BAKUBUNG LEDIG MIXED USE HOUSING DEVELOPMENT

DRAFT ENVIRONMENTAL IMPACT REPORT

NWP/EIA/36/2016

MARCH 2017

PREPARED FOR:

Kubu Property Investment (Pty) Ltd
6205 Birch Acres
25 Mogo street
Kempton Park
1618

Tel: 081 209 0239
Email: ben@bakubungfire.com

PREPARED BY:

K2M Environmental (Pty) Ltd
Encouraging Environmentally Sustainable Development

K2M Environmental (Pty) Ltd
Postnet Suite #509
Private Bag X4
Kloof
3640

Tel: 083 779 8119
Fax: 086 622 7276
Email: simitha@k2m.co.za

DETAILS OF THE INDEPENDENT ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

The Report was compiled by:

EAP:	Ms Simitha Bechan
Qualifications:	Bachelor of Science - Honours (Geography) – University of Witwatersrand
	Bachelor of Social Science (Geography and Environmental Management) - University of KwaZulu Natal
	Short course in ArcGIS
	Short course in Public Participation
	Professional Project Management Course
Work Experience:	June 2014 - Present: Environmental Assessment Practitioner for K2M Environmental
	February - May 2014: Environmental Technician for Royal HaskoningDHV
	August - January 2013: Project Officer for Energy and Climate for the South Durban Community Environmental Alliance (SDCEA)

I, Simitha Bechan declare that this report has been prepared independently of any influence or prejudice as may be specified by the Department of Rural, Environment and Agricultural Development.

I hereby confirm that all comments received from I&APs during the Scoping Report has been included into the Draft Environmental Impact Report in the form of a Draft Comments and Response Report.

March 2017

Ms. Simitha Bechan
K2M Environmental (Pty) Ltd
Environmental Assessment Practitioner

Date

Reviewed by:

EAP:	Gert Watson
Qualifications:	B.Art. et. Scient. (Planning) - University of Potchefstroom
	Advance Project Management (Project Management Body of Knowledge Methodology)
	IEMA Approved Environmental Impact Assessment Course: The National Environmental Management Act Regulations – A Practical Approach
	IEMA Approved Environmental Auditors Course
Work Experience:	2002 – 2005: Environmental Consultant for K2M Technologies (Rustenburg Office)
	2006 – 2009: Senior Environmental Consultant for K2M Technologies (Durban Office)
	2009 – Present: Director for K2M Environmental (Durban Office)

Expertise to undertake Environmental Impact Assessments:

K2M Environmental is an established environmental consultancy since 2009. The consultancy has been involved with more than 100 Environmental Impact Assessments and other environmental related projects in KwaZulu-Natal, Mpumalanga, Gauteng and the North-West Province over the last 7 years.

Independence:

I, Gert Watson declare that this report has been prepared independently of any influence or prejudice as may be specified by the Department of Rural, Environment and Agricultural Development.

I hereby confirm that all comments received from I&APs during the Scoping Report has been included into the Draft Environmental Impact Report in the form of a Draft Comments and Response Report.

March 2017

Mr. Gert Watson
K2M Environmental(Pty) Ltd
Director

Date

TABLE OF CONTENTS

LIST OF APPENDIXES

Appendix A:	Locality Map
Appendix B:	Application Form
Appendix C:	Receipt of Acknowledgment from DREAD
Appendix D:	Approval of Scoping Report
Appendix E:	Preferred Layout
Appendix F:	Alternate Layout
Appendix G:	Draft Engineering Services Report
Appendix H:	Draft Services Agreement
Appendix I:	Electrical Outline Scheme Report
Appendix J:	Transport Impact Assessment
Appendix K:	Flood Line Report
Appendix L:	Ecological Assessment
Appendix M:	Wetland Assessment
Appendix N:	Preliminary Geotechnical Report
Appendix O:	Letter of Exemption
Appendix P:	Newspaper Adverts
Appendix Q:	Site Notices
Appendix R:	Photos of Site Notice
Appendix S:	Handouts
Appendix T:	Register
Appendix U:	Waybills
Appendix V:	Draft Comments and Response Report
Appendix W:	CV of Simitha Bechan
Appendix X:	CV of Gert Watson

LIST OF FIGURES

LIST OF TABLES

1 BACKGROUND INFORMATION

1.1 INTRODUCTION AND BACKGROUND

The Bakubung Ba Ratheo Community, together with Kubu Property Investments, initiated a process for the establishment of an integrated development on Portion 15 of the Farm Ledig, No. 909.

The total extend of the project area is approximately 364,37ha and is a "Greenfield development". The project area is bordered by the R556 to the South, Sun City to the East and North and the remainder of the Ledig community to the West (refer to Figure **Appendix A** for the Locality Map).

The project is planned to deliver an integrated mix of housing typologies totaling approximately 4 608 units, which includes, subsidised units, institutional units, bonded units and security villages. All of the residential units will be connected to waterborne sewerage as well as have access to other supporting infrastructure and social facilities.

1.2 ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS

The Environmental Impact Assessment Regulations of December 2014 promulgated in terms of Section 24(5) of the National Environmental Management Act, (Act No. 107 of 1998) as amended, requires Environmental Authorisation from the competent authority which is the North West Department of Rural, Environment and Agricultural Development (DREAD) for activities listed in Government Notices R983, R984 and R985. Table 1.1 below identifies the activity triggered.

Table 1-1: Triggered Listed Activity

Activity	Activity Description (in terms of the relevant notice)	Description of listed activity as per project description
Activity 9, GN.R. 983	The development of infrastructure exceeding 1000 metres in length for the bulk transportation of water or storm water- (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more;	The proposed project will entail the development of infrastructure which will exceed 1000m in length for the purpose of transporting water with an internal diameter of 0.36m or more.

Activity 12, GN.R. 983	The development of- (iii) bridges exceeding 100 square metres in size; (vi) bulk storm water outlet structures exceeding 100 square metres in size; where such development occurs- (a) within a watercourse;	The proposed project will entail the construction of bridges and bulk storm water outlets within non-perennial drainage areas.
Activity 19, GN.R. 983	The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from- (i) a watercourse;	The construction of bridges and roads within a watercourse.
Activity 15, GN.R. 984	The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation	Prior to construction, more than 20Ha of degraded indigenous vegetation will be removed.
Activity 2, GN.R. 985	The development of reservoirs for bulk water supply with a capacity of more than 250 cubic metres within 10km from a National Park	This activity was initially included as part of the application, but has now been excluded as it will not be triggered. The proposed development reservoir is significantly smaller.
Activity 4, GN.R. 985	The development of a road wider than 4m with a reserve less than 13.5m within 10km from a National Park	The proposed development will entail the construction of internal roads which is within 10km of the Pilanesberg Game Reserve.
Activity 14, GN.R. 985	The development of- (iii) bridges exceeding 10 square metres in size; (vi) bulk storm water outlet structures exceeding 10 square metres in size; within 10km from a National Park	The proposed development will entail the construction of bridges and stormwater outlets within 10km of the Pilanesberg Game Reserve.

1.3 TERMS OF REFERENCE

Regulation 15 (1) of the Environmental Impact Assessment Regulations of 2014 states that it is the duty of the EAP to identify whether a Basic Assessment or Scoping and Environmental Impact Report is required. For this particular project a Scoping and Environmental Impact Report is required.

K2M Environmental (Pty) Ltd has been appointed as the independent Environmental Practitioner (EAP) by the applicant and will therefore be responsible for the Scoping and Environmental Impact Report concerned with the proposed development as specified in Sections 21 to 23 of Government Notice R982.

The competent authority with regard to providing the required environmental authorisation is the North West Department of Agriculture and Environmental Affairs (DREAD). K2M Environmental has submitted the completed Application for Environmental Authorisation to DREAD **(Appendix B)** and has been allocated with Reference Number NWP/EIA/36/2016 **(Appendix C).**

This Scoping Report has been prepared in response to Section 21 (1) of Government Notice R 982 and was approved DREAD on the 29th of November 2016 (**Appendix D)**.

1.4 APPROACH AND METHODOLOGY

The overall approach to this project included the following activities:

- An initial analysis of the proposed development, the area where it will take place, and the identification of potential impacts during the scoping phase. The impacts were identified from both the initial technical analysis, as well as the public participation process described in the approved Scoping Report.

- The EIA report and draft EMPr was compiled in line with the plan of study for the EIA as contained in the approved Scoping Report. Of specific relevance is the focus on key issues identified in the Scoping Report and the conducting of more detailed specialist studies to further investigate these issues, and recommend appropriate mitigation and management measures.

- The draft Environmental Management Programme outlined in Section 6 provides an indication of appropriate mitigation and management measures that will have to be implemented to ensure that the identified potentially significant impacts are appropriately mitigated to a reasonable level.

The following aspects were identified in the Scoping Report as specific issues requiring detailed investigation:

- Storm Water Management Plan
- Municipal Services
- Preliminary Engineering Report
- Preliminary Geotechnical Report
- Traffic Impact Assessment
- Wetland Assessment
- Ecological Assessment

Sufficient baseline information for both the Scoping Phase and Environmental Impact Assessment Phase of the study was available from a variety of desktop data sources, reports and relevant data bases, and

site visits to the project area by the project team. The specific issues of concern identified during the Scoping Report have been further analysed in detail by various specialist studies.

1.5 REPORT STRUCTURE

- **Section 2** consists of a summary description of the proposed development and alternatives considered.
- **Section 3** consists of summary of the Engineering Services.
- **Section 4** analyses the project area in terms of its biophysical and socio-economic characteristics and includes relevant summary information from the specialist studies conducted.
- **Section 5** consists of an analysis of the potential impacts of the proposed development on the environment. It describes the impact assessment criteria, the evaluation of potential impacts, a comparative assessment of the alternatives considered and an environmental impact statement.
- **Section 6** describes the public participation process conducted during the scoping phase and the EIA phase of the project.
- **Section 7** outlines a draft Environmental Management Programme (EMPr) for the mitigation and management of the identified potential impacts.
- Supporting documents, reports, correspondence and other relevant information are contained in various Appendixes attached to this report.

Appendix 2 of Government Notice R982 requires specific content to be addressed in the Environmental Impact Report. Table 1.2 has been included to assist the reader to find the relevant section in the report.

Table 1-2: NEMA Requirements for Environmental Impact Assessment Report

Section	Requirements For EIR	Sections In Report
3(a)	**Details of-**	
(i)	The EAP who prepared the report; and	Just after cover page
(ii)	The expertise of the EAP, including a curriculum vitae;	Appendix W and X

3(b)	**The location of the activity, including:**	
(i)	The 21 digit Surveyor General code of each cadastral land parcel;	Section 2.12
(ii)	Where available, the physical address and farm name;	-
(iii)	Where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	Section 2.1.1
3(c)	**A plan which locates the proposed activity or activities applied for as well as associated structures and infrastructure at an appropriate scale; or, if it is-**	
(i)	A linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or	-
(ii)	On land where the property has not been defined, the coordinates within which the activity is to be undertaken;	Section 2.1.1
3(d)	**A description of the scope of the proposed activity, including**	
(i)	All listed and specified activities triggered and being applied for; and	Section 1.2
(ii)	a description of the associated structures and infrastructure related to the development;	Section 1.2 and Appendix G
3(e)	A description of the policy and legislative context within which the development is proposed and an explanation of how the proposed activity complies with and responds to the legislation and policy context;	Section 1.7
3(f)	A motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;	Section 4.9
3(g)	A motivation for the preferred site, activity and technology alternative;	Section 2.3
3(h)	A full description of the process followed to reach the proposed preferred alternative within the site, including:	
(i)	Details of the development footprint alternatives considered;	Section 2.3
(ii)	Details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	Section 6
(iii)	A summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;	Section 6.2.6
(iv)	The environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 4.7
(v)	The impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;	Section 2.3
(vi)	The methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;	Section 5
(vii)	Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 4.7
(viii)	The possible mitigation measures that could be applied and level of residual risk;	Section 4.8
(ix)	If no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and	Section 2.3

(x)	A concluding statement indicating the preferred alternative development location and the approved site;	Section 2.3
3(i)	A full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including-	
(i)	A description of all environmental issues and risks that were identified during the environmental impact assessment process; and	
(ii)	An assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;	
3(j)	An assessment of each identified potentially significant impact and risk, including-	
(i)	Cumulative impacts;	Section 5
(ii)	The nature, significance and consequences of the impact and risk;	
(iii)	The extent and duration of the impact and risk;	
(iv)	The probability of the impact and risk occurring;	
(v)	The degree to which the impact and risk can be reversed;	
(vi)	the degree to which the impact and risk may cause irreplaceable loss of resources; and	
(vii)	the degree to which the impact and risk can be mitigated;	Section 5 and 7
3(k)	Where applicable, a summary of the findings and impact management measures identified in 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;	Refer to Appendix K, L, M and N.
3(l)	An environmental impact statement which contains-	
(i)	A summary of the key findings of the environmental impact assessment;	Section 8
(ii)	A map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and	Refer to Appendix E
(iii)	A summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	Section 2.3
3(m)	Based on the assessment, and where applicable, recommendations from specialist reports, the recording of the proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for the inclusion as conditions of authorization;	Section 7
3(n)	The final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;	Section 2.3
3(o)	Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation	
3(p)	A description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed;	Section 1.6
3(q)	A reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	Section 8
3(r)	Where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required, the date on which the activity will be concluded, and the post construction monitoring requirements finalised;	-

3(s)	An undertaking under oath or affirmation by the EAP in relation to:	
(i)	The correctness of the information provided in the reports;	Just after cover page and Section 6
(ii)	The inclusion of comments and inputs from stakeholders and I&APs;	
(iii)	The inclusion of inputs and recommendations from the specialist reports where relevant; and	
(iv)	Any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties; and	
3(t)	Where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	-
3(u)	A indication of any deviation from the approved scoping report, including the plan of study, including-	
(i)	any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and	-
(ii)	A motivation for the deviation	
3(v)	Any specific information that may be required by the competent authority; and	
3(u)	Any other matters required in terms of section 24(4)(a) and (b) of the Act.	

1.6 ASSUMPTIONS AND LIMITATIONS

The following assumptions and limitations apply to the EIA:

- The application for environmental authorization has been initiated during the conceptual design and planning stages of the development. The selection of the site and the extent of the various land use components had however already been established as a preferred site for the proposed development at the time of commencement of the EIA process, and no alternative sites were thus evaluated.
- It is assumed that the information provided by the various specialists and project engineers are accurate.
- Several assumptions and limitations are noted in the various specialist reports. The EIA project team is of the view that an adequate level of information is, however, provided in order to facilitate the required assessment of potential impacts of the proposed project alternatives and decision-making in this regard.
- The study involves the assessment of impacts on the current conservation value of affected land and not on either the historic or potential future conservation value.
- Predictions and graphical representation of socio-economic characteristics of the surrounding community are based on the 2011 census information.

1.7 APPLICABLE LEGISLATION, POLICIES AND GUIDELINES

In addition to the Environmental Impact Assessment Regulations of 2014, the following legislation and guidelines identified in Table 1.3 have been considered in the preparation of this draft Environmental Impact Report.

Table 1-3: Applicable Legislation and Policies

Legislation	Relevance to the development
National Water Act (No. 36 of 1998)	A Water Use License Application will be required for the proposed development in terms of Section 21(c) and (i), as there will be water crossings.
National Environmental Management Act (No. 107 of 1998)	This development requires a full Environmental Impact Assessment process to be conducted in terms of the EIA Regulations of 2014.
National Heritage Act (Act 25 of 1999)	Authorisation from SAHRA will be required as a Heritage Impact Assessment will be required.
National Environmental Management: Biodiversity Act (No. 10 of 2004)	An Ecological Assessment has been conducted for the proposed development and has been included as **Appendix L** of this report.
Moses Kotane Local Municipal SDF	The proposed development is aligned with the SDF as it will assist the municipality to achieve its spatial goal by meeting the demands of housing and services. Furthermore, the Farm Ledig has been set aside for residential development.
Moses Kotane IDP (2016/2017)	The IDP of Moses Kotane Local Municipality has identified the growing number of informal settlements as a concern. It is reported that the municipality does not have the capacity in terms of human resources to address this issue. However, Wesizwe Platinum will, in collaboration with the Bakubung-Ba-Ratheo Traditional Council, Kubu Property Investments and the North West Department of Local Government and Housing support the development of housing in the Ledig area.
Occupational Health and Safety Act (No. 85 of 1993)	The contractor needs to manage his/her staff and crew in strict accordance with the Occupational Health and Safety Act in order to prevent injuries to staff.
Constitution of the Republic of South Africa (Act No. 108 of 1006)	The proposed development will assist in providing basic housing and services to the beneficiaries that will occupy the houses.
Agricultural Land Act (Act 70 of 1970)	The land for the proposed development is owned by the state and is occupied by the Bakubung Ba Ratheo Community.
North West Biodiversity Sector Plan	The Biodiversity Sector Plan identifies areas of environmental importance, which need to be considered prior to any development. The area has been identified as a Critical Biodiversity Area 2. However, this area has been severely transformed due to anthropogenic activities. An

	Ecological Assessment was undertaken for the proposed development and it was found that majority of the area has been transformed.
Ledig Master Plan	This Framework gives direct guidance to the development of the site. As per the Ledig Master Plan, the site is earmarked for new residential development on the eastern and western parts of the site.
North West Climate Vulnerability Assessment	This report provides an overall view of the current and future status of climate change in the North West Province and should be considered before construction.
North West Province: Biodiversity Conservation Assessment	This Assessment provides an overview of the Biodiversity found within the province and identifies areas of sensitivity. As indicated above, an Ecological Assessment was undertaken for the proposed development and it was found that majority of the area has been transformed.

1.8 THE APPLICANT

The details of the applicant are as follows:

Applicant name : Kubu Property Investment (Pty) Ltd
Contact Person : Mr Ben Gumbi
Tel : 081 209 0239
Email : ben@bakubungfire.com
Address : 6205 Birch Acres, 25 Mogo street, Kempton Park, Gauteng,

1.9 THE LAND OWNER

The details of the land owner are as follows:

Landowner : Bakubung Ba Ratheo Community
Contact Person : Ignatius Monnakgotla
Tel : 072 171 8974
Email : mimonnakgotla@gmail.com
Address : Royal Bakubung Ba Ratheo, Office of the Kgosi, Stand E 2404, Ledig Village

1.10 THE INDEPENDENT ENVIRONMENTAL ASSESSMENT PRACTITIONER

K2M Environmental (Pty) Ltd was appointed as the Independent EAP responsible for the following tasks:

- Processes, information, plans and reports produced in complying with the Regulations
- Ensuring that the relevant authority has access to all information
- Public participation process

The contact details of the independent Environmental Assessment Practitioner are as follows:

Name : K2M Environmental (Pty) Ltd
Contact Person : Simitha Bechan
Telephone : 031 – 764 6743
Fax : 031 – 764 2354
E-mail : simitha@k2m.co.za
Postal Address : PostNet Suite #509, Private Bag X4, Kloof, 3640

2 DESCRIPTION OF PROPOSED ACTIVITY

2.1 PROJECT LOCATION

The proposed development is located on a portion of Portion 15 of the Farm Ledig, No. 909, within the Moses Kotane Local Municipality, North West Province. The project is boarded by the R556 to the South, Sun City to the East and North and the Ledig community to the West. Figure 2.1 below illustrates the location of the project area.

Figure 2-1: Location of Project Area

Source: Google Earth, 2016

2.1.1 Geographical co-ordinates

The geographical co-ordinates for the proposed development are illustrated in Table 2.1 below.

Table 2-1: Geographical co-ordinates

Latitude /Longitude	Degrees/Minutes/Seconds
South	25° 21’ 48.19”
East	27° 04’ 35.41”

2.1.2 Surveyor- General

The 21-digit surveyor general reference number for proposed development is indicated in Table 2.2 below.

