concluded that the proposed Dawkinsville Cemetery establishment can therefore continue.

Although all efforts are made to cover a total area during any assessment and therefore to identify all possible sites or features of cultural (archaeological and/or historical) heritage origin and significance, that there is always the possibility of something being missed. This will include low stone-packed or unmarked graves. This aspect should be kept in mind when development work commences and if any sites (including graves) are identified then an expert should be called in to investigate and recommend on the best way forward.

Conclusions and Recommendations

APelser Archaeological Consulting (APAC) was appointed by EnviroVision Consulting cc, on behalf of Malankane Consulting Engineers (Pty) Ltd, to conduct a Phase 1 HIA for the proposed establishment of a new cemetery (Dawkinsville Cemetery) on the Remainder of Portion 1 of the farm Townlands of Klerksdorp 424IP. The study area is located in the City of Matlosana Local Municipality (Klerksdorp) of the Northwest Province.

Background research indicates that there are some cultural heritage sites and features in the larger geographical area within which the study area falls. No sites, features or cultural material were found in the study area during the assessment. The area would have been used in the past for agricultural purposes and as a result if any sites, features or material of cultural heritage (archaeological and/or historical) origin or significance did exist here in the past it would have been extensively disturbed or destroyed as a result. Other recent developments such as the Eskom Powerline & servitudes would also have impacted on any archaeological and historical sites and features that might have been present here.

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.

Finally, it is concluded that the proposed Dawkinsville Cemetery establishment can therefore continue taking the above measures into mind.

7 PROJECT ALTERNATIVES

Introduction

According to DEAT 2004d, "The role of alternatives is to find the most effective way of meeting the need and purpose of the proposal, either through enhancing the environmental benefits of the activity, and or through avoiding potentially significant negative impacts".

The above description emphasises the importance of impact significance in the identification of alternatives in that it should *inter alia* be aimed at avoiding potentially significant negative impacts.

DEAT 2004d identifies the following types or categories of alternatives:

- Activity alternatives
- Location alternatives
- Process alternatives
- Demand alternatives
- Scheduling alternatives
- Input alternatives
- Routing alternatives
- Site layout alternatives
- Scale alternatives
- Design alternatives
- "No go" alternatives

For purposes of contextualisation and elucidation a brief description of each alternative in relation to its potential relevance and applicability is being provided.

Activity alternatives

"These are sometimes referred to as project alternatives, although the term activity can be used in a broad sense to embrace policies, plans and programmes as well as projects. Consideration of such alternatives requires a change in the nature of the activity. An example is incineration of waste rather than disposal in a landfill, or the provision of public transport rather than increasing the capacity of roads. In view of the substantive differences in the nature of the activities, it is likely that this category is most appropriate at a strategic decision-making level, such as in a Strategic Environmental Assessment" (DEAT:2004d).

The activity does not take place at a strategic decision-making level. Activity alternatives therefore do not apply to this activity.

Location alternatives

"Location alternatives could be considered for the entire proposal or for a component of the proposal, for example the location of a processing plant. The latter is sometimes considered under site layout alternatives. A distinction should also be drawn between alternative locations that are geographically quite separate, and alternative locations that are in close proximity. In the case of the latter, alternative locations in the same geographic area are often referred to as alternative sites. This tends to be the more common application" (DEAT: 2004d).

The subject site represents the only location alternative due to the following considerations:

- It is strategically well placed on land that has been zoned for municipal uses;

- It is strategically well placed on land in close proximity to the decommissioned Old Klerksdorp Cemetery and the existing Klerksdorp Cemetery that is approaching its maximum capacity;
- Large parts of the subject site has been subjected to biological degradation over an extended period of time due to sand mining, quarrying, backfilling, illegal dumping and traversing; and
- According to the North West Spatial Development Framework the activity is situated within a "Primary Regional Centre". The proposed activity does not contradict the land uses envisaged for these zones.
- No objections to the development were received during the prescribed public participation process.
- No potentially adverse negative impacts were identified during the assessment of the significance, probability and duration of potential impacts.

Process alternatives

"This type of alternative is particularly relevant to industrial projects. Due to the technical nature of the alternatives, the proponent is expected to play a major role in the identification of alternatives. For this reason transparency in identification and evaluation of alternatives is crucial" (DEAT:2004d).

Due to the non-industrial nature of the activity, process alternatives do not apply to the development.

Demand alternatives

"Demand alternatives arise when a demand for a certain product or service can be met by some alternative means. Thus, for example, the demand for electricity could be met by supplying more energy or through using energy more efficiently by managing demand" (DEAT:2004d).

Energy efficient alternatives may pose feasible and reasonable alternatives that will be considered during the prescribed environmental impact assessment process.

Scheduling alternatives

"These are sometimes known as sequencing or phasing alternatives. In this case an activity may comprise a number of components, which can be scheduled in a different order or at different times and as such produce different impacts. For example, activities that produce noise could be scheduled during the day to minimize impacts, and activities that may impact on birds could be scheduled to avoid the migratory season. Such alternatives could be incorporated into the project proposal and so be part of the project description, and hence need not necessarily be evaluated as separate alternatives" (DEAT:2004d).

Scheduling alternatives may pose feasible and reasonable alternatives that will be considered during the prescribed environmental impact assessment process.

Input alternatives

"By their nature, input alternatives are most applicable to industrial applications that may use different raw materials or energy sources in their processes. For example, an industry may consider using either high sulphur coal or natural gas as a source of fuel. Again, such alternatives could be incorporated into the project proposal and so be part of the project description, and need not necessarily be evaluated as separate alternatives" (DEAT:2004d).

Due to the non-industrial nature of the activity, input alternatives do not apply.

Routing alternatives

"Consideration of alternative routes generally applies to linear developments such as power lines, transport and pipeline routes. In route investigations, various corridors are investigated and compared in terms of their impacts" (DEAT:2004d).

The activity does not represent a linear development and routing alternatives were thus not considered.

Site layout alternatives

"Site layout alternatives permit consideration of different spatial configurations of an activity on a particular site. This may include particular components of a proposed development or may include the entire activity. For example, siting of a noisy plant away from residences, and secondly, siting of a particular structure either prominently to attract attention or screened from view to minimise aesthetic impacts" (DEAT:2004d).

The issues that have been identified as potential impacts may necessitate the consideration of site layout alternatives during the prescribed environmental impact assessment phase subject to the outcome, findings and recommendations of the respective specialist studies.

Scale alternatives

"In some cases, activities that can be broken down into smaller units can be undertaken on different scales. For example, in a housing development there could be the option of 100, 150 or 200 housing units. Each of these scale alternatives may have different impacts" (DEAT:2004d).

