

- That pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied;
- That the disturbance of landscapes and sites that constitute the nation's cultural heritage is avoided, or where it cannot be altogether avoided, is minimised and remedied;
- That waste is avoided, or where it cannot be altogether avoided, minimised and re-used or recycled where possible and otherwise disposed of in a responsible manner;
- That a risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions;
- Negative impacts on the environment, on people's environmental rights be anticipated; and, prevented, and where they cannot altogether be prevented, are minimised and remedied.

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

5. WASTE, EFFLUENT, EMISSION, NOISE, AND VISUAL IMPACT MANAGEMENT

5.1 Solid waste management

Did/does the activity produce any general waste (e.g. domestic-, commercial-, certain industrial waste, including building rubble also known as solid waste) during the construction phase <u>and/or</u> the operational phase?	YES	NO
If yes, briefly describe what type of waste was produced (i.e. green waste, building rubble, etc.) in which phase. Building rubble during the construction phase and domestic waste during the operational phase		
What quantity was/is produced during the construction period?	30	m ³
What was/is the estimated quantity that will be produced per month during the operational phase?	40	m ³

Did/does the activity produce any <u>hazardous</u> waste (e.g. chemical, medical waste, infectious, nuclear etc.) during the construction and/or the operational phase?	YES	NO
If yes, briefly describe what type of waste was produced (i.e. infectious waste, medical waste, etc.) in which phase.		
What quantity was/is produced during the construction period?		m ³
What was/is the estimated quantity that will be produced per month during the operational phase?		m ³

Where and how was/is waste treated / disposed of (describe each waste stream)?
Building rubble will be removed by means of trucks to the licensed solid waste site during the construction phase Domestic waste will be collected on a weekly basis by the Local municipality and disposed of at the licensed solid waste disposal site.

Has the municipality or relevant authority confirmed that sufficient capacity exist for treating / disposing of the solid waste to be generated by this activity(ies)? If yes, provide written confirmation from Municipality or relevant authority	YES	NO
Does/did the activity produce solid waste that was/will be treated and/or disposed of at another facility other than into a municipal waste stream?	YES	NO
If yes, did/has this facility confirmed that sufficient capacity exist for treating / disposing of the solid waste to be generated by this activity(ies)? Provide written confirmation from the facility and provide the following particulars of the facility:	YES	NO
Did/does the facility have an operating license? (If yes, please attach a copy of the license.)	YES	NO
Facility name:		
Contact person:		
Postal address:		
	Postal code:	
Telephone:	Cell:	
E-mail:	Fax:	

5.2 Liquid effluent

Did/does the activity produce sewage and or any other effluent?	YES	NO
What was/is the estimated quantity produced per month?		
	An estimated sewage peak flow of 26.56 l/s will be generated by the fully developed study area.	
Was/is the effluent treated and/or disposed of in a municipal system?	YES	NO
If Yes, did/has the Municipality or relevant authority confirmed that sufficient unallocated capacity exist for treating / disposing of the sewage or any other effluent generated by this activity(ies)? Provide written confirmation from the Municipality or relevant authority.		
Was/is any effluent produced be treated and/or disposed of on site?		
	Yes	NO
If yes, briefly describe the nature of the effluent and how it was/will be disposed of: No formal sewer treatment facilities are currently on site. Some VIP toilets have been erected.		
Did/does the activity produce effluent that was/will be treated and/or disposed of at another facility?	YES	NO
If yes, did/has this facility confirmed that sufficient capacity exist(ed) for treating / disposing of the liquid effluent generated by this activity(ies)? Provide written confirmation from the facility and provide the following particulars of the facility:	YES	NO
Does the facility have an operating license? (If yes, please attach a copy of the license.)	YES	NO
Facility name:		
Contact person:		

Postal address:	
	Postal code:
Telephone:	Cell:
E-mail:	Fax:

Describe the measures that was/will be taken to ensure the optimal reuse or recycling of waste water, if any:

5.3 Emissions into the atmosphere

Did/does the activity produce emissions that will be disposed of into the atmosphere?	YES	NO
If yes, did/does it require approval in terms of relevant legislation? If yes, attach a copy to this application	YES	NO
Describe the emissions in terms of type and concentration and how it was/will be treated/mitigated:		

5.4 Describe any mitigation/management measures that were adopted and the adequacy of these:

<p>Nothing has been adopted. Proposal for sewer treatment is described as follows:</p> <p>An estimated sewage peak flow of 26.56 l/s will be generated by the fully developed study area. The current bulk sewer infrastructure cannot cater for this impact. The recommended bulk sewer infrastructure requirements to enable development feasibility are therefore:</p> <ul style="list-style-type: none"> – 200mm O and 250mm O PVC-U 400KPa outfall sewer lines – Pump station delivering at least $(26.56 \times 1.2) = 31.8$ l/s – 200mm O PVC-U class 12 pump line (rising main) – 0.8 ML/day Waste Water Treatment Works or upgrade <p><u>Option 1 : Kuruman Waste Water Treatment Works:</u></p> <p>The existing Kuruman WWTW has a capacity of 4.0Ml/d. The WWTW are currently not optimally utilised but the planned refurbishment as per section 3.2.2 of this report will ensure that the works can operate to its design capacity. The anticipated 0.798Ml/d additional loading from Promise Land was not considered in the refurbishment. However, according to the Municipality's master plan the effective volume of the three reactors (concrete structures) is approximately 5 200 m³. This means if duly equipped with effective aerators (mechanical optimization) the design capacity of the works can be increased to at least 4.8 Ml/d (to accommodate Promised Land). Please note, some of the downstream processes such as secondary sedimentation (clarifiers), disinfection and sludge handling may also need to be upgraded accordingly.</p> <p>A 7.12km 200mm diameter dedicated pump line (rising main) will also be needed to connect the lowest point in Promise Land (proposed location of pump station) to the Kuruman Waste Water Treatment Works inlet.</p> <p><u>Option 2: Mothibistad Oxidation Ponds:</u></p>

The Mothibistad Oxidation Ponds only has a capacity 0.4Mℓ/d and with the planned refurbishment/upgrade expected to increase the capacity of the oxidation ponds to 1.4Mℓ/d. This is only to relieve the current overloading with allowance for the expected population growth up until 2021. The anticipated outflow from Promised Land was therefore not considered during the calculation as per WSIG application. To accommodate Promised Land the Mothibistad Oxidation Ponds should be upgraded with a further 0.8 Mℓ/d to a 2.2 Mℓ/d waste water treatment works.

A 2.1km, 200mm diameter rising main will be needed to connect the lowest point in Promised Land (proposed location of pump station) to the Mothibistad Oxidation Ponds inlet.

Option 3: Regional Waste Water Treatment Works:

Ga-Segonyana Municipality confirmed that a regional waste water treatment works west of Seoding is also considered for the future. This regional treatment works will treat all existing and future sewage flows generated by all the settlements in the municipal area besides Kuruman, Wrenchville and Bankara-Bodulong. This regional works will therefore also replace the Mothibistad Oxidation Ponds as the oxidation ponds is situated in an unstable dolomitic area. The Mothibistad and Promised Land (if option 2 is selected) will then need to be rerouted/extended to be linked with the regional works

5.5 Generation of noise

Will the activity generate noise?

YES	NO
YES	NO

If YES, is it controlled by any legislation of any sphere of government?

If YES, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

If NO, describe the noise in terms of type and level:

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5.6 Water use

(a) Please indicate the source(s) of water for the activity by crossing out ("X") the appropriate box(es)

Municipal	Water board	Groundwater	River, Stream, Dam or Lake	Other	The activity did/does not use water
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If water was/is extracted from a groundwater source, river, stream, dam, lake or any other natural feature, please indicate the volume that was/is extracted per month:

	m ³
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Please provide proof of assurance of water supply eg. letter of confirmation from Municipality/water user associations, yield of borehole etc.

Did/does the activity require a water use permit / license from DWAF? If yes, attach a copy to this application	YES	NO
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If yes, please submit the necessary application to Department of Water Affairs and Forestry and attach proof thereof to this application.

(b) Describe any mitigation/management measures that were adopted and the adequacy of these:

An estimated water peak flow of 88 ℓ/s is needed to service the study area under optimum peak conditions if fully developed. The surrounding bulk water infrastructure of Mothibistad cannot cater for this impact in terms of source, storage and elevation. The recommended bulk water infrastructure requirements to enable development feasibility therefore is:

- A dedicated 7.21km 355mm O pipe line from the two (2) 62KL elevated steel tanks south of Kuruman to the highest point south west of Promised Land as gravity trunk main which should deliver at least 88 ℓ/s at 240 kpa (2.4 bar) pressure directly into the proposed Promised Land internal water reticulation.

Promised Land will not need any storage facilities if the abovementioned link line is provided as it will abstract from the same water source and make use of the same regional bulk storage reservoirs west of Bankhara-Bodulong as Kuruman

5.7 Energy efficiency

(a) Please indicate the source of power supply eg. Municipality / Eskom / Renewable energy source.

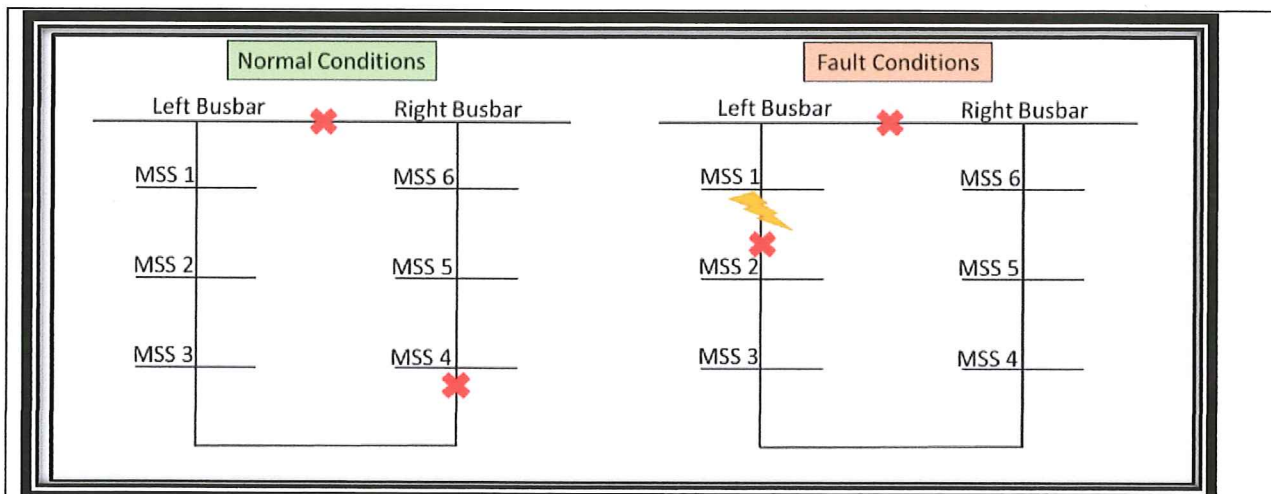
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Has the Municipality or relevant service provider confirmed that sufficient electricity capacity (i.e. generation, supply and transmission) exist for activity(ies)? If yes, provide written confirmation from Municipality or relevant service provider.	YES	NO
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<p>If power supply was/is not available, where was/is it sourced from?</p> <p>It is proposed that the Local Municipality should apply to NERSA to include the new development in their electrical supply license area. This would put the responsibility for the infrastructure development with the Local Municipality.</p> <p>The Local Municipality will have to apply with Eskom for a new bulk supply point at the Mothibistad 132/22 kV substation. A supply point of this magnitude will include a dedicated feeder bay and distribution line, which falls under the Eskom major projects division. Costs can only be confirmed after approval of a formal application. Typical timeline for such a project is 2-4 years depending on Eskom processes.</p> <p>Linda Coetzee (CoetzeLA@eskom.co.za) is the Eskom customer service representative for this area and will coordinate the application process with all involved parties.</p> <p>From the Eskom supply point power will be distributed by an overhead 22 kV line to pole mounted transformers. Each transformer will serve a dedicated zone with radial low voltage (LV) feeders.</p>
--

(b) Describe any mitigation/management measures that were adopted and the adequacy of these:

<p>MV Distribution: MV distribution will be done in accordance with the ring design philosophy as shown in the figure below. All MV distribution lines will be overhead with pole mounted transformers.</p>
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LV Reticulation: Electricity will be distributed throughout the development by way of an overhead LV radial network and associated pole top boxes.

LV Connections: LV connections (10/16mm², 3 Core, PVC/SWA/PVC/PVC) will be provided for each residential stand and specific sized LV feeders to each larger customer from the various pole top boxes.

Street & Area Lighting: Residential roads and public areas will make use of LED type luminaires installed on wooden poles.

The detail of the above will be determined during the detail design phase of the project, dependant on the final SDP and will be submitted for review and approval.

(c) Describe the design measures, if any, that have been taken to ensure that the activity is energy efficient:

Street & Area Lighting: Residential roads and public areas will make use of LED type luminaires installed on wooden poles.

(d) Describe how alternative energy sources have been taken into account or been built into the design of the activity, if any:

It is proposed that solar geysers be installed.

5.8 Noise Impacts

(a) Did/does the activity result in any noise impacts?	YES	NO
If yes, please describe and indicate the measures implemented to mitigate and manage these impacts?		