Table 2-2: 21 Digit Surveyor General Reference Number

T	0	J	Q	0	0	0	0	0	0	0	0	0	9	0	9	0	0	0	1	5

2.2 ACTIVITY DESCRIPTION

2.2.1 Extent of development

The total extent of the proposed development site is approximately 364,37 hectares.

2.2.2 Description of the proposed activity

The project is planned to deliver an integrated mix of housing typologies totalling 4 608 units, with additional supporting facilities. All of the residential units will be connected to waterborne sewerage and will be provided with supporting infrastructure as well as supporting social facilities.

The proposed development will entail clearing degraded indigenous vegetation. It will also entail construction of roads, some of which will be crossing water courses. It will also entail the laying of pipes for water and sewerage.

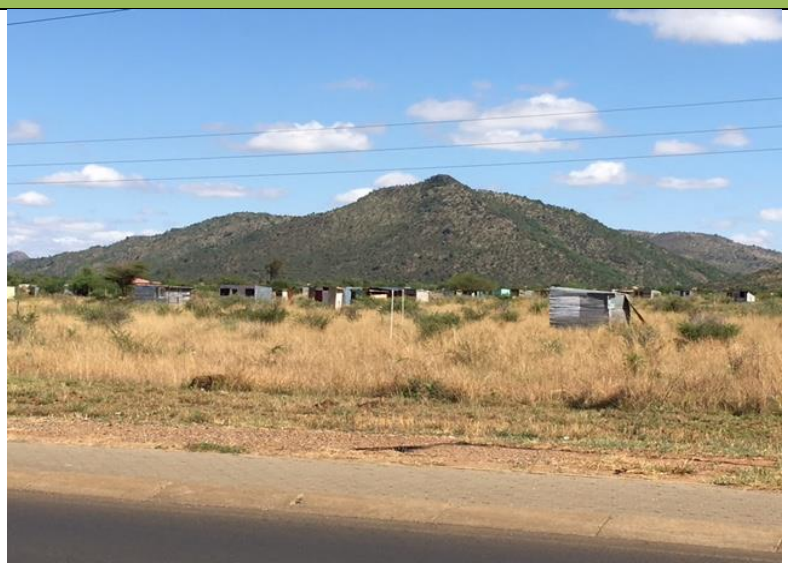
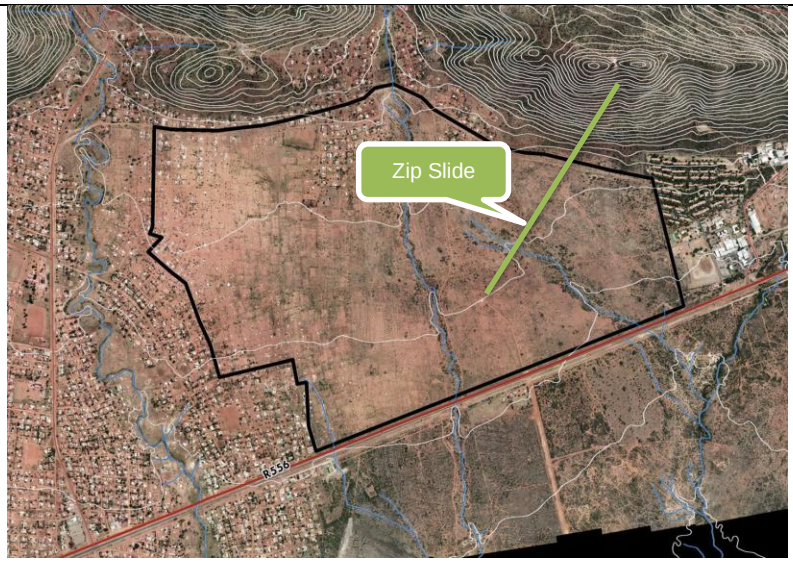
2.2.3 Access to the proposed development

Access to the site is via the R556. From Rustenburg, join the R104 and travel approximately 6km before turning right onto the R565. Travel approximately 32kms and then turn right onto the R556.Travel for 2kms and the project area will be on your left. Figure 2.2 below provide an illustration on how to access the site.

Figure 2-2: Access to Site

Google Earth, 2016

2.2.4 Existing/Current Situation

Activity	Photo
The site is situated next to the Ledig Settlement, which has spread informally over the western and northern parts of the project area. A portion of the site is currently being used for residential and subsistence agriculture.	 Informal houses on the eastern parts of the project area
There is a Zip 2000 Slide which is located in the project area. The Zip lines starts from a mountain range, north east of the project area and ends in the central section of the project area.	 Illuistraion of Zip Slide location

Tourists using the Zip 2000 Slide

2.2.5 Project phasing and construction program

The construction of the project is scheduled to commence as soon as all the processes to comply with applicable legislation are completed.

2.3 CONSIDERATION OF ALTERNATIVES

The identification and consideration of alternatives is recognised as required practice in environmental assessment procedures globally. The 2014 EIA Regulations required that alternatives be considered during the EIA process. Alternatives are seen as different means of meeting the general purpose and need of a proposed activity. Alternatives could include, amongst others, the following:

- Activity Alternatives: This requires a change in the nature of the proposed activity. This alternative is most appropriate at a strategic decision making level.
- Location Alternatives: Alternative locations for the entire project proposal, or for components of the project proposal.
- Layout Alternatives: This alternative allows different spatial configurations of an activity on a specific site.

- Scheduling Alternatives: also refer to alternative phasing options for the development. This alternative considers different phasing options during the implementation of the development.
- Infrastructure/ Input Alternatives: Also referred to as technological or equipment alternatives. This option considers various alternatives that will result in the same end result.

Layout and Infrastructure (technology) alternatives are the most pertinent to this EIA process, however all the above mentioned alternatives are briefly explored in the subsections below as well as the alternative of maintaining the status quo, commonly known as the "no-go" option.

2.3.1 Activity alternatives

Activity alternatives refer to the consideration of alternatives requiring a change in the nature of the proposed activity to be undertaken. Two alternatives were considered, i.e establishing tourism activities in the area or providing housing for the local communities. The option of establishing tourism activities in the area was considered, as the project area is bordered by the Provincial Tourism Development Corridor (P556) to the South, Sun City to the East and the Pilanesberg Nature Reserve to the North. Both Sun City and Pilanesberg Nature Reserve are considered tourism nodes and attracts 1000s of people yearly. However, the IDP of the Moses Kotane Local Municipality has identified the growing number of informal settlements as a concern, hence, the need for formal housing. Although, the municipality does not have the capacity in terms of human resources to address this issue, Wesizwe Platinum, in collaboration with the Bakubung-Ba-Ratheo Traditional Council, Kubu Property Investments and the North West Department of Local Government and Housing will provide support for the development of housing in the Ledig area.

2.3.2 Location alternatives

No location alternatives have been considered, as the IDP and SDF of Moses Kotane Local Municipality have identified the Ledig area for residential development.

2.3.3 Layout Alternatives

There have been a number of layouts that were drafted and revised. The layouts were revised in order to ensure that there is minimal impact on the natural environment. The images below, shows the transformation and refinement of the layout from the time of inception. It should be noted that K2M Environmental has been involved in the project from the time of inception to provide guidance in terms of environmentally sensitive areas. It should also be noted that the preferred and alternate layouts are

included as **Appendix E** and **Appendix F**. The advantages and disadvantages of the preferred and alternate layouts are discussed in Table below 2.3.

Figure 2-3: Transformation of Layout

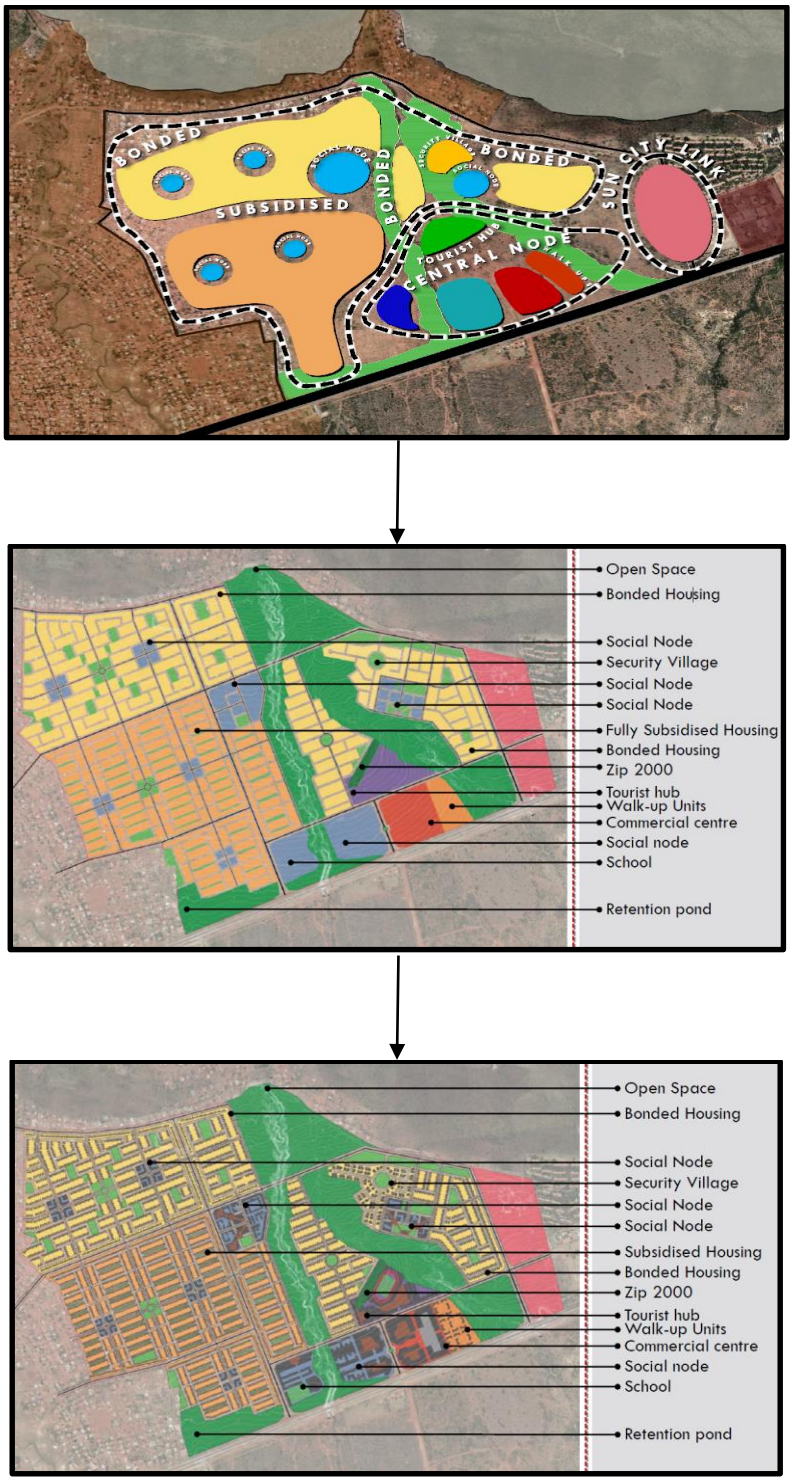


Table 2-3: Advantages and Disadvantages of Layout

Layout	Advantages	Disadvantages
Preferred Layout (Appendix E)	Provides for 81.02Ha of green areas (Parks)	
	Makes provision for social facilities such as schools and crèches.	
Alternate Layout (Appendix F)		Provides for 79.02Ha of green areas (Parks)
		Does not make provision for social facilities such as schools and crèches.

NB: The land use table refers to "Residential 6" and "Residential 4". Please note that "Residential 6" includes bonded houses, subsided houses and institutional houses whilst "Residential 30" refers to security villages.

2.3.4 Scheduling alternatives

The detailed time frame for implementation and completion of the proposed residential development is not currently available. However, given the extent of demand for housing within the Moses Kotane Local Municipality, it is anticipated that construction will commence as soon as approval of necessary statutory processes and authorizations (including environmental authorization) is obtained. No scheduling alternatives were therefore considered.

2.3.5 Input alternatives

Various types of materials can potentially be utilized during the construction phase of the project for both infrastructure and top structure purposes. This may include different material types (e.g. brick types, roof types and furnishings).

The images below are 3D representations of the proposed housing development.

Figure 2-4: 3D Representations

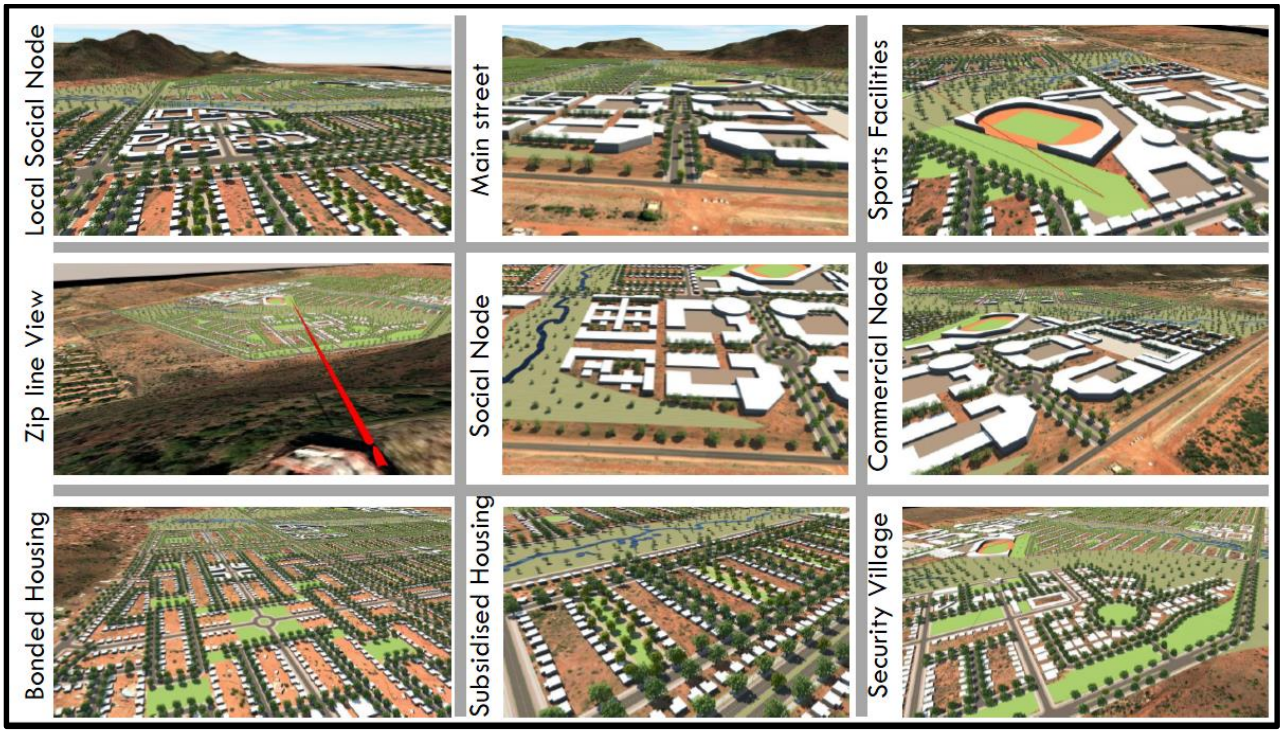


Figure 2-5: Zoomed in 3D Representations

2.3.6 Infrastructure alternatives

Three infrastructure alternatives with regards to sanitation were considered during the EIR phase. The three options are discussed below:

2.3.6.1 Option 1

Option 1, involves draining the two drainage zones using a common gravity bulk sewer pipeline to Wesizwe's WWTW as follows:

- Drainage zone 1 will involve the installation of a 355mm ND gravity outfall sewer pipeline that will convey sewage from the lowest point of drainage zone 1. This outfall sewer pipeline will run in the southern direction across the R556 road and into Wesizwe Mine's property. Within the property, the outfall sewer will run alongside the natural river stream until it reaches the mine's existing WWTW which is situated at the low point within the mine's area.

- Drainage zone 2 will be drained to the gravity outfall sewer indicated above, via the installation of a submerged pump station located at the low point of drainage zone 2 and a 250mm ND pumping main that will run in the western direction until it connects to the 355mm ND outfall sewer line.

Figure 2-6: Option 1

2.3.6.2 Option 2

Option 2, involves draining the two drainage zones using different bulk sewer lines to different WWTW plants as follows:

- Drainage zone 1 will involve the installation of a 355mm ND gravity outfall sewer pipeline that will convey sewage from the lowest point of drainage zone 1. This outfall sewer pipeline will run in the southern direction across the R556 road and into Wesizwe Mine's property. Within the property, the outfall sewer will run alongside the natural river stream until it reaches the mine's existing WWTW which is situated at the low point within the mine's area.

- Drainage zone 2 will be drained via the installation of submerged pump station located at the low point of drainage zone 2 and a 250mm ND pumping main that will run in the eastern direction until it connects to Suncity's existing WWTW.

Figure 2-7: Option 2

2.3.6.3 Option 3

Option 3, involves draining the two drainage zones using different gravity bulk sewer pipelines lines to Wesizwe's WWTW as follows:

- Drainage zone 1 will involve the installation of a 355mm ND gravity outfall sewer pipeline that will convey sewage from the lowest point of drainage zone 1. This outfall sewer pipeline will run in the southern direction across the R556 road and into Wesizwe Mine's property. Within the property, the outfall sewer will run alongside the natural river stream until it reaches the mine's existing WWTW which is situated at the low point within the mine's area.

- Drainage zone 2 will involve the installation of a 355mm ND gravity sewer outfall pipeline from the zone's lowest point and this pipeline will run in the southern direction across the R556 road and into the vacant land on the southern side of the R556 road. Within the vacant, the outfall sewer will run in a south-easterly direction until it connects to the outfall sewer of drainage zone 1.

Figure 2-8: Option 3

Considering all the options above, it is notable that all the options have a common sewage drainage purification plant which is the Wesizwe WWTW. The WWTW is located on the lowest point of the natural drainage area of the Bakubung development.

Therefore, it is preferred that option 3 be considered for the drainage of the proposed development as the bulk sewer lines will rely on gravity for drainage. This option eliminates the need for pump stations which can be costly in terms of maintenance in the long term.

2.3.7 "No-go" alternative

The "no-go" alternative should in all instances be considered as part of the EIA process. It assumes that the activity does not proceed, implying a continuation of the current situation of status quo. Should this development not go through, the housing demand will remain the same within the municipality. Furthermore, the vacant piece of land will be left vulnerable to illegal occupation and dumping.

3 ENGINEERING SERVICES

3.1 MUNICIPAL SERVICES

A range of municipal services will be provided for the proposed development. The Draft Engineering Services Report was compiled by Messrs. Bigen Africa in January 2017 and is attached as **Appendix G**. The salient findings and recommendations of the engineering services reports are summarised in the subsections below.

Services agreements have also been prepared by the engineers and will be entered into between the Implementing Agent, the Local Municipality and the District Municipality prior to the commencement of the development. Copies of the Draft Services Agreements are included in **Appendix H** for informative purposes.

3.1.1 Existing Infrastructure

3.1.1.1 Bulk Water Infrastructure

Water is currently abstracted from the Vaalkop dam and treated at the Vaalkop Water Treatment Works (WTW). The Vaalkop WTW has a capacity of 210 ML/d and from this plant water is supplied to the eastern parts of the Moses Kotane LM which also includes the Ledig area. Ledig currently has an existing 5ML reservoir that supplies water to the Ledig area, however, there is not enough capacity available in the system to supply the full water demand to Ledig.

3.1.1.2 Internal Water Infrastructure

There is no existing water network within the proposed Bakubung Ledig Integrated Mixed Use Development area.