The scale of the project proposal has been determined in accordance with perceived needs. Scale alternatives as such were therefore not pursued. It needs to be mentioned that a phased approach to be informed by budgetary considerations and market factors may be followed. This approach may influence the eventual scale of the activity.

Design alternatives

"Consideration of various designs for aesthetic purposes or different construction materials in an attempt to optimise local benefits and sustainability would constitute design alternatives. Appropriate applications of design alternatives are communication towers. In such cases, all designs are assumed to have different impacts. Generally, the design alternatives could be incorporated into the project proposal and so be part of the project description, and need not be evaluated as separate alternatives" (DEAT: 2004d).

Design alternatives that will enhance the aesthetic character of the area will be embedded into the development's building designs. No specific design alternatives are thus proposed.

"No-go" alternatives

"The "no-go" alternative … assumes that the activity does not go ahead, implying a continuation of the current situation or the status quo. In a situation where the negative environmental impacts have high significance, the "no-go" alternative takes on particular importance" (DEAT:2004d).

The "no-go" alternative normally receives consideration when an activity poses adverse negative impacts to the environment that cannot be successfully mitigated. A preliminary significance assessment did not reveal any potentially adverse negative impacts, either in unmitigated or mitigated form.

Alternatives to be considered

Based on the preceding discussion the following possible alternatives have been identified for purposes of detailed comparative assessment:

- Demand alternatives (e.g. energy efficient alternatives);
- Scheduling alternatives (e.g. construction during non-raining months);
- Site layout alternatives if so necessitated by specialist studies; and the
- "No Go" alternative.

Demand alternatives (e.g. energy efficient alternatives)

The following energy efficient alternatives will be implemented in the proposed development:

Solar Power
Solar power will be used for the provision of electricity in the cemetery.

Sustainable sanitation systems
An on-site sewage systems will be used.

Waste Minimisation and Recycling
Waste separation and recycling can generate jobs as well as removing recyclable resources from landfill. Individuals and recycling cooperatives can collect and separate wastes and sell recyclable materials. Buyback centres can be established in neighbourhoods, where recyclers can buy recyclable materials for reprocessing. Organic materials can also be separated and made into compost, adding nutrients to soil for agricultural production and greening.

Energy efficient alternatives, which will ensure a more sustainable development and reduce the carbon footprint of the development, is regarded as the preferred alternative.

Scheduling alternatives (e.g. construction during non-raining months)

Scheduling alternatives during non-raining months and during raining months will be assessed in the impact assessment of impacts associated with the proposed development *(refer to Section 9.4).*

Alternative 1 – scheduling construction during non-raining months.

Alternative 2 - scheduling construction during raining months.

Site layout alternatives

Specialist studies did not necessitate site layout alternatives to be considered in the EIA phase.
According to the Ecological Study the study area is regarded as medium to low sensitivity. No graves and sites of archaeological, historical and cultural significance were identified in the Heritage Assessment.

"No Go" alternative

The No-Go alternative will entail leaving the site in its present vacant state, prone to illegal dumping, sand mining, quarrying and illegal invasion by informal settlers.

The subject site represents the establishment of a new cemetery that may address an increasing and pending shortage for cemeteries. Furthermore the activity site is favourably and strategically located for purposes of the proposed activity due to the following considerations:

- It is strategically well placed on land that has been zoned for municipal uses;
- It is strategically well placed on land in close proximity to the decommissioned Old Klerksdorp Cemetery and the existing Klerksdorp Cemetery that is approaching its maximum capacity;
- Large parts of the subject site has been subjected to biological degradation over an extended period of time due to sand mining, quarrying, backfilling, illegal dumping and traversing; and
- According to the North West Spatial Development Framework the activity is situated within a "Primary Regional Centre". The proposed activity does not contradict the land uses envisaged for these zones.

The proposed activity thus represents the best practicable environmental option for this site in that it represents the utilisation of ecologically degraded land to provide a community oriented service and socio-economic spin-offs such as job generation and economic empowerment.

The No-Go alternative is therefore not regarded as the preferred alternative in the long term.

8 PUBLIC PARTICIPATION PROCESS

Chapter 6 of Government Notice No. R. 326 of 7 April 2017 provides for a public participation process.

It is further stipulated that the person conducting a public participation process must take into account any guidelines applicable to public participation and must give notice to all potential interested and affected parties of the application which is subjected to public participation by:

- Fixing a notice board at a place conspicuous to the public at the boundary or on the fence of the site where the activity to which the application relates is or is to be undertaken; and any alternative site mentioned in the application;
- Giving written notice to:
    - The occupiers of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
    - The owners and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
    - The municipal councilor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represents the community in the area;
    - The municipality which has jurisdiction in the area; and
    - Any organ of state having jurisdiction in respect of any aspect of the activity; and
    - Any other party as required by the competent authority.
- Placing an advertisement in one local newspaper; **or** any official *Gazette* that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations; and

- Placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or local municipality in which it is or will be undertaken: Provided that this paragraph need not be complied with if an advertisement has been placed in an official *Gazette;*
- Using reasonable alternative methods, as agreed to by the competent authority, in those instances where a person is desiring of but unable to participate in the process due to illiteracy, disability or any other disadvantage.

The main purpose of the public participation process that was undertaken in this regard, over and above giving effect to the relevant regulations, was to obtain information through a process of informing and involving interested and affected parties (I&AP's). The aim was for potential I&AP's to become aware of the positive and negative effects that the development may bring about in their living environments. The identification and consideration of negative effects can also serve as basis for the developer to effect changes in the course of action, either through mitigation of undesirable or unaccepted impacts, or through the introduction of alternatives.

The following objectives were pursued through the public participation process:

• To inform potential I&AP's of the development;
• To allow potential I&AP's to raise issues, concerns and suggestions;
• To promote transparency and an understanding of the project;
• To direct the focus of the EIA towards the most pertinent issues ;
• It was not one of the objectives of the public participation process to quell opposition or to foster consensus among role players.

This section of the report focuses on the issues and comments raised by I&AP's, if any. These inputs will be used to determine the anticipated impacts that such a development can have on the environment and highlight particular issues related to the project. The perceived impacts can assist individuals, communities as well as government to understand and anticipate the possible consequences (positive and negative) of the project.

