A BOTANICAL DESCRIPTION AND ASSESSMENT OF THE IMPACTS OF THE WRENCHVILLE PHASE 2 LOW COST HOUSING PROJECT. KURUMAN, NORTHERN CAPE

Prepared for:

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National Legislation and Regulations governing this report

1. This is a 'specialist report' and is compiled in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014.

2. National Environmental Management: Biodiversity Act, 2004 (Act No.10 of 2004) In terms of the Biodiversity Act, the developer has a responsibility for:
   - The conservation of endangered ecosystems and restriction of activities according to the categorisation of the area (not just by listed activity as specified in the EIA regulations).
   - Promote the application of appropriate environmental management tools in order to ensure integrated environmental management of activities thereby ensuring that all development within the area are in line with ecological sustainable development and protection of biodiversity.
   - Limit further loss of biodiversity and conserve endangered ecosystems. Chapter 4 of the Act relates to *threatened or protected ecosystems or species*.

3. National Forests Act (Act 84 of 1998). Regulations published for the National Forests Act (Act 84 of 1998) as amended, provide a list of protected tree species for South Africa.

Appointment of Specialist

Jan H Briers was appointed initially by Guillaume Nel Environmental Consultants CC to provide a specialist botanical assessment of the botanical attributes to inform the application for phase 2 of the Wrenchville housing project at Kuruman , Northern Cape Province. The consulting services comprise an assessment of potential impacts on the flora and vegetation in the designated study area that may result from the proposed activities.

Conditions relating to this report

The content of this report is based on the author's best scientific and professional knowledge as well as available information. ..... , reserve the right to modify the report in any way deemed fit should new, relevant or previously unavailable or undisclosed information become known to the author.

1. SPECIALIST INFORMATION

Specialist name:	J H Briers		
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2. Declaration by Specialist

I, J H Briers appointed as an independent botanist specialist declare that :

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the Specialist

Name of Specialist: Jan H Briers:

Date

See abbreviated CV of specialist under Appendix **3**

COMPLIANCE WITH THE APPENDIX 6 OF THE 2017 EIA REGULATIONS

Requirements of Appendix 6 – GN R326 EIA Regulations 7 April 2017	**Addressed in the Specialist Report**
1. A specialist report prepared in terms of these Regulations must contain: a) details of (i) the specialist who prepared the report; and (ii) the expertise of that specialist to compile a specialist report including a curriculum vitae;	3 Appendix 3
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	3
c) an indication of the scope of, and the purpose for which, the report was prepared;	6
(i) an indication of the quality and age of base data used for the specialist report;	10
(ii) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	7
d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	11
e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Appendix 2
f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	13-16
g) an identification of any areas to be avoided, including buffers;	
h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	N/A
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	11
j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;	11-12
k) any mitigation measures for inclusion in the EMPr;	18
l) any conditions for inclusion in the environmental authorisation;	18
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	
n) a reasoned opinion whether the proposed activity, activities or portions thereof should be authorised; (i) regarding the acceptability of the proposed activity or activities and (ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	18
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	N/A
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	See Main BA report
q) any other information requested by the competent authority.	See Main BA report
2) Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply	

CONTENTS

1. Introduction and background

Background

The project intends to add Phase 2 to the Wrenchville Low cost housing development situated about 5km east of Kuruman, in the Northern Cape Province. The application must take into consideration the National Environmental Management Act (Act 107 of 1998, as amended) 2014 EIA regulations since listed activities would potentially be triggered. JH Briers commissioned to carry out the botanical investigation.

The project would entail the construction of infrastructure comprising:

- About 200 erven for low cost houses just east of the township Wrenchville.
- The associated access road, roads, sewage, electricity supply and housing.
- The affected area is about 2 ha in size and the area considered about 4ha.

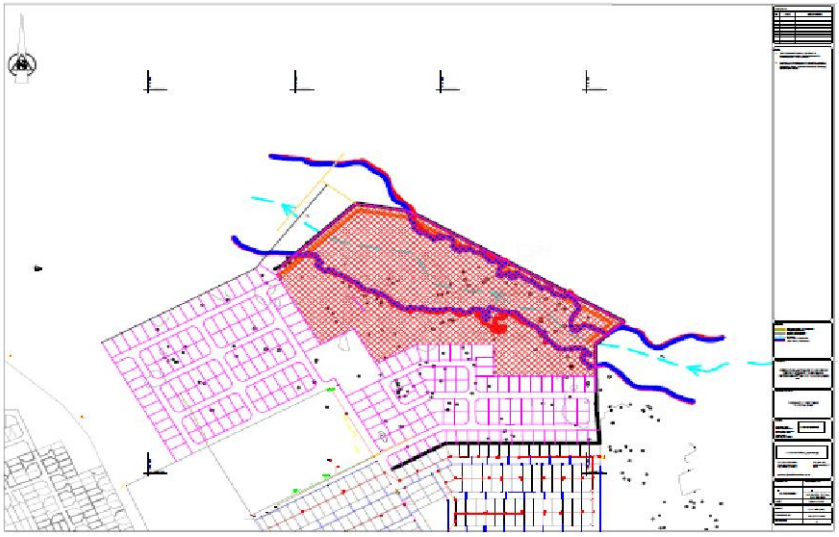


Figure 1: Wrenchville phase 2 low cost housing development showing site layout and area left undeveloped

2. Terms of Reference for the botanical assessment

The terms of reference of the study were to undertake the necessary field work and compile a report that considers the following:

- Provide a description of the vegetation of the site and identify any areas of sensitivity taking the local and regional context of the vegetation communities within the affected area, taking the relevant biodiversity plans and bioregional planning documents into consideration.
- The status and conservation value of the vegetation.
- Assess potential botanical and ecological impacts (including the No Go alternative).
- Any species of special concern (rare or endangered species), endemic to the area or threatened species encountered or likely to be present.