5.9 Visual impacts

(a) Did/does the activity result in any visual impacts?	YES	NO
If yes, please describe and indicate the measures implemented to mitigate and manage these impacts?		
The formalization of the township will enhance the aesthetics of the area by alleviating the need for informal settlement on the site.		
(b) Did/does the activity result in potential lighting impacts at night?	YES	NO
If yes, please describe and indicate the measures implemented to mitigate and manage these impacts?		

At present, sufficient electricity is not available in the area to have a significant impact. Once formalization has taken place, lighting impacts will occur. No measures have been implemented as this is for a normal residential development.

(c) Were/are there any alternatives available to address this impact? YES NO

If yes, please describe these alternatives?

6. SITE/AREA/PROPERTY DESCRIPTION

Current land-use zoning as per local municipality IDP/records:

Zoning of the land in terms of the land use scheme of the Municipality: "Undetermined" – "No building or use may be extended or changed without the approval of the Council"

In instances where there is more than one current land-use zoning, please attach a list of current land use zonings that also indicate which portions each use pertains to, to this application.

Is a change of land-use or a consent use application required? YES NO

6.1 Gradient of the site

Indicate the general gradient of the site.

Ridgeline	Plateau	Side slope of hill/mountain	Closed valley	Open valley	Plain	Undulating plain/low hills	Dune	Sea-front	Other
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6.2 Location in landscape

Indicate the landform(s) that best describes the site:

2.1 Ridgeline	<input type="checkbox"/>	2.4 Closed valley	<input type="checkbox"/>	2.7 Undulating plain / low hills	<input type="checkbox"/>
2.2 Plateau	<input type="checkbox"/>	2.5 Open valley	<input type="checkbox"/>	2.8 Dune	<input type="checkbox"/>
2.3 Side slope of hill/mountain	<input checked="" type="checkbox"/>	2.6 Plain	<input type="checkbox"/>	2.9 Seafront	<input type="checkbox"/>

6.3 Groundwater, Soil and Geological stability of the site

Is the site(s) located on any of the following?

Shallow water table (less than 1.5m deep)	YES	NO	UNSURE
Seasonally wet soils (often close to water bodies)	YES	NO	UNSURE
Unstable rocky slopes or steep slopes with loose soil	YES	NO	UNSURE
Dispersive soils (soils that dissolve in water)	YES	NO	UNSURE
Soils with high clay content	YES	NO	UNSURE
Any other unstable soil or geological feature	YES	NO	UNSURE
An area sensitive to erosion	YES	NO	UNSURE

If any of the answers to the above are "YES" or "UNSURE", specialist input may be requested by the Department. Information in respect of the above will often be available at the planning sections of local authorities. Where it exists, the 1:50 000 scale Regional Geotechnical Maps prepared by Geological Survey may also be used.

A Geo-Technical Engineering Specialist (Council for Geoscience) has been appointed to assess the area. Their findings can be summarised as follows:

Locally, the overall lithology encountered in the drilled boreholes encompasses an overburden material; i.e. colluvium / alluvium / hillwash / aeolian deposits, pedogenic material (calcrete and ferricrete), chert rubble, dolomitic residuum which includes WAD in some places, weathered shale, overlying weathered dolomite/limestone and hard dolomite bedrock, of the Ghaap group (Transvaal Supergroup). Large parts of the sites are characterised by dolomite outcrops, scattered dolomite and chert boulders and minor calcrete and ferricrete boulders.

During drilling, groundwater (both water strike and groundwater rest level) was recorded in 69 boreholes of the 118 boreholes drilled. Groundwater measurements were taken using a dip meter as per SANS 1936-1(2012) requirements. Sixty five (65) boreholes recorded groundwater to be occurring on the blanketing material while in 53 boreholes it is occurring within bedrock. Water rest levels recorded varied between 6.7 m (BH 34) and 57.8 m (PLA 46) with an average of 24.7 m. (1300 m AMSL).

The sites gravity values show a striking gravity low feature to the north east, south, west and central east gradually increases towards the central west, north, north east and south east. However, there is also a strong striking low feature to the northern portion of the site characterised by a very steep gradient from gravity high. This may indicate a general decrease in depth of dolomite bedrock towards north and south of the site. Military Veteran site gravity gradually moves from gravity lows on the southern portion of the site to gravity highs on the northern section of the site.

The hazard zonation is based on the results of geophysical surveys and percussion drilling of 118 boreholes. The stability evaluation was conducted in accordance with the Scenario Supposition Method which consider factors including blanketing layer, receptacles, mobilisation potential, mobilizing agents and maximum potential development space, as indicated in the SANS 1936 (2012) standard. The dolomite stability of the sites is described in terms of the following zones:

Zone I: Dolomite area Designation of D3 and Inherent Hazard Class IHC 3/(4)(5)// (4)1

Zone I is characterised by a medium inherent susceptibility of up to a medium size sinkhole and subsidence formation (2 m to 5 m in diameter) with respect to ingress and small size sinkhole (<2 m) with respect to groundwater level drawdown. Zone I occupies mainly the gravity high and gradient areas. This zone encompasses pockets of IHC5 due to the encounter of dolomite bedrock at 1 m and 4 m in BH43 and PLA23, respectively. The blanketing layer is characterised by colluvium, chert rubble, dolomite chert residuum (containing fines-Wad in some instances) underlain by weathered dolomite and dolomite bedrock. The depth to dolomite bedrock generally ranges between 6 m to 15 m. Groundwater rest level in this zone is mainly within bedrock.

Zone II: Dolomite area Designation of D3 and Inherent Hazard Class IHC 4//4(1)

This zone is characterised by a medium inherent susceptibility of up to a medium to large size sinkhole and subsidence formation (2 m to 5 m in diameter) with respect to both ingress and groundwater level drawdown. The blanketing layer is characterised by colluvium, chert residuum, dolomite chert residuum (containing fines-Wad) underlain by weathered dolomite and dolomite bedrock. The depth to dolomite bedrock is variable and groundwater rest level is mainly within the blanketing layer. Zone II is the most dominant zone in terms of areal coverage.

Zone III: Dolomite area Designation of D4 and Inherent Hazard Class IHC 7/8//7/8

This zone is characterised by a medium to high inherent susceptibility of up to a large to very large size sinkhole and subsidence formation (2 m to >15 m in diameter) with respect to both groundwater level drawdown and water ingress. The ground conditions in this zone is highly variable. Zone III occupies the gravity lows mainly in the northern section of the map. The blanketing layer is considerably thick and is characterised by colluvium, chert residuum, dolomite chert residuum (fines-Wad) underlain by weathered dolomite. The depth to dolomite bedrock is generally deep (>20 m) and groundwater rest level is mainly within the blanketing layer or within the cavity.

Based on the above hazard zonation and in accordance with SANS 1936-1 (2012), the following is recommended: In general, a high-density residential development, i.e. 150 m² (RN1) stands, have a higher density of wet services and a greater chance of an undetected leak than a commercial development on the same property. Therefore, future development on the study area should take into cognizance the allowable land use densities shown in **Appendix D** as per SANS 1936-1 (2012) permissible land use tables.

▣ **Zone I and II have a Dolomite Area Designation of D3:** These D3 areas could be considered for certain types of residential development (i.e. RN2/DH2 or RN3/DH3, greater than 300 m² stands) according to Table 2 of SANS 1936-1:2012 and Table 10 of NHBRC Home Building Manual 2015.

▣ **Zone III has a Dolomite Area Designation of D4:** D4 is not considered suitable for residential development of any type. Only certain types of commercial/light industrial may be considered as per SANS 1936-1 (**Appendix II**), subject to conditions.

▣ In general, a regional Dolomite Risk Management Plan is recommended for implementation by the Municipality as a whole. This should include groundwater monitoring, as existing developments within Kuruman could be negatively affected by a continued decline in the groundwater level.

▣ Any signs of ground instabilities or subsidence should be reported immediately to the municipality, and remediated in accordance with SANS 1936-4 (2012).

According to SANS 1936-1 (2012), in proposing suitable foundation types in a D3 area, consideration shall be given to the potential loss of support anticipated for the designated IHC based on the expected sinkhole size. Foundation design on such land shall provide sufficient structural integrity and stability to allow occupants to safely escape in the event of sudden loss of support under the foundations. The provisional foundation design requirement on parcels of land categorized as D3 is that foundations should at least be able to span a 5 m loss of support and no residential housing development is allowed on land categorized as D4

If you are unsure about any of the above or if you are concerned that any of the above aspects may be an issue of concern in the application, an appropriate specialist should be appointed to assist in the completion of this section. Information in respect of the above will often be available as part of the project information or at the planning sections of local authorities. Where it exists, the 1:50 000 scale Regional Geotechnical Maps prepared by the Council for Geo Science may also be consulted.

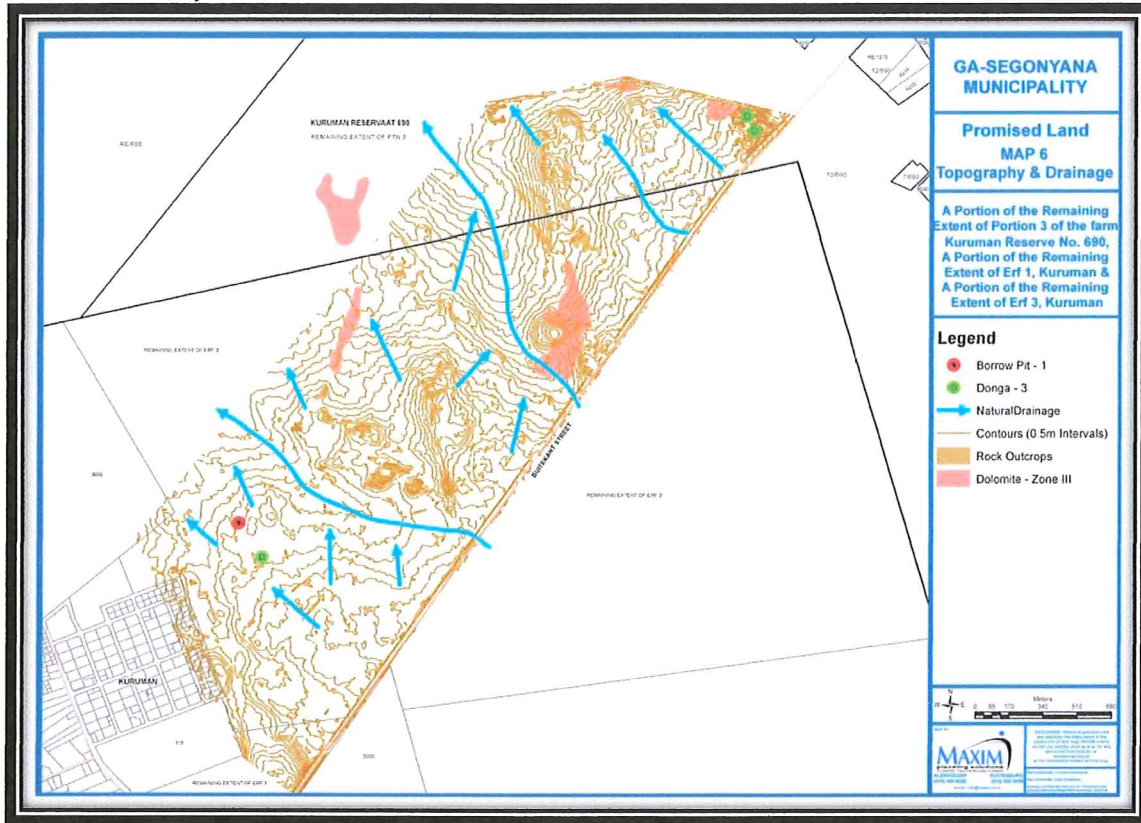
6.4 Surface water

Indicate the surface water present on and or adjacent to the site and alternative sites (cross out (“”) the appropriate boxes)?

Perennial River	YES	NO	UNSURE
Non-Perennial River	YES	NO	UNSURE
Permanent Wetland	YES	NO	UNSURE
Seasonal Wetland	YES	NO	UNSURE

Artificial Wetland	YES	NO	UNSURE
Estuarine / Lagoonal wetland	YES	NO	UNSURE

The landscape can be described as gentle undulating topography and low relief. The natural drainage is the area is mainly in a north and north-western direction



6.5 Vegetation and groundcover

6.5.1 Vegetation / Groundcover (Pre-commencement)

Indigenous Vegetation - good condition	Indigenous Vegetation with scattered aliens	Indigenous Vegetation with heavy alien infestation
Describe the vegetation type above: While it cannot be categorically stated that no threatened, near-threatened plant species were found at the site prior to the informal development, there are no distinct indicators that such species would have been at the site. Declining plant species such as <i>Boophone disticha</i> (Poison Bulb) could have been present at the site owing to suitable habitat. Some loss in numbers of the Protected tree species <i>Vachellia erioloba</i> (Camel	Describe the vegetation type above:	Describe the vegetation type above:

Thorn), could also have taken place at the site. A number of these Camel Thorn trees remain at the site and it also appear to be specifically conserved at some of the informal settlement areas

To serve as local context for the vegetation at the site an outline of the Kuruman Thornveld vegetation type from Mucina and Rutherford (2006) follows.