8.1 Public Participation Activities Undertaken during the Scoping Phase

Proof of public participation during the Scoping Phase was included in the Final Scoping Report

Notification of potential I&AP's

In terms of Subsection (6) of Section 41 of Government Notice No. R. 326 of 7 April 2017 the person conducting the public participation process must ensure that information containing all relevant facts in respect of the application is made available to potential or registered interested and affected parties; and that participation by potential interested and affected parties is facilitated in such a manner that all potential interested and affected parties are provided with a reasonable opportunity to comment on the application.

Where an environmental authorisation is required in terms of these Regulations and an authorisation, permit or licence is required in terms of a specific environmental management Act, the public participation process may be combined with any public participation process prescribed in terms of a specific environmental management Act, on condition that all relevant authorities agree to such combination of processes.

In order to comply with this requirement as well as other related requirements stated in the relevant regulations, written notice of the development together with the opportunity to comment was given to the following persons and / or institutions:

Written notice was given to the City of Matlosana Municipality as local municipality, landowner and only adjacent landowner. No written response was received to date.

Written notice was given to the relevant municipal councilor through the Office of the Speaker. No written response was received to date.

Written notice was given to the Office Manager: Potchefstroom, Department of Water Affairs and Sanitation. No written response was received to date.

Proof of notice board

In terms of Subsection (4) of Section 41 of Government Notice No. R. 326 of 7 April 2017 the required notice board must:

- Give details of the application which is subjected to public participation; and
- State that the application has been submitted to the competent authority in terms of these Regulations, as the case may be; whether basic assessment or scoping procedures are being applied to the application, in the case of an application for environmental authorisation; the nature and location of the activity to which the application relates; where further information on the application or activity can be obtained; and the manner in which and the person to whom representations in respect of the application may be made;
- Be of a size at least 60cm by 42cm; and
- Display the required information in lettering and in a format as may be determined by the competent authority.

A notice board complying with the stated requirements was placed on the subject property on 8 April 2021.

Proof of newspaper advertisement

In terms of Subsection (2) of Section 41 of Government Notice No. R. 326 of 7 April 2017 an advertisement must be placed in one local newspaper; **or** any official *Gazette* that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations; the required advertisement must:

- Give details of the application; and
- State that the application has been or is to be submitted to the competent authority in terms of these Regulations, as the case may be; whether basic assessment or scoping procedures are being applied to the application, in the case of an application for environmental authorisation; the nature and location of the activity to which the application relates; where further information on the application or activity can be obtained; and the manner in which and the person to whom representations may be made.

An advertisement complying with the stated requirements has been placed in the Klerksdorp Rekord newspaper of 9 July 2021.

Proof of advertisement in Gazette

In terms of Subsection (2) of Section 41 of Government Notice No. R. 326 of 7 April 2017 an advertisement must be placed in one local newspaper; **or** any official *Gazette* that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations; the required advertisement must:

- Give details of the application; and
- State that the application has been or is to be submitted to the competent authority in terms of these Regulations, as the case may be; whether basic assessment or scoping procedures are being applied to the application, in the case of an application for environmental authorisation; the nature and location of the activity to which the application relates; where further information on the application or activity can be obtained; and the manner in which and to whom representations in respect of the application may be made.

Since an advertisement has already been placed in the Klerksdorp Record newspaper a notice has not been placed in the Provincial Gazette as well.

I&AP Register

In terms of Section 42 of Government Notice No. R. 326 of 7 April 2017 an applicant must ensure the opening and maintenance of a register which contains the names and addresses of all persons who, as a consequence of the public participation process, have submitted written comments or attended meetings with the applicant or EAP; all persons who, after completion of the public participation process have requested the applicant, in writing, for their names to be placed on the register; and all organs of state which have jurisdiction in respect of the activity to which the application relates.

Based on the above the following I&AP register was opened.

I&AP	Capacity	Address
Ms O Skosana	Competent Authority	Agricentre Building C/O Dr James Moroka & Stadium Rd Mmabatho
The Area Manager: Potchefstroom Department of Water and Sanitation	Government Department	126 Chris Hani Avenue Potchefstroom
The Municipal Manager: Matlosana Local Municipality	Local Authority	41 Braam Fischer Street Klerksdorp
The ward councilor Matlosana Local Municipality	Local Authority	41 Braam Fischer Street Klerksdorp

Summary of issues raised

In terms of Subsection 1 of Section 43 of Government Notice No. R. 326 of 7 April 2017 a registered interested and affected party is entitled to comment, in writing, on all written submissions made to the competent authority by the applicant, and to bring to the attention of the competent authority any issues which that party believes may be of significance to the consideration of the

application, provided that comments submitted within the relevant timeframes or any extension, and the interested and affected party discloses any direct business, financial, personal or other interest which that party may have in the approval or refusal of the application.

No comments or issues were received to date.

A copy of the Draft Scoping Report has been distributed to the registered Interested and Affected Parties for comment.

No comments or issues were received on the Draft Scoping Report.

8.2 Public Participation Activities Undertaken during the EIA Phase

Notification of the availability of the Draft EIAR will be submitted to all I&APs.

The DEIAR will be available for comment on the Setala website using a given link. The comment period will be for 30 days until 10/03/2022.

Copies of the DEIAR will be submitted to the following key stakeholders:

- North West Department of Economic Development, Environment, Conservation and Tourism, Environmental Impact Management
- City of Matlosana Municipality, Municipal Manager
- Department of Water and Sanitation, Pretoria Office. Dr. Khorommbi and Ms. Aluwani Mulaudzi to confirm relevant official who will provide comments.
- SA Heritage Resources Agency (via SAHRIS)

9 ENVIRONMENTAL IMPACT ASSESSMENT

9.1 Introduction

The EIA of the project activities is determined by identifying the environmental aspects and then undertaking an environmental risk assessment to determine the significant environmental aspects. The environmental impact assessment has included all phases of the project namely:

- Construction Phase; and
- Operational Phase.

Please note: due to the nature of the development it is anticipated that the infrastructure would be permanent, thus not requiring decommissioning or rehabilitation. Maintenance of infrastructure will be addressed under the operational phase.

9.2 Impact Assessment Methodology

The potential environmental impacts associated with the project will be evaluated according to its nature, extent, duration, intensity, probability and significance of the impacts, whereby:

- **Nature:** A brief written statement of the environmental aspect being impacted upon by a particular action or activity.