- Investigate ecological / biodiversity processes that could be affected (positively and/or negatively) by the proposed project.
- Address the handling of protected *Wachellia (Acacia) aerioloba* trees present on site.
- Review botanical work applicable to the area and consider the value of the site in relation to biodiversity of the area.
- Recommend impact mitigation measures to minimise impacts associated with the proposed development.

The study includes the activities as required in Appendix 6 – GN R326 EIA Regulations 7 April 2017 (see above).

3. Study Area and Historical Management

3.1 Specific location and history

The proposed Wrenchville housing development area is located on the north-east side of the town of Kuruman off Buitekant street (Figures 1 & 2). The size of the area concerned is about 2 ha in size.

Figure 2: Aerial image (Google Earth) showing the location of the Wrenchville Housing development site – indicated in red.

On the 2005 Google aerial images (Figure 3) below (i) a refuge dumping site is visible to the north of the site and (ii) mining of the deep red sand is evident on the western boundary of the site. The dumping of rubble has been going on since before 2005 and is still taking place in the northern 30% of the site along the tracks that give access.

Figure 3: The Google map dated 4 August 2005 clearly shows the municipal dump to the north of the site and mining activity to the north and north-west of the site.

Figure 4: The Google map dated 2 May 2018 clearly shows that the past removal of sand has ceased north of the site for a period, so that the area rehabilitated. Renewed mining activity on the western corner of the site is visible. The map further shows the Wrenchville School west and Phase 2 of the housing development of the proposed site.

Figure 5: The Google map (Google Earth) dated 23 March 2019 shows the escalation of dumping in the northern part as well as newly removed banded-ironstone just north of the School. The area delineated in Red is the boundary of Phase 2 of Wrenchville housing development. The botanical survey sample track is shown as the white line.

3.2 Topography, Geology and Soils

The study area is located at about 1300m a.m.s.l. and is relatively flat. Elevation does not vary much over the whole site but has a gentle fall towards the watercourse situated along the northern boundary of the site. Aspect therefore does not have an influence on the vegetation.

Campbell Group Dolomite is visible on the surface on a small portion of the application area situated just west of the Wrenchville School. Further west it is covered by windblown sand that is a 1-3m deep layer. North of the school it is covered with a layer of a sediment, a mixture of sand and banded Iron stone, of up to 2 m deep. The soils are generally described as red well-drained sandy soils with high base status.

3.3 Climate

Kuruman experiences summer rainfall with most rain falling from October to April. Rainfall is highly unpredictable and an average of about 300 mm of precipitation falls annually. The driest month is July, with an average of 3 mm of rain, while most rain falls in January and February, averaging above 50 mm per month. This rain usually falls as a result of thunderstorms.

The monthly distribution of average minimum and maximum temperatures (Figure 6) shows that the average minimum temperatures range from the lowest 1.0 ^{o} C in July to 32.0 ^{o} C in January. Sub-zero temperatures are often recorded from May to September and frost may fall during April to October with an average of 10 days of frost falling during July.

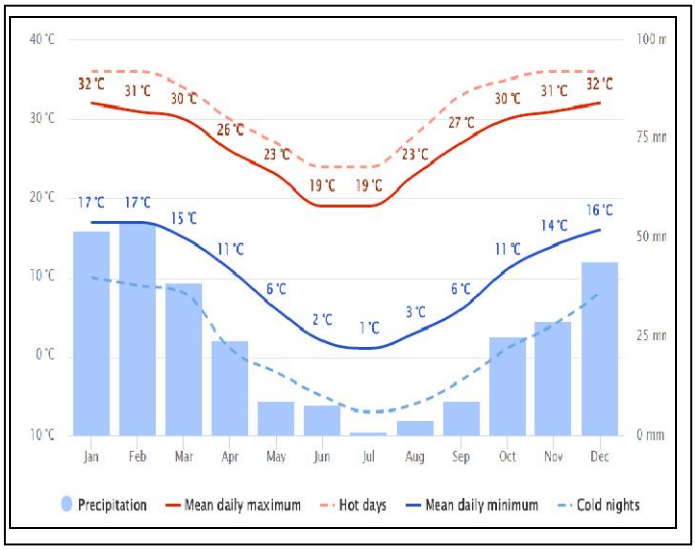


Figure 6: Long-term average monthly Rainfall and average monthly Minimum and Maximum Temperatures for Kuruman.

4. Evaluation Method

The Wrenchville study area was visited on 14 May 2019 to conduct the required botanical survey. The survey was carried out on foot and a rapid assessment, plot-less method employed. The root followed 'sample track' over the site is shown in (Figure 4 & 5). Specific details of the vegetation, plant samples and features of then habitat were recorded and photographs taken. Before commencing with the 'sample track', notes were taken of the surrounding area to obtain an understanding of the overall landscape and area.

A number of standard assessment criteria were used to determine the potential impacts:

- *Ecological condition*: this is the actual condition of the various habitats, which considers (1) quality of the vegetation; (2) species composition; (3) disturbance regime; (4) degree of intactness; (5) the sites spatial connectivity with adjoining habitats.
- *Ecosystem status:* informed by the List of Threatened Terrestrial Ecosystems (Government Gazette, 2011). The ecosystems are based on the vegetation types in *The Vegetation of South Africa, Lesotho and Swaziland* (Mucina & Rutherford, 2006).
- *Important species*: the presence or absence of threatened (i.e. Red List) and ecologically important species informs the sites ecological condition and sensitivity.

Data Sourcing and Review Information on plant species recorded for the general area was extracted from the SABIF/SIBIS database hosted by SANBI & https://herbaria.plants.ox.ac.uk/bol/brahms/ (sourced in May 2019). This database includes the various botanical databases housed within SANBI as well as those from various herbaria and museums. Threatened Ecosystem data was extracted from the NEMBA listed ecosystems layer (SANBI 2011). Vegetation type conservation status was extracted from the South African National Vegetation Map (Mucina and Rutherford 2006 map updated in 2012).