SVk 9 Kuruman Thornveld

Distribution: In South Africa the Kuruman Thornveld is found at the North West and Northern Cape Provinces. Kuruman Thornveld occurs on the flats from the vicinity of Postmasburg and Danielskuil (here west of the Kuruman Hills) in the south extending via Kuruman to Tsineng and Dewar in the north. Altitude is 1100 – 1500 m (Mucina & Rutherford, 2006).

Vegetation and landscape features: Flat rocky plains and some sloping hills with very well-developed, closed shrub layer and well-developed open tree stratum consisting of *Acacia erioloba* (Mucina & Rutherford, 2006).

Geology and soils: Some Campbell Group dolomite and chert and mostly younger, superficial Kalahari Group sediments, with red wind-blown (0.3 – 1.2 m deep) sand. Locally, rocky pavements are formed in places. Most important land types Ae, Ai, Ag and Ah, with Hutton soil form (Mucina & Rutherford, 2006).

Climate: Summer and autumn rainfall with very dry winters. Mean annual precipitation (MAP) about 300-450 mm. Frost frequent in winter (Mucina & Rutherford, 2006).

Important taxa: Tall tree: *Acacia erioloba*. Small trees: *Acacia mellifera* subsp. *detinens*, *Boscia*

<p><i>albitrunca</i>. Tall Shrubs: <i>Grewia flava</i>, <i>Lycium hirsutum</i>, <i>Tarchonanthus camphoratus</i>, <i>Gymnosporia buxifolia</i>. Low Shrubs: <i>Acacia hebeclada</i> subsp. <i>hebeclada</i>. <i>Monechma divaricatum</i>, <i>Gnidia polycephala</i>, <i>Helichrysum zeyheri</i>, <i>Hermannia comosa</i>, <i>Pentzia calcarea</i>, <i>Plinthus sericeus</i>. Geoxylic Suffrutex: <i>Elephantorrhiza elephantina</i>. Graminoids: <i>Aristida meridionalis</i>, <i>Aristida stipitata</i> subsp. <i>stipitata</i>, <i>Eragrostis lehmanniana</i>, <i>Eragrostis echinochloidea</i>, <i>Melinis repens</i>. Herbs: <i>Dicoma schinzii</i>, <i>Gisekia africana</i>, <i>Harpagophytum procumbens</i> subsp. <i>procumbens</i>, <i>Indigofera daleoides</i>, <i>Limeum fenestratum</i>, <i>Nolletia ciliaris</i>, <i>Seddera capensis</i>, <i>Tripteris aghillana</i>, <i>Vahlia capensis</i> subsp. <i>vulgaris</i>.</p>		
Provide ecosystem status for above: It could be perceived to have been sensitive.	Provide ecosystem status for above:	Provide Ecosystem status for above:
Indigenous Vegetation in an ecological corridor or along a soil boundary / interface	Veld dominated by alien species	Distinctive soil conditions (e.g. Sand over shale, quartz patches, limestone, alluvial deposits, termitaria etc.) – describe
Bare soil	Building or other structure	Sport field
Other (describe below)	Cultivated land	Paved surface
<p>Please note: The Department may request specialist input/studies depending on the nature of the vegetation type / groundcover and impact(s) of the activity/ies. To assist with the identification of the vegetation type and ecosystem status consult http://bgis.sanbi.org or BGIShelp@sanbi.org. Information is also available on compact disc (cd) from the Biodiversity-GIS Unit, Ph (021) 799 8698. This information may be updated from time to time and it is the applicant/ EAP's responsibility to ensure that the latest version is used.</p>		

6.5.2. Vegetation / Groundcover (Post-commencement)

Cross out ("X") the block or describe (where required) the vegetation types / groundcover present on the site after commencement of the activity.

Indigenous Vegetation - good condition	Indigenous Vegetation with scattered aliens	Indigenous Vegetation with heavy alien infestation	X
Describe the vegetation type above:	Describe the vegetation type above:	Describe the vegetation type above:	

		<p>Vegetation at much of the site is transformed or modified. Informal buildings, roads, numerous scraped areas and fences are found widespread at the site. Informal dumping occurs at site. Various alien invasive weeds are widespread at the site. Some fragmented and ecologically disturbed patches of indigenous vegetation remain at some parts. <i>Vachellia erioloba</i> (Camel Thorn) trees remain and some appear to be conserved even in areas that are otherwise cleared. A number of indigenous tree-, shrub-, herb- and grass species are present at the site; often widespread pioneer species well-adapted to disturbed areas</p> <p>Vegetation at much of the site is transformed or modified. Numerous areas where vegetation has been cleared, are present at the site. Some fragmented and ecologically disturbed patches of indigenous vegetation remain at some places at the site. <i>Vachellia erioloba</i> (Camel Thorn) trees still remain and some appear to be conserved even in areas that are otherwise cleared. Other indigenous small trees at the site include <i>Tarchonanthus camphoratus</i> (Vaalbos), <i>Vachellia hebeclada</i> (Candlepod Thorn), <i>Senegalia mellifera</i> (Black Thorn), <i>Grewia flava</i> (Velvet Raisin), <i>Ziziphus mucronata</i> (Buffalo-thorn) and <i>Vachellia tortilis</i> (Umbrella Thorn). Indigenous grass species include <i>Eragrostis lehmanniana</i> (Lehman's Love Grass), <i>Aristida congesta</i> (Tassel Three-awn) and <i>Enneapogon cenchroides</i>. Indigenous herbs at the site include <i>Hirpicium echinus</i>, <i>Acrotome inflata</i>, <i>Dicoma schinzii</i>, <i>Elephantorrhiza elephantina</i>, <i>Senna italica</i> and <i>Hermannia tomentosa</i>. Numerous alien invasive weeds are found at the site such as <i>Verbesina encelioides</i>, <i>Argemone ochroleuca</i> (White-flowered Mexican Poppy), <i>Schkuhria pinnata</i> (Dwarf Marigold), <i>Chenopodium album</i></p>
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		(White Goosefoot), <i>Tagetes minuta</i> (Khaki Weed), <i>Bidens pilosa</i> (Common Blackjack), <i>Bidens bipinnata</i> (Spanish Black Jack), <i>Datura ferox</i> (Large Thorn-apple) and <i>Datura stramonium</i> (Common Thorn-apple)
Provide ecosystem status for above:	Provide ecosystem status for above:	Provide Ecosystem status for above: Informal buildings, roads, numerous scraped areas and fences are found widespread at the site. Informal dumping occurs at some parts. Various alien invasive weeds are widespread at the site Scope for the site to be part of a corridor of particular conservation concern is small
Indigenous Vegetation in an ecological corridor or along a soil boundary / interface	Veld dominated by alien species	Distinctive soil conditions (e.g. Sand over shale, quartz patches, limestone, alluvial deposits, termitaria etc.) – describe
Bare soil	Building or other structure	Sport field
Other (describe below)	Cultivated land	Paved surface

6.5.3 Vegetation / Groundcover Management

Describe any mitigation/management measures that were adopted and the adequacy of these:

- Vegetation at much of the site is transformed or modified. Informal buildings, roads, numerous scraped areas and fences are found widespread at the site. Informal dumping occurs at site. Various alien invasive weeds are widespread at the site. Some fragmented and ecologically disturbed patches of indigenous vegetation remain at some parts. *Vachellia erioloba* (Camel Thorn) trees remain and some appear to be conserved even in areas that are otherwise cleared. A number of indigenous tree-, shrub-, herb- and grass species are present at the site; often widespread pioneer species well-adapted to disturbed areas.
- The vegetation type representing the Savanna Biome at the site is Kuruman Thornveld (SVk 9). Kuruman Thornveld is not listed as threatened according to the National List of Threatened Ecosystems (2011).
- Scope for the site to be part of a corridor of particular conservation concern is small.
- No Threatened or Near Threatened plant or animal species appear to be present at site.
- One plant species that are not threatened but listed as Declining occurs at the site; *Vachellia erioloba* (= *Acacia erioloba*) (Camel Thorn tree).

- Camel Thorn, *Vachellia erioloba* which is found at the site is also a Protected tree species. In terms of a part of section 15(1) of the National Forests Act No. 84 of 1998, no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a license granted by the Minister.
- Protected plant species according to Northern Cape Nature Conservation Act No. 9 of 2009 (Updated in Provincial Gazette No. 1566, December 2011 with date of commencement 1 January 2012) have not been found at the site.
- Ecological sensitivity at the site is medium-low at present.
- No Threatened or Near Threatened plant or animal species appear to be present at site.
- Informal developments had ecological impacts at the site. Loss of natural habitat with indigenous vegetation took place owing to informal developments. While it cannot be categorically stated that no threatened, near-threatened plant species were found at the site prior to the informal development, there are no distinct indicators that such species would have been at the site. Declining plant species such as *Boophone disticha* (Poison Bulb) could have been present at the site owing to suitable habitat. Some loss in numbers of the Protected tree species *Vachellia erioloba* (Camel Thorn), could also have taken place at the site. A number of these Camel Thorn trees remain at the site and it also appear to be specifically conserved at some of the informal settlement areas.
- Establishment of exotic weeds should be monitored and exotic weeds at the site should be eradicated. A declared invader such as the mesquite tree (*Prosopis* species), should not be planted or allowed to spread from adjacent areas to the proposed footprint.
- No bird's nests of particular conservation concern such as nests of large raptors or nests of sociable weavers, have been found at the site.
- The conservation of *Vachellia erioloba* (a Protected tree species that is also listed as Declining) should receive special attention. If further development is approved a special effort should be made (apart from applying for the necessary permits) to conserve and cultivate *Vachellia erioloba* (Camel Thorn) trees to enhance the conservation of these magnificent trees in the larger area.
- If further development is approved, the key would be to conserve and cultivate as many as practical locally indigenous tree species at the urban area so that an urban conservation corridor could be created for the larger Kuruman and Mothibistad area.

6.6 Land use character of surrounding area

Cross out (“”) the block that reflects the past land uses and/or prominent features that occurred within +/- 500m radius of the site and neighbouring properties if these are located beyond 500m of the site.

Please note: The Department may request specialist input/studies depending on the nature of the land use character of the area and impact(s) of the activity/ies.

Untransformed area	Low density residential	Medium density residential	High density residential	Informal residential
Retail	Commercial & warehousing	Light industrial	Medium industrial	Heavy industrial

Power station	Office/consulting room	Military or police base/station/compound	Casino/entertainment complex	Tourism & Hospitality facility
Open cast mine	Underground mine	Spoil heap or slimes dam	Quarry, sand or borrow pit	Dam or reservoir
Hospital/medical center	School	Tertiary education facility	Church	Old age home
Sewage treatment plant	Train station or shunting yard	Railway line	Major road (4 lanes or more)	Airport
Harbour	Sport facilities	Golf course	Polo fields	Filling station
Landfill or waste treatment site	Plantation	Agriculture	River, stream or wetland	Nature conservation area
Mountain, koppie or ridge	Museum	Historical building	Graveyard	Archaeological site
Other land uses (describe):				

7. CULTURAL/HISTORICAL FEATURES

Were there any signs or evidence (unearthed during construction) of culturally or historically significant elements including archaeological or palaeontological sites, on or in close proximity to the site?	YES	NO
	UNCERTAIN	
If YES, explain:		
If uncertain, the Department may request that specialist input be provided to establish whether there was such possibilities occurred on or close to the site.		
Briefly explain the findings of the specialist if one was already appointed:	<p>A Pelsers Archaeological Consulting (APAC) was appointed by Maxim Planning Solutions to undertake a Phase 1 HIA for the proposed township Promised Land on a Portion of the Remaining Extent of Erven 1 and 3 Kuruman and a Portion of the Remaining Extent of Portion 3 of the farm Kuruman Reserve No. 690 at Ga-Segonyana Local Municipality Northern Cape Province. The project is conducted under instruction from the Housing Development Agency (HDA).</p> <p>A number of known cultural heritage sites (archaeological and/or historical) exist in the larger geographical area within which the study area falls. There are no known sites on the specific land parcel and none was identified and recorded during the recent assessment. The area has been heavily impacted and disturbed in the recent past by current ongoing residential and related activities. If any did exist here in the past it would have been disturbed or destroyed as a result. It is clear from aerial views of the study area that recent large scale human settlement has slowly encroached on the area since 2005. It is therefore</p>	

	<p>highly unlikely that any significant and intact sites, features or material would be present here.</p> <p>Finally, it should be noted that although all efforts are made to locate, identify and record all possible cultural heritage sites and features (including archaeological remains) there is always a possibility that some might have been missed as a result of grass cover and other factors. The subterranean nature of these resources (including low stone-packed or unmarked graves) should also be taken into consideration. Should any previously unknown or invisible sites, features or material be uncovered during any development actions then an expert should be contacted to investigate and provide recommendations on the way forward.</p> <p>From a cultural heritage point of view the development can therefore continue, taking cognizance of the above recommendations.</p>		
Were any buildings or structures older than 60 years be affected in any way?	<table border="1"> <tr> <td data-bbox="1300 705 1380 750">YES</td> <td data-bbox="1380 705 1460 750">NO</td> </tr> </table>	YES	NO
YES	NO		
Was it necessary to apply for a permit in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999)?	<table border="1"> <tr> <td data-bbox="1300 761 1380 806">YES</td> <td data-bbox="1380 761 1460 806">NO</td> </tr> </table>	YES	NO
YES	NO		
<p>If yes, please submit or, make sure that the applicant or a specialist submit the necessary application to SAHRA or the relevant provincial heritage agency and attach proof thereof to this application.</p>			

8. IMPACT ASSESSMENT

Objective of the environmental impact assessment process

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

1. determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;
2. describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the development footprint on the approved site as contemplated in the accepted scoping report;
3. identify the location of the development footprint within the approved site as contemplated in the accepted scoping report; based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;
4. determine the –
 - i. nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and
 - ii. degree to which these impacts-
 - (aa) can be reversed;
 - (bb) may cause irreplaceable loss of resources, and
 - (cc) can be avoided, managed or mitigated;
5. identify the most ideal activity within the development footprint of the approved site as contemplated in the accepted scoping report based on the lowest level of environmental sensitivity identified during the assessment;
6. identify, assess, and rank the impacts the activity will impose on the development footprint on the site as contemplated in the accepted scoping report through the life of the activity;

7. identify suitable measures to avoid, manage or mitigate identified impacts; and identify residual risks that need to be managed and monitored.