- **Extent:** The area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment phase of a project in terms of further defining the determined significance or intensity of an impact. For example, high at a local scale, but low at a regional scale;

- **Duration:** Indicates what the lifetime of the impact will be;

- **Intensity:** Describes whether an impact is destructive or benign;

- **Probability:** Describes the likelihood of an impact actually occurring; and

- **Cumulative:** In relation to an activity, means the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

TABLE 3: CRITERIA TO BE USED FOR RATING OF IMPACTS

Criteria	**Description**			
Extent	**National (4)** The whole of South Africa	**Regional (3)** Provincial and parts of neighbouring provinces	**Local (2)** Within a radius of 2 km of the construction site	**Site (1)** Within the construction site
Duration	**Permanent (4)**	**Long-term (3)**	**Medium-term (2)**	**Short-term (1)**

	Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient	The impact will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter. The only class of impact which will be non-transitory	The impact will last for the period of the construction phase, where after it will be entirely negated	The impact will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase
Intensity	**Very High (4)** Natural, cultural and social functions and processes are altered to extent that they permanently cease	**High (3)** Natural, cultural and social functions and processes are altered to extent that they temporarily cease	**Moderate (2)** Affected environment is altered, but natural, cultural and social functions and processes continue albeit in a modified way	**Low (1)** Impact affects the environment in such a way that natural, cultural and social functions and processes are not affected
Probability of occurrence	**Definite (4)** Impact will certainly occur	**Highly Probable (3)** Most likely that the impact will occur	**Possible (2)** The impact may occur	**Improbable (1)** Likelihood of the impact materialising is very low

Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

TABLE 4: CRITERIA FOR THE RATING OF CLASSIFIED IMPACTS

Low impact (4 - 6 points)	A low impact has no permanent impact of significance. Mitigation measures are feasible and are readily instituted as part of a standing design, construction or operating procedure.
Medium impact (7 - 9 points)	Mitigation is possible with additional design and construction inputs.
High impact (10 - 12 points)	The design of the site may be affected. Mitigation and possible remediation are needed during the construction and/or operational phases. The effects of the impact may affect the broader environment.
Very high impact (13 - 20 points)	Permanent and important impacts. The design of the site may be affected. Intensive remediation is needed during construction and/or operational phases. Any activity which results in a “very high impact” is likely to be a fatal flaw.
Status	Denotes the perceived effect of the impact on the affected area.
Positive (+)	Beneficial impact.
Negative (-)	Deleterious or adverse impact.
Neutral (/)	Impact is neither beneficial nor adverse.
It is important to note that the status of an impact is assigned based on the status quo – i.e. should the project not proceed. Therefore not all negative impacts are equally significant.	

The suitability and feasibility of all proposed mitigation measures will be included in the assessment of significant impacts. This will be achieved through the comparison of the significance of the impact before and after the proposed mitigation measure is implemented. Mitigation measures identified as necessary will be included in an EMPr. The EMPr will form part of the Environmental Impact Assessment Report (EIAR). *Refer to Appendix E.*

9.3 Impacts

9.3.1 Geology Impacts

Where E = Extent, D = Duration, I = Intensity and P = Probability of occurrence.

Potential Aspect and / or Impact	Before Mitigation				Significance Rating (before mitigation)	Mitigation and management measures	After Mitigation				Significance Rating (after mitigation)
	E	D	I	P			E	D	I	P	
CONSTRUCTION											
Soils stability Geological attributes such as stability, excavatibility and permeability may negatively affect the activity especially during its operational phase	1	2	2	4	Negative Medium (-8)	• Impact rolling over this soil zone or the side slopes of the grave excavations to be cut back to prevent collapse of sidewalls. • Additional geotechnical testing is recommended after the impact rolling has been conducted. These tests include limited test pitting and DPL tests to confirm dense soil conditions and stable sidewalls of open trenches. • All disturbed areas (Soil Zone "C") should be properly re-instated to its original state prior to the development if the client wish to develop graves in these areas. • The placement of fill must be controlled with suitable field tests to confirm that the required densities are achieved during compaction and that the quality of fill material is within specification.	1	2	1	2	Negative Low (-6)
Corrosive nature of soils	1	2	2	2	Negative Medium (-7)	The use of nonferrous metal pipes or plastic pipes are recommended for underground wet services	1	1	1	1	Negative Low (-4)
OPERATIONAL											
Soils stability Geological attributes such as stability,	1	4	2	4	Negative High (-10)	• Impact rolling over this soil zone or the side slopes of the grave excavations to be cut back to prevent collapse of sidewalls.	1	4	2	2	Negative Medium (-8)

excavatibility and permeability may negatively affect the activity especially during its operational phase						• Additional geotechnical testing is recommended after the impact rolling has been conducted. These tests include limited test pitting and DPL tests to confirm dense soil conditions and stable sidewalls of open trenches. • All disturbed areas (Soil Zone "C") should be properly re-instated to its original state prior to the development if the client wish to develop graves in these areas. • The placement of fill must be controlled with suitable field tests to confirm that the required densities are achieved during compaction and that the quality of fill material is within specification.					

9.3.2 Topographical Impacts

Where E = Extent, D = Duration, I = Intensity and P = Probability of occurrence.

Potential Aspect and / or Impact	Before Mitigation				Significance Rating (before mitigation)	Mitigation and management measures	After Mitigation				Significance Rating (after mitigation)
	E	D	I	P			E	D	I	P	
CONSTRUCTION											
Surface gradient	1	2	2	3	Negative Medium (-8)	• Surface drainage measures should be in place according to the engineer's design to ensure good site drainage without ponding of water after precipitation.	1	2	1	2	Negative Low (-6)
Alteration of topography due to stockpiling of soil, building material and debris and waste material on site.	1	3	2	3	Negative Medium (-9)	• All stockpiles must be restricted to designated areas and are not to exceed a height of 2 metres. • Stockpiles created during the construction phase are not to remain during the operational phase.	1	2	1	2	Negative Low (-6)

						• The contractor must be limited to clearly defined access routes to ensure that sensitive and undisturbed areas are not disturbed.					

9.3.3 Hydrogeology Impacts

Where E = Extent, D = Duration, I = Intensity and P = Probability of occurrence.