5. Limitations and assumptions

The survey of the Wrenchville/Kuruman study site was undertaken in the late summer which was the ideal time since above average rains had been experienced prior to the site visit (from 1 January till 30 April over 250mm of rain fell) and the vegetation was in good condition. Season therefore did not impose any limitations on the survey and a high degree of confidence was achieved for the survey. A fire had occurred over parts of the study site in the previous winter but many of the shrubs were coppicing vigorously and the grasses were strongly stimulated by the fire so this in no way negatively influenced the survey.

6. Vegetation Classification and Conservation Status

6.1 General description

The vegetation map of South Africa, Lesotho and Swaziland (Mucina & Rutherford 2006) and updated in 2012) indicates that the entire area of the Wrenchville housing site falls within the widespread vegetation type known as Kuruman Thornveld (see Figure 7). Kuruman Thornveld is a vegetation type within the Savannah Biome, Eastern Kalahari Bushveld Bioregion, of Southern Africa. The vegetation type is considered as a Least Threatened vegetation type (Government Gazette, 2011) most probable because only 2% of the vegetation type has been disturbed and the very low number of threatened plant species present therein.

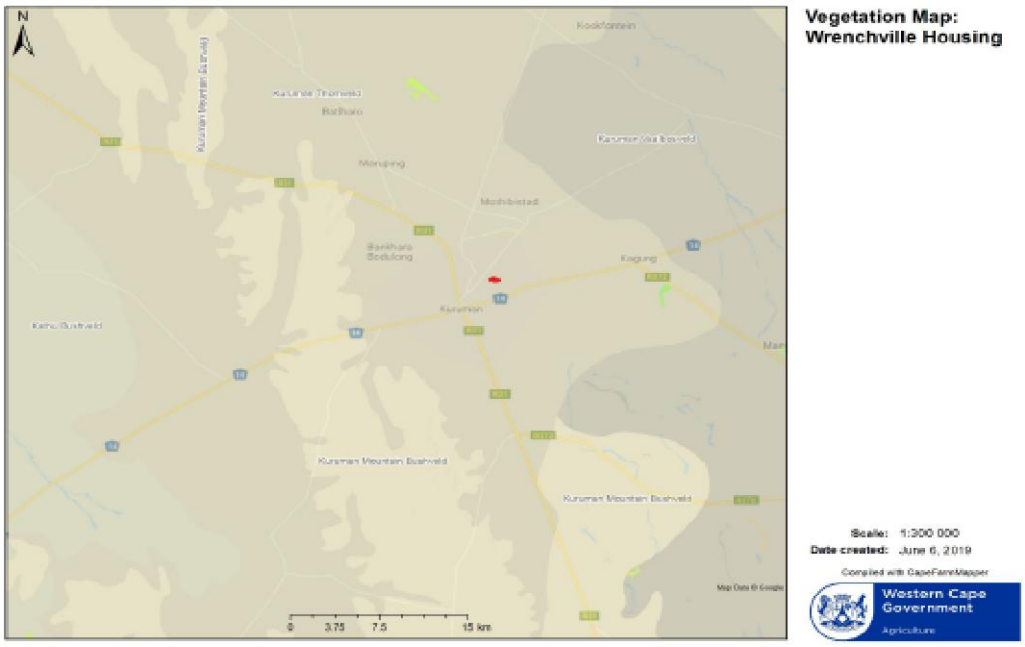


Figure 7: Portion of the Vegetation Map of South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2006 and map updated in 2012) showing the location of the study site (**Red**) located in Kuruman Thornveld **(**in light Grey).

A portion of the northern and eastern tip of the site has been mined in the past. Gravel are being mine in a portion of the site situated just north of the Wrenchville School and the eastern tip of the site falls in an area where red sand has recently been removed. See Figure 8. Rubble has

been dumped over approximately 20% of the site (see Figure 5). The site is disturbed and livestock grazed over the area. The dominance of grass such as Rhynchelytrum repens, Aristida concasta, Enneapogon cenchroides and the presence of naturalise weedy species such as Tagetes , Rumex and Zinnea in the area, is proof thereof.

Figure 8: Disturbance in the areas. Gravel and sand removed in and next to area.

6.2 The Vegetation at the site

The total site was well covered along the 'sample track' as shown in Figure 5 & 6 and the plant species found along the surveyed track, identified and vegetation described. Observations during the field investigation at the study site verified the classification of the vegetation as Kuruman Thornveld and revealed that the area is a mosaic of grassland with thickets. Sixty seven (67) different plant species were identified, of which 4 species were weedy and the rest were all classified as Least Concern (LC).

Plant species that were abundant common over the entire area were: **trees**- Tarchonanthus camphorates, Gewia flava, Wachellia (Acacia) aerioloba, Senegalia (Acacia) mellifera, Wachellia (Acacia) hebeclada, *Ziziphus mucronata* (blinkblaar wag-'n-bietjie) and *Lycium hirsutum;* **grasses**- *Schmidtia kalahariensis, Eragrostis lehmanniana, Rhynchelytrum repens, Stipagrostis uniplumis, Aristida congesta, Aristida meridionalis* and; **herbs**- *Elephantorrhiza elephantine, Geigeria ornativa and Senna italica subsp. Arachoides, Tribulus terrestris, Asparagus capensis and Cittrulus lanatus.* In the deeper red sandy-loam soils along the water course north-west of the site, the tree stratum of the vegetation is dominated by Wachellia (Acacia) *erioloba and the* grass stratum by *Schmidtia kalahariensis.* Wachellia (Acacia) *karoo* was a dominant tree in the gravelly soils north of the Wrenchville School.

	
North of Wrenchville Phase 2 with W aerioloba left and tall thickets in distance.	*North of School with W. karoo* (sweet thorn) in distance

Figure 9: Kuruman Thornveld vegetation on site.

