



# LOUBOS

## *Proposed low cost housing Mier Municipality Residential Project, Northern Cape*

### DRAFT BIODIVERSITY & BOTANICAL SCAN

---

A preliminary Biodiversity & Botanical scan in order to identify significant environmental features (and to identify the need for additional studies if required).

January, 2013



**PREPARED BY: PB Consult**

**PREPARED FOR: ENVIROAFRICA CC**

**REQUESTED BY: MIER LOCAL MUNICIPALITY**

©

## INDEPENDENCE & CONDITIONS

PB Consult is an independent consultant to BVi Engineers and has no interest in the activity other than fair remuneration for services rendered. Remunerations for services are not linked to approval by decision making authorities and PB Consult have no interest in secondary or downstream development as a result of the authorization of this proposed project. There are no circumstances that compromise the objectivity of this report. The findings, results, observations and recommendations given in this report are based on the author's best scientific and professional knowledge and available information. PB Consult reserve the right to modify aspects of this report, including the recommendations if new information become available which may have a significant impact on the findings of this report.

## RELEVANT QUALIFICATIONS & EXPERIENCE OF THE AUTHOR

Mr. Peet Botes holds a BSc. (Hons.) degree in Plant Ecology from the University of Stellenbosch (Nature Conservation III & IV as extra subjects). Since qualifying with his degree, he had worked for more than 20 years in the environmental management field, first at the Overberg Test Range (a Division of Denel) managing the environmental department of OTB and being responsible for developing and implementing an ISO14001 environmental management system, ensuring environmental compliance, performing environmental risk assessments with regards to missile tests and planning the management of the 26 000 ha of natural veld, working closely with CapeNature (De Hoop Nature Reserve). In 2005 he joined Enviroscientific, an independent environmental consultancy specializing in wastewater management, botanical and biodiversity assessments, developing environmental management plans and strategies, environmental control work as well as doing environmental compliance audits and was also responsible for helping develop the biodiversity part of the Farming for the Future audit system implemented by Woolworths. During his time with Enviroscientific he performed more than 400 biodiversity and environmental legal compliance audits. During 2010 he joined EnviroAfrica in order to move back to the biodiversity aspects of environmental management. Experience with EnviroAfrica includes EIA applications, biodiversity assessment, botanical assessment, environmental compliance audits and environmental control work.

Mr. Botes is also a registered Professional Environmental and Ecological Scientists at SACNASP (South African Council for Natural Scientific Professions) as required in terms of Section 18(1)(a) of the Natural Scientific Professions Act, 2003, since 2005.

Yours sincerely,



P.J.J. Botes (*Pr.Sci.Nat: 400184/05*)  
Registered Professional Environmental and Ecological Scientist