Potential Aspect and / or Impact	Before Mitigation				Significance Rating (before mitigation)	Mitigation and management measures	After Mitigation				Significance Rating (after mitigation)
	E	D	I	P			E	D	I	P	
CONSTRUCTION											
Groundwater contamination due to graves and sanitation system.	2	4	3	3	Negative High (-12)	• On site groundwater assessment and monitoring boreholes are recommended to better define the local groundwater level depths and flow direction, but also to define the current groundwater quality characteristics. • One upstream and two downstream boreholes are recommended – upstream between the cemetery site and the Averda incinerator and downstream – one borehole along the southern boundary (possibly on the fault) and one borehole to the west, in the Transnet property. • Mapping of the fault on site is recommended and should be done by applying geophysical surveying techniques. • Water quality determinants during the last phase of site assessment and groundwater monitoring should incorporate major and trace element chemistry, microbiology, physical determinants, and, if possible, selected organics such as formaldehyde.	1	2	1	2	Negative Low (-6)

OPERATIONAL											
Groundwater contamination due to graves and sanitation system.	2	4	3	3	Negative High (-12)	• Minimal accessories should be buried and coffins should preferably not contain too many artificial metals and plastics. These do, over time, mobilise, to the likely detriment of the receiving environment and groundwater and surface water resources. • Regular groundwater monitoring is recommended	2	4	1	1	Negative Medium (-8)

9.3.4 Hydrology Impacts

Where E = Extent, D = Duration, I = Intensity and P = Probability of occurrence.

Potential Aspect and / or Impact	Before Mitigation				Significance Rating (before mitigation)	Mitigation and management measures	After Mitigation				Significance Rating (after mitigation)
	E	D	I	P			E	D	I	P	
CONSTRUCTION											
Increased urban run-off	2	2	2	1	Negative Medium (-7)	• Land disturbance must be minimized in order to prevent erosion and run-off - this includes leaving exposed soils open for a prolonged period of time. As soon as vegetation is cleared (including alien) the area must be re-vegetated if it is not to be developed on in future.	2	1	1	1	Negative Low (-5)
OPERATIONAL											
Erosion and waterlogging of graves	1	3	2	3	Negative Medium (-9)	• A reduction in irrigation for landscaping is proposed as a generic mitigation measure. Graves will likely cause zones of preferential infiltration if somewhat depressed, or will likely increase erosion or obstruct runoff if mounded. Optimal landscaping practices with minimal irrigation at low intensity will ensure	1	2	1	2	Negative Low (-6)

						that grass can grow without extensive mobilisation of possible contaminants. • Planting larger and indigenous trees with deeper root systems may aid in redistributing subsurface moisture and preventing waterlogging of graves and backfill. Where possible, natural vegetation and trees should not be removed, or should be replanted to aid in the natural management of subsurface waters.					

9.3.5 Vegetation and Fauna Impacts

Where E = Extent, D = Duration, I = Intensity and P = Probability of occurrence.

Potential Aspect and / or Impact	Before Mitigation				Significance Rating (before mitigation)	Mitigation and management measures	After Mitigation				Significance Rating (after mitigation)
	E	D	I	P			E	D	I	P	
CONSTRUCTION											
Clearing of vegetation at habitat of medium and low sensitivity at the proposed footprint.	1	3	2	3	Negative Medium (- 9)	Cultivation of indigenous plant species at the site is imperative. Control of alien invasive plant species should be applied.	1	2	2	2	Negative Medium (- 7)
Removal of sensitive species Sensitive species: Presence of Threatened or Near Threatened Mammals, Reptiles, Amphibians and Invertebrates at the site appear to be unlikely. A widespread Protected tree species at the site, *Vachellia erioloba* (Camel Thorn), is listed as a Declining (not Threatened) plant species. *Vachellia erioloba* occurs in relatively low numbers at the site. Camel Thorn forests containing particularly large *Vachellia*	1	3	2	2	Negative Medium (-9)	Avoidance of individual *Vachellia erioloba* trees where practical (Application for permits when *Vachellia erioloba* trees will be damaged or removed, if the development is approved, is essential).	1	2	1	2	Negative Low (-6)

erioloba individuals are absent at the site (Reference sites for such special Camel Thorn trees are Witsand Nature Reserve and Kathu Camel Thorn Forest visited/ researched in the past by the specialist).											
Fragmentation of corridors of particular conservation concern. The scope for the site to be a corridor of particular conservation concern at the site is small.	1	2	2	2	Negative Medium (- 7)	• Rubble or waste that could accompany the construction effort, if the development is approved, should be removed during and after construction. Measures should be taken to avoid any spills and infiltration of petroleum fuels or any chemical pollutants into the soil during construction phase.	1	2	1	2	Negative Low (-6)
Possible disturbance, trapping, hunting and killing of vertebrates during construction phase	1	2	2	2	Negative Medium (- 7)	• If the development is approved, contractors must ensure that no animal species are disturbed, trapped, hunted or killed during the construction phase.	1	2	1	2	Negative Low (-6)
OPERATIONAL/CUMULATIVE											
An increased infestation of exotic or alien invasive plant species owing to clearance or disturbance where the footprint took place. Infestation by alien invasive species could replace indigenous vegetation or potential areas where indigenous vegetation could recover. It is in particular declared alien invasive species such as Melia azedarach (Syringa Berrytree) and Australian *Acacia* species that should not be allowed to establish because once established these combating these alien invasive plant species may become very expensive in the long term.	1	2	2	2	Negative Medium (- 7)	• Continued monitoring and eradication of alien invasive plant species are imperative. • It is in particular declared alien invasive species such as alien invasive Australian *Acacia* species, *Melia azedarach* (Syringa Berrytree) and *Prosopis glandulosa* (Honey Mesquite) that should not be allowed to establish.	1	2	1	2	Negative Low (-6)

9.3.6 Waste Impacts

Where E = Extent, D = Duration, I = Intensity and P = Probability of occurrence.

Potential Aspect and / or Impact	Before Mitigation				Significance Rating (before mitigation)	Mitigation and management measures	After Mitigation				Significance Rating (after mitigation)
	E	D	I	P			E	D	I	P	
CONSTRUCTION											
Contamination of the surface and site with general waste.	1	2	2	3	Negative Medium (-8)	• An adequate number of general waste receptacles, including bins must be arranged around the site to collect all domestic refuse, and to minimise littering. • Bins must be provided on site for use by employees. • Bins should be clearly marked and lined for efficient control and safe disposal of waste. • Different waste bins, for different waste streams must be provided to ensure correct waste separation. • A fenced area must be allocated for waste sorting and disposal on the site. • General waste produced on site is to be collected in skips for disposal at the local municipal waste site. • Hazardous waste is not to be mixed or combined with general waste earmarked for disposal at the municipal landfill site. • Under no circumstances is waste to be burnt or buried on site. • Waste bins should be cleaned out on a regular basis to prevent any windblown waste and/or visual disturbance. • All general waste must be removed from the site at regular intervals and disposed of in suitable waste receptacle	1	2	1	2	Negative Low (-6)
Contamination of the surface and site with general and hazardous waste.	1	2	3	3	Negative Medium	• Hazardous waste is to be disposed at a Permitted Hazardous Waste Landfill Site.	1	1	2	2	Negative Low (-6)