Since Kuruman Thornveld is classified as a Least Threatened vegetation type (Mucina & Rutherford, 2006). The survey, as well as a SANBI PROSA search of an area with a radius of more than 30km around the site including about 200 plant species, did not include any threatened plant species.

However, as noted above, Wachellia (*Acacia) erioloba* (camel thorn) trees are scattered over the site, but the dense and larger *W. erioloba* trees fall outside the development site. The number of W. erioloba trees that will have to be removed is well within acceptable limits. Where removal of the camel thorn trees will be necessary, a permit will have to be required from the Department of Agriculture Fisheries and Forestry, since these trees are protected under the National Forests Act, 1998 (Act No. 84 of 1998).

7. Impact Assessment

The impact assessment is a measure of the impacts likely to occur on the affected environment, specifically the vegetation, ecological processes, important species and habitats.

Three types of impacts are assessed:

- The 'No Go' scenario.
- Direct impacts: Impacts occurring directly on the vegetation of the site as a result of the proposed development
- Indirect impacts: Impacts that are not a direct result of the proposed activity (in this case the housing development) but occur away from the original source of impact.
- Cumulative impacts: impacts caused by several similar projects within the same vegetation type.

The approaches adopted to assess impacts that have been followed here can be seen table in Appendix **2.** When evaluating the individual impacts against the various criteria, the element of mitigation, where relevant, was also brought into the assessment.

7.1 The 'No Go' Alternative

In the case of the 'No Go' option the housing development would not be pursued and the status quo would persist. The 'No Go' alternative implies no further development of the study area and the current use of the land was considered to the likely future use. The vegetation would continue to deteriorate as a result of grazing, illegal mining a dumping of rubble. The 'No Go' alternative would therefore result in a Medium negative local impact. Not Neutral because there is a level of negative impact locally, due to the removal of sand and gravel from the site, dumping of rubble and grazing by livestock.

7.2 Direct Impacts

The impacts on the vegetation and habitat for the proposed housing development at Wrenchville, Kuruman are considered according to two identified potential impacts which are:

- Loss of vegetation type and habitat including plant species due to construction and operational activities.
- Loss of ecological processes found within the original or currently existing habitat.

7.2.1 Loss of Kuruman Thornveld habitat together with associated plans due to construction and operational activities.

The direct impact as result of construction and operational activities at local scale on vegetation will be Low Negative (it would have been medium if the veld was in a better condition and better managed). Regionally the impact would be **Very Low Negative** (see below).

Table 1: Impact and Significance – Loss of Kuruman Thornveld and associated habitat due to the 'No Go' alternative and construction alternatives (including operational phase) of the proposed phase 2 of the Wrenchville housing development.

Development area	Extent of impact	Duration of impact	Intensity / Magnitude	Probability of occurrence	Degree of confidence	Significance before mitigation	Significance after mitigation
'No Go'	Very Low	Long term	Very Low	High	High	Very Low	--
Housing development	Very Low	Long term	Very Low	High	High	Very Low	Very Low

The impact of housing on Kuruman Thornveld together with associated vegetation is Very Low as indicated under Table 3. This impact can however not be reversed and should largely be regarded as a long term loss that can be mitigated to a small degree. Housing should be designed to be sustainable to make the best use of land and surface. See discussion under indirect impacts.

Mitigation

No to minimal mitigation would be possible for the loss of vegetation and habitat in the area developed for housing due to construction and operational activities at Wrenchville.

The first important mitigation measure would be to attempt to design the final layouts of the housing area to cater for the loss of as few **Wachellia** erioloba (camel thorn) trees as possible. But, since the erven and houses are small, the possibility to keep camel thorn trees in the development area is nearly impossible. An application to remove such trees will be submitted. Further mitigation in this respect would be to keep all **Wachellia** erioloba trees in the green open space north and east of the development to offset any trees that would be lost during construction.

Housing should be designed to be sustainable to make the best use of land and surface and aim to reduce the demand for water, power and environmental services (i.e. food) to zero. See comments under indirect impact, point 7.3.3.

7.2.2 Loss of ecological processes

Ecological processes vary in condition across the study site largely in relation to the condition of the habitat. The habitat at Wrenchville is ecologically functional across the site and this functionality would be kept intact if enough of the area is maintained as undeveloped space. The impact would be **Low Negative** on ecological processes (Table 3).

Table 2: Impact and Significance: Loss of ecological processes resulting from vegetation clearing and housing of the phase 2 Wrenchville low cost housing development and include the 'No Go' alternative .

Development area	Extent of impact	Duration of impact	Intensity / Magnitude	Probability of occurrence	Degree of confidence	Significance before mitigation	Significance after mitigation
'No Go'	Very Low	Long term	Very Low	High	High	Very Low	---
Housing development	Very Low	Long term	Low	High	High	Low	Low

Mitigation

No to minimal mitigation would be possible for the loss or ecological processes in the area developed for housing due to construction and operational activities at Wrenchville.

Housing is a ongoing process and thus should be designed to be sustainable and to make the best use of land and surface and aim to reduce the demand for water, power and environmental services (i.e. food) to as low as possible or positive. This will include the use of roof surfaces for solar power generation and water tanks and open public land to be used for establishing vegetable gardens and fruit orchards or planting of local indigenous trees.

7.3 Indirect Impacts

Indirect impacts (impacts that are not a direct result of the proposed activity) that occur away from the original source of impact for this housing development are:

The continued **removal of sand** from the thicket between the Wachellia erioloba (camel thorn) trees along the watercourse, just north of the site earmarked for housing (see figure 3), will result in the loss of a number of large very old camel thorn trees. This will have a Medium to High local impact on this thicket that may act as a shady park or recreational area. It will further impact on water infiltration and the water flow in the water course. It seems that the recently removed sand was used to level the previous phase of the Wrenchville housing project.