Scope of assessment and content of environmental impact assessment reports

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

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

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

Assumptions, uncertainties, limitations and gaps in knowledge

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

The report is based on the *project description* provided by Maxim Town Planning Solutions as a result of reports that was compiled by the following Specialists:

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

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

8.1 DESCRIPTION OF THE ENVIRONMENT THAT MAY BE AFFECTED BY THE PROJECT

8.1.1 BIO-PHYSICAL ASPECTS

8.1.1.1 GEOLOGY

According to the 1: 250 000, sheet 2722 Kuruman geological map, the sites are underlain by the Ghaap Group of the Transvaal Supergroup, which forms part of Griqualand West Sequence.

Locally, the overall lithology encountered in the drilled boreholes encompasses an overburden material; i.e. colluvium / alluvium / hillwash / aeolian deposits, pedogenic material (calcrete and ferricrete), chert rubble, dolomitic residuum which includes WAD in some places, weathered shale, overlying weathered dolomite/limestone and hard dolomite bedrock, of the Ghaap group (Transvaal Supergroup). Large parts of the sites are characterised by dolomite outcrops, scattered dolomite and chert boulders and minor calcrete and ferricrete boulders.

During drilling, groundwater (both water strike and groundwater rest level) was recorded in 69 boreholes of the 118 boreholes drilled. Groundwater measurements were taken using a dip meter as per SANS 1936-1(2012) requirements. Sixty five (65) boreholes recorded groundwater to be occurring on the blanketing material while in 53 boreholes it is occurring within bedrock. Water rest levels recorded varied between 6.7 m (BH 34) and 57.8 m (PLA 46) with an average of 24.7 m. (1300 m AMSL).

The sites gravity values show a striking gravity low feature to the north east, south, west and central east gradually increases towards the central west, north, north east and south east. However, there is also a strong striking low feature to the northern portion of the site characterised by a very steep gradient from gravity high. This may indicate a general decrease in depth of dolomite bedrock towards north and south of the site. Military Veteran site gravity gradually moves from gravity lows on the southern portion of the site to gravity highs on the northern section of the site.

The hazard zonation is based on the results of geophysical surveys and percussion drilling of 118 boreholes. The stability evaluation was conducted in accordance with the Scenario Supposition Method which consider factors including blanketing layer, receptacles, mobilisation potential, mobilizing agents and maximum potential development space, as indicated in the SANS 1936 (2012) standard. The dolomite stability of the sites is described in terms of the following zones:

Zone I: Dolomite area Designation of D3 and Inherent Hazard Class IHC 3/(4)(5)// (4)1

Zone I is characterised by a medium inherent susceptibility of up to a medium size sinkhole and subsidence formation (2 m to 5 m in diameter) with respect to ingress and small size sinkhole (<2 m) with respect to groundwater level drawdown. Zone I occupies mainly the gravity high and gradient areas. This zone encompasses pockets of IHC5 due to the encounter of dolomite bedrock at 1 m and 4 m in BH43 and PLA23, respectively. The blanketing layer is characterised by colluvium, chert rubble, dolomite chert residuum (containing fines-Wad in some instances) underlain by weathered dolomite and dolomite bedrock.

Zone II: Dolomite area Designation of D3 and Inherent Hazard Class IHC 4//4(1)

This zone is characterised by a medium inherent susceptibility of up to a medium to large size sinkhole and subsidence formation (2 m to 5 m in diameter) with respect to both ingress and groundwater level drawdown. The blanketing layer is characterised by colluvium, chert residuum, dolomite chert residuum (containing fines-Wad) underlain by weathered dolomite and dolomite bedrock. The depth to dolomite bedrock is variable and groundwater rest level is mainly within the blanketing layer. Zone II is the most dominant zone in terms of areal coverage.

Zone III: Dolomite area Designation of D4 and Inherent Hazard Class IHC 7/8//7/8

This zone is characterised by a medium to high inherent susceptibility of up to a large to very large size sinkhole and subsidence formation (2 m to >15 m in diameter) with respect to both groundwater level drawdown and water ingress. The ground conditions in this zone are highly variable. Zone III occupies the gravity lows mainly in the northern section of the map. The blanketing layer is considerably thick and is characterised by colluvium, chert residuum, dolomite chert residuum (fines-Wad) underlain by weathered dolomite. The depth to dolomite bedrock is generally deep (>20 m) and groundwater rest level is mainly within the blanketing layer or within the cavity.

Based on the above hazard zonation and in accordance with SANS 1936-1 (2012), the following is recommended:

In general, a high-density residential development, i.e. 150 m² (RN1) stands, have a higher density of wet services and a greater chance of an undetected leak than a commercial development on the same property. Therefore, future development on the study area should take into cognizance the allowable land use densities shown in **Appendix D** as per SANS 1936-1 (2012) permissible land use tables.

▣ **Zone I and II have a Dolomite Area Designation of D3:** These D3 areas could be considered for certain types of residential development (i.e. RN2/DH2 or RN3/DH3, greater than 300 m² stands) according to Table 2 of SANS 1936-1:2012 and Table 10 of NHBRC Home Building Manual 2015.

▣ **Zone III has a Dolomite Area Designation of D4:** D4 is not considered suitable for residential development of any type. Only certain types of commercial/light industrial may be considered as per SANS 1936-1 (**Appendix II**), subject to conditions.

▣ In general, a regional Dolomite Risk Management Plan is recommended for implementation by the Municipality as a whole. This should include groundwater monitoring, as existing developments within Kuruman could be negatively affected by a continued decline in the groundwater level.

▣ Any signs of ground instabilities or subsidence should be reported immediately to the municipality, and remediated in accordance with SANS 1936-4 (2012).

According to SANS 1936-1 (2012), in proposing suitable foundation types in a D3 area, consideration shall be given to the potential loss of support anticipated for the designated IHC based on the expected sinkhole size. Foundation design on such land shall provide sufficient structural integrity and stability to allow occupants to safely escape in the event of sudden loss of support under the foundations. The provisional foundation design requirement on parcels of land categorized as D3 is that foundations should at least be able to span a 5 m loss of support and no residential housing development is allowed on land categorized as D4.

The depth to dolomite bedrock generally ranges between 6 m to 15 m. Groundwater rest level in this zone is mainly within bedrock.

The dolomite stability of the area is described in terms of the following zones:

Zone I: Dolomite area Designation of D3 and Inherent Hazard Class IHC 3/(4)(5)// (4)1

Zone I is characterised by a medium inherent susceptibility of up to a medium size sinkhole and subsidence formation (2m to 5m in diameter) with respect to ingress and small size sinkhole (<2m) with respect to groundwater level drawdown.

Zone II: Dolomite area Designation of D3 and Inherent Hazard Class IHC 4//4(1)

Zone II is characterised by a medium inherent susceptibility of up to a medium to large size sinkhole and subsidence formation (2m to 5m in diameter) with respect to both ingress and groundwater level drawdown.

Zone III: Dolomite area Designation of D4 and Inherent Hazard Class IHC 7/8//7/8

Zone III is characterised by a medium to high inherent susceptibility of up to a large to very large size sinkhole and subsidence formation (2m to >15m in diameter) with respect to both groundwater level drawdown and water ingress.

Summary:

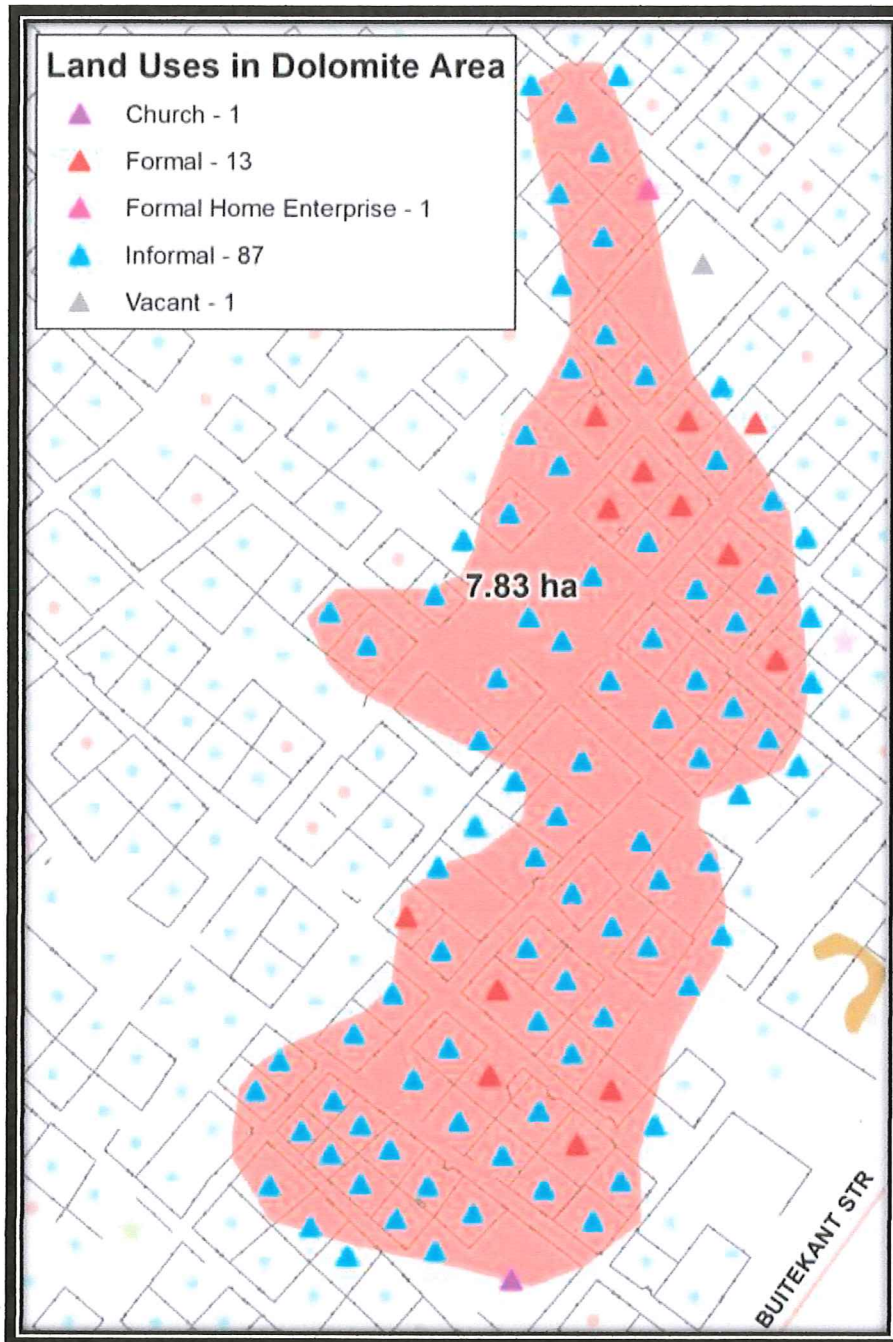
Zone I and II have a Dolomite Area Designation of D3:

- These D3 areas could be considered for certain types of residential development (i.e. RN2/DH3, greater than 300m² stands)

Zone III has a Dolomite Area Designation of D4:

- D4 is not considered suitable for residential development of any type. Only certain types of commercial/light industrial may be considered as per SANS 1936-1, subject to conditions.

As far as Promised Land is concerned, an area of ±7,8 ha in the central part of the village, as well as 2 smaller areas of 1,78 ha in the northern boundary, are affected by the Zone III dolomite area. Refer to **Map 3: Dolomite Zonation**



8.1.1.2 TOPOGRAPHY

The study area and Kuruman as a whole is bounded by a prominent ridge and scattered hills to the north and west. The maximum elevation is approximately 1326 m AMSL. The elevation of the study areas ranges between 1326 m AMSL on the south and 1311 m AMSL to the north. The landscape of the sites is in the form of gentle undulating topography and low relief. Undulating topography in the study area is characterised by areas of rock outcrops and flat planes are characterised by highly weathered rocks.