Hazardous waste produced on site include: • Oil and other lubricants, diesel, paints, solvent; • Containers that contained chemicals, oils or greases; and • Equipment, steel, other material (rags), soils, gravel and water contaminated by hazardous substances (oil, fuel, grease, chemicals or bitumen).					(-9)	• The Environmental Manager must have as part of his/her records the waste manifest for each batch based disposal. • Hazardous waste bins must be clearly marked, stored in a contained area (or have a drip tray) and covered (either stored under a roof or the top of the container must be covered with a lid). • A hazardous waste disposal certificate must be obtained from the waste removal company as evidence of correct disposal. • In the case of a spill of hydrocarbons, chemicals or bituminous, the spill should be contained and cleaned up and the material together with any contaminated soil collected and disposed of as hazardous waste to minimize pollution risk.					
OPERATIONAL											
Generation and disposal of domestic waste by the proposed development.	1	3	2	2	Negative Medium (-8)	Waste will be collected by an accredited waste company and disposed of at an appropriate and licensed waste disposal facility.	2	1	1	2	Negative Low (-6)

9.3.7 Air Quality Impacts

Where E = Extent, D = Duration, I = Intensity and P = Probability of occurrence.

Potential Aspect and / or Impact	Before Mitigation				Significance Rating (before mitigation)	Mitigation and management measures	After Mitigation				Significance Rating (after mitigation)
	E	D	I	P			E	D	I	P	
CONSTRUCTION											
Dust and emissions during construction generated by debris handling and debris piles, truck transport, bulldozing, general construction.	1	2	2	3	Negative Medium (-8)	• Dust must be suppressed on the construction site and during the transportation of material during dry periods by the regular application of water. Water used for this purpose must be used in quantities that will not result in the generation of run-off.	2	1	1	2	Negative Low (-6)

						• Loads could be covered to avoid loss of material in transport, especially if material is transported off site. • Dust and mud should be controlled at vehicle exit and entry points to prevent the dispersion of dust and mud beyond the site boundary. • Facilities for the washing of vehicles should be provided at the entry and exit points. • A speed limit of 40 km/hr should be set for all vehicles travelling over exposed areas. • During the transfer of materials, drop heights should be minimised to control the dispersion of mater being transferred. • The height of all stockpiles on site should be a maximum of 2m. • Use of dust retardant road surfacing if made necessary due to the exceedance of Air Quality Guidelines.					

9.3.8 Noise Impacts

Where E = Extent, D = Duration, I = Intensity and P = Probability of occurrence.

Potential Aspect and / or Impact	Before Mitigation				Significance Rating (before mitigation)	Mitigation and management measures	After Mitigation				Significance Rating (after mitigation)
	E	D	I	P			E	D	I	P	
CONSTRUCTION											
During the construction phase there is likely to be an increase in noise pollution from construction vehicles and construction staff.	1	2	3	2	Negative Medium (-8)	• All construction activities should be undertaken according to daylight working hours between the hours of 07:00 – 17:00 on weekdays and 7:30 –13:00 on Saturdays. • No construction activities may be undertaken on Sunday. • Provide all equipment with standard silencers. Maintain silencer units in vehicles and	1	1	1	2	Negative Low (-5)

						equipment in good working order. • All earth moving vehicles and equipment must be regularly maintained to ensure their integrity and reliability. • Construction staff working in area where the 8-hour ambient noise levels exceed 60 dBA must have the appropriate Personal Protective Equipment (PPE). • All operations should meet the noise standard requirements of the Occupational Health and Safety Act (Act No. 85 of 1993).					

9.3.9 Heritage Impacts

Where E = Extent, D = Duration, I = Intensity and P = Probability of occurrence.

Potential Aspect and / or Impact	Before Mitigation				Significance Rating (before mitigation)	Mitigation and management measures	After Mitigation				Significance Rating (after mitigation)
	E	D	I	P			E	D	I	P	
CONSTRUCTION											
Disturbance of graves and sites of archaeological, historical and cultural significance.	1	3	2	2	Medium High (-8)	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.	1	1	1	2	Negative Low (-5)

9.3.10 Traffic Impacts

Where E = Extent, D = Duration, I = Intensity and P = Probability of occurrence.

Potential Aspect and / or Impact	Before Mitigation				Significance Rating (before mitigation)	Mitigation and management measures	After Mitigation				Significance Rating (after mitigation)
	E	D	I	P			E	D	I	P	
CONSTRUCTION											
There is likely to be an increase in traffic from construction vehicles.	1	2	2	3	Negative Medium (-8)	• Construction vehicles are to avoid main roads during peak traffic hours. • All vehicles entering the Site are to be roadworthy. • When using heavy or large vehicles / equipment, "spotters" are to be present to assist the driver with his blind spots. • Any incident or damage to a vehicle must be reported immediately.	1	1	1	2	Negative Low (-5)
The proposed development would have an impact on the current road network	2	3	2	2	Negative Medium (-9)	• The applicant must comply with the access arrangements, parking requirements and road upgrades, which are the applicant's responsibility, as stated inthe Traffic Impact Study. This compliance will be in terms of the Matlosana Local Municipality Bylaws (for applications i.t.o. SPLUMA) or the Section 82 or Section 101 requirements (as applicable for applications i.t.o the Ordinance). • A Site Development Plan regarding the access is to be submitted for approval. If a security gate is to be used at the access point, such a point should be located in such a way that ample storage area is provided in order not to congest the road reserve. • Access points and road upgrading of the road infrastructure will only be valid if all the geometric requirements that might be required by the Divisional: Roads and Stormwater Matlosana Local Municipality	2	1	1	2	Negative Low (-6)

						can be met. The planning, design and construction of the access and road infrastructure shall be done in accordance with the latest specifications, and no work inside the road reserve may be done before written permission of the Division: Roads and Stormwater Matlosana Local Municipality has been obtained (for work involving municipal roads), Northwest Province (for work involving provincial roads) and Sanral (for work involving national roads). • All design plans must be submitted to the Division: Roads and Stormwater Matlosana Local Municipality for approval and/or Northwest Province or Sanral as may be required. • The minimum number of parking spaces to be provided on-site, are to be provided as contained in the *"Parking Standards, PG 3185 (second edition)"* published by the Department of Transport. • The requirements for public transport, as identified in the impact study, are to be provided for. • The needs of pedestrians should be taken into consideration in the planning and the design of the access to the development as well as the design of the road infrastructure. • The applicant will be responsible to obtain any additional road reserve that might be required for the provision of any additional lanes or road widening applicable to this development.					
OPERATIONAL											
The proposed development would have an impact on the current road network during funerals.	2	3	2	2	Negative Medium (-9)	• Traffic control measures to be implemented during large funerals	2	2	1	1	Negative Low (-6)

CUMULATIVE											
The proposed development together with other developments in the region would have a significant impact on the current road network						• Traffic control measures at intersections along the main roads will have to be changed once more development occurs in the region					

9.3.11 Socio-Economic Impacts

Where E = Extent, D = Duration, I = Intensity and P = Probability of occurrence.