Water use has an unaccounted environmental impact as it put further stress on the groundwater required and other water supply infrastructure (dams, pipelines, etc.). Assuming 4 people per house with water use of 50l/person per day, the demand for each house would be 200l/day or 6000l/month or 72Kl/a. With an average rainfall of 300mm/a and roof surface of 60m^2, each house could harvest 18Kl/a of water or 25% of the total use and in so doing reduce runoff and the mentioned environmental stresses.

The **increased runoff** from the increased hard and compacted surfaces (roofs and roads) will increase runoff from the site and may lead to increased erosion. The sandy nature of the soils and scale of the project will however reduce such impact to Very Low and manageable.

Electricity requirements of the houses will have to be generated and transmitted to Wrenchville. The habitat and wetland degradation and soil loss at coalmines, carbon generated at power plants and environmental impact of very long distance transmission lines are not accounted for.

If 30m^2 surface of each house is used for solar power generation and it is possible to generate 200w/m^2 for 8 hours it equals 48kwh/day or 1440 Kwh/month. At a demand per household of 300 Kwh/month this amount leaves more than 1100 Kwh/month (electricity enough to supply power for more than 3 houses in a neighbouring township).

Sewage generated by housing will have to be disposed of and treated.

Garbage generated must be removed and disposed of at a landfill site.

Table 3: Impact and Significance: Indirect impact of the phase 2 Wrenchville project and housing projects in general and include the 'No Go' alternative.

Development area	Extent of impact	Duration of impact	Intensity / Magnitude	Probability of occurrence	Degree of confidence	Significance before mitigation	Significance after mitigation
'No Go'	Very Low	Long term	Very Low	High	High	Very Low	---
Indirect impacts of Housing development	Medium	Long term	Medium	High	High	Medium	Low

Mitigation

- Prohibit the removal of sand from the areas surrounding the housing development. Find fill material from the rest of the development area or from areas where such material will

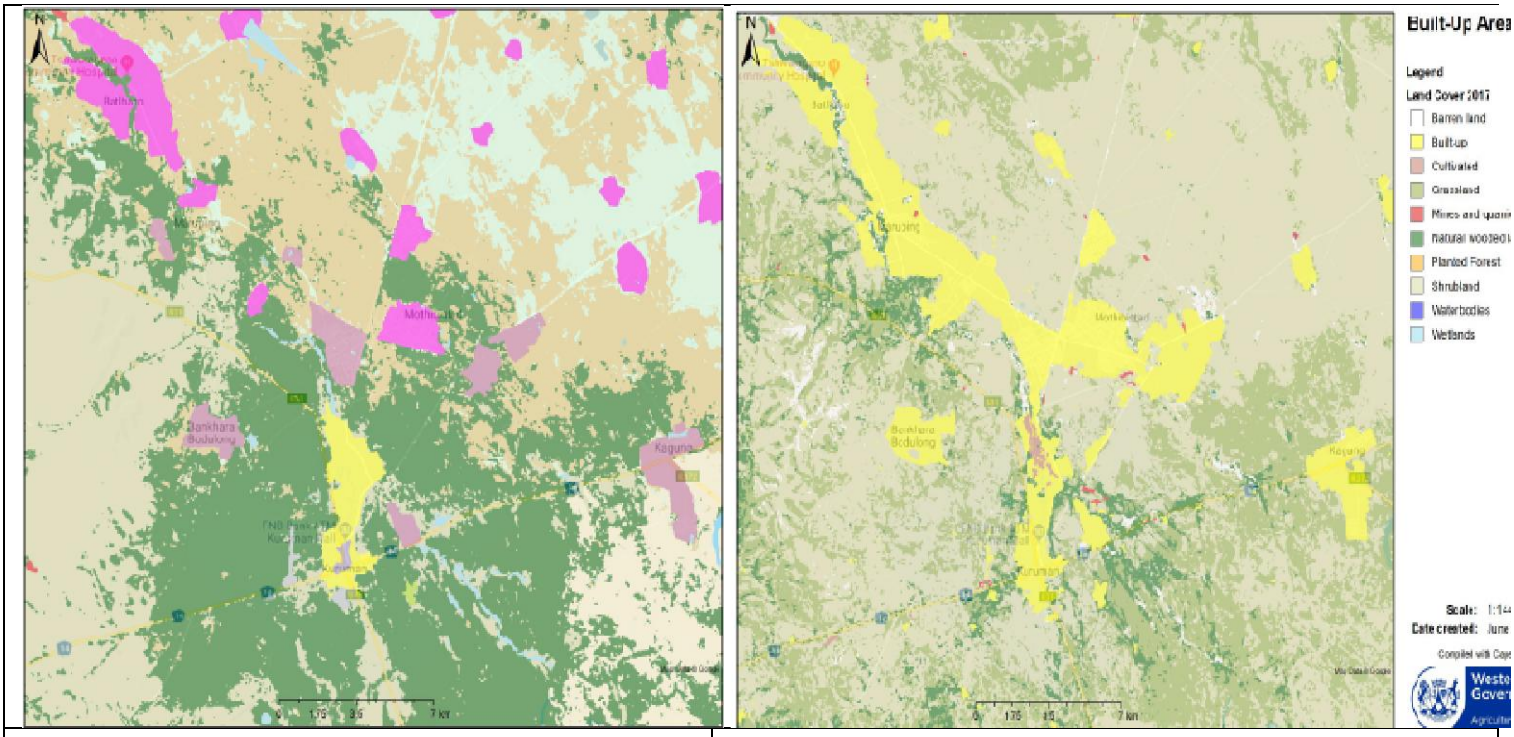
have to be removed or shall in any case be covered (at waste disposal site). Investigate if standard foundations on the exposed solid rock is absolutely necessary.