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

8.1.1.3 CLIMATE

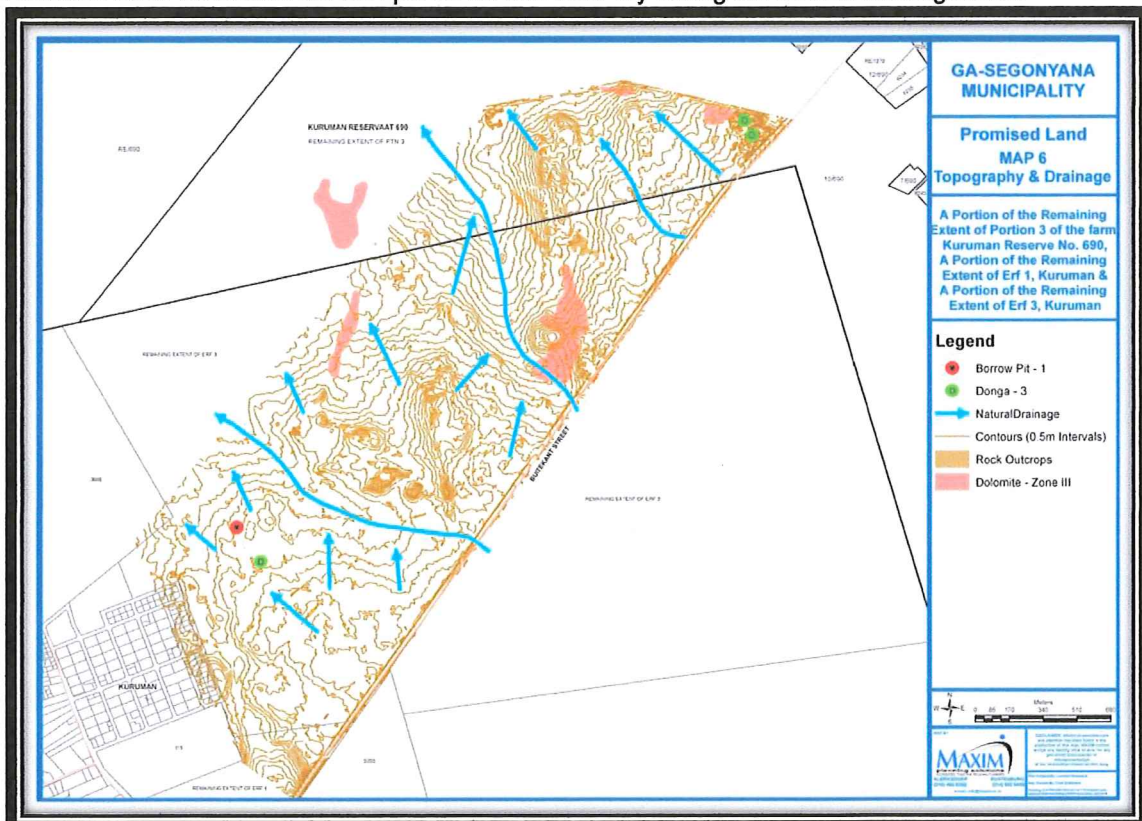
According to Mucina and Rutherford (2006), Kuruman is a summer rainfall area. It normally receives about 266 mm of rain per year, with most of the rainfall (58 mm) occurring mainly in February while the lowest rainfall (0 mm) is in June. The monthly distribution of average daily maximum temperatures ranges from 17.5°C in June to 32.6°C in January. The region is the coldest during June when the mercury drops to 0°C on average during the night. Mean annual evaporation potential (MAEP) is between 2700 mm and 2786 mm.

Kuruman has relatively mild weather patterns compared to other neighbouring Northern Cape towns. The Weinerts N value for this area is greater than 5, indicating that mechanical weathering takes place rather than chemical weathering.

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

8.1.1.4 SURFACE DRAINAGE

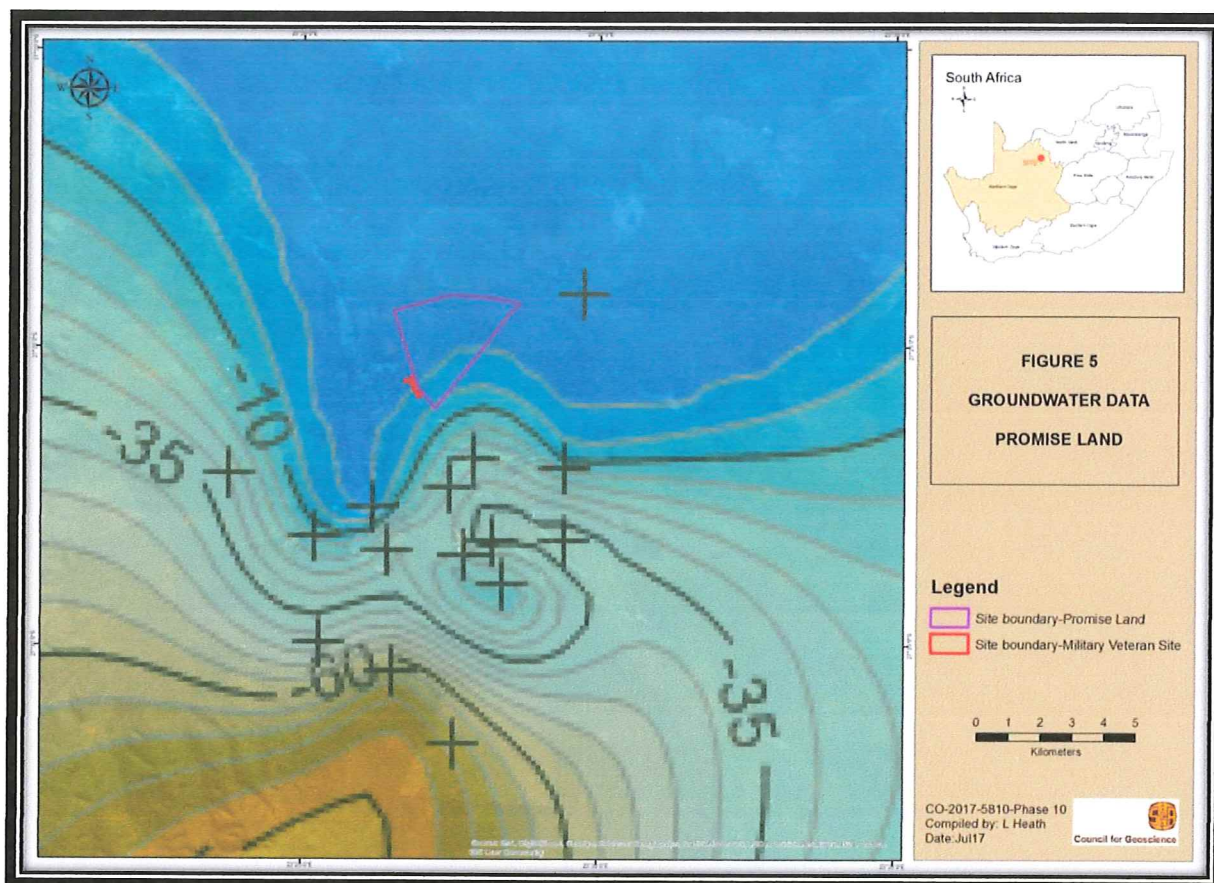
The natural drainage in the area is mainly in a north and north-western direction. No streamlines intersects the site. The study area, to the east is characterised by gullies of a tributary which during the investigation was dry. Figure below shows the Kuruman River flowing northwards to the west of the study area. The Kuruman River tributaries are non-perennial and were dry during the current investigations.



8.1.1.5 GROUND WATER

The nature of dolomite bedrock is impervious with porosity of less than 0.3 %. However, due to the jointing, fractures and faulting; water is able to percolate and seeps through the rock (Brink, 1979). The dolomite of the study area is also considered as an aquifer, due to faulting, dolerite intrusions and fracturing.

The groundwater level is a key risk assessment factor in the engineering-geological characterisation of any dolomitic environments. According to the 1: 50 000 hydro-geological Map 2722 Kimberly, the principal groundwater occurrence system is a karst type. Groundwater map below indicates the location of site with respect to groundwater level.



Groundwater Data (DWA, 2010)

According to the Department of Water Affairs Groundwater Assessment: Dolomite Aquifers Study conducted in December 2006, Kuruman is located on Kuruman Groundwater Compartment. The compartment is being dewatered. Kuruman and surrounding communities are almost entirely dependent on groundwater.

During drilling, groundwater (both water strike and groundwater rest level) was recorded in 69 boreholes of the 118 boreholes drilled. Groundwater measurements were taken using a dip meter as per SANS 1936-1(2012) requirements. Sixty five (65) boreholes recorded groundwater to be occurring on the blanketing material while in 53 boreholes it is occurring within bedrock. **Table 1** indicates that the water rest levels recorded varied between 6.7 m (BH 34) and 57.8 m (PLA 46) with an average of 24.7 m. (1300 m AMSL).

The results of the investigations show that the water table lies within the blanketing layer above bedrock in most cases. This indicates that fluctuations in the regional groundwater level could have an influence on the stability of the site. Significant lowering of the groundwater level could adversely affect the stability of the sites.

8.1.1.6 FLORA

To serve as local context for the vegetation at the site an outline of the Kuruman Thornveld vegetation type from Mucina and Rutherford (2006) follows.

SVk 9 Kuruman Thornveld

Distribution: In South Africa the Kuruman Thornveld is found at the North West and Northern Cape Provinces. Kuruman Thornveld occurs on the flats from the vicinity of Postmasburg and Danielskuil (here west of the Kuruman Hills) in the south extending via Kuruman to Tsineng and Dewar in the north. Altitude is 1100 – 1500 m (Mucina & Rutherford, 2006).

Vegetation and landscape features: Flat rocky plains and some sloping hills with very well-developed, closed shrub layer and well-developed open tree stratum consisting of *Acacia erioloba* (Mucina & Rutherford, 2006).

Geology and soils: Some Campbell Group dolomite and chert and mostly younger, superficial Kalahari Group sediments, with red wind-blown (0.3 – 1.2 m deep) sand. Locally, rocky pavements are formed in places. Most important land types Ae, Ai, Ag and Ah, with Hutton soil form (Mucina & Rutherford, 2006).

Climate: Summer and autumn rainfall with very dry winters. Mean annual precipitation (MAP) about 300-450 mm. Frost frequent in winter (Mucina & Rutherford, 2006).

Important taxa: Tall tree: *Acacia erioloba*. Small trees: *Acacia mellifera* subsp. *detinens*, *Boscia albitrunca*. Tall Shrubs: *Grewia flava*, *Lycium hirsutum*, *Tarchonanthus camphoratus*, *Gymnosporia buxifolia*. Low Shrubs: *Acacia hebeclada* subsp. *hebeclada*. *Monechma divaricatum*, *Gnidia polycephala*, *Helichrysum zeyheri*, *Hermannia comosa*, *Pentzia calcarea*, *Plinthus sericeus*. Geoxylic Suffrutex: *Elephantorrhiza elephantina*. Graminoids: *Aristida meridionalis*, *Aristida stipitata* subsp. *stipitata*, *Eragrostis lehmanniana*, *Eragrostis echinochloidea*, *Melinis repens*. Herbs: *Dicoma schinzii*, *Gisekia africana*, *Harpagophytum procumbens* subsp. *procumbens*, *Indigofera daleoides*, *Limeum fenestratum*, *Nolletia ciliaris*, *Seddera capensis*, *Tripteris aghillana*, *Vahlia capensis* subsp. *vulgaris*.

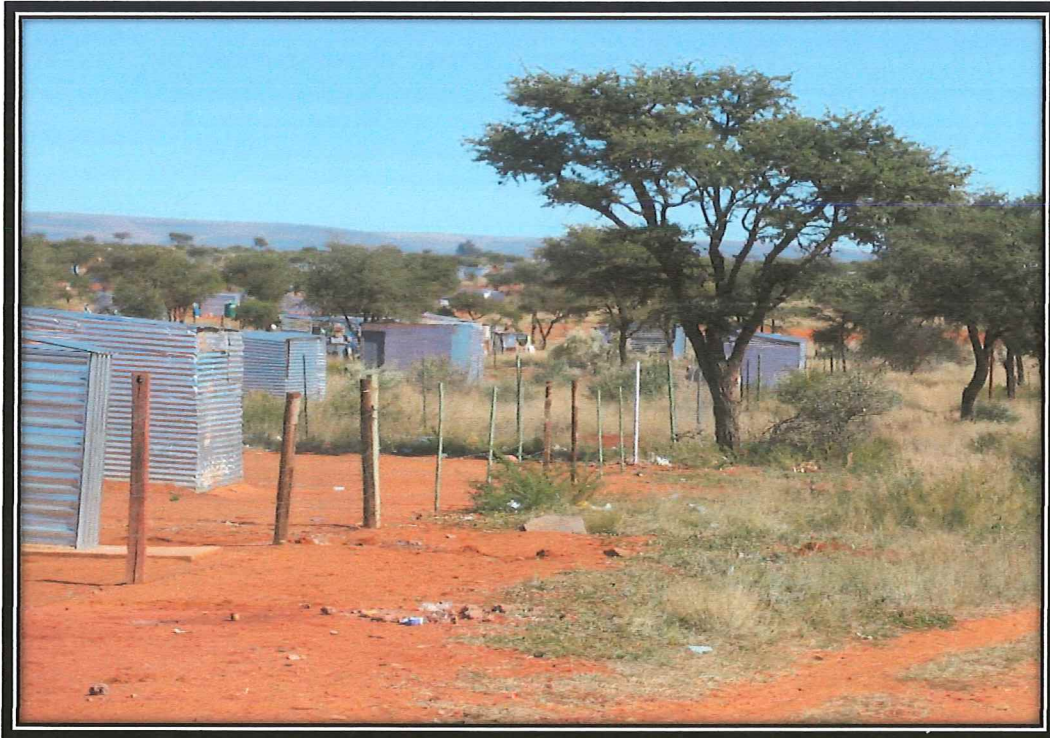
Note: Though some plant species of the above listed vegetation type are present at the site, not necessarily all of the plant species listed above are present at the site.