3.1.1.3 Bulk Sanitation Infrastructure

The area earmarked for the proposed housing development is a Greenfield development and therefrore no bulk sanitation infrastructure is within the area. However, there are existing Waste Water Treatment Works (WWTW) in the areas neighbouring the development. These areas include the Sun City Holiday Resort and Wesizwe mine.

The Sun City Holiday resort is situated on the eastern side of the proposed Bakubung Ledig Integrated Mixed Use Development and the resort has a 5.07 ML/day WWTW which is located at a distance of approximately 1km from the eastern boundary of the proposed development. Sun City's infrastructure manager has indicated that the WWTW has spare capacity of 3ML/day.

Wesizwe mine is located on the southern side of the proposed Bakubung development and the mine is currently upgrading its existing WWTW to enable a capacity of 1.6 ML/day. The mine's existing WWTW is located on a low point topographically within the mine's area, and this plant is located at a distance of approximately 2km from the southern boundary of the proposed development

3.1.1.4 Internal Sanitation Infrastructure

There is no existing sanitation network within the proposed Bakubung Ledig Integrated Mixed Use Development area.

3.1.1.5 Bulk Road Infrastructure

The proposed development is located within the vicinity of the following roads:

- The R556 on the southern side of the proposed development; and
- The R565 to the west of the proposed development

3.1.1.6 Internal Road Infrastructure

There is no existing internal roads network within the proposed development.

3.1.1.7 Bulk Stormwater Infrastructure

There is no existing bulk stormwater infrastructure within the proposed development.

3.1.1.8 Internal Stormwater Infrastructure

There is no existing stormwater infrastructure within the proposed development.

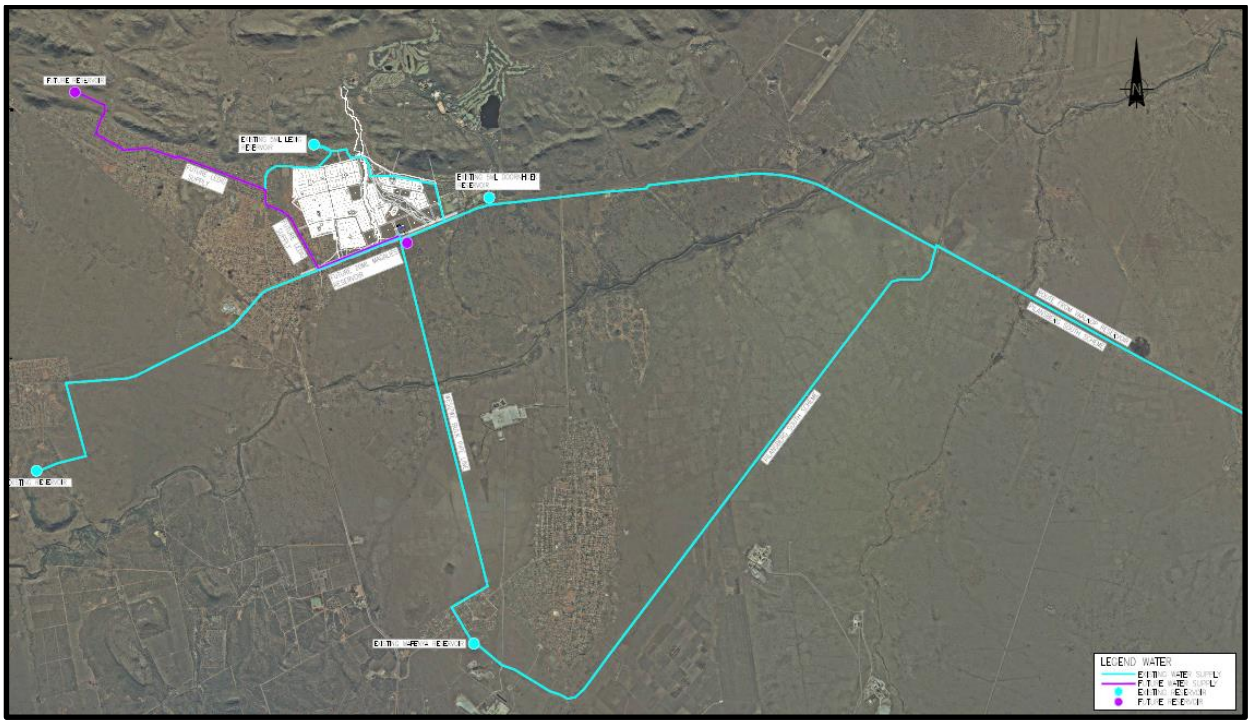
3.1.2 Infrastructure Currently Under Construction

3.1.2.1 Water Infrastructure

The South Pilanesberg Water Scheme is currently being initiated to create the possibility for the Moses Kotane Local Municipality (MLM) to provide a sustainable water source to the Ledig community. This will enable the MLM to deliver a basic level of service to all its residents.

The scheme includes a Magalies bulk water supply pipeline that has already been constructed, the pipeline runs in the northern direction from the Mafenya reservoir until it terminates at the southern boundary of the proposed Bakubung Ledig Integrated Mixed Use Development. The Magalies bulk water pipeline will supply a new 20ML balancing reservoir which will be built adjacent to where the pipeline terminates. It is proposed this reservoir will also supply water to the Bakubung housing Development.

Figure 3-1: Water Infrastructure under Construction



3.1.2.2 Sanitation Infrastructure

Wesizwe mine is currently upgrading its WWTW to a capacity of 1.6 ML/day.

3.1.2.3 Road Infrastructure

There is no roads infrastructure that is currently under construction within the proposed development.

3.1.2.4 Stormwater Infrastructure

There is no stormwater infrastructure that is currently under construction within the proposed development.

3.1.3 Proposed Infrastructure

3.1.3.1 Water Infrastructure

As mentioned previously the South Pilanesberg Water Scheme is being initiated to create the possibility for the MLM to provide a sustainable water source to the Ledig community. This scheme will include the construction of a 20ML reservoir and a pump station adjacent to the reservoir. It is proposed that water will be pumped from the 20ML reservoir and supplied to the proposed Bakubung housing development.

The MLM has requested that a 48-hour storage reservoir must be provided for the Bakubung Ledig Integrated Mixed Use Development. Following this, from the calculated water demand of 5ML/day a new 10ML reservoir will be required for the development.

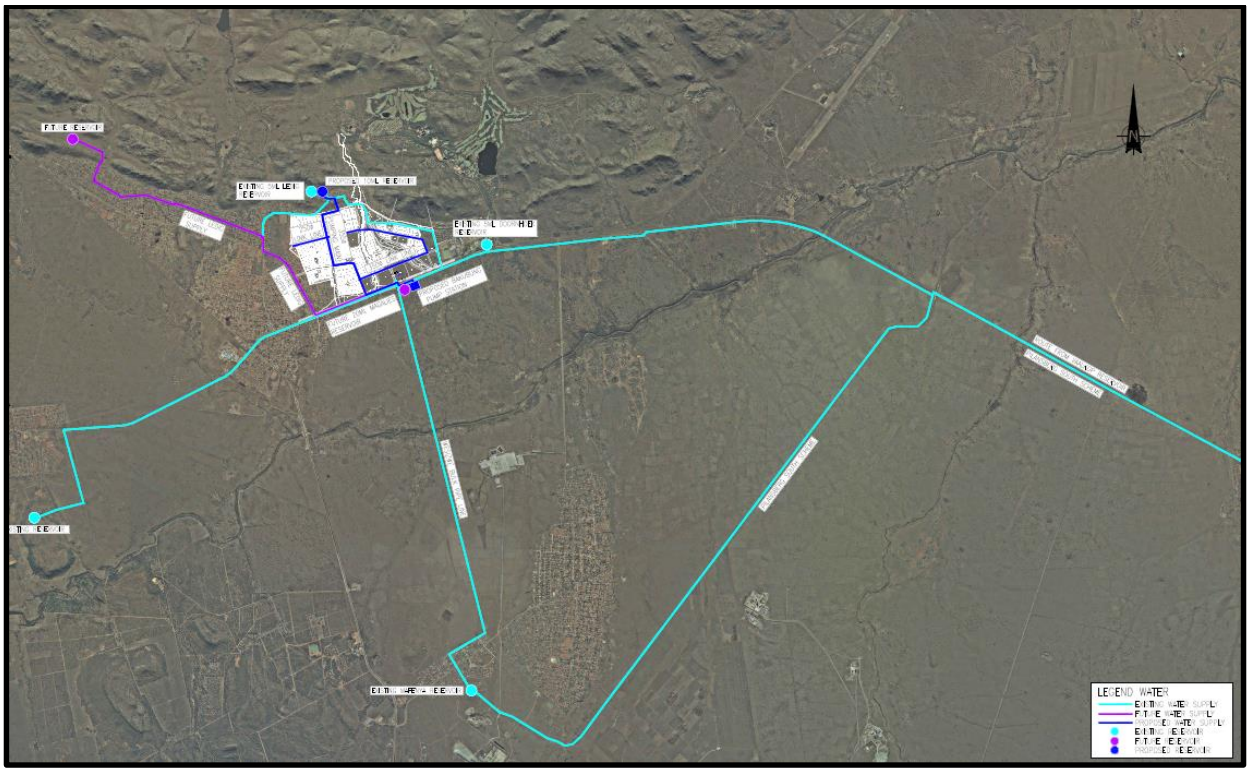
The proposed 10ML reservoir will be situated adjacent to the existing Ledig reservoir. This reservoir (10ML) will be supplied via a future 355 mm ND pumping main that will extract water from the future 20ML reservoir that will be constructed under South Pilanesberg Water Scheme.

The following bulk pipelines will be required to supply water to the proposed Bakubung Ledig Integrated Mixed Use Development:

- A 355mm ND pumping main will be required to connect the proposed South Pilanesberg Water Scheme 20ML supply reservoir to the new Bakubung 10ML reservoir. The pumping main will start from the new pumpstation and traverse in the north direction through the Bakubung development until it connects to the new 10ML reservoir. The total length of the pumping main will be approximately 3.7 km.
- A 600mm ND distribution gravity pipeline will then distribute water from the 10ML reservoir to the proposed Bakubung Ledig Integrated Mixed Use Development. The total length of this line will be approximately 1.36 km.

- A 600mm ND line indicated above is intercepted by a 355mm ring line which distributes water to the eastern and western side of the existing north to south gully.
- Also intercepting the 600mm ND line indicated above is a 250mm ND line which distributes water to the eastern side of the development.

Figure 3-2: Proposed Water Infrastructure



3.1.3.2 Sanitation Infrastructure

Due to the natural topography of the area where the proposed Bakubung Ledig Integrated Mixed Use Development is situated, the proposed development area is divided into two drainage zones which are: the western drainage zone and eastern drainage zone. The western drainage zone (drainage zone 1) flows in the southern direction towards the low point situated on the southern side of Wesizwe mine and the eastern drainage zone (drainage zone 2) drains in the easterly direction.

The estimated peak sewage outflow that will be generated by the development is 134 l/s with drainage zone 1 generating an estimated outflow of 82 l/s and drainage zone 2 generating an estimated outflow of 52 l/s.

As discussed in Section 2.3.6, three different options were considered for the sewer infrastructure. The preferred method was option 3 which involves draining the two drainage zones using different gravity bulk sewer pipelines lines to Wesizwe's WWTW. This option entails the following:

- Drainage zone 1 will involve the installation of a 355mm ND gravity outfall sewer pipeline that will convey sewage from the lowest point of drainage zone 1. This outfall sewer pipeline will run in the southern direction across the R556 road and into Wesizwe Mine's property. Within the property, the outfall sewer will run alongside the natural river stream until it reaches the mine's existing WWTW which is situated at the low point within the mine's area.
- Drainage zone 2 will involve the installation of a 355mm ND gravity sewer outfall pipeline from the zone's lowest point and this pipeline will run in the southern direction across the R556 road and into the vacant land on the southern side of the R556 road. Within the vacant, the outfall sewer will run in a south-easterly direction until it connects to the outfall sewer of drainage zone 1.

The reason for option 3 been selected was because the bulk sewer lines will rely on gravity for drainage, which will then eliminate the need for pump stations which can be costly in terms of maintenance in the long term.

3.1.3.3 Road Infrastructure

A Traffic Impact Assessment was prepared by ITS Engineers. This report will summarized in section 3.3 of this report.

3.1.3.4 Stormwater Infrastructure

The stormwater that will be generated externally outside the development on the north western and north eastern side of the development will be conveyed via bulk stormwater channels.

A 1.5m x 1m bulk stormwater v-channel on the north western side of the development will convey the stormwater for a distance of approximately 3 km to a stormwater inlet structure outside of the development and from then on, the stormwater will be conveyed via a 1200 mm ND bulk stormwater pipeline for a distance of approximately 2 km. The pipeline will eventually discharge the stormwater into an attenuation pond. The attenuation pond will accommodate the stormwater generated by a greater portion of the western side of the proposed development.

A 2m x 1m bulk stormwater v-channel on the north eastern side of the development will convey the stormwater for a distance of approximately 1.5 km to a stormwater inlet structure on the eastern boundary of the development and from then on, the stormwater will be conveyed via a 1200 mm ND bulk stormwater pipeline running in the north-south direction for a distance of approximately 1 km. The pipeline will eventually discharge the stormwater into an attenuation pond located on the south eastern stand within the development.

On the downstream side of the proposed development there are existing culverts crossing the R556 road. The R556 is a provincial and a class 2 road which is under the custodianship of the South African National Roads Agency (SANRAL).

SANRAL requires that culverts that cross class 2 roads must be able to accommodate 1:20 year floods. Therefore, from the flood discharge calculations carried out for the proposed development, it was found that the capacity of one of the culverts crossing the R556 will need to be upgraded in order to accommodate the 1 in 20 year flood.

The culvert crossing that will need to be upgraded is the one that enables the river flow of the western leg of the stream traversing through the development. Therefore, a culvert of a diameter of 2.8 m will need to be installed to provide the required capacity.

3.2 ELECTRICAL INFRASTRUCTURE

The Electrical Outline Scheme Report has been undertaken by Messrs Bigen Africa in December 2016. A copy of the report is attached in **Appendix I** and summarized below.

3.2.1 Existing Electrical Infrastructure and Services

The electrical supply authority for the area is Eskom. The existing electrical infrastructure in the vicinity of the Proposed Development consists primarily of rural overhead lines that have limited capacity and that will not be able to supply new developments.

3.2.2 Electrical Supply

The bulk supply for the Proposed Development will come from Eskom. A formal application was logged and an Investigation Fee of R62 643.00 (VAT Incl.) to Eskom. Eskom completed their internal investigations to determine whether the require capacity could be made available from the nearest existing Eskom Substation. The Bakubung-Ledig Development will require 20MVA supply at end state, and can be supplied in the following ways:

3.2.2.1 Temporal Supply- 3.7 MVA

The full load cannot be accommodated from any of the nearby substations without upgrades. This supply will be connected in phases starting from 2017 up to 2023. The 22kV overhead line that passes by the southern boundary of the Proposed Development has enough spare capacity to provide a temporary supply to the Proposed Development, but there are severe constraints at the Sun City Substation which only has 1 X 5MVA transformer.

The Sun City Substation will have to be upgraded before additional loads can be added to the existing 22kV overhead line. The 3.7MVA that can be made available after the substation has been upgraded, can only cater for the first 1 057 units.

Eskom has indicated that the Scope of Works required at the Sun City Substation is as follows:

- Extend the substation towards the North
- Exchange the existing 5MVA transformer with a new 1 OMVA, 11 /22kV transformer
- Build 550m of 22kV Hare overhead from Pole No. SCM24 of the existing 22kV line to the boundary of the Proposed Development install Metering Units (ground CT/VT) on the boundary of the Proposed Development
- Install an auto-recloser on the boundary of the Proposed Development to create a bulk point

3.2.2.2 Permanent Supply

To supply the end state capacity of 20MVA to the Proposed Development, Eskom has indicated that a new substation will have to be constructed on the Proposed development.

The Scope of Works required to construct the substation, is as follows:

- Build a new 20MVA, 132/22kV Substation that will be called 'Bale Substation'. The substation will consist of:
  - 1 X 132kV Feeder Bay
  - 2 X 22kV Feeder Bays
  - A fully equipped control room with protection and metering equipment
  - Build 3.5km 132kV Chickadee line from the existing Bakubung Substation to the New Bale Substation

3.3 TRANSPORT IMPACT ASSESSMENT

A Transport Impact Assessment was undertaken by Messrs ITS Engineers during January 2017. A copy of the report is attached as **Appendix J** and is summarised below:

- It is expected that the development will generate 2248vph during the AM peak hour and 2358vph during the PM peak hour;
- It is proposed to construct three traffic circle controlled accesses from the R556 to the development;
- Upgrades to traffic circle control at the R556/R565 intersection is proposed in order to accommodate the background traffic as well as at the R556/Internal Rd 1 and R556/Engen Access intersections in order to accommodate the 2021 background and development traffic;
- Public transport facilities should be constructed on the R556, downstream of the proposed development accesses;
- Sidewalks are proposed on the southern part of the R556 leading to the public transport lay-bys;
- Given that the proposed upgrades are in place, it can be recommended that the development should be considered favourably from a traffic engineering point of view.

3.4 PROJECT PHASING AND CONSTRUCTION PROGRAM

The construction of the project is scheduled to commence as soon as all the processes to comply with applicable legislation are completed and will be phased.

4 SITUATION ASSESSMENT OF PROJECT AREA AND AFFECTED ENVIRONMENT

4.1 CLIMATE

The study area is situated in the eastern region of the North West Province with a mean annual precipitation (MAP) of between 566 and 620mm. This is higher than average, as the North-West Province has a MAP of 481mm. Averages show typically summer rainfall, with the highest averages being recorded in December and January. Furthermore, the region in which the study area is situated experiences on average of 5-28 hot days in the year with temperatures frequently exceeding 30°C. According to Mucina and Rutherford (2006), frost is fairly frequent in winter. The area also enjoys a sub-tropical climate with average temperatures around 16 °C during winter and 31 °C during summer with on average of 19°C.

4.2 PHYSICAL AND LANDSCAPE CHARACTERISTICS OF THE SITE

The topography is characterised by a combination of flat plains and isolated koppies and mountainous areas to the north of the development site, with the average elevation of the study area being 1080 meters above mean sea level.

The rivers and wetlands on the proposed development site are semi-ephemeral streams. The main river bisecting the site originates within the Pilanesberg National Park and ultimately joins the Elands river system which flows east and joins the Crocodile River. The Pilanesberg is an old volcanic crater, and as such provides a highland mountainous source, from wetlands and springs, which is supplemented by rainfall.

4.3 SURROUNDING LAND USE

The project is boarded by the R556 to the South, Sun City to the East, the Pilanesberg Nature Reserve to the North and the Ledig Village to the West. Figure 2.1 below illustrates the surrounding land uses of the project area.

Figure 4-1: Surrounding Land Use

Source: Google, 2016

4.4 PHOTOGRAPHIC OVERVIEW OF THE SITE

The following photos provide an overview of the proposed development areas as described above.

Figure 4-2: Photographic overview of the site

North facing photo of the Project Area	Manmade dam within the Project Area
	
Zip Slide	**Drainage channel within the Project Area**
	
	
Access path within Project Area	**R556**

4.5 BIOPHYSICAL ENVIRONMENT

4.5.1 Floodlines and Drainage

A Floodline Assessment was undertaken by Messrs Bigen Africa during November 2016. A copy of the report is attached as **Appendix K** and summarised below.

The study area falls within the Crocodile-Marico River catchment and within quaternary catchment A22F. The Elands River occurs to the south of the site and are classified as Critically Endangered with a Present Ecological State of Class D: largely Modified.