- Keep all *Wachellia erioloba* trees in the green open space north and east of the development site to offset any trees that would be lost during construction.
- Investigate the use of solar panels on the roofs of all houses to generate all electricity use and export power to the surrounding town as an offset for night-time use.
- The collection, storage and use of all runoff water from all roof surfaces should be investigated and considered. Water could be used without treatment for gardens and of flushing toilets.
- Sewage and garbage could be recycled or used for fuel.
- Open public land should be planted with local indigenous trees or fruit trees.

7.4 Cumulative Impacts

The proposed development of the Phase 2 at Wrenchville housing at Kuruman would contribute to the loss of Kuruman Thornveld in the local area around the town of Kuruman. However, Kuruman Throrvneld is regionally widespread and classified as Least threatened with no threatened plant species. Overall cumulative botanical direct impacts of the proposed development, as well as future housing developments, are likely to be rated as Low negative after mitigation.

As can be seen in Figure 10 below, it is clear that build-up land has expanded substantially over the past 17 years. The indirect negative impacts of housing developments are therefore potentially Medium but depending on the rate of growth will increase to High and mitigation measures addressing that should be investigated and considered.



Built-up areas in 2000	Built-up areas in 2017

Figure 10: The increase of housing over a period of 17 years in the area near Kuruman (*Cape Farm Mapper* – https://gis.elsenburg.com/apps/cfm/ *sourced June 2019*)

Mitigation

The cumulated impacts of the Indirect Impacts will be substantial over time, but can be successfully mitigated. Therefore the importance of the mitigation measures of indirect impacts explained under point 7.3 must be investigated and implemented as soon as possible.

8. Conclusions and Recommendations

The investigation of the proposed area of the Wrenchville housing development at Kuruman revealed the Kuruman Thornveld vegetation which occurs in the application area, has been disturbed for a long time and is in a poor state. A number of scattered and two clusters of the protected tree species Wachellia erioloba (camelthorn) occur in the development footprint. Development of the site would result in local Low negative impact in terms of (i) loss of vegetation and habitat as well as (ii) loss of ecological processes at a local and a regional scale. However, at a regional scale the impact would be limited and so cumulative impacts are rated as Low negative. Medium to Low Negative is the preferred alternative. Alternative 2 is implemented.

- No plant species of conservation concern (Red List species) (Raimondo et al. 2009) were found during the study.
- Wachellia erioloba (camel thorn) trees are a protected tree species and a permit would be required for any disturbance of these trees. A permit from the Department of Agriculture Forestry and Fisheries would be required for the destruction of any natural vegetation.
- The Kuruman Thornveld in the Wrenchville study area is Least Threatened and in a poor state and the proposed housing development is supported without major constraints or need for cumbersome mitigation measures.
- Mitigation measures must be put in place to the prevention removal of the soil that supports the Wachellia erioloba trees from the area along the water course on the north and east boundary of the site. It is recommended that this area should be shaped and the rubble removed so that it can rehabilitate and act as a shady park area and visual buffer.
- Removal of gravel from the western block of the area (north of the school) must be stopped as soon as possible.

9. References

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Appendix 1.

	Genus	Species
Trees and shrubs	Wachellia (Acacia)	earioloba
	Tarchonanthus	camphoratus
	Ziziphus	mucronata
	Senegalia (Acacia)	mellifera
	Lycium	hirsutum
	Grewia	flava
	Diospiros	austro-africana
	Grewia	retinervis
	Wachellia (Acacia)	hebeclada
	Wachellia (Acacia)	karoo
	Gymnosporia	buxiflora
	Searsia	linearis
	Searsia	lancea
	Euclea	crispa
	Erethia	alba
	Maquiniella	rubra
	Prosopus	glandulosa
	Eucalyptus	sp.
Grass	Schmidtia	kalahariensis
	Aristida	meridionalis
	Aristida	congesta
	Eragrostis	lehmanniana
	Rhynchelytrum	repens
	Stipagrostis	uniplumis
	Cenchrus	ciliaris
	Enneapogon	cenchroides
	Ereagrostis	echinochloidea
	Cynodon	dactylon
	Heteropogon	contortus
	Hyparrhenia	hirta
	Elionurus	muticus
	Cymbopogon	pospischilii
	Tragus	berteronianus
Herbs	Elephantorhiza	elephantina
	Tribulus	terrestris
	Geigeria	ornativa
	Asparagus	capensis
	Cittrulus	lanatus

	Gazania	**krebsiana**
	Oxalis	**sp.**
	Penzia	**incana**
	Hermania	**comosa**
	Hermania	**quartiniona**
	Asparagus	**densiflorus**
	Whatsonea	**sp.**
	Indigofera	**daleoides**
	Indigofera	**sp.**
	Acrotome	**inflata**
	Sesamum	**triphylum**
	Acrotome	**inflata**
	Heliotropium	**sp.**
	Cleome	**filiosa**
	Poligala	**leptophylla**
	Monechma	**mallissimum**
	Hermbstaedtia	**adorata**
	Galenia	**sarcophylla**
	Heliophylla	**sp.**
	Ornithoglosum	**vulgare**
	Pteronea	**incana**
	Ipomoea	**sp.**
	Moraea	**sp.**
	Aptosimum	**sp.**
	Gomphocarpus	**fruticosus**
	Commelina	**sp.**
	Tagetes	**minuta**
	Rumex	**sp.**
	Zinnea	**sp.**

Appendix 2: Convention for assigning significance ratings to impacts.

Specialists will consider seven rating scales when assessing potential impacts. These include:

- extent;
- duration;
- intensity;
- status of impact;
- probability;
- degree of confidence; and
- significance.