Potential Aspect and / or Impact	Before Mitigation				Significance Rating (before mitigation)	Mitigation and management measures	After Mitigation				Significance Rating (after mitigation)
	E	D	I	P			E	D	I	P	
CONSTRUCTION											
Employment											
The development will result in job creation and provision of employment.	1	2	1	3	Positive Medium (+7)	• All labour (skilled and unskilled) and contractors should be sourced locally where possible. • A labour and recruitment policy must be developed, displayed and implemented by the contractor. • Recruitment at the construction site will not be allowed. • Where possible, labour intensive practices (as opposed to mechanised) should be practiced. • The principles of equality, BEE, gender equality and non-discrimination will be implemented.	1	2	1	3	Positive Medium (+7)
The development will lead to increased rates and taxes accruing to the local municipality.	1	2	1	3	Positive Medium (+7)						
Safety											
Public safety during construction.	1	2	2	2	Negative Medium (-7)	• Members of the public adjacent to the construction site should be notified of construction activities in order to limit unnecessary disturbance or interference. • Construction activities will be undertaken	1	2	1	1	Negative Low (-5)

						during daylight hours and not on Sundays.					
Construction staff safety during construction. Where sourcing of local labour is not possible, "outsiders" may need to be employed in order to address skills shortages. On-site accommodation may lead to social disturbances in the area and will also require additional service provisioning measures.	1	2	2	3	Negative Medium (-8)	• Ensure the appointment of a Safety Officer to continuously monitor the safety conditions during construction. • All construction staff must have the appropriate PPE. • The construction staff handling chemicals or hazardous materials must be trained in the use of the substances and the environmental, health and safety consequences of incidents. • Report and record any environmental, health and safety incidents to the responsible person.	1	2	2	1	Negative Low (-6)
OPERATIONAL											
Employment											
• The development will result in job creation and provision of employment. • Jobs for the maintenance of infrastructure and services will be created following the completion of the development. These jobs might be made available to existing labour there creating long term employment. • Service contractors could have access to other developments or projects in the area thereby creating long term employment.	2	3	2	3	Positive High (+10)						
PROVISION OF CEMETERY											
• Provision of a much-needed cemetery	2	3	3	4	Positive High (+12)						

TABLE 5: SUMMARY OF IMPACT ASSESSMENT AFTER MITIGATION

CONSTRUCTION PHASE (PROPOSAL)

Impact Description	Intensity	Extent	Duration	Probability it would occur	Significance rating After Mitigation
Geology: Stability, excavatibility, and permeability may negatively affect the activity especially during its operational phase	1	2	1	2	Low
Topography: Surface gradient	1	2	1	2	Low
Hydrogeology: Groundwater contamination	1	2	1	2	Low
Hydrology: Erosion due to increased urban runoff	2	1	1	1	Low
Impact on Natural Habitat	1	2	2	2	Medium
Removal of sensitive species	1	2	1	2	Low
Fragmentation of corridors	1	2	1	2	Low
Possible disturbance, trapping, hunting and killing of vertebrates	1	2	1	2	Low
Waste Management	1	2	1	2	Low
Impact of odour, Noise, Safety and Dust	2	1	1	2	Low
Impact on Cultural Heritage Resources	1	1	1	2	Low
Traffic Impact	2	2	1	1	Low
Impact of Labourers	1	2	2	1	Low
Economic Impacts This will be a POSITIVE impact	1	2	1	3	Medium

OPERATIONAL PHASE (PROPOSAL)

Impact Description	Intensity	Extent	Duration	Probability Probability it would occur	Significance rating After Mitigation
Geology: Stability of excavations and excavatibility of graves	1	4	2	2	Medium
Hydrogeology: Groundwater contamination	2	4	1	1	Medium
Hydrology: Erosion and waterlogging of graves	1	2	1	2	Low
An increased infestation of exotic or alien invasive plant species owing to clearance or disturbance where the footprint took place.	1	2	1	2	Low
Waste management	2	1	1	2	Low
Infestation by Alien vegetation	1	2	1	2	Low
Traffic: The proposed development would have an impact on the current road network during funerals	2	2	2	2	Low
Economic Impacts This will be a POSITIVE impact	1	2	1	3	High

Provision of a much needed cemetery	2	3	3	4	High

9.4 Comparative Assessment of Alternatives

Table 5 provides a comparative assessment of the two scheduling Alternatives options i.e. Scheduling Alternative 1 – construction during the non-raining season and Scheduling Alternative 2 - construction during the raining season.

For many of the specialist fields, the potential impacts for the different project phases (construction and operations) for the two scheduling options are relatively the same and have been combined to prevent repetition.

The comparative assessment below takes into account the impact assessment provided in Section 9.3.

TABLE 6: COMPARATIVE ASSESSMENT OF THE TWO CONSTRUCTION SCHEDULING OPTIONS AFTER MITIGATION

	Scheduling Alternative 1	**Scheduling Alternative 2**
Geology	-6	-6
	Geological attributes such as stability, excavatibility, permeability and corrosive nature of soils may negatively affect the activity especially during its operational phase. The geological impacts before mitigation for both alternatives are of a **medium** significance and the post mitigation significance is **low**.	
Topography	-6	-8
	Developing the site will result in disturbance to topography which could be more detrimental during the rainy season. The potential impacts before mitigation for Alternative 1 is of a **medium** significance and the post mitigation significance is **low.** The potential impacts before mitigation for Alternative 2 is of a **medium** significance and the post mitigation significance is **medium.**	
Hydrogeology	-6	-6
	The possibility of groundwater contamination due to graves and sanitation system for both alternative options exist, and the mitigation measures listed in the EMPr, need to be complied with to reduce this impact from a **high** to a **low** rating.	
Hydrology	-5	-8
	Land disturbance and increased urban run-off could result in erosion for both alternatives. The potential impacts before mitigation for Alternative 1 is of a **medium** significance and the post mitigation significance is **low.** The potential impacts before mitigation for Alternative 2 is of a **medium** significance and the post mitigation significance is **medium.**	
Vegetation and Fauna	-6	-7
	Clearing of vegetation at habitat of medium and low sensitivity at the proposed footprint. The potential impacts before mitigation for Alternative 1 is of a **medium** significance and the post mitigation significance is **low.** The potential impacts before mitigation for Alternative 2 is of a **medium** significance and the post mitigation significance is **medium** due to soil erosion as a result of clearing of vegetation**.**	
Waste	-6	-6
	During construction, impacts such as contamination of the surface and site with general and hazardous waste are applicable to both alternative. The mitigation measures included in the EMPr must be complied with to achieve the post-mitigation significance rating of **low.**	
Air Quality	-6	-6
	Dust and emissions during construction generated by debris handling and debris piles, truck transport, bulldozing and general construction will exist for both the alternatives. The post-mitigation significance rating is **low.**	