The rivers and wetlands on the proposed development site are semi-ephemeral streams. The main river bisecting the site originates within the Pilanesberg National Park and ultimately joins the Elands river system which flows east and joins the Crocodile River. The Pilanesberg is an old volcanic crater, and as such provides a highland mountainous source, from wetlands and springs, which is supplemented by rainfall.

4.5.1.1 Flood line Modelling

The 1:50 and 1:100 flood-lines were determined using the HEC-RAS (Hydrologic Engineering Centre's River Analysis System Version 4.1.0) computer analysis software as mentioned above.

A digital terrain model (DTM) was generated from the tacheometric survey of the defined water course, using AutoCAD Civil 3D. The DTM was used to produce a longitudinal section of the two streams. Cross-sections of the two defined water course were generated along the centre of the channels and at the culverts crossing the R556, this crossing were the critical points.

4.5.1.2 Flood Profile Computation

The longitudinal section and cross-sections were imported into the HEC-RAS model and used as inputs in the flood-line simulation. The simulation of the flood was based on Manning's formula using an n-value (roughness coefficient) of 0.045 and 0.06. The computation of the flood scenario was based on "steady flow" condition.

Cross-sections were extracted for two defined water courses at 50m interval along the centre line of the channel and at critical points. This was done using the available contour data from the digital terrain model.

Circular Culverts crossing R556 were considered in the models, Inverts levels and other data were extracted from the survey and site investigations and these were used as input into the model.

Figure 4-3: Floodlines

4.5.2 Fauna and Flora

An Ecological Study for the Bakubung Ledig project area was undertaken by Hudson Ecological. The report is attached as **Appendix L** and is summarized below.

- There were four vegetation communities identified within the project area, namely the, Secondary clay thornveld; Footslope broadleafed bushveld; Secondary turf thornveld; and Secondary riparian vegetation. The majority of the area is characterised as being transformed or secondary vegetation communities and therefore have low conservation importance, due to the lack of species of conservation importance being present in, or reliant on these vegetation communities.

- No flora species of concern were observed or recorded during the site survey.

- A total of 21 arthropod taxa, 4 reptile taxa, 0 amphibians, 19 birds and 5 mammal species were recorded during the 2015 site survey. None of the species recorded are listed as species of concern, but a small number of species of concern have a moderate probability of occurrence in the area.

- Where not transformed or heavily degraded, the ecological function of the riparian zones and broadleaf bushveld can be considered high. The transformed and severely degraded areas have low ecological integrity.

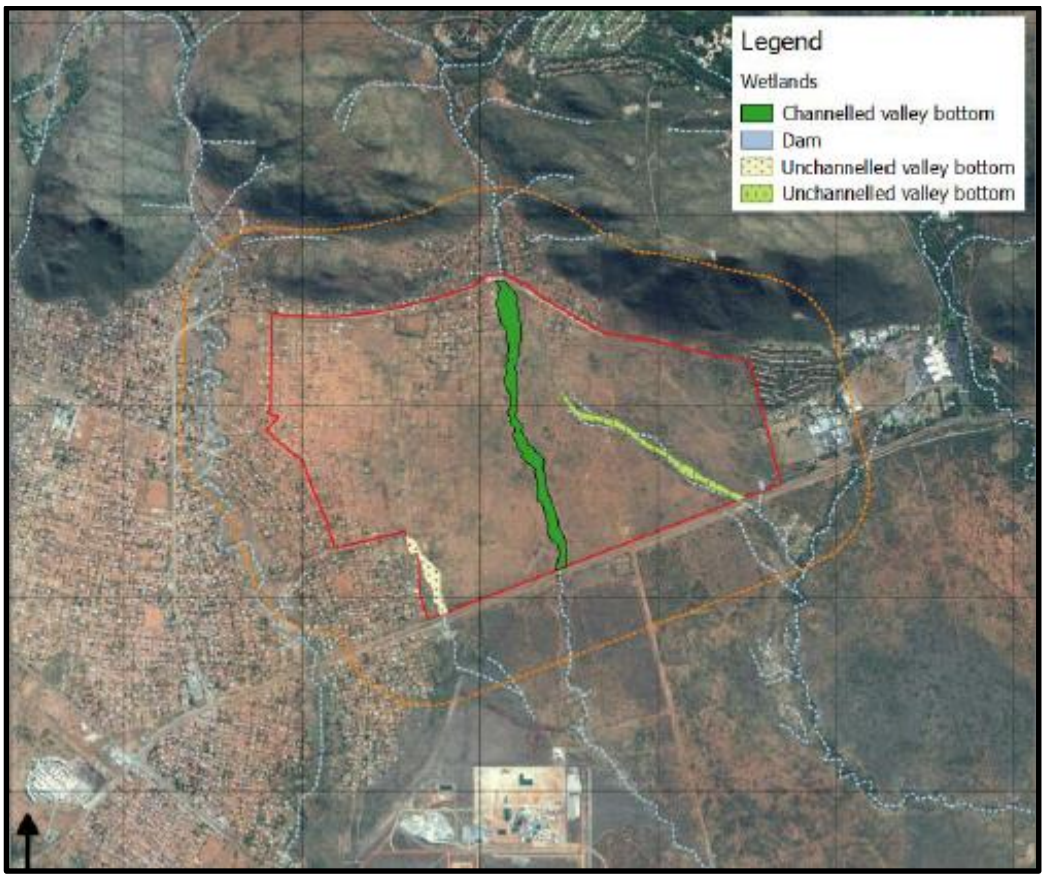
- It is unlikely that development of this area will have any significant detrimental effect on biodiversity of the area.

4.5.3 Wetland System

A Wetland Assessment was undertaken for the Bakubung Ledig project area by the Biodiversity Company. A copy of the report is attached as **Appendix M** and is summarized below.

- There were four HGM units that were identified within 500m of the project area, namely:
    - Channelled Valley Bottom (HGM 1);
    - Unchannelled Valley Bottom (HGM2);
    - Unchannelled Valley Bottom (HGM3); and
    - Depressions (dam) (HGM 4).

Figure 4-4: Identified Wetlands



- Two dams were identified for the project. These dams are considered to be endorheic, with no outflow. These systems are thought to be old borrow pits, and are not regarded as natural wetland systems. Based on this, the depressions will not be considered for the ecological assessment and risk study components.

- The PES results for the wetlands are as follows:

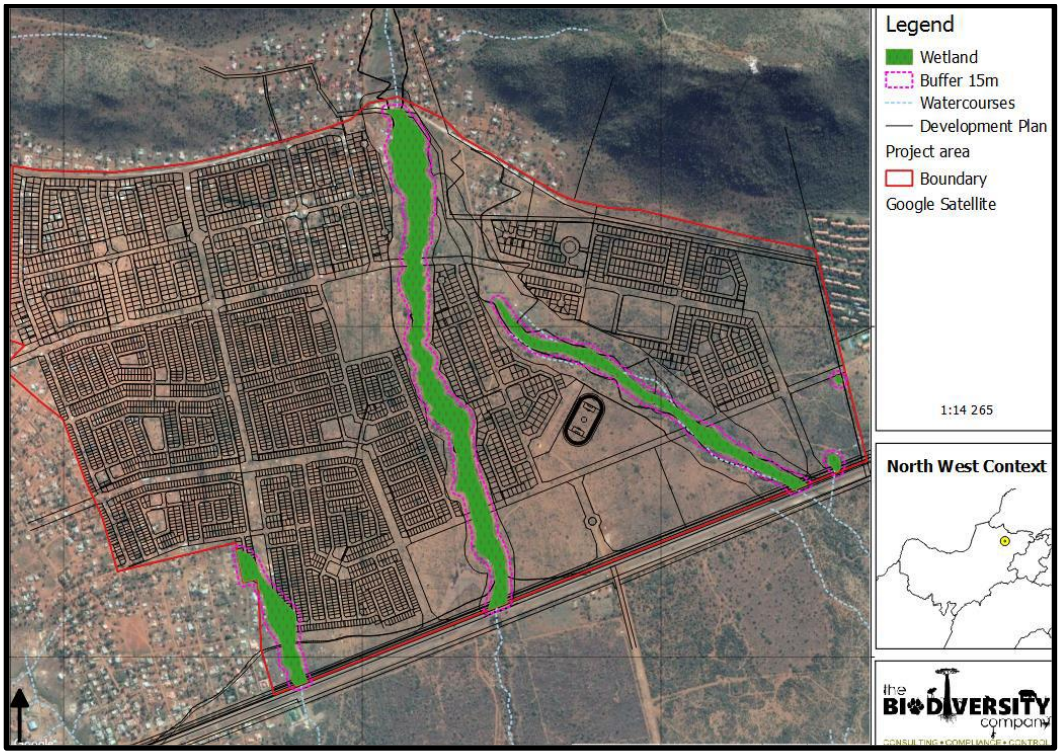
HGM 1	Channelled Valley Bottom	E: Seriously Modified
HGM 2	Un-Channelled Valley Bottom	C: Moderately Modified
HGM 3	Un-Channelled Valley Bottom	E: Seriously Modified

- HGM 1 and HGM 2 showed Moderate (C) level of importance for the Ecological Integrity & Sensitivity as well as for the Hydrological Importance. The Direct Human benefits were rated to be moderate and marginally important for HGM 1 and HGM respectively. HGM 3 showed Marginal /

Low (D) level of importance for the Ecological Integrity & Sensitivity as well as for the Direct Human benefits. The Hydrological / Functional benefits were rated to be moderate.

- Buffer zones were suggested for the various HGM units to address the vulnerability of the wetlands to impacts. A buffer zone of between 16 – 18m during the construction phase of the project was determined for the three (3) units. Additionally, a buffer zone of 15m during the operational phase, is recommended for all three HGM units.

Figure 4-5: Buffers



- This project has the potential address a number of aspects identified during the study that may be impacting on the status and function of these systems. Aspects that may be improved upon for the development include the following:
    - Improved storm water management to prevent sedimentation of the receiving wetland systems.
    - An improved storm water management system will also address the formation of gullies and head cuts in the catchment area. It will also likely reduce the extensive erosion of the wetland systems.

- Improved services will provide a formal means for the dumping and disposal of waste for the area. Waste that has been dumped within the systems must be removed and disposed of in designated areas.
- Drains and channels that have been dig within the wetlands and catchment to divert flows can be backfilled to restore the hydrological functioning of the systems.

- The proposed development, specifically the construction of crossings (or bridges) does pose a risk to the identified wetlands, with the level of risk determined to vary from low to moderate. The low risk ratings may largely be attributed to the current state of the local wetland systems.

- The following recommendations are provided for the study:
  - The unchannelled valley bottom wetland identified for the study that occurs in the south-western section of the site has been extensively modified through canalization of the wetland, building of residences in the wetland area, soil modification, rubble dumping etc. This area still represents a wetland system although this area should rather be managed in a grass stormwater canal considering that the residences in the area have modified most of the wetland from its original state. The section to the south of the R556 road has been canalised to divert water further south towards the Elands River."
  - A wetland rehabilitation plan should be compiled for the project, with a key focus being the rehabilitation of the channelled valley bottom wetland. The plan should include measures to rehabilitated gullies and head cuts, and also include measures to prevent further erosion of the system.

4.5.4 Geology and Subsoil conditions

A Preliminary Geotechnical Report was undertaken for the Bakubung Ledig project area by Messrs Intraconsult. A copy of the report is attached as **Appendix N**. As per the specialist, the sites are largely anticipated to fall in Development Category 2, i.e. potentially developable with constraints (e.g. active clays).

The majority of development occurs on sites with this designation. Detailed geotechnical investigations are merited on the site. Such investigations should comply with the contents of Generic Specification GFSH-2. The anticipated problematic soil conditions may be readily managed through the application of appropriate foundation solutions and precautionary measures on residential structures.

4.5.5 Archaeological Interest

A copy of the Scoping Report was submitted to SAHRA for their comment. SAHRA indicated that a Heritage Impact Assessment and Paleontological Assessment be undertaken for the proposed development. Specialist have been appointed to undertake the assessment. The letter of Exemption for a Paleontological Assessment has been attached as **Appendix O**. The Heritage Impact Assessment is still in the progress.

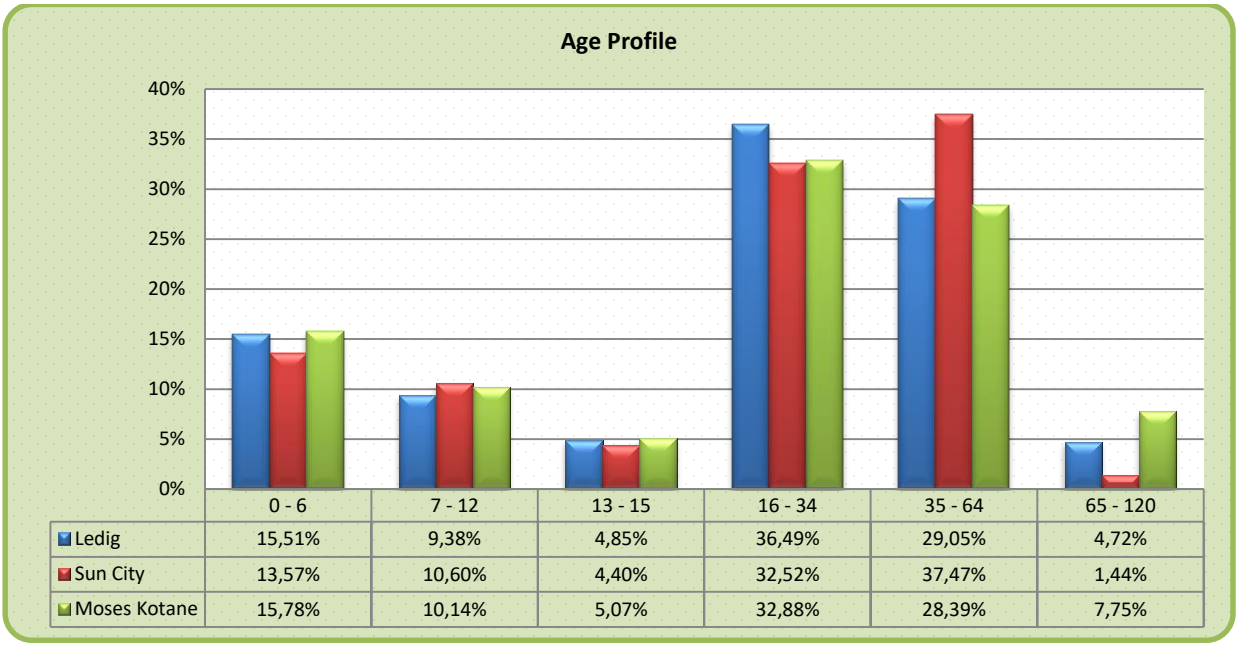
4.6 SOCIO ECONOMIC ENVIRONMENT

Socio-economic figures illustrated below were prepared from the Census 2011 data and present a socio-economic overview of the surrounding communities of the study area. The surrounding areas that were used were that of the Ledig community and Sun City. The reason these areas were selected is because it gives an overview of the high income earners and low income earners. It should be noted that the proposed development accommodates for both the high and low income earners.

4.6.1 Age Profile

As indicated in Figure 4.6 below, majority (36.49%) of the population from the Ledig community are between the ages of 16-34 years. This number is higher than the Sun City area (32.52%) and the Local Municipality (32.88%).

Figure 4-6: Age Profile

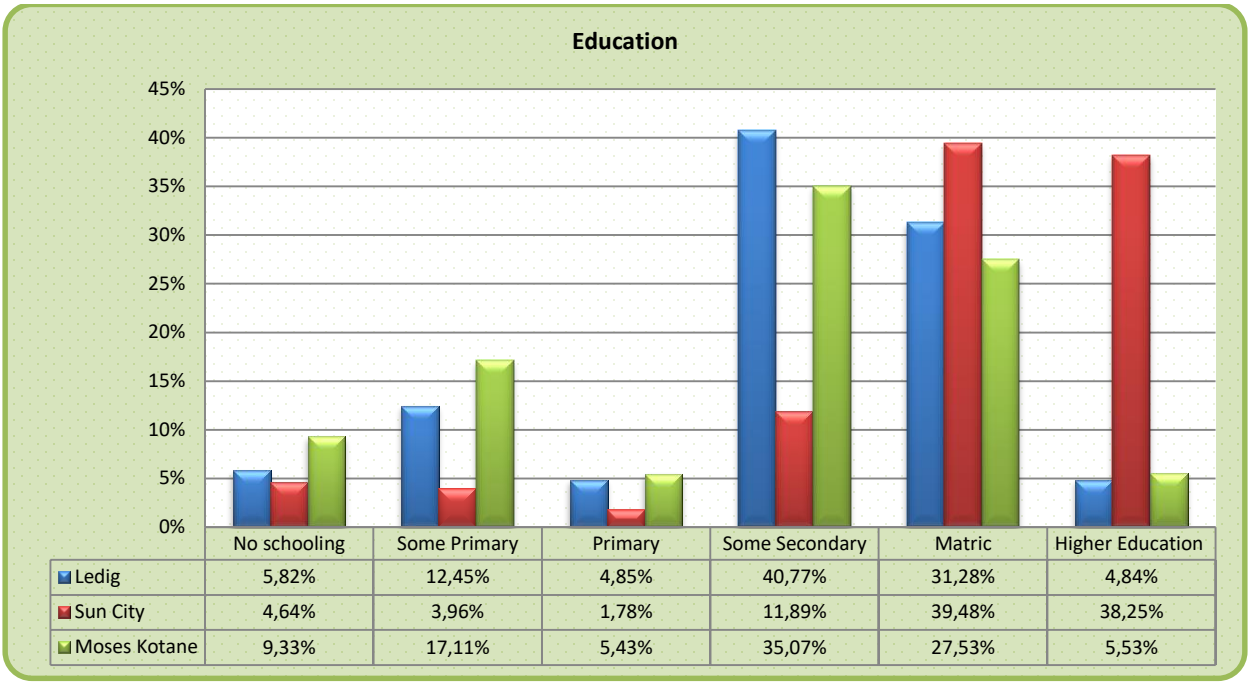


	0 - 6	7 - 12	13 - 15	16 - 34	35 - 64	65 - 120
Ledig	15,51%	9,38%	4,85%	36,49%	29,05%	4,72%
Sun City	13,57%	10,60%	4,40%	32,52%	37,47%	1,44%
Moses Kotane	15,78%	10,14%	5,07%	32,88%	28,39%	7,75%

4.6.2 Education Profile

These following figures illustrate the education levels of persons over the age of 20 years and therefore falling into the economically active categories of the population. The figures suggest relatively high education and literacy levels within the surrounding communities with as much as 40.77% of the population in Ledig having completed some secondary education whilst 31.28% of the population completed matric. In the Sun City area, approximately 38.25% of the population completed higher education. This figure is much higher than the figures for Ledig (4.84%) and the municipality (5.53%).