In assigning significance ratings to potential impacts before and after mitigation specialists are instructed to follow the approach presented below:

1. The core criteria for determining significance ratings are "extent" (Section 6.3.1), "duration" (Section 6.3.2) and "intensity" (Section 6.3.3). The preliminary significance ratings for combinations of these three criteria are given in Section 6.3.7.
2. The status of an impact is used to describe whether the impact will have a negative, positive or neutral effect on the surrounding environment. An impact may therefore be negative, positive (or referred to as a benefit) or neutral.
3. Describe the impact in terms of the probability of the impact occurring (Section 6.3.5) and the degree of confidence in the impact predictions, based on the availability of information and specialist knowledge (Section 6.3.6).
4. Additional criteria to be considered, which could "increase" the significance rating if deemed justified by the specialist, with motivation, are the following:

- Permanent / irreversible impacts (as distinct from long-term, reversible impacts);
- Potentially substantial cumulative effects (see Item 7 below); and
- High level of risk or uncertainty, with potentially substantial negative consequences.

5. Additional criteria to be considered, which could "decrease" the significance rating if deemed justified by the specialist, with motivation, is the following:
    - Improbable impact, where confidence level in prediction is high.
6. When assigning significance ratings to impacts *after mitigation*, the specialist needs to:
    - First, consider probable changes in intensity, extent and duration of the impact after mitigation, assuming effective implementation of mitigation measures, leading to a revised significance rating; and
    - Then moderate the significance rating after taking into account the likelihood of proposed mitigation measures being effectively implemented. Consider:
        - Any potentially significant risks or uncertainties associated with the effectiveness of mitigation measures;
        - The technical and financial ability of the proponent to implement the measure; and
        - The commitment of the proponent to implementing the measure, or guarantee over time that the measures would be implemented.
7. The cumulative impacts of a project should also be considered. "Cumulative impacts" refer to the impact of an activity that may become significant when added to the existing activities currently taking place within the surrounding environment.

8. Where applicable, assess the degree to which an impact may cause irreplaceable loss of a resource. A resource assists in the functioning of human or natural systems, i.e. specific vegetation, minerals, water, agricultural land, etc.

9. The significance ratings are based on largely objective criteria and inform decision-making at a project level as opposed to a local community level. In some instances, therefore, whilst the significance rating of potential impacts might be "low" or "very low", the importance of these impacts to local communities or individuals might be extremely high. The importance which I&APs attach to impacts must be taken into consideration, and recommendations should be made as to ways of avoiding or minimising these negative impacts through project design, selection of appropriate alternatives and / or management.

The relationship between the significance ratings after mitigation and decision-making can be broadly defined as follows (see overleaf): substance

Significance rating	Effect on decision-making
VERY LOW; LOW	Will not have an influence on the decision to proceed with the proposed project, provided that recommended measures to mitigate negative impacts are implemented.
MEDIUM	Should influence the decision to proceed with the proposed project, provided that recommended measures to mitigate negative impacts are implemented.
HIGH; VERY HIGH	Would strongly influence the decision to proceed with the proposed project.

1. Extent

"Extent" defines the physical extent or spatial scale of the impact.

Rating	Description
LOCAL	Extending only as far as the activity, limited to the site and its immediate surroundings. Specialist studies to specify extent.
REGIONAL	Western Cape. Specialist studies to specify extent.
NATIONAL	South Africa
INTERNATIONAL	

2. Duration

"Duration" gives an indication of how long the impact would occur.

Rating	Description
SHORT TERM	0 – 5 years
MEDIUM TERM	5 – 15 years
LONG TERM	Where the impact will cease after the operational life of the activity, either because of natural processes or by human intervention.
PERMANENT	Where mitigation either by natural processes or by human intervention will not occur in such a way or in such time span that the impact can be considered transient.

3. Intensity

"Intensity" establishes whether the impact would be destructive or benign.

Rating	Description
ZERO TO VERY LOW	Where the impact affects the environment in such a way that natural, cultural and social functions and processes are not affected.
LOW	Where the impact affects the environment in such a way that natural, cultural and social functions and processes continue, albeit in a slightly modified way.
MEDIUM	Where the affected environment is altered, but natural, cultural and social functions and processes continue, albeit in a modified way.
HIGH	Where natural, cultural and social functions or processes are altered to the extent that it will temporarily or permanently cease.

4. Loss of resources

"Loss of resource" refers to the degree to which a resource is permanently affected by the activity, i.e. the degree to which a resource is irreplaceable.

Rating	Description
LOW	Where the activity results in a loss of a particular resource but where the natural, cultural and social functions and processes are not affected.
MEDIUM	Where the loss of a resource occurs, but natural, cultural and social functions and processes continue, albeit in a modified way.
HIGH	Where the activity results in an irreplaceable loss of a resource.

5. Status of impact

The status of an impact is used to describe whether the impact would have a negative, positive or zero effect on the affected environment. An impact may therefore be negative, positive (or referred to as a benefit) or neutral.

6. Probability

"Probability" describes the likelihood of the impact occurring.

Rating	Description
IMPROBABLE	Where the possibility of the impact to materialise is very low either because of design or historic experience.
PROBABLE	Where there is a distinct possibility that the impact will occur.
HIGHLY PROBABLE	Where it is most likely that the impact will occur.
DEFINITE	Where the impact will occur regardless of any prevention measures.

7. Degree of confidence

This indicates the degree of confidence in the impact predictions, based on the availability of information and specialist knowledge.

Rating	Description
HIGH	Greater than 70% sure of impact prediction.
MEDIUM	Between 35% and 70% sure of impact prediction.
LOW	Less than 35% sure of impact prediction.

8. Significance

"Significance" attempts to evaluate the importance of a particular impact, and in doing so incorporates the above three scales (i.e. extent, duration and intensity).

Rating	Description
VERY HIGH	Impacts could be EITHER: of ***high intensity*** at a ***regional level*** and endure in the ***long term***; OR of ***high intensity*** at a ***national level*** in the ***medium term***; OR of ***medium intensity*** at a ***national level*** in the ***long term***.
HIGH	Impacts could be EITHER: of ***high intensity*** at a ***regional level*** and endure in the ***medium term***; OR of ***high intensity*** at a ***national level*** in the ***short term***; OR of ***medium intensity*** at a ***national level*** in the ***medium term***; OR of ***low intensity*** at a ***national level*** in the ***long term***; OR of ***high intensity*** at a ***local level*** in the ***long term***; OR of ***medium intensity*** at a ***regional level*** in the ***long term***.