Vegetation at much of the site is transformed or modified. Numerous areas where vegetation has been cleared, are present at the site. Some fragmented and ecologically disturbed patches of indigenous vegetation remain at some places at the site. *Vachellia erioloba* (Camel Thorn) trees still remain and some appear to be conserved even in areas that are otherwise cleared. Other indigenous small trees at the site include *Tarchonanthus camphoratus* (Vaalbos), *Vachellia hebeclada* (Candlepod Thorn), *Senegalia mellifera* (Black Thorn), *Grewia flava* (Velvet Raisin), *Ziziphus mucronata* (Buffalo-thorn) and *Vachellia tortilis* (Umbrella Thorn). Indigenous grass species include *Eragrostis lehmanniana* (Lehman's Love Grass), *Aristida congesta* (Tassel Three-awn) and *Enneapogon cenchroides*. Indigenous herbs at the site include *Hirpicium echinus*, *Acrotome inflata*, *Dicoma schinzii*, *Elephantorrhiza elephantina*, *Senna italica* and *Hermannia tomentosa*. Numerous alien invasive weeds are found at the site such as *Verbesina encelioides*,

Argemone ochroleuca (White-flowered Mexican Poppy), *Schkuhria pinnata* (Dwarf Marigold), *Chenopodium album* (White Goosefoot), *Tagetes minuta* (Khaki Weed), *Bidens pilosa* (Common Blackjack), *Bidens bipinnata* (Spanish Black Jack), *Datura ferox* (Large Thorn-apple) and *Datura stramonium* (Common Thorn-apple).

Informal buildings, roads, numerous scraped areas and fences are found widespread at the site. Informal dumping occurs at some parts. Various alien invasive weeds are widespread at the site.

Scope for the site to be part of a corridor of particular conservation concern is small.



Informal developments and *Vachellia erioloba*, Camel Thorn trees, at the site.
Photo: R.F. Terblanche.



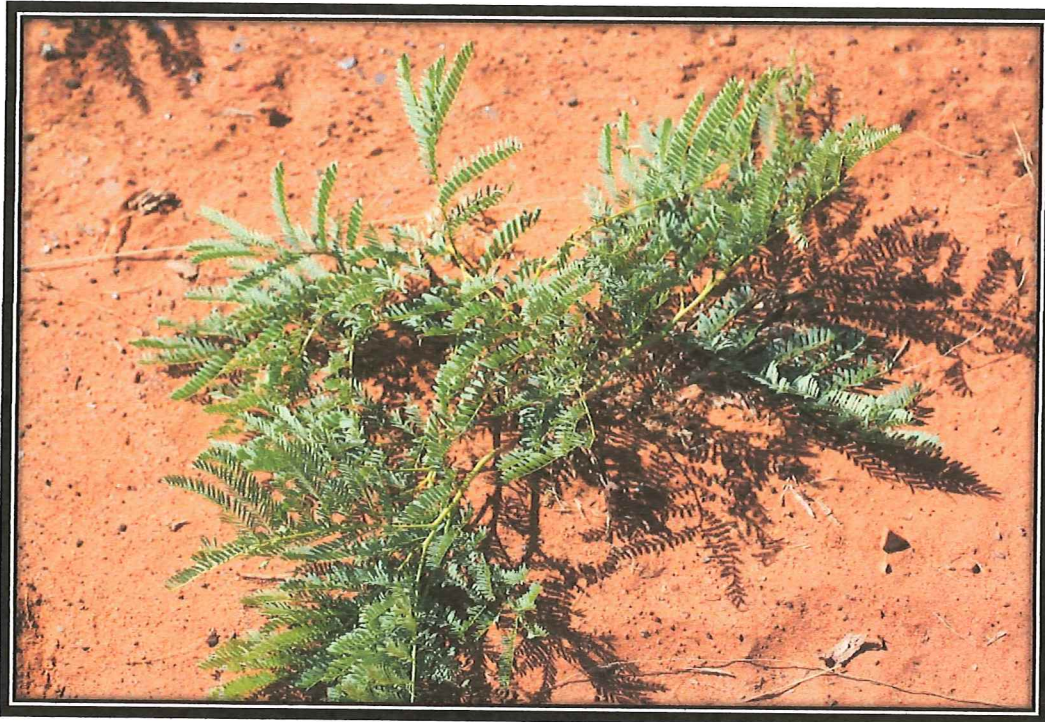
Informal developments with some associated infrastructure at the site and remains of some indigenous vegetation.
Photo: R.F. Terblanche.



Informal dumping at the site. Shrub-height thorn tree in picture is *Vachellia hebeclada* (Candlepod Thorn)
Photo: R.F. Terblanche.



Widespread indigenous herbaceous species, *Hirpicium echinus*, at the site.
Photo: R.F. Terblanche.



Elephanthorrhiza elephantina (Eland's Bean) re-sprouting at scraped area.
Photo: R.F. Terblanche.



Foliage and pods of the Camel Thorn, *Vachellia erioloba* at the study area.
Photo: R.F. Terblanche.

8.1.1.7 FAUNA

The fauna of the area is highly disturbed by the people living in the adjoining suburbs. The likelihood of the presence of larger mammals is doubtful. No listed species were identified during the fieldwork phase.

VERTEBRATES

Mammals

Since the site falls outside reserves, threatened species such as the black rhinoceros (*Diceros bicornis*) and the African wild dog (*Lycaon pictus*) are obviously not present. No smaller mammals of particular high conservation significance are likely to be found on the site as well.

Birds

With bird species which often have a large distributional range, their presence does not imply that they are particularly dependent on a site as breeding location. Therefore the emphasis in the right hand columns of. Literature sources that were mainly consulted are Barnes (2000), Hockey, Dean & Ryan, P.G. (2005) and Chittenden (2007). No threat to any threatened bird species or any bird species of particular conservation importance are foreseen.

Reptiles

While the conservation statuses of reptile species are under revision Alexander & Marais (2007) as well as Tolley & Burger (2007) give useful indications of possible red listings in the near future. There appears to be no threat to any reptile species of particular high conservation importance if the site is developed.

Amphibians

There is no suitable habitat for *Pyxicephalus adspersus* (Giant Bullfrog) at the site. There appears to be no threat to any amphibian species of particular high conservation importance if the site is developed.

INVERTEBRATES

Butterflies

Studies relating to the vegetation and habitat of threatened butterfly species in South Africa showed that ecosystems with a unique combination of features are selected by these often localised threatened butterfly species (Deutschländer and Bredenkamp 1999; Edge 2002, 2005; Terblanche, Morgenthal & Cilliers 2003; Lubke, Hoare, Victor & Ketelaar 2003; Edge, Cilliers & Terblanche, 2008). Threatened butterfly species in South Africa can then be regarded as bio-indicators of rare ecosystems.

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

Assessment of threatened butterfly species

***Aloeides dentatis dentatis* (Roodepoort Copper)**

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

***Anthene lindae* (Kalahari Hairtail)**

Small but distinct butterfly species discovered by R.F. Terblanche in 1990 at the present Witsand Nature Reserve in the Northern Cape. Recent red listing and extinction risk assessments list *Anthene lindae* as Vulnerable (Henning, Terblanche & Ball, 2009; Mecenero *et al.*, 2013). The butterfly is intimately associated with *Acacia erioloba* which may prove to be the larval food plant (Terblanche, 1994; Jessnitz pers. comm). However, all the localities for this butterfly species have been found on what appears to be a unique catchment area and basins with particular high water tables on the western side of the Langberg mountain chain, Northern Cape Province (Terblanche & Taylor, 2000). According to Henning *et al.* (2009) *Anthene lindae* has up to date only been found at an ecotone between Gordonias Plains Shrubland and Olifantshoek Plains Thornveld (Mucina & Rutherford, 2006). *Anthene lindae* is not found everywhere where *Vachellia erioloba* is present (Terblanche In prep.) and based on the present knowledge and surveys, presence of the butterfly at the site is unlikely.

***Chrysoritis aureus* (Golden Opal/ Heidelberg Copper)**

The proposed global red list status for *Chrysoritis aureus* according to the most recent IUCN criteria and categories is Endangered (Mecenero *et al.*, 2013) *Chrysoritis aureus* (Golden Opal/ Heidelberg Copper) is a resident where the larval host plant, *Clusia pulchella* is present. However, the distribution of the butterfly is much more restricted than that of the larval host plant (S.F. Henning 1983; Terblanche, Morgenthal & Cilliers 2003). One of the reasons for the localised distribution of *Chrysoritis aureus* is that a specific host ant *Crematogaster liengmei* must also be present at the habitat. Fire appears to be an essential factor for

the maintenance of suitable habitat (Terblanche, Morgenthal & Cilliers 2003). Research revealed that *Chrysoritis aureus* (Golden Opal/ Heidelberg Copper) has very specific habitat requirements, which include rocky ridges with a steep slope and a southern aspect (Terblanche, Morgenthal & Cilliers 2003). Owing to a lack of habitat requirements and ideal habitat the presence of the taxon is highly unlikely.

***Lepidochrysops praeterita* (Highveld Blue)**

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

Conclusion on threatened butterfly species

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

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

***Colotis celimene amina* (Lilac tip)**

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

***Lepidochrysops procera* (Savanna Blue)**

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

***Metisella meninx* (Marsh Sylph)**

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

hexandra (G.A. Henning & Roos, 2001). Owing to a lack of habitat requirements and ideal habitat the presence of the taxon at the site is highly unlikely.

Platylesches dolomitica (Hilltop Hopper)

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

8.1.2 SOCIO ECONOMIC FACTORS

8.1.2.1 SOCIAL AMENITIES

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

According to the Ga-Segonyana SDF, the area where the Promised Land Informal Settlement is situated has been earmarked as a zone of integration that includes future residential development as well as the D3456 Street Corridor for business and mixed land use development. By introducing a formalized township on the farm portion, the existing informal settlement will be relocated and further "squatting" will be reduced.

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

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

8.1.2.2. AIR QUALITY

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

8.1.2.3 NOISE

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

8.1.2.4 ARCHAEOLOGY AND CULTURAL SITES

A Pelser Archaeological Consulting (APAC) was appointed by Maxim Planning Solutions to undertake a Phase 1 HIA for the proposed township Promised Land on a Portion of the Remaining Extent of Erven 1 and 3 Kuruman and a Portion of the Remaining Extent of Portion 3 of the farm Kuruman Reserve No. 690 at Ga-Segonyana Local Municipality Northern Cape Province. The project is conducted under instruction from the Housing Development Agency (HDA).

A number of known cultural heritage sites (archaeological and/or historical) exist in the larger geographical area within which the study area falls. There are no known sites on the specific land parcel and none was identified and recorded during the recent assessment. The area has been heavily impacted and disturbed in the recent past by current ongoing residential and related activities. If any did exist here in the past it would have been disturbed or destroyed as a result. It is clear from aerial views of the study area that recent large scale human settlement has slowly encroached on the area since 2005. It is therefore highly unlikely that any significant and intact sites, features or material would be present here.

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

8.1.2.6 AESTHETICS

Aesthetics have very little influence as the area is already highly disturbed. The project on the other hand will have a huge impact on the Aesthetics of the area as the informal settlement will be formalized and services will be provided.

8.2 IMPACTS THAT MAY RESULT FROM THE PLANNING AND DESIGN, CONSTRUCTION, OPERATIONAL, DECOMMISSIONING AND CLOSURE PHASES AS WELL AS PROPOSED MANAGEMENT OF IDENTIFIED IMPACTS AND PROPOSED MITIGATION MEASURES

Provide a summary and anticipated significance of the potential direct, indirect and cumulative impacts that are likely to occur as a result of the planning and design phase, construction phase, operational phase, decommissioning and closure phase, as well as the mitigation measures that may eliminate or reduce the potential impacts listed (Full impact statement is provided as Appendix H).