Figure 4-7: Education

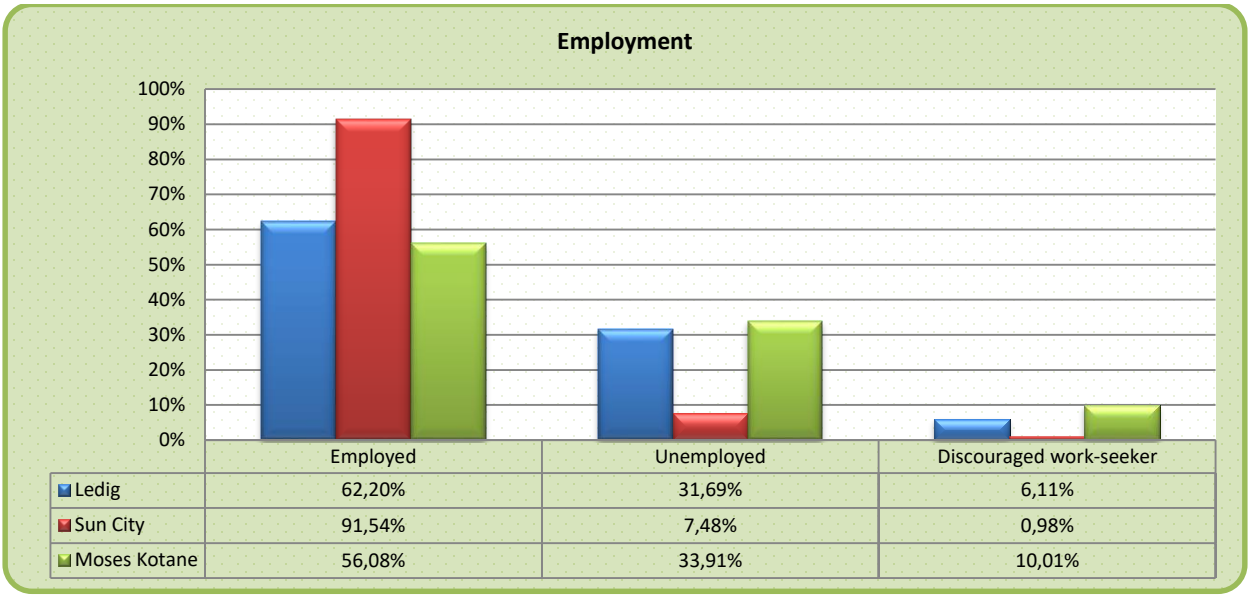


	No schooling	Some Primary	Primary	Some Secondary	Matric	Higher Education
Ledig	5,82%	12,45%	4,85%	40,77%	31,28%	4,84%
Sun City	4,64%	3,96%	1,78%	11,89%	39,48%	38,25%
Moses Kotane	9,33%	17,11%	5,43%	35,07%	27,53%	5,53%

4.6.3 Employment

These figures illustrate the employment profiles of persons over the age of 16 years and therefore falling into the economically active categories of the population. As much as 62.20% of the active population in Ledig and 91.54% in Sun City indicated that they are employed. Whilst 31.69% and 7.48% of the economically active population in Ledig and Sun City indicated that they were unemployed.

Figure 4-8: Employment

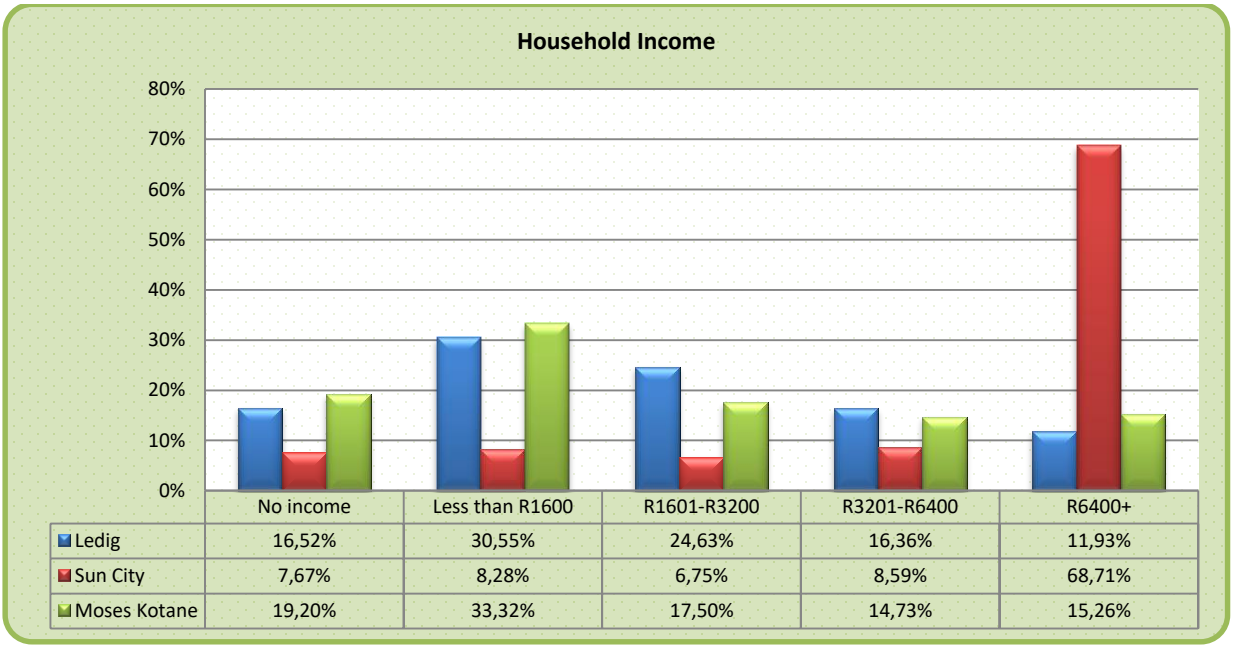


	Employed	Unemployed	Discouraged work-seeker
Ledig	62,20%	31,69%	6,11%
Sun City	91,54%	7,48%	0,98%
Moses Kotane	56,08%	33,91%	10,01%

4.6.4 Household Income

Majority (30.55) of households in the Ledig community earn less than R1600 a month whilst 16.52% do not have any form of income. Approximately 11.93% of households in Ledig earn more than R6400, which is much lower as compared to Sun City (68.71%) and the Municipality (15.26%).

Figure 4-9: Household Income



	No income	Less than R1600	R1601-R3200	R3201-R6400	R6400+
Ledig	16,52%	30,55%	24,63%	16,36%	11,93%
Sun City	7,67%	8,28%	6,75%	8,59%	68,71%
Moses Kotane	19,20%	33,32%	17,50%	14,73%	15,26%

4.7 IMPACT OF THE PROPOSED ACTIVITY ON THE ENVIRONMENT

4.7.1 Geographical and Physical

The Ledig area has been identified as an area for new housing projects. The development will therefore contribute positively to the area as it will prevent illegal occupation of the land and prevent the establishment of informal settlements.

4.7.2 Biophysical

The impact of the proposed activity on the biophysical environment is relatively low as the areas for conservation have been set aside. The Wetland specialist indicated that buffers between 15m and 18m need to be put in place. No residential units are to be constructed within these areas. Infrastructure that will be constructed within the rivers and buffers zones will be that of roads. A water Use License Application will need to be applied for in this case.

4.7.3 Socio-economic

The proposed activity will have a positive impact in terms of the socio-economic environment. The activity itself will ideally reduce the establishment of informal housing in the Moses Kotane Municipality and in turn improve the living conditions of those living in informal settlements. It will also contribute to job creation during the construction phase of the development.

4.8 MITIGATION MEASURES

A list of mitigation measures is briefly listed below. Mitigation measures will be addressed in detail in the draft EMPr which is highlighted in Section 7 of this report.

4.8.1 Cultural and Heritage Aspects

- Before construction starts, all staff must be informed what possible archaeological, historical or palaeontological objects (e.g. tools, human remains, fossils, etc) of value look like, and must notify the engineer or contractors should such an item be uncovered
- All work should cease immediately if any archaeological, historical or palaeontological remains are discovered during development and SAHRA should be notified.

4.8.2 Stormwater

- Plan and install appropriate stormwater control measures
- Increase in storm water run-off resulting from construction activities must be estimated and the drainage system assessed accordingly. A drainage plan must be submitted to the engineer for approval.
- If vegetation is to be removed, it must be done in phases to ensure that a minimum area of soil is exposed to potential erosion at any one time.
- Temporary cut off drains, grassed or rock-pitched diversion ditches and berms may be required to capture storm-water and promote infiltration or to divert run-off away from exposed soil or construction areas.
- Contractors must not in any way modify nor damage the banks or beds of streams or rivers, wetlands, other open water bodies and drainage lines adjacent to or within the designated area.
- Earth, stone and rubble is to be properly disposed of to prevent obstruction of natural water pathways over the site. These materials must not be placed in storm-water channels, drainage lines or rivers.
- Storm-water outfalls should be designed to reduce flow velocity and avoid stream bank and soil erosion

4.8.3 Ecological Aspects

- No vegetation may be cleared without prior permission from the engineer, ECO, or ecological specialists if required.
- No trees are to be cleared unless they are exotic invaders which must be verified by the ECO.
- Disturbance of mammals, birds, reptiles, other animals and their habitats must be prevented.

- If subterranean mammals are found in a construction area, construction must stop and the ECO must arrange for their capture and translocation to a safe area.

4.8.4 Water Quality

- Storage areas that contain chemicals and hazardous substances must be bunded with an approved impermeable lining. The containment capacity must equal the capacity of the storage containers. The ECO must approve the location and storage of any chemicals and hazardous substances on site.
- Adequate spillage containment measures must be implemented, such as cut-off drains, berms, etc.
- Mixing or decanting of all chemicals and hazardous substances must take place either on a tray or on an impermeable surface. Waste from these operations must be disposed of at a suitable DWS-certified waste facility for which a waybill must be shown to the engineer and ECO.
- Spills in bunded areas must be cleaned up, removed and disposed of safely from the bunded area as soon after detection as possible to minimise pollution risk and reduced bunding capacity.

4.9 NEED AND DESIRABILTY

The need and desirability for the Bakubung Ledig Mixed Use Housing Development is evident in the SDF and IDP of the Moses Kotane Municipality, as it has identified the project area as an area for housing developments. The implementation of the housing development will assist in reducing the establishment of informal settlements. Given that this project is a mixed use housing development, it will cater for all income groups as there is a combination of housing typologies.

The proposed development will also include the construction of water networks and proper sanitation infrastructure. By providing water and sanitation services to the proposed Bakubung Ledig development, it will assist in reducing surface water and groundwater pollution. This will be a result of households using piped water in their daily activities instead of water from the nearby rivers and utilising proper sanitation methods.

Furthermore, it is anticipated that Bakubung Platinum Mine will employ a permanent workforce of 3 375 employees between 2017 and 2014. This translates to a requirement of between 1 002 and 1 336 housing units.

Table 4.1 below was adapted from the 2014 BAR Template of the Department of Environmental Affairs. This table was inserted to motivate for the need and desirability of the proposed development.

Table 4-1: Needs and Desirability

1. Is the activity permitted in terms of the property's existing land use rights?		NO
The proposed development is not permitted in terms of the existing land use rights. The property will be rezoned as part of the development application. However, it should be noted that as per the SDF of Moses Kotane Municipality, the area has been identified for development.		
2. Will the activity be in line with the following?		
(a) Provincial Spatial Development Framework (PSDF)	YES	
The proposed development will assist in reducing the establishment of informal settlements.		
(b) Urban edge / Edge of Built environment for the area		NO
The proposed development will occur on Portion 15 of the Farm Ledig, No. 909. This piece of land is bordered by the Ledig community to the west and Sun City to the east.		
(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?).		NO
The Moses Kotane IDP identifies the Bakubung Ledig area for housing developments, which is in line with the preferred development proposal. The proposed development will therefore not compromise the integrity of the IDP but would rather enhance the objectives of the Moses Kotane IDP. Furthermore, as per the SDF of Moses Kotane Municipality, the area has been identified for development as Ledig is categorized as Nodal Area 5. Nodal areas are areas that have been identified as priority areas requiring development.		
(d) Approved Structure Plan of the Municipality	To be determined	
(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?)		NO
There is no Environmental Management Framework in place for the Moses Kotane Municipality.		
(f) Any other Plans (e.g. Guide Plan)	YES	
The following reports were assessed in terms of its applicability to this project: North West Biodiversity Sector Plan, Ledig Master Plan, North West Climate Vulnerability Assessment and the North West Province: Biodiversity Conservation Assessment. The relevance of this reports are indicated in Table 1.3.		
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	
Please see above (2c).		

4. Does the community/area need the activity and the associated land use concerned (is it a societal priority)?	YES	
The implementation of the housing development will assist in reducing the establishment of informal settlements. Given that this project is a mixed use housing development, it will cater for all income groups as there is a combination of housing typologies. The proposed development will also include the construction of water networks and proper sanitation infrastructure. By providing water and sanitation services to the proposed Bakubung Ledig development, it will indirectly assist in reducing surface water and groundwater pollution. This will be a result of households using piped water in their daily activities instead of water from the nearby rivers and utilising proper sanitation methods.		
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?		NO
• There is a reservoir that is currently been built, that will supply water to the proposed development. • In terms of sanitation, the preferred method involves draining the two drainage zones using different gravity bulk sewer pipelines lines to Wesizwe's WWTW. The Wesizwe's WWTW is currently been upgraded. • Roads will need to be constructed within the project area. • An investigation application fee was made to Eskom.		
6. Is this development provided for in the infrastructure planning of the municipality, and if not what will the implication be on the infrastructure planning of the municipality (priority and placement of services and opportunity costs)?	YES	
The municipality has provided for the infrastructure planning of the development as it has been identified in the IDP. The Department of Local Government and Human Settlements, together with Kubu Property Investments, Wesizwe Platinum and the Bakubung Ba Ratheo Community will be responsible for the construction of the houses.		
7. Is this project part of a national programme to address an issue of national concern or importance?	YES	
Throughout the country, there are many people without proper housing structures and access to basic services. The aim of this development is therefore to reduce the establishments of informal settlements and construct houses that can be utilised by all income earners.		
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	
Majority of the land for the proposed development is vacant. All environmentally sensitive areas have been demarcated. Furthermore, the project is boarded by the R556 to the South, Sun City to the East and North and the Ledig community to the West.		
9. Will the benefits of the proposed land use/development outweigh the negative impacts of it?	YES	
Given that the IDP has identified many informal settlements, the implementation of the housing development will assist in reducing the establishment of these settlements. This project is a mixed use housing development; therefore, it will cater for all income groups as there is a combination of housing typologies.		

10. Will the proposed land use/development set a precedent for similar activities in the area (local municipality)?	YES	
There are many other proposed housing developments in the municipality.		
11. Will any person's rights be negatively affected by the proposed activity/ies?		NO
This development will not infringe on any person's rights, as the proposed development will entail the construction of mixed housing typologies which can meet the needs of all income earners.		
12. What will the benefits be to society in general and to the local communities?		
• Access to municipal services such as water and sanitation. • Provision of educational facilities and community halls etc. • Job creation during the construction phase • Prevent illegal occupation of the land which will affect the surrounding communities • Prevention of illegal dumping • Prevention of informal settlements		

5 IMPACT ASSESSMENT

5.1 INTRODUCTION

The impact assessment aims at identifying potential environmental impacts (both positive and negative impacts) and evaluating these impacts in terms of its significance. This assessment is provided in the form of a systematic analysis framework to evaluate the nature, extent, duration, intensity, probability and significance of the various impacts. **The significance of the impacts is considered both without and with mitigation and management measures. The mitigation and management measures relating to the potential impacts identified as potentially significant will be addressed in detail in the Environmental Impact Assessment report and draft Environmental Management Plan.**

5.2 IMPACT ASSESSMENT CRITERIA

The assessment of the potential impacts of the envisaged development is undertaken in accordance with the broad criteria required by the integrated environmental management procedure and includes the following:

- Nature of Impact
- Extent/Scale
- Duration
- Intensity
- Probability

5.2.1.1 Nature of impact

A brief description of the type of impact the proposed development will have on the affected environment.

5.2.1.2 Extent/Scale

The physical extent of the impact.

i. Footprint
   The impacted area extends only as far as the actual footprint of the activity.

ii. Site
   The impact will affect the entire or substantial portion of the site/property.

iii. Local
The impact could affect the area including neighbouring properties and transport routes.

iv. Regional
Impact could be widespread with regional implication.

v.National
Impact could have a widespread national level implication.

5.2.1.3 Duration

The duration of the impact.

i. Short term
The impact is quickly reversible within a period of one year, or limited to the construction phase.

ii. Medium term
The impact will have a medium term lifespan (project lifespan 1 – 10 years).

iii. Long term
The impact will have a long term lifespan (project lifespan > 10 years).

iv. Permanent
The impact will be permanent beyond the lifespan of the development.

5.2.1.4 Intensity

This criteria evaluates intensity of the impact and are rated as follows:

i. Minor
The activity will only have a minor impact on the affected environment in such a way that the natural processes or functions are not affected.

ii. Low
The activity will have a low impact on the affected environment

iii. Medium
The activity will have a medium impact on the affected environment, but function and process continue, albeit in a modified way.

iv. High

The activity will have a high impact on the affected environment which may be disturbed to the extent where it temporarily or permanently ceases.

v. Very high
The activity will have a very high impact on the affected environment which may be disturbed to the extent where it temporarily or permanently ceases.

5.2.1.5 Probability

This describes the likelihood of the impacts actually occurring.

i. Improbable
The possibility of the impact occurring is highly improbable (less than 5% of impact occurring).

ii. Low
The possibility of the impact occurring is very low, due either to the circumstances, design or experience (between 5% to 20% of impact occurring).

iii. Medium
There is a possibility that the impact will occur to the extent that provision must be made therefore (between 20% to 80% of impact occurring).

iv. High
There is a high possibility that the impact will occur to the extent that provision must be made therefore (between 80% to 95% of impact occurring).

v. Definite
The impact will definitely take place regardless of any prevention plans, and there can only be relied on mitigatory actions or contingency plans to contain the effect (between 95% to 100% of impact occurring).