Rating	Description
MEDIUM	Impacts could be EITHER: of ***high intensity*** at a ***local level*** and endure in the ***medium term***; OR of ***medium intensity*** at a ***regional level*** in the ***medium term***; OR of ***high intensity*** at a ***regional level*** in the ***short term***; OR of ***medium intensity*** at a ***national level*** in the ***short term***; OR of ***medium intensity*** at a ***local level*** in the ***long term***; OR of ***low intensity*** at a ***national level*** in the ***medium term***; OR of ***low intensity*** at a ***regional level*** in the ***long term***.
LOW	Impacts could be EITHER of ***low intensity*** at a ***regional level*** and endure in the ***medium term***; OR of ***low intensity*** at a ***national level*** in the ***short term***; OR of ***high intensity*** at a ***local level*** and endure in the ***short term***; OR of ***medium intensity*** at a ***regional level*** in the ***short term***; OR of ***low intensity*** at a ***local level*** in the ***long term***; OR of ***medium intensity*** at a ***local level*** and endure in the ***medium term***.
VERY LOW	Impacts could be EITHER of ***low intensity*** at a ***local level*** and endure in the ***medium term***; OR of ***low intensity*** at a ***regional level*** and endure in the ***short term***; OR of ***low to medium intensity*** at a ***local level*** and endure in the ***short term***.
INSIGNIFICANT	Impacts with: Zero to very low intensity with any combination of extent and duration.
UNKNOWN	In certain cases it may not be possible to determine the significance of an impact.

9. Degree to which impact can be mitigated

This indicates the degree to which an impact can be reduced / enhanced.

Rating	Description
NONE	No change in impact after mitigation.
VERY LOW	Where the significance rating stays the same, but where mitigation will reduce the intensity of the impact.
LOW	Where the significance rating drops by one level, after mitigation.
MEDIUM	Where the significance rating drops by two to three levels, after mitigation.
HIGH	Where the significance rating drops by more than three levels, after mitigation.

10 Reversibility of an impact

This refers to the degree to which an impact can be reversed.

Rating	Description
IRREVERSIBLE	Where the impact is permanent.
PARTIALLY REVERSIBLE	Where the impact can be partially reversed.
FULLY REVERSIBLE	Where the impact can be completely reversed.

Appendix 3

CURRICULUM VITAE: J H BRIERS

1. GENERAL / PERSONAL INFORMATION

NAME: Jan Hendrik Briers

CONTACT NUMBERS: Cell 079 857 4457

POSTAL ADDRESS: PO Box 878 BETTY'S BAY 7141

PRESENT POST: Specialist Ecological Consultant. Sole proprietor

2. QUALIFICATIONS

		Year completed
Matric		1972
B.Sc. University of Pretoria,		1976
B.Sc. (Hons- Zoology)	University of Pretoria,	1977
B.Sc. (Hons- Botany)	University of Pretoria	1984
M.Sc. (Botany) Potchefstroom University for CHE		1988
BB and A (Hons) in Business and Administration. University of Stellenbosch		*2003*

3. PROFESSIONAL REGISTRATION

I am a Professional Natural Scientist, registered to practice as Ecologist: *SACNASP - Reg. No. 400279/13*

4. CAREER HISTORY AND EXPERIENCE

4.1 Deputy Director: Environment. Department of Mineral Resources.

Assess environmental impacts of mining activities and evaluate environmental management programmes (EMP's). Ensure that all the costs and benefits of mines are taken into account and rehabilitation funds are sufficient.

.4.2 Assistant Director: Scientific Services for East Cape Nature Conservation.

Manage and direct scientific research. Provide a scientific advisory service to management. Initiate and carry out cooperative scientific projects together with other institutions, Conservation- and land use planning. Manage a research programme regulating natural resource use and promoting the sustainable use of natural resources.

4.3 Capacity: Research Scientist at PU- Research Institute for Rehabilitation Ecology. Potchefstroom University for CHE

Research on the rehabilitation of vegetation on disturbed and denuded areas such as mine-dumps, road reserves and overgrazed areas.

4.4 Capacity: Technical Assistant. Botany Department, University of Pretoria.

4.5 Capacity: Research Scientist. National Institute for Water Research. C.S.I.R

Responsible for a research projects;
Optimising algal production in sewage water.
Purifying water through algal pond systems.

4.6 Capacity: Professional officer, Nature Conservation. Lebowa Government.

Conservation planning and planning and motivating for new and conservation areas.
Training and scientific advice on reserve planning, game management and monitoring.
Initiate conservation-development projects.

4.7 Capacity: Establish, owned and managed Nursery.

5. SERVE ON NATIONAL, REGIONAL AND LOCAL COMMITTEES

I have been nominated to serve on more than 18 Liaison and the Steering Committees over the years and was an active member in professional organizations.

6. PAPERS AND POSTERS PRESENTED AT SCIENTIFIC CONFERENCES AND SYMPOSIA.

I have attended a large number of international and local symposia and made presentations and posters at more than 23 symposia in trying to keep abreast of the latest ideas in the field and expose myself to peer review (the list of presentations can be forwarded).

7. PUBLICATIONS

I have published 5 peer-reviewed papers in scientific journals and numerous other reports and papers.

8. INITIATE AND MANAGE CONTRACT RESEARCH PROJECTS

Initiate and motivate, and administer a number the projects that was concluded by Masters and Honour students covering subjects such as determinants of vegetation distribution, floristic ecological, vegetation mapping, geo-morphological impact of alien vegetation, cost-benefit analysis of alternative forms of land management and rehabilitation techniques.