Noise Construction	-5	-5
	During the construction phase there is likely to be an increase in noise pollution from construction vehicles and construction staff. The post-mitigation significance rating is **low.**	
Heritage Construction	-5	-5
	Disturbance of graves and sites of archaeological, historical and cultural significance could take place during construction. The mitigation measures included in the EMPr must be complied with to achieve the post-mitigation significance rating of **low.**	
Traffic Construction	-5	-5
	During the construction phase there is likely to be an increase in traffic from construction vehicles. Construction vehicles are to avoid main roads during peak traffic hours and mitigation measures outlined in the EMPr are to be implemented. The post mitigation significance for both alternatives is **low.**	
Socio-economic Construction	+7	+7
	The development will result in a significant number of construction phase jobs for the local people. The significance rating is **medium.**	
	-5	-5
	Construction staff and public safety during construction. The post mitigation significance is **low.**	
TOTAL	-66 +7	-72 +7

Based on the comparative assessment of the two scheduling alternative options and the impact identification and assessment, it is evident that there is a difference in the negative impacts for the alternative options: -66 for scheduling Alternative 1 (construction during the non-rainy season) compared to -72 for Alternative 2 (construction during the rainy season).

Scheduling Alternative 1 (construction during the non-raining season) is regarded as the preferred scheduling alternative.

The majority of the negative impacts, which have contributed to the greater impact rating score for Scheduling Alternative 2, pertain to the increased risk of soil erosion during the rainy season.

10 ENVIRONMENTAL IMPACT STATEMENT

10.1 Conclusions

The findings conclude that there are no environmental fatal flaws that could prevent the proposed Dawkinsville Cemetery development if the recommended mitigation and management measures contained in the preceding chapter and EMPr (*Appendix E)* are implemented.

The results of the impact assessment indicate that the most significant impacts as a result of the proposed project would include the following:

PHYSICAL ENVIRONMENT

<u>Geology</u>

With regards to suitability of the site for the establishment of a cemetery the ease of excavation of the in-situ material and stability of open excavations were identified as the most significant

impacts. Mitigation and management measures supplied by the geotechnical engineer to be implemented.

Geohydrology

Groundwater contamination due to decomposition of bodies, contaminants released from burial materials and decomposition of coffins in the proposed cemetery development.

The locality of the site was in line with minimum requirements in terms of the positioning of a cemetery (i.e. distance from any drinking source, distance from any surface bodies, depth of water table etc.).

Recommendations and mitigations measures supplied by the geohydrological specialist to be implemented.

BIOLOGICAL ENVIRONMENT

According to the Ecological Fauna and Flora Habitat Survey the ecological sensitivity of the site is **medium-low.**

No Threatened or Near Threatened plant or animal species appear to be resident at the site. No other plant or animal species of particular conservation importance appear to be present at the site, apart from the widespread tree species *Vachellia erioloba* which is a Protected Tree species.

Where practical individual *Vachellia erioloba* trees are to be avoided at the site otherwise a permit should be applied for if any *Vachellia erioloba* trees will be damaged or destroyed at the proposed footprint, if the development is approved. Additional mitigation measures and recommendations supplied by the Ecological Specialist to be implemented.

SOCIO-ECONOMICAL ENVIRONMENT

Cultural heritage sites and graves

No graves or cultural heritage sites were identified on the site. 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.

Availability of services

Water: A water connection shall be provided by the Municipality on request and at the expense of the applicant.

Sewer: The applicant shall at own cost install a septic tank.

Electricity: Solar power will be used for electricity.

Solid waste: The applicant will be responsible for waste collection and removal to the licensed Klerksdorp Landfill Site.

Traffic Impacts

The proposed cemetery development would have an impact on the current road network. The recommended access arrangements, parking requirements and road upgrades must be implemented. Traffic control measures to be implemented during large funerals.

Need and desirability

The need for a cemetery in the area had been confirmed. The existing Klerksdorp Cemetery is approaching its maximum capacity. The proposed cemetery development is in line with the North West Spatial Development Framework.

Socio-economic

The proposed cemetery development will create employment opportunities during both the construction and operational phase.

The development will lead to increased rates and taxes accruing to the City of Matlosana Municipality.

It is the opinion of Setala Environmental that there are presently no environmental impacts emanating from the proposed activity that cannot be adequately managed. The management of the negative impacts will require the implementation of the necessary mitigatory measures detailed in the EMPr (refer to Appendix E) of this report.

10.2 Recommendations

Based on the assumption that the mitigation measures will be effectively implemented for the proposed project and its associated infrastructure and that no fatal flaws have been identified to date, it is the opinion of the EAP that this activity should be authorised to proceed to the final stages of decision making.

In order to achieve appropriate environmental management standards and ensure that the findings of the environmental studies are implemented through practical measures, the recommendations from this EIA study are included within an EMPr *(Appendix E).*

The EMPr must be used to ensure compliance with environmental specifications and management measures. The implementation of this EMPr for the life cycle phases of the project is considered to be vital in achieving the appropriate environmental management standards as detailed for this project.

The proponent must appoint a suitably experienced (independent) Environmental Control Officer (ECO) for the construction phase of the development that will have the responsibility to ensure that the mitigation / rehabilitation measures and recommendations are implemented and to ensure compliance with the provisions of the EMPr.

10.3 Proposed Duration of Environmental Authorisation

If granted, the environmental authorisation is required for a period of at least five years.

It is envisaged that the construction period will be concluded and post construction monitoring requirements will be finalised approximately five years after commencement of the activity. At present a commencement date has not been finalised.

10.4 Assumptions, Uncertainties and Gaps In Knowledge

The assessment contained in this report as well as the recommendations made is based on the assumption that it does not replace or nullify any other spheres of legislation that may apply to any or all aspects of the proposed development.