5.2.1.6 Determination of significance

Significance is determined through a synthesis of the various impact characteristics and represents the combined effect of the extent, duration, intensity and probability of the impacts.

i. No significance
The impact is not substantial and does not require any mitigatory action.

ii. Low
The impact is of little importance, but may require limited mitigation.

iii. Medium

The impact is of importance and therefore considered to have a negative impact. Mitigation is required to reduce the negative impacts to acceptable levels.

iv. High

The impact is of great importance. Failure to mitigate, with the objective of reducing the impact to acceptable levels, could render the entire development option or entire project proposal unacceptable. Mitigation and management is essential

5.2.2 Assessment of Potential Impacts

5.2.2.1 Physical and landscape characteristics

Nature	Phase	Type	Extent	Duration	Intensity	Probability	Significance	
							(WOM*)	(WM*)
1. Impact of development on natural drainage patterns, caused by surface clearance and associated decrease of vegetation cover, leading to increased surface runoff and erosion.	C/O	Negative	Local	Short	Medium	Medium	Medium	Low
2. Alteration of unique landscape characteristics	C/O	Negative	Site	Permanent	Low	High	Medium	Low

* WOM: Without Mitigation

* WM: With Mitigation

5.2.2.2 Ecological characteristics

Nature	Phase	Type	Extent	Duration	Intensity	Probability	Significance	
							(WOM)	(WM)
1. Removal of natural vegetation as a result of site development activities	C	Negative	Footprint	Permanent	Low	Low	Low	Low
2. Potential increase in and spread of exotic invader species	C/O	Negative	Local	Short	Medium	Medium	Medium	Low
3. Impact on surrounding vegetation during construction (e.g. collection of firewood, veld fires, etc.)	C	Negative	Local	Short	Medium	Low	Medium	Low
4. Removal or destruction of red data plant species	C	Negative	Site	Long	Minor	Low	Low	No significance
5. Risks or impacts to habitat connectivity. The riparian corridor performs an important linking function and should be conserved as an open space.	C/O	Negative	Local	Permanent	Medium	Medium	Medium	Low
6. Impact on functional contribution of the larger ecosystem (e.g. terrestrial bird breeding and feeding, insect breeding and habitat for migrating small game)	O	Negative	Local	Long	Low	Low	Low	Low

5.2.2.3 Current and potential land uses of development area

Nature	Phase	Type	Extent	Duration	Intensity	Probability	Significance	
							(WOM)	(WM)
1. Impact on surrounding property values	O	Negative/ Positive	Local	Long	Low	Low	Low	Low

5.2.2.4 Soil characteristics and geology

Nature	Phase	Type	Extent	Duration	Intensity	Probability	Significance	
							(WOM)	(WM)
1. Soil pollution (cement powder, diesel, oil etc.) during construction	C	Negative	Site	Short	Medium	Low	Low	Low
2. Soil erosion resulting from site clearance activities (removal of vegetation cover) during construction	C	Negative	Site	Short	Medium	Medium	Low	Low
3. Impact on building structures and/or building cost due to soil/geotechnical characteristics, including collapsible soil, swelling clays, poorly drained soil, and shallow soils.	C/O	Negative	Footprint	Permanent	Medium	Medium	Medium	Low
4. Soil erosion during operational phase resulting from increased stormwater run-off and velocity	O	Negative	Local	Long	Low	Low	Low	Low

5.2.2.5 Fauna

Nature	Phase	Type	Extent	Duration	Intensity	Probability	Significance	
							(WOM)	(WM)
1. Impact on faunal activity on surrounding properties during construction (e.g. trapping of animals, construction vehicles, etc.).	O	Negative	Local	Short	Minor	Improbable	Low	No significance
2. Potential impact of development on nesting birds.	C/O	Negative	Site	Long	Low	Low	Low	Low

5.2.2.6 Climate

Nature	Phase	Type	Extent	Duration	Intensity	Probability	Significance	
							(WOM)	(WM)
1. Soil erosion due to heavy rainfall during thunderstorms in summer, especially during construction phase.	C	Negative	Site	Short	Medium	Medium	Medium	Low

5.2.2.7

5.2.2.8 Ground and surface water

Nature	Phase	Type	Extent	Duration	Intensity	Probability	Significance	
							(WOM)	(WM)
1. Pollution of groundwater/ surface water during construction phase with typical construction related pollutants such as oil and diesel, and enterobecteria/viruses and plant nutrients if sanitation for construction workers is not properly managed.	C	Negative	Local	Short	Medium	Medium	Low	Low
2. Impact on Wetland and associated buffer zones.	O/C	Negative	Site	Long	Medium	Medium	Medium	Low

5.2.2.9 Archaeological, historical and cultural significance

Nature	Phase	Type	Extent	Duration	Intensity	Probability	Significance	
							(WOM)	(WM)
1. Impact on sites with valuable archaeological, history and cultural significance	C	Negative	Site	Permanent	Minor	Improbable	Low	No significance

5.2.2.10 Socio-economic impacts

Nature	Phase	Type	Extent	Duration	Intensity	Probability	Significance	
							(WOM)	(WM)
1. Direct employment creation, including construction workers, architects, draughtsmen, land surveyors, plumbers, electricians etc.	C	Positive	Regional	Short	Medium	High	Medium	Medium (Positive)

2. Indirect job creation (e.g. building suppliers) and induced job creation (broader local economy).	C/O	Positive	Regional	Short	Medium	Medium	Medium	Medium (positive)
3. Job creation during operation phase (domestic workers, maintenance, etc.).	O	Positive	Local	Long	Medium	Medium	Medium	Medium (positive)
4. Security (reduced sense of security accompanied by the presence of construction workers)	C	Negative	Local	Short	Medium	Medium	Low	Low

5.2.2.11 Social and community facilities

Nature	Phase	Type	Extent	Duration	Intensity	Probability	Significance	
							WOM	WM
1. Impact on demand for educational facilities.	C/O	Negative, but if provide for it will contribute positively to the area	Local	Long	Medium	Medium	Medium	Medium (Positive)

5.2.2.12 Engineering Services

Nature	Phase	Type	Extent	Duration	Intensity	Probability	Significance	
							WOM	WM
1. Capacity of road network to handle additional traffic generated from the proposed development.	C/O	Negative	Local	Permanent	High	Definite	High	Medium
2. Possibility of increased number of road accidents due to increased traffic volumes. Accident risk may be highest at the point where the site is accessed from the R556.	C/O	Negative	Local	Long	Medium	Low	Medium	Low
3. The area will be covered with impermeable surfaces, leading to an increase in stormwater volume and intensification of stormwater peak flow.	C/O	Negative	Local	Permanent	Medium	Medium	Medium	Low
4. Increased soil erosion due to increased quantity and flood peak intensity of stormwater flow, most significantly at stormwater outlets.	C/O	Negative	Site	Long	Medium	Medium	Medium	Low
5. Capacity of power grid to supply electricity to the proposed development.	O	Negative	Regional	Long	Medium	Medium	Medium	Low
6. Capacity of existing landfill sites to accommodate additional waste generated by the proposed development (note that this is a cumulative impact caused by all waste generating activities throughout the region).	C/O	Negative	Regional	Long	Medium	Medium	Medium	Low
7. Impact of waste generated and risk of illegal dumping and littering on water resources.	C/O	Negative	Local	Long	Low	Low	Low	Low

8. Impact of access road on surrounding properties.	C/O	Negative	Local	Long	Low	Low	Low	Low

5.2.2.13 Potential Environmental Pollution

Nature	Phase	Type	Extent	Duration	Intensity	Probability	Significance	
							(WOM)	(WM)
1. Increase in air pollution (dust) during construction (e.g. construction vehicles, excavation, earthworks, burning of waste products etc.).	C	Negative	Local	Short	Medium	High	Medium	Low
2. Increase in ambient noise level affecting surrounding properties.	C/O	Negative	Local	Long	Low	Low	Low	Low
3. Visual impact of development on landscape ("sense of place").	O	Negative	Local	Long	Medium	Medium	Medium	Low
4. Some phases of construction may cause odors that are detective over some distance (e.g. burning of plastic containers and bags).	C	Negative	Local	Short	Low	Medium	Low	Low
5. Impact on the ambient air quality due to vehicle tailpipe emissions from increased traffic volumes.	C/O	Negative	Local	Long	Low	High	Low	Low
6. Impact of lighting on surrounding properties, including light trespass and over-illumination. Apart from being a visual impact, over-illumination is also a waste of energy.	C/O	Negative	Local	Long	Medium	Low	Low	Low

6 PUBLIC PARTICIPATION

6.1 INTRODUCTION

The aim of the Scoping Study is to collect the issues, concerns and queries of interested and affected parties (I&APs) and determine the scope of the following phase of the EIA. The main objective of the Scoping Study is to:

- Inform the stakeholders about the proposed project and the environmental assessment process to be followed;
- Provide ample opportunity to all parties to exchange information and express their views and concerns;
- Obtain contributions from stakeholders (including the client, consultants, relevant authorities and the public) and ensure that all issues, concerns and queries raised are fully documented;
- Evaluate the issues raised and identify the significant issues; and
- Provide comment on how these issues are to be assessed as part of the Environmental Impact Assessment Process.

The public scoping processes undertaken are in accordance with the required EIA procedures prescribed within national legislation.

6.2 REQUIREMENTS OF THE 2014 ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS

According to Section 41 of the Environmental Impact Assessment Regulations, the following is required for the public participation process:

(a) Fixing a notice board at a place conspicuous to the public at the boundary or on the fence of
  (i) the site where the activity to which the application relates is or is to be undertaken; and
  (ii) any alternative site;

(b) Giving written notice in any of the manners provided for in section 47D of the Act, to-
  (i) the occupiers of the site and, if the proponent or applicant is not the owner or person in control of the site on which the activity is to be undertaken, the owner or person in control of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;

(ii) owners, persons in control of, 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;

(iii) the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area;

(iv) the municipality which has jurisdiction in the area;

(v) any organ of state having jurisdiction in respect of any aspect of the activity; and

(vi) any other party as required by the competent authority;

(c) Placing an advertisement in –

(i) one local newspaper; or

(ii) 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;

(d) 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 referred to in paragraph (c)(ii); and

(e) 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-

(i) illiteracy;

(ii) disability; or

(iii) any other disadvantage.

6.2.1 Submission of EIA application forms

The appropriate EIA application forms were completed and submitted to DREAD as required by the EIA regulations. Reference Number **NWP/EIA/36/2016** was allocated to the proposed development.

6.2.2 Newspaper Advertisements and Site Notices

The EIA regulations require that the proposed project be advertised. The EIA process was advertised in Tshwane on the 26th of August 2016 in the Platinum Weekly and in English in the Rustenburg Herald **(Appendix P)**. Notice boards were also placed at various locations on the site boundary in both English and Tshwane **(Appendix Q)**, to ensure that the site notice is visible and accessible. Photos of the placement of site notices are included in **Appendix R**.

The purpose of the advertisements and site notice's is to notify I&APs of the EIA process for the proposed development and to invite them to register as I&APs.

In addition to the site notices and newspaper adverts, information leaflets **(Appendix S)** in English and Tshwane were distributed to the surrounding communities. An affidavit form the EAP has also been included in **Appendix S**, stating that the handouts were distributed to the communities.

6.2.3 Register of interested and affected parties

According to the Environmental Impact Assessment Regulations of 2014, a register of interested and affected parties must be kept during the EIA process. A copy of the register is included as **Appendix T.**

6.2.4 Information sharing meeting

A public meeting will be held should there be a number of Registered Interested and Affected Parties. The purpose of the meeting will be to address any issues and queries.

6.2.5 Distribution of Scoping Report

The following governmental and non-government authorities were provided with a copy of the Scoping report for comment:

- Moses Kotane Local Municipality
- Bonjala District Municipality
- Department of Water and Sanitation
- Bakubung Tribal Offices
- Department of Rural, Environment and Agricultural Development
- Department of Local Government and Human Settlements
- COGTA
- Sun City
- Wesizwe Platinum Mine

A copy of the Waybills and Receipts of Acknowledgements are included as **Appendix U.**

6.2.6 Comments and Response

The comments received as part of the Scoping Report is addressed in Table 6.1 below.

Table 6-1: Response to Comments Received

Name	Comments Received	Response
Carel (Mac) Heyneke from Voltex	I would like to be registered as an interested party regarding this project. We are electrical wholesalers and is interested in the supply at a later stage.	Mr Heyneke was registered as an I&AP.
T. Mabaso	Mr Mabaso requested further information regarding Scoping and Environmental report.	Mr Mabaso was registered as I&AP and was sent a copy of the Scoping Report.
Carmen Barends from Leads 2 Business	Please could I register as an I&A party on the above proposed project and receive a copy of the Background Information Document and Scoping Report if possible?	Ms Barends was registered as I&AP and was sent a copy of the Scoping Report.
Barbera Lange from DAFF	This serves as a notice of receipt and confirms that your application has been captured in our electronic AgriLand tracking and management system.	No response required.
Simon Jonas from Tellroy Transport	Mr Jonas inquired about the tender process for materials during the construction phase. He sent through a company profile.	Mr Jonas was informed that K2M Environmental was appointed to undertake the Environmental Impact Assessment and was not involved in any of the tender processes for materials.
Hitesh Behari from Global Roofing Solutions	Mr Behari inquired about the tender process for roofing materials during the construction phase.	Mr Behari was informed that K2M Environmental was appointed to undertake the Environmental Impact Assessment and was not involved in any of the tender processes.
FJ Nel from Jacques Classen Attorneys (Representing Pacific Paramount)	Please send us a copy of the relevant EA.	Mr Nel was informed that an Environmental Authorisation has not yet been issued as we are only in the Scoping phase of the project. Mr Nel was registered as an I&AP and was sent a copy of the Scoping Report.
Joany Govenden from Esor Construction	Ms Govenden inquired about the tender process for the construction phase of the project. She sent through a company profile.	Ms Govenden was informed that K2M Environmental was appointed to undertake the Environmental Impact Assessment and was not involved in any of the tender processes for materials.
Mr Molebatsi	I would like to be informed more about the project. I think it would be a good project. It will help improve the place and help with housing.	Mr Molebatsi was registered as an I&AP.

FJ Nel from Jacques Classen Attorneys (Representing Pacific Paramount)	We act on behalf of Pacific Paramount (Pty) Ltd, represented by Pascal Stratis, ("OUR CLIENT") herein. Our instructions are as follows: • We note that the draft scoping report (NWP/EIA/36/2016) refers to Bakubung Ba Ratheo Community, and Kubu Properties Investments ("the applicants") who wish to establish and construct mixed housing typologies on Portion 15 of the Farm Ledig, No. 909 ("the subject property"). • We cannot draw an inference from the draft scoping report as to whether the mixed housing typologies will include Residential Commercial Developments. • Our client wishes to register as an interested and affected party to enable him to have access to the Town Planning Application that will be submitted in respect of to the subject property.	No comment required. The proposed development will include residential and commercial sections. Please refer to preferred layout in Appendix E. Pacific Paramount represented by Jacques Classen Attorneys have been registered as an I&AP.
Samantha Kelly (Representing Sun International)	We act for Sun International (South Africa) Limited ("our Client"). We have been instructed to address this correspondence to you on our Client's behalf. Your correspondence of 25 August 2016 refers. Our Client has perused the Draft Scoping Report NWP/EIA/2016 ("DSR") and has consulted with its internal departments in this regard. Our Client's preliminary comments are as follows: *Sun City- Waste water treatment works ("WWTW)":* • Clause 2.5.2 of the DSR states that the option of upgrading the Sun City WWTW needs to be investigated. Please note that our Client is currently have treatment capacity for an additional 2.2 Mil per day, which needs to remain available for internal treatment for future and current development taking place at Sun City. Thus, any upgrades undertaken by them, at the insistence of the developer and/or local authority, should be for the developer's account. However, our Client is amenable to investigating the possibility of expanding the Sun City WWTW and, if proven feasible, offering the developer a waste management solution.	There were 3 options discussed with regards to the sanitation infrastructure. Option 3 is the preferred option which entails draining the two drainage zones using different gravity bulk sewer pipelines lines to Wesizwe's WWTW. The reason for option 3 been selected was because the bulk sewer lines will rely on gravity for drainage, which will then eliminate the need for pump stations which can be costly in terms of maintenance in the long term.

	• Sun City is currently looking at undertaking a project to establish a waste-to-energy plant. If this project materialises, our Client will investigate the possibility of this site accommodating the waste from the development as a disposal option (this will be discussed and negotiated with the developer at a later stage if proven to be a viable option).	This comment has been noted.
	• Pending the establishment by SI of a waste-to-energy plant at Sun City, our Client is open to investigating the possibility of the developer using our current waste management solution facility. Thus, if feasible to both parties, the developer will not need to rely on municipal waste services to take their waste to Mogwase; but rather, instead pay a small disposal rate to our Client to use same (to be further discussed and negotiated if proven to be a worthwhile option and should the developer be interested).	This comment has been noted.
	• We note that our Client's Integrated Water Use License will need to be amended with Department of Water Affairs ("DWA") prior to concluding any agreement in respect of the above, as well as any additional registrations with DWA to treat external sewage as a service provider.	This comment has been noted. As mentioned above, option 3 with regards to sanitation has been preferred.
	Sludge treatment:	
	• Sludge treatment avenues will need to be explored as our Client does not have disposal facilities in respect of same. This could include the construction of a fertilizer pellet plant where the fertilizer could then be used at Sun City (or any other options proposed and investigated).	This comment has been noted.
	• We note that upgrade improvements for this purpose should be for the developer's costs. Once the improvements are completed, we can explore that possibility of Sun City taking over full operation and maintenance of all plant equipment and carry all costs pertaining to future operation and maintenance.	This comment has been noted.

	Electricity: • Clause 2.5.4 of the DSR states that all the electricity supply in respect of the development will be dealt by Eskom. Please may we request that this information must be shared with our Client, as it may impact on the electricity supply for the Sun City.	Please refer to the Electrical Outline Scheme Report which is attached as Appendix I.
	Security: • Our Client is concerned about the security to Sun City residents during and post construction. • Will any security measures be taken during and post construction?	During construction, there will be security on the site and the site camp. With regards to post construction, the respective land owners will be responsible for their own security.
	• It has been suggest that the development site is to be properly fenced/built wall to prevent ingress or egress to the site by unwanted individuals. This will minimise the risk of theft for the contractors and ability to manage the construction site effectively.	The site will be demarcated and fenced off during construction. There will also be security on site during the construction phase.
	Listed Activities: • In respect of the Listed Activities (as shown in the table on page 7), Activity 2, GN.R. 985: our Client notes that supporting infrastructure for the reservoir is in place already, which means that such activity has already been commenced. Are all the EIA requirements included in the Magalies Project Record of decision?	Please note that this activity was initially included as part of the application, but has now been excluded from this application.
	• Clause 3.7.2 of the DSR states that there will be no development within 32 meters. However, it is noted that activities 12 and 19 (on page 7 of the DSR) are within watercourse controlled area of 32 meters. Please will you provide clarity on this discrepancy?	A Wetland Assessment was undertaken for the proposed development. The specialist indicated that buffers between 15m and 18m need to be put in place. The 32m buffer therefore falls away, as a site specific buffer is in place. No residential units are to be constructed within these areas. Infrastructure that will be constructed within the rivers and buffers zones will be that of roads. A water Use License Application will need to be applied for in this case.

	Mitigation measures: • Clause 3.8.2 of the DSR states that rubble is to be properly disposed of to prevent obstruction. Please advise on how and where will rubble be disposed of and how will this be monitored? Miscellaneous: • The northern border of the proposed development is not Pilanesberg National Park, but is Sun City Resort. • The wetland (as mentioned in clause 3.5.3) is situated on both Bakubung and Sun City land. • Please note that Sun City has sewage and potable water infrastructure and servitudes in the area which the must be protected. Please advise on how this will be done.	Rubble and waste will be kept on site in skips. These skips will need to emptied out on a regular basis. An Environmental Control Office will be appointed to ensure that the Environmental Management Programme is adhered to. Please refer to Section 7 of this report. This comment has been noted. All registered infrastructure and servitudes will be demarcated on the layout to ensure that it will not be impacted upon.
Refiloe Raditlhalo from the Moses Kotane Local Municipality	• The proposed site of activity will be occurring along a wetland and fluvial prone area and such areas are vulnerable to protected species including Fauna and Flora. Therefore, as provided in the National Environmental Management Biodiversity Act 10 of 2004, section 2, which makes provision for species risk assessments, the applicant ought to conduct an ecological risk assessment in respect to the proposed activities. • Furthermore, areas prone to wetlands may not be geologically stable because of the rock type and geo-structural features inherent within the site. Therefore, a geo-structural assessment must be conducted to address the risks that may associated with the proposed activity- in respect to the Construction, Operational and Closure phases of the project. • Section 38 of the National Heritage Resources Act of 2004 requires that an applicant conduct a Heritage Impact assessment since the site to be cleared will be more that 10 000 metre-squared.	Please note that an Ecological Assessment has been undertaken and included as Appendix L. Please note that a Preliminary Geotechnical Report (Appendix N) and Wetland Assessment (Appendix M) have been undertaken for the proposed development which identifies sensitive areas. A copy of the Scoping Report was submitted to SAHRA for their comment. SAHRA indicated that a Heritage Impact Assessment and Paleontological Assessment be undertaken for the proposed development. Specialist have been

	• The Unit therefore accepts the Scoping Report and grants the applicant permission to proceed with the Full Environmental Impact Assessment as outlined in the GN. R982 2014 Environmental Impact Assessment, Appendix 3.	appointed to undertake the assessment. The letter of Exemption for a Paleontological Assessment has been attached as Appendix O. The Heritage Impact Assessment is still in the progress. No comment required.
Motshabi Mohlalisi from DREAD	Sent an acknowledgement of receipt indicating that the Department has received the draft scoping report.	No comment required.
Department of Water and Sanitation	This office acknowledges the receipt of your application documents regards to the above-mentioned on 28 September 2016 (Task T438/2016). The office responsible for this area is : Ms Lethabo Ramashala and can be contacted at (012) 207-9911.	No comment required.
SAHRA	The Bakubung Ba Ratheo Community, together with Kubu Property Investments, initiated a process for the establishment of mixed housing typologies on Portion 15 of the Farm Ledig, No. 909. Thank you for notifying SAHRA of the proposed Bakubung Ledig Mixed Housing Development on portion 15 of the Farm Ledig, No. 909, near Ledig, North West Province. In terms of the National Heritage Resources Act, no 25 of 1999, heritage resources, including archaeological or palaeontological sites over 100 years old, graves older than 60 years, structures older than 60 years are protected. They may not be disturbed without a permit from the relevant heritage resources authority. This means that before such sites are disturbed by development it is incumbent on the developer to ensure that a Heritage Impact Assessment is done. This must include the archaeological component (Phase 1) any other applicable heritage components. Appropriate (Phase 2) mitigation, which involves recording, sampling and dating sites that are to be destroyed, must be done if required. In your application received by SAHRA there was no indication of an assessment of the archaeological resources. The quickest process to follow for the	SAHRA'S comments have been noted. An Archaeological Assessment and a Paleontological Letter of Exemption will be undertaken and included as part of the EIR. The reports will then be submitted to SAHRA for assessment.

	archaeological component would be to contract a specialist (see www.asapa.org.za) to provide a Phase 1 Archaeological Impact Assessment Report. The Phase 1 Impact Assessment Report will identify the archaeological sites and assess their significance. It should also make recommendations (as indicated in section 38) about the process to be followed. For example, there may need to be a mitigation phase (Phase 2) where the specialist will collect or excavate material and date the site. At the end of the process the heritage authority may give permission for destruction of the sites. If the property is very small or disturbed and there is no significant site the specialist may choose to send a letter to the heritage authority to indicate that there is no necessity for any further assessment. Where bedrock is to be affected, or where there are coastal sediments, or marine or river terraces and in potentially fossiliferous superficial deposits, a Palaeontological Desk Top study must be undertaken to assess whether or not the development will impact upon palaeontological resources - or at least a letter of exemption from a Palaeontologist is needed to indicate that this is unnecessary. If the area is deemed sensitive, a full Phase 1 Palaeontological Impact Assessment will be required and if necessary a Phase 2 rescue operation might be necessary (see www.palaeontologicalsocitey.co.za for qualified paleontologists). Any other heritage resources that may be impacted such as built structures over 60 years old, sites of cultural significance associated with oral histories, burial grounds and graves, graves of victims of conflict, and cultural landscapes or viewscapes must also be assessed. The Basic Assessment Report (BAR) or Scoping Report or Environmental Impact Assessment (EIA) with all appendices must be submitted in order for an informed comment to be issued.	