Activity	Impact summary	Significance	Proposed mitigation
Township establishment and formalization of informal settlement on Portion of the Remaining Extent of Erf 1 and 3 Kuruman and a Portion of the Remaining Extent of Portion 3 of the Farm Kuruman Reserve No. 690 measuring in excess of 20ha	Direct impacts:		
	Clearance of 361.4146 hectares of indigenous vegetation	<i>Medium</i>	Exotic and invasive plant species should not be allowed to establish, if the development is approved.
	A total of 121 households are situated on Zone III dolomite areas of which 15 are formal houses and 106 informal houses	<i>Medium</i>	<p>Following a request to the Council for Geo-Science regarding the formal houses on areas designated as D4 (Zone III) in terms of the Dolomite Stability Investigation, the Council for Geo-Science did not recommend the relocation or demolishing of formal houses but recommend strict adherence the following precautionary requirements:</p> <p>A. Site specific Dolomite Risk Management Plan in accordance with SANS 1936-4:2012 must be compiled and implemented for these houses / formal structures in D4 Land. The owners/responsible persons must be made aware of the risks involved in building on dolomite, and be informed about how to be vigilant and act pro-actively by applying sound water management principles.</p> <p>B. General precautionary measures as set out in SANS 1936 Part 3: Design and construction of buildings, structures and infrastructure, must be studied and implemented.</p>
One plant species that are not threatened but listed as Declining occurs at the site;	<i>Medium</i>	In terms of a part of section 15(1) of the National Forests Act No. 84 of 1998, no person may cut, disturb, damage or	

	<p><i>Vachellia erioloba</i> (= <i>Acacia erioloba</i>) (Camel Thorn tree).</p> <p>This tree is also a Protected tree species.</p>		<p>destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a license granted by the Minister.</p> <p>If developments are approved, such a permit should be applied for</p>
	<p>The development will have an impact on graveyard that was found on site.</p>	<p><i>Medium</i></p>	<p>Graves always carry a High Cultural Significance rating and should not be impacted if possible and be left intact. If the site cannot be avoided then the graves can be exhumed and relocated after all due processes (social consultation/getting consent/permits have been obtained) have been successfully completed. The best would be however to keep the site fenced-off and protected.</p>
	<p>Un-rehabilitated, disturbed surfaces can lead to erosion and dust pollution.</p>	<p><i>Medium</i></p>	<p>Start the rehabilitation of disturbed surfaces as soon as possible.</p> <p>Spray bare surfaces with water to prevent dust pollution.</p>
	<p>Foreign plant species are likely to invade disturbed areas.</p>	<p><i>Medium</i></p>	<p>Start the extermination of any invasive species as soon as possible and maintain the eradication programme.</p>
	<p>Poorly planned ablution facilities for construction workers may cause pollution of surface and underground water.</p>	<p><i>Medium</i></p>	<p>Provide portable ablution facilities that will not cause pollution during the construction phase.</p>
	<p>The proposed project can impact on the soil and geology.</p>	<p><i>Medium</i></p>	<p>Geological instability has been determined by the Council for Geoscience.</p> <p>Properly plan the construction phase in such a manner that impacts on the soil and geology of the area can be minimised.</p>

		<p>Plan foundations and structures in such a manner that no erosion can take place. No concentrated flow into the receiving environment is allowed. Water dispersal structures must be planned to ensure safe dispersal of floodwater.</p> <p>Plan to prevent spills of lubricants/oils that can take place on bare soil. This will include the use of drip trays for stationary vehicles (more than 24 hours).</p>
The vegetation of the area will be removed during the construction phase, which will destroy floral and faunal habitats.	<i>Medium</i>	<p>Start with the rehabilitation of vegetation to minimize the negative effects of the removal of plants.</p> <p>The rule must be to minimize the disturbance of animal life by keeping the footprint as small as possible.</p> <p>No snares may be set.</p>
Indirect impacts:		
Dust generation from the proposed project could impact on the surrounding area.	<i>Medium</i>	<p>Spray water on open surfaces to ensure that dust does not cause air pollution during construction.</p> <p>Start the rehabilitation of disturbed surfaces as soon as possible</p>
Spills of lubricants / oils can take place on bare soil.	<i>Medium</i>	<p>Prevent spills of lubricants/oils that can take place on bare soil. This will include the use of drip trays for vehicles that are standing for more than 24 hours.</p> <p>Ensure that all construction vehicles are in good working order and not leaking oil and or fuel.</p>

	Waste materials such as glass, plastic, metal or paper present a possible pollution hazard	<i>Medium</i>	<p>Implement the management plan to ensure that:</p> <ul style="list-style-type: none"> • All construction rubble is disposed of in a safe and environmentally acceptable manner. • NO concrete, gravel or other rubbish will be allowed to remain on site after the construction phase. • All cement is housed as to prevent spills (due to rain and or handling errors). • NO glass, plastic, metal, or paper shall be allowed to pollute the area.
	Non-compliance to the relevant legislation may cause social and environmental problems.	<i>Medium</i>	<p>Ensure that contractors (construction phase) abide by all the requirements of the Occupational Health and Safety Act.</p> <p>Ensure that all contractors are aware of the consequences of non-compliance to the relevant legislation regarding the above-mentioned act as well as with regard to the environment (acts, regulations, and special guidelines).</p>
	<p>New employment opportunities will be created.</p> <p>Local skills development will take place.</p>	<i>Medium</i>	No mitigation measures needed apart from the fact that contractors will have to ensure that they abide to the requirements of the Occupational Health and Safety Act and the Employment Equity Act.
Cumulative impacts:			
	<u>Solid waste:</u> The proposed development will add additional solid waste into the existing waste stream of the area.	<i>Medium</i>	A Civil Engineer has been appointed and will assess the availability and design of services to ensure a sustainable development.
	<u>Sewage:</u> The proposed development will add additional	<i>Medium</i>	

	sewage into the existing sewage stream of the area.		<p>Upgrading of infrastructure does not form part of this application.</p> <p>Ensure that services are available before formalization takes place.</p> <p>No mitigation required</p> <p>No mitigation required</p>
	<u>Water supply:</u> The proposed development will add pressure to the water supply of the area.	<i>Medium</i>	
	<u>Electricity Supply:</u> The proposed development will add pressure to the supply of electricity to the area	<i>Medium</i>	
	<u>Broadened tax base:</u> The proposed development will generate more income for the Ga-Segonyane Local Municipality.	<i>High</i>	
	<u>Employment:</u> The proposed development will lessen the unemployment rate of the area.	<i>High</i>	

9. ENVIRONMENTAL IMPACT STATEMENT

Taking the assessment of potential impacts into account, please provide an environmental impact statement that summarises the impact that the proposed activity and its alternatives may have on the environment after the management and mitigation of impacts have been taken into account, with specific reference to types of impact, duration of impacts, likelihood of potential impacts actually occurring and the significance of impacts.

9.1 GEOLOGY

GEOLOGY - POSSIBLE IMPACTS (TYPE)

- ◆ The Geology of the area may have some negative impacts on the development.
- ◆ Excavations for construction can impact on the underlying rock formations.
- ◆ A total of 121 households are situated on Zone III dolomite areas of which 15 are formal houses and 106 informal houses.

GEOLOGY - POSSIBLE DURATION OF IMPACTS

- ◆ The impacts of the Geology on the development will be permanent.
- ◆ The impacts of the development on the Geology:
 1. As long as it is necessary to excavate the foundations.
 2. As soon as the foundations are laid all excess rubble will be removed.

GEOLOGY- LIKELIHOOD OF IMPACTS OCCURRING

- ◆ The likelihood of the impacts occurring is medium.

GEOLOGY - POSSIBLE SIGNIFICANCE

- ◆ If properly managed and the stipulations of the Health and Safety Act and the Geotechnical report are implemented, the significance of the impacts occurring is low.

GEOLOGY – POSSIBLE MITIGATION STEPS

- ◆ Following a request to the Council for Geo-Science regarding the formal houses on areas designated as D4 (Zone III) in terms of the Dolomite Stability Investigation, the Council for Geo-Science did not recommend the relocation or demolishing of formal houses but recommend strict adherence the following precautionary requirements:
- ◆ Site specific Dolomite Risk Management Plan in accordance with SANS 1936-4:2012 must be compiled and implemented for these houses / formal structures in D4 Land. The owners/responsible persons must be made aware of the risks involved in building on dolomite, and be informed about how to be vigilant and act pro-actively by applying sound water management principles.
- ◆ General precautionary measures as set out in SANS 1936 Part 3: Design and construction of buildings, structures and infrastructure, must be studied and implemented.

9.2 TOPOGRAPHY

TOPOGRAPHY - POSSIBLE IMPACTS (TYPE)

- ◆ The study area and Kuruman as a whole is bounded by a prominent ridge and scattered hills to the north and west. The maximum elevation is approximately 1326 m AMSL. The elevation of the study areas ranges between 1326 m AMSL on the south and 1311 m AMSL to the north.
- ◆ The landscape of the site is in the form of gentle undulating topography and low relief.
- ◆ Undulating topography in the study area is characterised by areas of rock outcrops and flat planes are characterised by highly weathered rocks.
- ◆ The above mentioned will have an impact on storm water dispersal and will have to be considered in the design of the Layout Plan.

TOPOGRAPHY - POSSIBLE DURATION OF IMPACTS

- ◆ The duration of the storm water dispersal as well as the final layout is local and long term.

TOPOGRAPHY - LIKELIHOOD OF IMPACTS OCCURRING

- ◆ The likelihood of the impacts occurring is high.

TOPOGRAPHY - POSSIBLE SIGNIFICANCE

- ◆ If properly managed and the stipulations of the Health and Safety Act, as well as storm water management measures stipulated by DWS, DENC are met, when constructing infrastructure, the significance of the impacts occurring is low to medium.

TOPOGRAPHY – POSSIBLE MITIGATION STEPS

- ◆ Construct the necessary infrastructure to mitigate possible adverse impacts from both low and steep gradients on possible storm water events and ensure that it is properly maintained over

the long term.

9.3 CLIMATE

CLIMATE - POSSIBLE IMPACTS (TYPE)

- ◆ Flooding can occur due to intense rainfall events (See topography in relation to storm water).
- ◆ Dry spells due to droughts – with the resultant dust storms and the possibility of veldt fires.

CLIMATE - POSSIBLE DURATION OF IMPACTS

- ◆ The duration of climatic impacts is difficult to determine, as climatic fluctuations are extremely difficult to predict. The impacts may be local and short term after an intense rainfall event, but may be long-term during droughts.

CLIMATE - LIKELIHOOD OF IMPACTS OCCURRING

- ◆ The likelihood of the impacts occurring is medium to high.

CLIMATE - POSSIBLE SIGNIFICANCE

- ◆ The significance of extreme climatic events can be high.
- ◆ If properly managed and the stipulations of the Health and Safety Act, DWS, The Department of Rural, Environmental and Agricultural Development and the Ga-Segonyana Local Municipality implemented when constructing infrastructure, the significance of the impacts occurring is low to medium.

CLIMATE – POSSIBLE MITIGATION STEPS

- ◆ Construct the necessary infrastructure to mitigate adverse impacts of possible flood events (see topography above).
- ◆ In the event of extremely dry spells during the construction phase; plan to spray exposed surfaces with water to curb excessive dust generation.

9.4 SOIL

SOIL - POSSIBLE IMPACTS (TYPE)

- ◆ Soil erosion due to either floods or dry spells (wind erosion), (See topography in relation to storm water).
- ◆ Soil disturbance due to construction activities.

SOIL - POSSIBLE DURATION OF IMPACTS

- ◆ The duration of erosion caused by either floods or dry spells are difficult to determine due to the uncertainty associated with weather cycles.
- ◆ Problems associated with soils as part of construction activities are dependent on the time that will be spent on construction. It is envisaged that construction will take approximately one year.

SOIL - LIKELIHOOD OF IMPACTS OCCURRING

- ◆ The likelihood of both the impacts occurring is high.

SOIL - POSSIBLE SIGNIFICANCE

- ◆ The significance of climatic events on the soil is low to medium depending on the implementation of mitigation measures. The impact deriving from construction activities are normally (if sound management practices are implemented) regarded as low to medium.
- ◆ If properly managed and the stipulations of the Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) implemented when constructing infrastructure, the significance of the impacts occurring is low to medium.

SOIL – POSSIBLE MITIGATION STEPS

- ◆ Ensure that the mitigation measures described for the protection of soils denuded of vegetation, as well as of soils disturbed during the construction phase are implemented. (see topography above and refer to the Civil Engineer's internal road and storm water design specifications).

9.5 WATER

WATER - POSSIBLE IMPACTS (TYPE)

- ◆ Floods as a result of intense rainfall events.
- ◆ Pollution of surface and/or ground water resources.

WATER - POSSIBLE DURATION OF IMPACTS

- ◆ The duration of floods is virtually impossible to determine as climatic fluctuations are extremely difficult to predict.
- ◆ If pollution of surface and/or ground water resources are occurring, it is usually likely due to mismanagement of either water dispersal/water pollution (e.g. by sewage) or poor management, it can be considered to be local and long-term for underground water and regional and short term for surface water resources.

WATER - LIKELIHOOD OF IMPACTS OCCURRING

- ◆ The likelihood of the impacts occurring is low to medium

WATER - POSSIBLE SIGNIFICANCE

- ◆ The significance of extreme climatic events can be high.
- ◆ The significance of pollution occurring will be low if all the proposed mitigation steps are implemented.

WATER – POSSIBLE MITIGATION STEPS

- ◆ Implement plans to prevent the possible contamination of surface and/or underground water resources. This can be accomplished by implementing measures described in both the bio-physical as well as the socio-economical sections of this document.

9.6 FLORA

FLORA - POSSIBLE IMPACTS (TYPE)

- ◆ The denuding of surfaces due to construction activities and the resultant erosion (water and wind).
- ◆ Invasion by non-indigenous species.