## SUMMARY - MAIN CONCLUSIONS

PREPARED BY:		PREPARED FOR:
PB Consult 22 Buitekant Street Bredasdorp 7280		EnviroAfrica CC PO Box 5367 Helderberg 7135
CONTACT PERSON		CONTACT PERSON
Peet Botes Cell: +(27)82 – 921 5949 Fax: +(27)86 – 415 8595 Email: <a href="mailto:pbconsult@vodamail.co.za">pbconsult@vodamail.co.za</a>		Mr. Bernard de Witt Tel: +(27) 21 – 851 1616 Fax: +(27) 86 – 512 0154 Email: <a href="mailto:bernard@enviroafrica.co.za">bernard@enviroafrica.co.za</a>
SUMMARY OF POSSIBLE SIGNIFICANT BIODIVERSITY FEATURES		
<b>Geology &amp; soils</b>	Geology & soils vary only slightly in the larger study area, with sandy soils found over most of the area.	No special features have been encountered (e.g. true quartz patches or broken veld) and the impact on geology and soils is expected to be very localised and low. In addition much of the area is already impacted. <b>Impact = low</b>
<b>Land use and cover</b>	Transformed with very little natural veld remaining, utilised for urban settlement and stock grazing.	All of the sites have been heavily impacted (basically transformed) as a result of urban settlement and associated activities. As long as the protected species is incorporated within the layout design the impact is expected to be <b>low and localised</b> .
<b>Vegetation types</b>	Kalahari Karroid Shrubland	Classified as “Least threatened”, but according to the draft Siyanda EMF, shrubland in good condition is given a high conservation priority, but the specific site does not fall within a proposed conservation area or a CBA area and was given a very low (0-1) environmental sensitivity classification. <b>Impact low.</b>
<b>Conservation priority areas.</b>	In terms of the draft Siyanda EMF	According to the EMF the site also does not fall within a proposed conservation area. <b>Impact low/localised.</b>
<b>Sensitivity index</b>	In terms of the draft Siyanda EMF	According to the EMF, the proposed site falls within an area identified as of very low environmental sensitivity (0-1). <b>Impact low</b> and localised.
<b>Protected plant species</b>	Protected species observed. 11 x <i>Boscia albitrunca</i> (protected in terms of NFA) 3 x <i>Boscia foetida</i> (Protected in terms of NCNCA).	Protected tree species was observed on site (both <i>Boscia albitrunca</i> & <i>B. foetida</i> ). Fortunately almost all of the trees are located just outside of any of the proposed development areas. However, on the proposed Site 3, a number of <i>Boscia albitrunca</i> is found next to the drainage furrow to the north of the site. If a 32m corridor is observed along this stream, no protected species should be impacted.  If the corridor is observed, the impact is expected to be much reduced (only single individuals) and may be regarded as local and relative <b>low</b> .  However, if the protected species are to be removed the impact will be a much more significant <b>medium</b> (although still localised).
<b>Fauna &amp; Avi-fauna</b>	The site is used for live-stock grazing and is in close proximity to constant human activity.	Although natural fauna and avi-fauna may still be present, it is expected that it would be limited to avi-fauna, insects and maybe some reptile's species (proximity to the town of Loubos and the current land-use). Apart from the possible impact on mature trees and the associated impact on wildlife the activity is not expected to have a significant impact on fauna or avi-fauna. <b>Impact low.</b>
<b>Rivers &amp; wetlands</b>	One drainage furrow observed in Site 2 (seasonal streams outside of footprint)	Although most of these drainage lines are basically storm water channels with little riparian vegetation they should still be seen as significant biodiversity features, which should be protected by adequate river corridors. <b>Impact low.</b>
<b>Invasive alien infestation</b>	Prosopis species was observed	All invasive alien species must be removed during the construction. <b>Impact positive.</b>
RECOMMENDATION		
In summary, the proposed sites is all located on highly disturbed areas (grazing and urban creep) with little natural veld remaining. If protected species are all retained, the impact on individual species is regarded as very low, the impact on sensitive habitats is regarded as low to very low, the impact on ecosystem function is regarded as very low (but erosion prevention measures must be assured), cumulative impact on ecology is regarded as very low and finally the impact on economic use of the vegetation is regarded as very low.  <b>With the available information to the author's disposal it is recommended that the project be approved, but that all mitigation measures described in this document is implemented.</b>		

## CONTENTS

Independence & conditions .....	i
Relevant qualifications & experience of the author.....	i
Contents.....	iii
LIST OF FIGURES.....	v
LIST OF TABLES.....	v
LIST OF PHOTOS' .....	v
1. Introduction: Loubos .....	1
1.1 Terms of reference.....	2
2. Applicable legislation.....	4
2.1 Northern Cape Nature Conservation Act 9 of 2009 .....	5
3. Definitions & Abbreviations.....	6
3.1 Definitions.....	6
3.2 Abbreviations .....	8
4. References .....	9
5. Project Description .....	10
5.1 Methods .....	11
6. Description of Environment.....	12
6.1 Location & Layout .....	12
6.2 Topography .....	14
6.3 Climate .....	14
6.4 Geology & Soils .....	14
6.5 Landuse and Cover .....	15
6.6 Broad scale vegetation types expected .....	15
6.6.1 Gordonia Duneveld.....	16
6.6.2 Kalahari Karroid Shrubland .....	17
6.7 Vegetation encountered .....	17
6.7.1 Loubos site 1 .....	17