A Draft Comments and Response Report regarding the comments received for Scoping Report has been included as **Appendix V.**

7 ENVIRONMENTAL MANAGEMENT FRAMEWORK

7.1 METHODOLOGY AND STRUCTURE OF EMP

7.1.1 Background and Methodology

An EMP can be defined as a detailed plan and programme of measures to prevent environmental degradation due to construction and operational phase development activities. Its purpose is to describe how negative environmental impacts will be managed, rehabilitated and monitored and how positive impacts will be maximised (Department of Environmental Affairs & Tourism 1992).

7.1.2 Methodology

The following information (as proposed by the IEM guidelines for Environmental Management Programmes of the Department of Environmental Affairs and Tourism, 1992) is included:

- Potential environmental impacts of the proposed development.
  - Construction phase
  - Operational phase
- Details of mitigation measures and management actions.
- Parties responsible for implementing mitigation measures and management recommendations.
- Guidelines for frequency of monitoring and auditing of compliance.

7.1.3 Amendments during implementation

Although no change of scope is anticipated in the construction phase of the proposed housing development, some controls may need to be incorporated to check such changes. Any changes to the scope of the project during the construction will have to be reflected in on updated EMP which will have to be approved by DREAD.

7.2 ENVIRONMENTAL MANAGEMENT COMPLIANCE

7.2.1 Environmental control officer (ECO)

The designated official from the developer or applicant who will be responsible for the implementation of the EMP must ensure compliance and monitoring of this EMP and will be responsible for:

- Monitoring activities of the developer and contractors regularly during the construction phase,
- Ensure that mitigation measures are implemented and keep monitoring records of compliance and non-compliance. Monitoring results must be reported to the developer and DREAD in the form of a Compliance Monitoring Report, which must be submitted monthly during the construction phase. Records of non-compliance must indicate how problems are rectified and must be reported to the developer and the DREAD to enable follow-up, if necessary.
- Liaise with the DREAD when necessary about any new environmental issues which may arise. Any new mitigation measures or amendments to existing ones that address areas of concern raised by the ECO must be carried out by the developer and contractors.
- Maintain open communication channels with IAPs throughout the project. All communications with IAPs received by members of the development team must be referred to the ECO to ensure that these are properly recorded and the appropriate action taken. A record of all correspondence with IAPs should be kept, noting the following details:
    - Date of correspondence or verbal communication, name of the IAP and contact details and issues raised by the IAP.
    - Date and nature of follow-up action taken.
    - Date and nature of notification of the IAP about follow-up action taken.

7.2.2 EMP compliance

This EMP is an extension of the Conditions of Approval of the environmental authorisation as determined by DREAD is binding for all contractors associated with the development. Non-compliance with, or any deviation from the conditions set out in this EMP, constitutes non-compliance with these conditions. The developer is thus responsible for the actions and impacts caused by all his contractors and agents during the construction phase.

7.2.3 EMP Responsibilities

Parties responsible for complying with this EMP during the construction phase are the developer and contractors appointed by the developer. The developer however assumes ultimate responsibility for environmental management during the construction phase. The individuals responsible for ensuring that the EMP is understood and implemented by the developer and contractors and monitored and audited are the Environmental Control Officer and the Site Engineer, both of whom are appointed by the developer. DREAD is the provincial environmental authority responsible for monitoring submitted reports and addressing issues of non-compliance which may arise.

A summary of development activities and their environmental management is summarized below.

- The developer/landowner (D) and contractors (C) are responsible for complying with this EMP.
- The Environmental Control Officer (ECO) and Site Engineer (E) must ensure that the EMP is understood by the developer and contractors and must monitor compliance.
- The Department of Economic Development, Tourism and Environmental Affairs (DREAD) is responsible for examining submitted reports and dealing with issues of non-compliance.

Additional abbreviations: **DOT** – Department of Transport; **DWS** – Department of Water and Sanitation; **IAPs** – Interested and Affected Parties; **LM** = Moses Kotane Local Municipality

7.3 CONSTRUCTION PHASE – MITIGATION AND MANAGEMENT MEASURES

7.3.1 Construction site housekeeping

7.3.1.1 Access to site and construction sites

Potential environmental issues: • Biophysical impacts due to development and use of environmentally unsound access roads.			
ISSUE	MANAGEMENT PLAN RECOMMENDATIONS	RESPONSIBILITY	FREQUENCY
1. Access to site	a) Traffic safety measures should be taken where construction roads and public roads intersect. If sand, aggregate or soil spill into the public road, it should be removed the same day	C/E	Ongoing monitoring during construction; daily checks
	b) Accident risk may be the highest at the point where the site is accessed from the R556. Appropriate traffic management and road safety measures must be implemented.	C/E	Ongoing monitoring during construction
	c) The contractor should ensure that the access roads are maintained in good condition by attending to potholes, storm water damage and other aspects as soon as these develop.	E/LM/C	Ongoing during the construction phase
2. Access Roads	a) Unnecessary compaction of soils by heavy vehicles must be avoided; construction vehicles must be restricted to demarcated access and turning areas.	C/E/ECO	Prior to moving on site
	b) Agreed turning areas are to be formalised and used by contractors. No turning manoeuvres other than at the designated places must be permitted.	ECO/C	Ongoing monitoring during construction
	c) Machine/vehicle operators should receive clear instructions to remain within demarcated access routes and operations/construction areas.	C/E	Prior to moving on site

7.3.1.2 Housekeeping: Construction Site

Potential environmental issues: • Impacts due to activities at Construction site. • Impact of construction vehicles • Potential soil or groundwater pollution due to construction activities • Soil erosion resulting from site clearance activities			
ISSUE	MANAGEMENT PLAN RECOMMENDATIONS	RESPONSIBILITY	FREQUENCY
1 Establishment and Maintenance of storage areas	a) Storage areas must be designated, demarcated and fenced if necessary.	E/C/ECO	During site setup
	b) Location of storage areas must take into account prevailing wind direction and on-site topography.	E/C/ECO	During site setup
	c) Storage areas should be secure and be safe from access by children and animals.	E/C/ECO	Ongoing during construction
	d) Fire prevention equipment must be present at all storage facilities. Workers should be trained to use such equipment.	C/ECO	Ongoing during construction
	e) Contractors/Developer must ensure that storage facilities are cleaned and maintained regularly and	D/C/ECO	Ongoing during construction

		that leaking containers are disposed of without spillage onto the soil.		
2 Risks associated with materials on site	a)	Material stockpiles or stacks, such as pipes and bricks, must be stable and well secured to avoid collapse and possible injury to site workers/local residents.	C/E/ECO	Daily during construction
	b)	No materials are to be stored in unstable or high-risk areas.	E/C/ECO	Ongoing during construction
3 Hazardous Substances & Materials (*Those hazardous substances and materials which are potentially poisonous, flammable, carcinogenic or toxic. These could include:* ▪ *Diesel, petroleum, oil, bituminous products.* ▪ *Cement.* ▪ *Solvent based paints.* ▪ *Lubricants.* ▪ *Explosives.* ▪ *Drilling fluids.* ▪ *Pesticides, herbicides.* ▪ *Liquid petroleum gas.*	a)	Storage areas containing hazardous substances and materials must be clearly signed and fenced/locked.	C/ECO	During site setup and ongoing during construction
	b)	Hazardous storage and refuelling areas must be underlain with an impermeable liner to protect groundwater quality. Hazardous storage areas should be covered or roofed.	C/E/ECO	During site setup and ongoing during construction
	c)	If applicable, fuel tanks must meet relevant specifications and must be elevated so that leaks may be detected easily.	C/E/ECO	During site setup and ongoing during construction
	d)	Staff dealing with these materials and substances must be aware of their potential impacts and must be capable of following the appropriate safety measures.	C/ECO	During staff induction and ongoing during construction as necessary.
	e)	Handling, storage and disposal of potential hazardous materials, residues or their containers must be in accordance with DWS's and DREAD's requirements and specifications. Scheduled hazardous waste such as bitumen, tar, oils, etc., must be disposed of at DWS-approved facilities.	C/ECO/E	Ongoing during construction
4 Hazardous Areas due to Construction Activities	a)	Potentially hazardous areas such as trenches are to be demarcated and clearly marked so that warning about these areas is visible during the day and night, especially along former footpaths.	C/ECO	Ongoing during construction period with daily checks.

7.3.1.3 Material Management

Potential environmental issues:
- Impacts due to materials for site and construction site activities.
- Increased air pollution due to earthworks, stockpiles or crushing plants

ISSUE		MANAGEMENT PLAN RECOMMENDATIONS	RESPONSIBILITY	FREQUENCY
1 Materials & Stockpiles *(Polluting materials and operations include:* ▪ *Batching,* ▪ *Storage of cement, concrete and mortar.* ▪ *Petrol,* ▪ *oil,* ▪ *chemical storage and transfer.* ▪ *Washing, ablution and toilet facilities.*	a)	Stockpiles should not be located such that they may obstruct natural stormwater pathways.	E/C/ECO	Ongoing during construction
	b)	Stockpiles should not exceed 2 m in height unless otherwise permitted by the engineer.	C/E/ECO	Ongoing during construction
	c)	If stockpiles are exposed to windy conditions or heavy rain, they should be covered by suitable material, depending on the duration of the project. Stockpiles may further be protected by the construction of berms or low brick walls around their bases.	C/E/ECO	When necessary

▪ *Plant storage and refuelling.)*	d) Stockpiles should be kept clear of weeds and exotic vegetation growth by regular weed eradication to prevent further spreading along the river corridor to the west.	C/ECO	Ongoing during construction, at least once a month
	e) Contractor/Developer must maintain storage of all polluting materials and conduct potentially polluting operations away from sensitive areas.	C/ECO	Ongoing during construction
	f) After construction is completed and stockpile material is removed, the former stockpile footprint area, if not covered by infrastructure, paving or garden vegetation, should be ripped, compost added, and seeded with indigenous grass species which should include a mixture of pioneer and sub-climax species.	C/ECO	At completion of construction phase
2 Handling of Hazardous Materials	a) No vehicles transporting, placing or compacting asphalt or any other bituminous product may be washed on site.	C/ECO	Ongoing monitoring during construction
	b) Powders, e.g. lime and cement powder, must not be mixed during excessively windy conditions.	C/ECO	When necessary, dictated by weather conditions
	c) All concrete mixing must take place on a designated, impermeable surface.	C/ECO	Ongoing during construction
	d) No vehicles transporting concrete to the construction site may be washed on site.	C/ECO	Ongoing during construction
	e) Hazardous substances and materials are to be transported in sealed containers or bags.	C/ECO	Ongoing during construction

7.3.2 Environmental Education & Awareness

Potential environmental issues:

- Various biophysical and sociological impacts due to poor staff conduct of contractor staff
- Loss of significant archaeological or paleontological remains.

ISSUE	MANAGEMENT PLAN RECOMMENDATIONS	RESPONSIBILITY	FREQUENCY
Staff Conduct on Site Social Environment & Interested & Affected Parties (IAPs)	a) The contractor/developer should ensure proper supervision of employees at all times.	C/E/ECO	Ongoing during construction
	b) Staff needs to be made aware of the following general rules which must be followed at all times. (i) No alcohol or drugs are to be present on site. (ii) No firearms or traditional weapons are allowed on site or in vehicles transporting staff to/from site, unless used by security personnel. (iii) Prevent excessive noise, including to keep voices and music down at night, early morning hours and on Sundays. (iv) No harvesting of firewood from the site or from the areas adjacent to it. (v) Trespassing on private properties near the site is strictly forbidden. (vi) Driving under the influence of alcohol is prohibited. (vii) No pets are allowed on site	C/ECO	Ongoing during construction.

7.3.3 Geology and Soils

Potential environmental issues:

- Loss of top soil from excavated areas.
- Contamination of topsoil and subsoil (e.g. Cement, diesel, oil, etc.).
- Ineffective disposal of storm water and uncontrolled run-off can cause damage to property and soil erosion
- Soil erosion resulting from site clearance activities

ISSUE	MANAGEMENT PLAN RECOMMENDATIONS	RESPONSIBILITY	FREQUENCY
1 Topsoil	a) The stripping of vegetation during preliminary activities on site greatly increases the risk of erosion and permanent loss of topsoil. The removal of vegetation must be limited to demarcated areas under strict supervision of the ECO.	C/ECO	Start of construction and ongoing monitoring during construction
	b) The time that stripped areas are exposed must be minimized.	C/E/ECO	Before construction commences and ongoing monitoring during construction
	c) Where earthworks are necessary and prior to their commencement, the contractor must determine the average depth of topsoil, commonly up to 300 mm and following approval of the ECO, strip the full depth of topsoil from areas affected by construction and related activities; this also applies to access routes and working, storage and site areas. No unnecessary soil stripping must occur in the development area.	C/E/ECO	Before construction
	d) Topsoil and subsoil should not be mixed during excavation.	C/E/ECO	Start of construction and ongoing monitoring during construction
	e) Use topsoil in the rehabilitation of any disturbed areas at specific destabilized sites and preferably in their immediate surroundings.	C/E/ECO	At completion of construction
	f) Application of topsoil and re-vegetation must commence immediately after the completion of development activities. Re-vegetation should only commence in the rainy season.	C/E/ECO	On completion of each activity
2 Soil Stockpiles	a) Topsoil stockpiles must be kept separate, must not be compacted and must not exceed two metres in height	C/E/ECO	Ongoing during construction
	b) Stockpiles not used within three months of initial stripping or prior to the seasonal rains must be seeded with grass seed mixes native to the area (recommended by an ecologist) to avoid further possible erosion. The grass species *Eragrostis tef* (1kg/ha) can be applied as a temporary soil stabilizer (in the rainy season).	C/E/ECO	Ongoing during construction
	c) Soil stockpiles must be kept free of any contaminants, including paints, building rubble, cement, chemicals, oil, etc.	C/E/ECO	Ongoing monitoring during construction

	d) Soil stockpiles should be located away from stormwater drainage areas.	C/ECO	Ongoing monitoring during construction
	e) Weeds/alien/invasive plants that germinated on the soil stockpiles should regularly be removed.	C/ECO	Ongoing during construction, at least once a month
3 Soil Erosion	a) Storm-water control should be undertaken to prevent soil loss from development site.	C/E/ECO	Ongoing during construction
	b) Canalisation or concentration of stormwater flow over exposed soil surfaces, and direct release of stormwater into exposed soil, should be prevented by the use of berms, silt traps, detention ponds and temporary measures to spread flow over the soil surface into vegetation.	C/E/ECO	Once soil is exposed; Ongoing during construction
4 Construction Site Surface Management	a) The smallest possible area should be disturbed.	C/E/ECO	Start of construction and ongoing during construction
	b) Vegetation must not be removed until immediately before construction.	C/E/ECO	Ongoing during construction
	c) Soils must be rehabilitated immediately after construction. Rehabilitation includes planting or hydro-seeding of grasses native to the area.	C/ECO	After completion of construction. Ongoing monitoring during construction
	d) Soils compacted by construction activity must be ripped deeply to loosen compacted layers and re-graded to even levels. Topsoil must be re-spread over rehabilitated areas.	C/E/ECO	After completion of construction.
	e) Excess earthworks material must be disposed of in an environmentally sound way. Locations in the area for this spoil should be investigated in consultation with the Local Municipality.	C/ECO	Ongoing during construction
	f) Vehicles must use pre-planned access routes, and construction vehicle speeds should be kept below 30 km/h. This will reduce dust pollution, noise pollution and promote public safety.	C/ECO	Ongoing during construction
5 Soil Contamination	a) Potential soil contaminants, e.g., fuel, oil and cement, must be managed carefully with adequate containment measures.	C/E/ECO	Ongoing during construction.
	b) If it is suspected that top- and/or sub-soils have become contaminated due to site operations, top-/subsoil tests must be conducted.	C/ECO	After spillage
	c) If tests are positive the contractor must remove the polluted soil to the full depth of pollution. If more than $3m^2$ soil is contaminated a soil remediation expert should be contacted to discuss in-situ bioremediation or other suitable remediation method.	C/ECO	After spillage
	d) Contaminated soil that will not be remediated on-site must be transported to a DWS-approved facility. Waybills for all	C/E/ECO	After spillage

	such disposals are to be kept by contractors/developer for review by the engineer and the ECO.		
	e) If imported topsoil is needed, it must be obtained from the site of other construction works and not from an undisturbed area.	C/E/ECO	When required during construction
6 Geological Conditions	a) All recommendations of the attached Geo-technical Report must be adhered to.	D/C/E	Planning and construction phase
	b) Conventional construction methods and foundations at nominal depth (500mm) is recommended.	D/C/E	Planning and construction phase
	c) Where necessary, foundations must be deepened and placed on the concrete layer.	D/C/E	Planning and construction phase
	d) If larger structures (e.g. structures higher than 3 storeys) are to be constructed, further geotechnical investigation is recommended to confirm the absence of softer soil beneath the hard concrete layer.	D/C/E	Planning and construction phase
	e) Although drainage problems may be experienced during periods of prolonged rainfall, no special treatment of foundations is required, other than the DPC protective layer.	D/C/E	Planning and construction phase

7.3.4 Water

Potential environmental issues:

- Potential pollution of surface water and ground water or reduced water quality due to construction activities.
- Possible pollution of the watershed resulting from construction activities such as concrete preparation and illegal dumping of construction waste.