FLORA - POSSIBLE DURATION OF IMPACTS

- ◆ The impacts derived from denuded surfaces will depend entirely on the effectiveness and dedication to the principal of rehabilitation of disturbed surfaces. In the extreme scenario – the impact can last for years, or in the favourable scenario – impacts can last for a few months only. If the proposed mitigation measures are implemented, the duration of the impacts will be local and short term.
- ◆ The duration of impacts from invasive species, also depend entirely on the dedication and/or lack of dedication to the invasive prevention programs. If the proposed mitigation measures are implemented, the duration of the impacts will be local and short term.

FLORA - LIKELIHOOD OF IMPACTS OCCURRING

- ◆ The likelihood of the impacts occurring during the construction phase is high.
- ◆ The positive impacts derived from the proposed mitigation measures will be local and long term and of high significance.

FLORA - POSSIBLE SIGNIFICANCE

- ◆ The significance of both denuded surfaces and/or invasive intrusions are low if the proposed mitigation measures are implemented.

FLORA – POSSIBLE MITIGATION STEPS

- ◆ Implement the rehabilitation plans for vegetation as well as the elimination of invader species at the earliest possible moment.

9.7 FAUNA

FAUNA - POSSIBLE IMPACTS (TYPE):

- ◆ Disturbance of habitats.

FAUNA - POSSIBLE DURATION OF IMPACTS

- ◆ The impact on burrowing mammals and reptiles of all kinds are likely to be local and short term during the construction phase.
- ◆ All types of indigenous fauna are likely to survive and even re-colonise the area (if proper rehabilitation of flora is implemented).

FAUNA - LIKELIHOOD OF IMPACTS OCCURRING

- ◆ The likelihood of the negative impacts occurring is high, while sound environmental practices

may result to some degree of success as far as the return of faunal species are concerned.

FAUNA - POSSIBLE SIGNIFICANCE

- ◆ The significance of the expected faunal impacts is low – depending on the degree of success achieved through habitat restoration.

FAUNA - MITIGATION STEPS

- ◆ Take the necessary steps to preserve the few remaining faunal species and enhance their chances of survival by implementing rehabilitation measures for flora.

9.8 AIR QUALITY

AIR QUALITY - POSSIBLE IMPACTS (TYPE):

- ◆ Dust – due to exposed soils.

AIR QUALITY - POSSIBLE DURATION OF IMPACTS

- ◆ The duration of these impacts will be local and short term.

AIR QUALITY - LIKELIHOOD OF IMPACTS OCCURRING

- ◆ The likelihood of the negative impacts occurring is medium to high.

AIR QUALITY - POSSIBLE SIGNIFICANCE

- ◆ The significance of the expected air quality impacts is low, if proper mitigation measures are followed in terms of dust suppression.

AIR QUALITY - MITIGATION STEPS

- ◆ Take the necessary steps to prevent dust generation by spraying water over denuded surfaces during dry spells.

9.9 NOISE

NOISE - POSSIBLE IMPACTS (TYPE):

- ◆ Noise pollution due to construction activities.

NOISE - POSSIBLE DURATION OF IMPACTS

- ◆ The duration of the impacts will be local and short term.

NOISE - LIKELIHOOD OF IMPACTS OCCURRING

- ◆ The likelihood of the negative impacts occurring is low.

NOISE - POSSIBLE SIGNIFICANCE

- ◆ The significance of this impact is judged to be medium, providing the restrictions of construction and operational times are adhered to.

NOISE - MITIGATION STEPS

- ◆ Take the necessary steps to restrict construction and operational times to normal working hours.

9.10 AESTHETICS

AESTHETICS - POSSIBLE IMPACTS (TYPE):

- ◆ Disturbance of the ambiance of the surrounding area due to construction activities and an increased number of people in the area.
- ◆ Positive impacts may however occur if the necessary rehabilitation measures described for fauna and flora are implemented.

AESTHETICS - POSSIBLE DURATION OF IMPACTS

- ◆ The duration of these negative impacts are likely to be long term if the necessary rehabilitation is not implemented. If proper rehabilitation is a priority for the future occupants of the site, the negative impacts may be local and short term.

AESTHETICS QUALITY - LIKELIHOOD OF IMPACTS OCCURRING

- ◆ The likelihood of the positive impacts occurring is high if proper mitigation steps are implemented.

AESTHETICS - POSSIBLE SIGNIFICANCE

- ◆ The likelihood of the negative impacts occurring is highly significant as it could detract from the quality of life of concerned citizens. If proper rehabilitation is a priority to the future occupants of the site, the positive impacts may become the dominant factor (improving aesthetics).

AESTHETICS - MITIGATION STEPS

- ◆ Implement the necessary rehabilitation measures to enhance the aesthetics of the area.
- ◆ Landscape the platform to minimize the visual effect.

9.11 SOCIO-ECONOMIC ASPECTS

SOCIO-ECONOMIC ASPECTS - POSSIBLE IMPACTS (TYPE)

- ◆ Employment opportunities will be created for some of the unemployed people in the area (especially in relation to the proposed business uses).
- ◆ Skills improvement will be provided for presently unskilled (or semi-skilled workers) living in the area.
- ◆ Sufficient Bulk services are not available yet. Upgrading of infrastructure does not form part of this application.
- ◆ Providing the management plan for the project is correctly implemented; the present nature of the area where the proposed development is planned, can be maintained.
- ◆ The quality of life for people working in the proposed development can be maintained at an

acceptable level if ALL the necessary steps are followed when services are provided.

- ◆ All possible negative impacts** that may be derived from poor environmental performances during all the project phases, must be identified, monitored, and mitigation steps implemented.
- ◆ The development will have an impact on the graveyard that was found on site.

** Negative impacts include all the aspects described under the biophysical as well as the socio-economic characteristics of the area.

SOCIO-ECONOMIC ASPECTS - POSSIBLE DURATION OF IMPACTS

- ◆ The duration of these impacts will be entirely dependent on the duration of the construction phase, the implementation of possible mitigation measures and the dedication of the applicant, contractors and eventual occupants of the new residential area to sound environmental principles (including management plans / mitigation measures, etc). The overall duration of impacts can be considered to be long term.
- ◆ Employment generated by the proposed businesses will have a medium to long term impact.
- ◆ The impact of the graveyard will be permanent as it will have to remain fenced off.

SOCIO-ECONOMIC ASPECTS - LIKELIHOOD OF IMPACTS OCCURRING

- ◆ The likelihood of the impacts occurring is high.

SOCIO-ECONOMIC ASPECTS - POSSIBLE SIGNIFICANCE

- ◆ The significance of this impact is judged to be medium to high.

SOCIO-ECONOMICS - MITIGATION STEPS

- ◆ Implement all the management steps described in this document to enhance the socio-economic aspects of the area.
- ◆ Ensure that services are available before formalization takes place
- ◆ Graves always carry a High Cultural Significance rating and should not be impacted if possible and be left intact. If the site cannot be avoided then the graves can be exhumed and relocated after all due processes (social consultation/getting consent/permits have been obtained) have been successfully completed. The best would be however to keep the site fenced-off and protected

10. PUBLIC PARTICIPATION

10.1 Advertisement and Notice

Publication name	Stellalander	
Date published	10/04/2019	
Site notice position	Latitude	Longitude
	27°25'57.65"S	23°27'16.71"E
	27°25'26.27"S	23°27'41.64"E
	27°24'59.24"S	23°28'2.81"E
	27°24'26.75"S	23°28'27.99"E
Date placed	10/04/2019	

Include proof of the placement of the relevant advertisements and notices in Appendix I1.

10.2 Determination of appropriate measures

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

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

Title, Name and Surname	Affiliation/ key stakeholder status	Contact details (tel number or e-mail address)
Various	Adjoining Landowners	Letter drop see photographic evidence

Include proof that the key stakeholder received written notification of the proposed activities as Appendix I2. This proof may include any of the following:

- e-mail delivery reports;
- registered mail receipts;
- courier waybills;
- **signed acknowledgements of receipt;** and/or
- or any other proof as agreed upon by the competent authority.

10.3 Issues raised by interested and affected parties

Summary of main issues raised by I&APs	Summary of response from EAP
The Directorate: Forestry Management (Other Regions) in the Department of Agriculture, Forestry and Fisheries (DAFF) is responsible for administration of the National Forests Act, Act 84 of 1998 (NFA) and the National Veld and Forest Fires Act, Act 101 of 1998 as amended. The developer must take note of the following sections of the NFA:	The EAP acknowledges this fact and has considered the impact of this on the <i>Vachellia erioloba</i> (= <i>Acacia erioloba</i>) (Camel Thorn tree) that occurs on site.

1.1 Section 12(1): "The Minister may declare-

- (a) a particular tree,
- (b) a particular group of trees,
- (c) a particular woodland; or
- (d) trees belonging to a particular species, to be a protected tree, group of trees, woodland or species.

1.2 Section 15(1): "No person may-

- (a) Cut, disturb, damage or destroy any protected tree; or
- (b) Possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, or any forest product derived from a protected tree, except-
 - (i) under a license granted by the Minister; or
 - (ii) in terms of an exemption from the provision of this subsection published by the Minister in the Gazette on the advice of the Council."

1.3 "Any person who contravenes the prohibition on-

- (i) The cutting, disturbance, damage or destruction of temporarily protected trees or groups of trees referred to in section 14(2) or protected trees referred to in section 15(1)(a); or
- (ii) The possession, collection, removal, transport, export, purchase or sale of temporary protected trees or groups of trees referred to in section 14(2) or protected trees referred to in section 15(1)(b), or any forest product derived from a temporarily protected tree, group of trees or protected tree, is guilty of a first category offence.

1.4 Section 58 (1): "Any person who is guilty of a first category offence referred to in sections 62 and 63 may be sentenced to a fine or imprisonment for a period of up to three years, or to both a fine and such imprisonment."

1.5 The list of protected tree species under section 12(1) (d) of the National Forests Act, 1998 (Act No. 84 of 1998) is published annually; the most recent publication was in GN536 of 7 September 2018.

The Draft Report mentioned the National Forest Act, Act 84 of 1998 (NFA) under applicable legislation, but refers to GN 1602 of December 2016, which is outdated. Please see number 1.5 above	The EAP has amended the report and has considered the most recent publication of the Act.
The report confirmed the presence of nationally protected tree species <i>Vachellia erioloba</i> on site and stated that although the site is mostly transformed, some Camel thorn trees were conserved. If further development is approved and a re-layout is done to formalize the township with road construction and installation of bulk services (water, electricity and sewerage), protected trees must be avoided as far as possible	This has been done.
In the event that protected trees cannot be avoided, the developer must apply for a Forest Act License. Getting a Forest Act License can take up to 30 days. License application forms are available on the Departmental website or at any Forestry Office	This will be done and has been included into the EMPr.

10.4 Comments and response report

The practitioner must make report (s) available to I&APs record all comments received from I&APs and respond to each comment before is submitted. The comments and responses must be captured in a comments and response report as prescribed in the EIA Regulations and be attached to the Final Report as Appendix I3.

10.5 Authority participation

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

Authority/Organ of State	Contact person (Title, Name and Surname)	Tel No	Fax No	e-mail	Postal address
Department of Water and Sanitation Northern Cape office	Mr A Abrahams	(053) 830 8888	(053) 842 3258		Private Bag X6101 Beaconsfield Kimberley 8301
Northern Cape Department of Agriculture and Land Reform and Rural Development	HOD, Mr. V. Mothibi	(053) 838 9118	(053) 831 3635	cfortune@agri.ncpg.gov	Private Bag X5018, Kimberley 8300
Northern Cape Department of Environment and Nature Conservation	Mr. Dewald Badenhorst Biodiversity Management services	(053) 807 7300	(053) 807 7367		Private Bag X6120 Kimberley 8301

Northern Cape Department of Agriculture, Forestry and Fisheries	Mrs. J Mans	(054) 338 5860	(054) 338 0030		P.O. Box 2782, Upington 8800
John Taolo Gaetsewe District Municipality	The Municipal Manager Mr. T. Matlhare	053 712 8700	053 712 2502		PO Box 1480 Kuruman 8460
Ga Segonyana Local Municipality	The Municipal manager Mr. Tsatsimpe	053 723 6000	053 723 2021		Private Bag X1522, Kuruman, 8460
Ga Segonyana Local Municipality	The Councillor Ward 1	053 712 9300	053 712 3581		Private Bag X1522, Kuruman, 8460
Ga Segonyana Local Municipality	The Councillor Ward 6	053 712 9300	053 712 3581		Private Bag X1522, Kuruman, 8460
Ga Segonyana Local Municipality	The Councillor Ward 13	053 712 9300	053 712 3581		Private Bag X1522, Kuruman, 8460
Eskom	Mbulelo Dala	078 795 1188		dalaME@eskom.co.za	

Include proof that the Authorities and Organs of State received written notification and draft reports of the proposed activities as Appendix I4.

10.6 Consultation with other stakeholders

Note that, for any activities (linear or other) where deviation from the public participation requirements may be appropriate, the person conducting the public participation process may deviate from the requirements of that sub-regulation to the extent and in the manner as may be agreed to by the competent authority.

Proof of any such agreement must be provided, where applicable. Application for any deviation from the regulations relating to the public participation process must be submitted prior to the commencement of the public participation process.

A list of registered I&APs must be included as Appendix I5.

Copies of any correspondence and minutes of any meetings held must be included in Appendix I6.