ISSUE	MANAGEMENT PLAN RECOMMENDATIONS	RESPONSIBLITY	FREQUENCY
1 Storm-water Management	a) The expansion of impervious surfaces will lead to an increase in stormwater run-off.	C/E/ECO	Prior to commencement of construction
	b) To reduce erosion and loss of soil/silt during rain, silt traps should be used at areas that are likely to erode during development.	C/E/ECO	Prior to construction and ongoing during construction
	c) If vegetation is to be removed, it must be done in phases to ensure that a minimum area of soil is exposed to potential erosion at any one time.	C/E/ECO	At commencement of construction
	d) Storm-water outlets should be designed to reduce flow velocity and prevent erosion	C/E/ECO	During planning phase, prior to construction
	e) Disturbed surfaces must be re-vegetated immediately after completion of construction activities.	C/ECO	After completion of construction
2 Water Quality *Water quality could be affected by the incorrect handling and management of substances and materials that includes the following:*	a) Emergency contact telephone numbers should be on hand in order to deal with spillages and contamination of the soil, groundwater or aquatic environments.	C/E/ECO	Before construction phase starts
	b) Storage areas that contain chemicals and hazardous substances must be bunded with an approved impermeable lining. The containment capacity must be in excess of the capacity of the storage containers. The ECO must approve the location and storage of any chemicals and hazardous substances on site	C/E/ECO	During site setup

▪ *Pollution due to soil erosion and sediment infiltration.* ▪ *Mismanagement of polluted run-off from vehicle and plant washing.* ▪ *Wind dispersal of dry materials into rivers and watercourses.* ▪ *Incorrect disposal of substances and materials and polluted run-off can have serious negative effects on groundwater quality.*	c)	Adequate spillage containment measures must be implemented, such as cut-off drains, berms, etc.	C/E/ECO	At site setup and ongoing monitoring during construction
	d)	Spills in bunded areas must be cleaned up, removed and disposed of safely from the bunded area immediately after detection to minimise pollution risk and reduced bunding capacity.	C/E/ECO	Ongoing monitoring and immediately after spills
	e)	Any spillage residues must be removed from the development area by the contractors/developer to DWA-approved waste facilities for which a waybill must be shown to the engineer and ECO.	C/E/ECO	After spill; check waybill
	f)	If silt pollution is found to be a significant problem, provision should be made for silt polluted stormwater run-off to be treated (e.g. by silt traps, small infiltration basins etc.) to the engineer's and ECO's approval before being discharged to the municipal stormwater system or adjacent properties. This will be required for the duration of the project.	C/E/ECO	Prior to commencement of construction, ongoing monitoring during construction
	g)	Effluent from concrete batch and crusher plants (if applicable) should be treated in a suitable designated sedimentation pond to legally required standards. Designs of such a facility should be submitted to the site engineer for approval.	C/E/ECO	Ongoing during construction
3 River Crossings		The following methods are recommended for river crossings in order to prevent soil erosion and collapsing of river banks: <u>Slope protection:</u> • Grass • Riprap • Interlocking concrete blocks • Gabion mattresses • Geotextile mats and fabrics • Stone pitching • Sand-cement bags • Concrete blocks, grouted • Concrete blocks, cable-tied • In situ concrete slab • Dolosse <u>Vertical protection:</u> • Steel sheet piling • Timber, piles/waling • Gabion boxes • I n situ concrete wall • Brickwork wall • Reinforced earth	C/E	Ongoing during construction

7.3.5 Ecological characteristics of the development area and its surroundings

Potential environmental issues:

- Potential impact on indigenous flora and fauna species associated with open short grassland in urban areas.
- Introduction and spreading of alien invasive plants from development areas
- Impact on faunal activities on surrounding properties during construction

ISSUE	MANAGEMENT PLAN RECOMMENDATIONS	RESPONSIBILITY	FREQUENCY
1 Potential impact on Flora, Fauna and Habitats	a) No trees are to be cleared outside the development footprint unless they are exotic invaders, which must be verified by the ECO.	C/ECO	Prior to commencement of construction
	b) Disturbance of indigenous fauna and flora, and the natural ecology in the surrounding areas must be avoided.	C/ECO	Ongoing during construction
	c) Gathering of firewood, medicinal plants or any other natural material or the collecting of animals on site or in areas adjacent to the site is not allowed.	C/ECO	Ongoing monitoring during construction
	d) Disturbance of mammals, birds, reptiles, other animals and their habitats must be prevented.	C/ECO	Ongoing monitoring during construction
	e) If subterranean mammals are found in a construction area, construction must stop and the ECO must arrange for their capture and translocation to a safe area.	C/ECO	When necessary
	f) Immediate re-vegetation of stripped areas and removal of alien species by weeding must take place on an ongoing basis. This will significantly reduce the amount of time and money that need to be spent on exotic plant removal during final rehabilitation at the end of the construction phase	C/E/ECO	Ongoing during construction
2 Exotic Invasive Plant Control	a) Avoid the introduction of exotic plant species to the site of proposed development and surrounding areas through the use of imported material. Imported sand and other material should be checked for alien/invasive plant propagules	C/ECO	Ongoing monitoring during construction
	b) Plant invader species favour disturbed soil (i.e. areas with low competition) and pose a major threat to indigenous vegetation adjacent to the development site. These species must be eradicated before they can spread.	C/ECO	Ongoing monitoring during construction
	c) The spread of any exotic plant species in and from the site must be controlled.	C/ECO	Ongoing monitoring during construction
3 Plant Collecting, Hunting & Trapping of Animals	a) The laying of snares and other traps or the trapping or collection of any mammal, bird, reptile, amphibian or any other fauna is strictly forbidden on the construction site or on adjacent or nearby sites.	C/ECO	Ongoing monitoring during construction
	b) Gathering of firewood, fruit, medicinal plants or any other plant material on site or in areas adjacent to the site is not allowed.	C/ECO	Ongoing monitoring during construction

7.3.6 The impact of the development on current land use of the area and its surroundings

Potential environmental issues: • Potential impact on land use of areas outside the planned demarcated construction area and development areas			
ISSUE	MANAGEMENT PLAN RECOMMENDATIONS	RESPONSIBILITY	FREQUENCY
1 Planning and Architecture	a) All construction materials and building plans will be compatible with the building codes and by-laws of the municipality to ensure minimum visual impact.	D/C/Architect	Prior to commencement of construction
	b) Development footprint must be demarcated accurately and no additional land must be impacted upon by the development.	C/E/ECO	Ongoing monitoring during construction.
	c) Existing land uses in the area around development sites must not be negatively impacted upon through any unauthorized activity during the construction process.	C/E	Ongoing monitoring during construction.
	d) Building/facility orientation must ensure that heat will be conserved during the winter (reduce need for heating in the winter) and minimize need for cooling in the summer.	C/E/Architect	Planning phase
	e) Natural light should be utilised as far as practically possible to minimize need for artificial lighting. As far as practically possible, energy saving light bulbs or neon lights will be installed, also for public lighting purposes. Each tenant will be provided with a poster on energy (and water) saving tips that tenants will place where their employees can see it.	C/E/Architect	Planning phase
	f) As a precautionary measure, buildings and other infrastructure should be placed, orientated and designed to reduce noise pollution from the adjacent residential areas.	C/E/Architect	Planning phase

7.3.7 Existing archaeological, historical and cultural sites

Potential environmental issues: • Possible impact on currently undiscovered archaeological, historical or paleontological remains due to construction activities.			
ISSUE	MANAGEMENT PLAN RECOMMENDATIONS	RESPONSIBILITY	FREQUENCY
1 Archaeological, historical or paleontological objects	a) All relevant staff should be sensitized prior to commencement of construction to be able to recognize possible archaeological, historical or paleontological objects.	C/ECO	Before construction starts.
	b) Staff must be informed to notify the engineer or contractors/developer immediately should such an item be uncovered during construction activities.	C/E/ECO	Ongoing monitoring during construction; when required
	c) If any archaeological, historical or paleontological objects are found during construction, all development activity at the site should cease immediately and SAHRA must be informed.	C/E/ECO	When required

7.3.8 Waste management

Potential environmental issues: • Incorrect management of hazardous and non-hazardous waste, and building rubble • Littering and waste on surrounding properties during construction			
ISSUE	MANAGEMENT PLAN RECOMMENDATIONS	RESPONSIBILITY	FREQUENCY
1 On-Site Waste Management *(Waste includes all construction waste such as rubble, asphalt millings, cement bags, waste cement, timber, cans, other containers, wire and nails.)*	a) Potentially hazardous waste will be separated from inert building waste, and only those hazardous materials will be landfilled at a suitably registered waste disposal site. Inert building waste, specifically broken bricks and excessive aggregate, will be re-used on-site as fill material. If no need for fill material exists, inert building waste will be disposed of at a registered waste disposal site (site for general landfill), where it may be used as lining or daily cover.	C/ECO	Ongoing monitoring during construction
	b) After removal of building waste, alien and invasive plant species that may have been established on or next to temporary construction waste piles, must be removed, and if the footprint or the piles will not be covered by infrastructure, it must be rehabilitated (ripping of soil and addition of organic matter).	C/ECO	After completion of construction
	c) The excavation and use of rubbish pits or the burning of waste on site is forbidden.	C/ECO	Ongoing monitoring during construction
	d) Refuse must be placed in a designated area in skips or bins, and provided with a suitable cover to prevent refuse from being blown out by wind and the attraction of vermin or scavengers e.g. dogs.	C/ECO	During site and site setup and ongoing monitoring during construction
	e) Skips and bins must be emptied and removed regularly, and transported to a registered recycling or waste disposal facility.	C/E/ECO	Ongoing monitoring during construction
	f) Recycling should be encouraged by the provision of separate bins for different types of waste. Workers should be encouraged and informed on how to make use of the recycling system.	C/ECO	During site setup and ongoing monitoring during construction
	g) Littering on the site of proposed development or on adjacent areas is forbidden and the site must be cleared of litter at the end of each working day.	C/ECO	Ongoing monitoring during construction; daily cleaning
	h) Waste from the temporary on-site sanitation system for construction workers should be disposed of regularly at a certified waste facility by a registered waste contractor. Care must be taken to avoid soil and water pollution at the construction site and adjoining areas.	C/E/ECO	Ongoing monitoring during construction

7.3.9 Socio-economic impacts

Potential environmental issues:

- Impact of employment opportunities to be created
- Investment in the local economy
- Increased traffic and road safety issues
- Perceived impact on safety and security in nearby areas during construction

ISSUE	MANAGEMENT PLAN RECOMMENDATIONS	RESPONSIBILITY	FREQUENCY
1 Socio-economic impacts	a) Where possible, local building contractors or sub-contractors should be appointed to provide construction service.	D/E/C	Before construction and ongoing during construction
	b) Where possible, construction materials and other products and supporting services should be procured from local suppliers.	D/E/C	Before construction and ongoing during construction
	c) Potential sub-contracting should be made accessible to small local entrepreneurs. This may entail the breaking down of large tasks into smaller tasks, accompanied by smaller but more frequent payments. Advice on how to deal with tenders should be given.	D/E/C	Before construction and ongoing during construction
2 Ability of road network to handle increased traffic and traffic safety	a) All recommendations regarding road upgrades, intersection design and layouts, and traffic management measures must be strictly adhered to and implemented.	D/E/C/LM	Ongoing during construction
3 Safety and security during construction	a) All guidelines for the management and housekeeping of the construction site and staff conduct as outlined above, should be strictly adhered to.	C/D/E	Ongoing monitoring during construction
	b) The total number of workers to be housed on site will be limited to those necessary for safety and security purposes at the construction phase and other critical functions to be performed.	C/D/E	Ongoing monitoring during construction

7.3.10 Other potential forms of pollution

Potential environmental issues:

- Potential water and soil pollution due to construction activities.
- Air pollution due to construction activities (e.g. dust from construction vehicles, excavation, earthworks, stockpiles).
- Visual pollution due to construction activities.
- Increase in ambient noise levels during construction phase.

ISSUE	MANAGEMENT PLAN RECOMMENDATIONS	RESPONSIBILITY	FREQUENCY
1 Pollution from dust and odours *The following activities can reduce air quality:* • *Establishment of the site and related temporary works*	a) Areas that have been stripped of vegetation, existing exposed soil surfaces and sandy access routes must be dampened regularly or treated with dust inhibiters to avoid excessive dust, particularly during dry and windy conditions.	C/ECO	During site set up and ongoing during construction
	b) The time that stripped areas are left open to exposure should be minimised wherever possible.	C/ECO	Ongoing monitoring during construction
	c) Rehabilitation of exposed soil surfaces must take place immediately after completion of earthworks	C/ECO	Immediately after completion of earthworks

at construction sites. ○ *Dust from vehicle movements and stockpiles.* ○ *Vehicle emissions and fires.*	d) Construction vehicles must adhere to speed limits to avoid creating excessive dust. A speed limit of 30 km/hr must be adhered to.	C/ECO	Ongoing monitoring during construction
	e) Contractors must provide appropriate arrangements for cooking and/or heating requirements of staff (open fires not allowed)	C/ECO	During site set up and ongoing monitoring during construction
2 Noise pollution	a) Working hours must be limited to between 7:00 am and 17:00 pm, or as otherwise agreed to with adjacent land owners.	C/ECO	Ongoing monitoring during construction
	b) Notice of particularly noisy activities (e.g. Jackhammers, Blasting, Drilling, if needed) must be given to local residents at least 24 hours before the activity.	C/ECO	At least 24 hours before the start of the activity
	c) Buildings and other infrastructure should be placed, orientated and designed to reduce noise pollution from the adjacent roads and distant railway to the east.	C/Architect	Planning phase
3 Visual impacts	a) Storage facilities, elevated tanks and other temporary structures on site should be located to have as little as possible visual impact.	E/C/ECO	During site set up and ongoing monitoring during construction
	b) Lighting at the construction sites should be pointed downwards and away from oncoming traffic and nearby residents.	E/C/ECO	Ongoing monitoring during construction
	c) Ensure that building types and designs will be compatible with the desired image as envisaged by the local municipality. This is important because the proposed development is visually prominent and therefore may play a valuable role in place branding.	C/D/Architect	During planning and construction phases

7.4 OPERATIONAL PHASE – MITIGATION AND MANAGEMENT MEASURES

7.4.1 Physical and landscape characteristics of the development area.

Potential environmental issues: • Uncontrolled storm water run-off and potential associated erosion. • Impact on natural drainage pattern.			
ISSUE	MANAGEMENT PLAN RECOMMENDATIONS	RESPONSIBILITY	FREQUENCY
1 Soil Erosion	a) Ongoing prevention of soil erosion and maintenance of stormwater infrastructure.	D/LM	After completion of construction
2 Maintenance of Access Roads and Parking Area	a) The developer should ensure that the access roads are maintained in good condition by attending to potholes and storm water damage as soon as these develop, and ensure that road directions e.g. signage and paint on parking area surface is clear and well maintained.	D/LM	Throughout operational phase

7.4.2 The ecological characteristics of the land development area and its surroundings

Potential environmental issues: • Introduction and spread of exotic invader species			
ISSUE	MANAGEMENT PLAN RECOMMENDATIONS	RESPONSIBILITY	FREQUENCY
1 Indigenous flora & Exotic vegetation	a) Disturbance of mammals, birds, reptiles, other animals and their habitats on surrounding properties during operational phase must be prevented.	D	Throughout operational phase
	b) Only indigenous vegetation should be introduced and maintained for gardening and landscaping purposes. Indigenous plants may act as habitat to small wildlife and use less water than most exotics.	D	Throughout operational phase

7.4.3 Waste management in and around the development

Potential environmental issues: • Accumulation of waste or disposal of waste in inappropriate areas.			
ISSUE	MANAGEMENT PLAN RECOMMENDATIONS	RESPONSIBILITY	FREQUENCY
1 Waste Management	a) Domestic, office and related waste should be separated on-site into different waste components (organic matter, paper and cardboard, metals, glass, plastic, oils) for possible recycling.	D	Throughout operational phase
	b) Tenants should be encouraged to store the separated domestic waste in sealable containers, according to the specific materials to be recycled (glass, plastic, paper containers) in a designated area.	D	Throughout operational phase
	c) Collection of the stored recyclable materials, as well as the transportation of these materials to the appropriate Recycling and Garden Waste drop-off centers should be coordinated by the property/facility manager.	D	Weekly
	d) Non-recyclable waste should be collected, transported and disposed of at a municipal land fill site on regular bases as part of the municipal refuse removal system.	D/LM	Weekly
	e) Organic waste (e.g. from restaurants) must be removed regularly as per the provisions of the relevant by-laws of the municipality. Organic waste must be stored in an enclosed and roofed area where vermin, dogs and cats will not be able to reach, and where possible odours will not affect other tenants or the public.	D/LM	Throughout operational phase
	f) Non-recyclable refuge/business/commercial waste will be removed regularly as per the provision of the relevant by-laws of the municipality and disposed at a registered landfill site (general landfill). Refuse must be placed a designated area in skips or bins, and provided with a suitable cover to prevent refuse from being blown out by wind and the attraction of vermin or scavengers e.g. dogs.	D/LM	Throughout operational phase

7.4.4 Socio-economic impacts

Potential environmental issues: • Creation of employment opportunities in operational phase. • Generation of income (e.g. rates and taxes) to various spheres of government.			
ISSUE	MANAGEMENT PLAN RECOMMENDATIONS	RESPONSIBILITY	FREQUENCY
1 Use of local labour	a) A number of employment opportunities will be created during the operational phase associated with commercial activities and the maintenance of properties and infrastructure. Where possible local people should be employed for this purpose	D	Throughout operational phase

7.4.5 Possible pollution

Potential environmental issues: • Water pollution due to operational activities • Air pollution due to operational activities			
ISSUE	MANAGEMENT PLAN RECOMMENDATIONS	RESPONSIBILITY	FREQUENCY
1 Pollution/Water Quality	a) All water and sanitation infrastructure must be properly maintained on an ongoing basis	D/LM	Throughout operational phase
2. Air Pollution due to increase traffic	a) Controlling the speed limit in parking area will minimize possible contribution to air pollution	D	Throughout operational phase
3 Stormwater	a) All stormwater structures and infrastructure must be properly maintained on an ongoing base.	D/LM	Throughout operational phase
	b) The Storm Water Management Plan for the site must ensure that post-development peak flow off the site equals predevelopment peak flows. To this end, adequate storm water attenuation features should be incorporated in the layout design of the development, and energy dissipation structures should be fitted at all concentrated flow release points within the drainage network of the housing development. This would aid in reducing flow velocities off the hardened surfaces and towards the wetland areas. Where possible, the use of check dams, porous pavements, percolation trenches and permanent slope diversion structures to promote infiltration are encouraged; the effectiveness of infiltration measures will of course depend on geotechnical and topographical conditions.	D/LM	Throughout operational phase

8 SUMMARY RECOMMENDATIONS OF EAP

It is the opinion of the Environmental Assessment Practitioner that the North West Department of Rural, Environment and Agricultural Development consider authorizing the proposed activity and the preferred layout. This consideration should however be subject to the implementation of all the mitigation and management measures as described in the draft EMP as well as the findings of all specialist studies. As indicated in Section 5, the proposed activity will result in a number of potential impacts. The impact assessment has however indicated that the majority of these impacts can be described as having a "low" level of significance. The impacts with a high or medium level of significance will require the specific mitigation measures as outlined in Section 7. The proposed development is also in accordance with the IDP and SDF of the Moses Kotane Local Municipality.

It is the opinion of the EAP that the information contained in the Environmental Impact Assessment Report, and the Specialist studies which have been compiled to address specific areas of concern, provided sufficient information to undertake a sound assessment of the proposal and provide an informed recommendation with a sufficient degree of confidence.