6.7.2	Loubos Site 2 .....	19
6.7.3	Loubos Site 3 .....	21
6.7.4	Flora .....	22
6.8	Significant and/or protected plant Species .....	23
6.8.1	Sheppard's tree .....	24
6.9	Fine-Scale mapping (CBA's) .....	25
6.9.1	Summary of findings according to the EMF .....	25
6.10	Fauna and Avi-fauna .....	28
6.11	Rivers and wetlands .....	28
6.12	Invasive alien infestation .....	29
7.1	Significant biodiversity features encountered .....	31
8.	Biodiversity Assessment .....	32
8.1	Nature of the Impact .....	32
8.1.1	Parameters of the impact .....	32
8.1.2	Possible issues / impacts associated with construction .....	33
8.2	Evaluation of Significant Impacts .....	33
8.2.1	Threatened or protected ecosystems .....	33
8.2.2	Special habitats .....	34
8.2.3	Corridors and or conservancy networks .....	35
8.2.4	Threatened or endangered species .....	35
8.2.5	Protected species .....	36
8.2.6	Direct impacts .....	36
8.2.7	Indirect impacts .....	38
8.2.8	Cumulative impacts .....	38
8.3	The no-go option .....	39
9.	Recommendations & Impact Minimization .....	40
9.1	Impact minimization .....	41
9.1.1	General .....	41
9.1.2	Site specific .....	41

## LIST OF FIGURES

Figure 1: Google image indicating the route walked during the site visit as well as GPS reference points taken .....	11
Figure 2: General location of the town within South Africa.....	12
Figure 3: Showing the town in relation to the immediate surrounding towns .....	13
Figure 4: Google image giving an indication of the proposed location for the proposed new developments .....	13
Figure 5: Average rainfall, temperature and night-time temperatures for Loubos (www.saexplorer.co.za) .....	14
Figure 6: National land cover map indicating the Landcover expected .....	15
Figure 7: Vegetation map of SA, Lesotho and Swaziland (2006).....	16
Figure 8: Loubos Site 1 – Existing community hall, sport fields and school .....	18
Figure 9: Google overview of the proposed Loubos Site 2, indicating the drainage corridor in blue .....	19
Figure 10: A Google overview (proposed Loubos Site 3), indicating the stream to the north and significant features encountered .....	21
Figure 11: A copy of the Draft Vegetation Assessment Conservation Priorities in the Siyanda EMF (Location mark with red arrow) .....	27
Figure 12: South African National Veldfire Risk Classification (March 2010) .....	30
Figure 13: Google image showing the Loubos site, with river corridors which should be protected in blue .....	42

## LIST OF TABLES

Table 1: Identified need for low cost housing in the Mier Municipality (BVi, 2011) .....	10
Table 2: GPS coordinates for Loubos, Local settlement and the proposed new development .....	12
Table 3: Vegetation status according to the 2004 National Spatial Biodiversity Assessment.....	16
Table 4: List of species encountered on the sites (excluding grass species) .....	22
Table 5: NFA protected tree species with a geographical distribution that may overlap the broader study area .....	23
Table 6: A list of protected trees encountered during the site visit, referenced by GPS waypoints (WG84 format) .....	24
Table 7: Summary of biodiversity features encountered and their possible significance .....	31

## LIST OF PHOTOS

Photo 1: Loubos school grounds .....	18
Photo 2: Loubos community hall and sport fields.....	18
Photo 3: Loubos site 2 - looking over the southern portion of the proposed site (from east to west).....	20
Photo 4: Loubos Site 2 – A view of the site from northwest to southeast.....	20
Photo 5: Loubos Site 2 – A view of the drainage furrow indicated on figure 9 (looking from east to west).....	20
Photo 6: Loubos Site 3 – A view over the site (northwest to southwest) .....	21
Photo 7: Loubos Site 3 – A view of the river to the north of the proposed site.....	22

## 1. INTRODUCTION: LOUBOS

The Mier Municipality is situated adjacent to one of the world's largest conservation areas, the Kgalagadi Transfrontier Park. The municipal area of Mier includes the communities of Rietfontein, Philandersbron, Groot Mier, Klein Mier, Loubos, Welkom, Askham and Noenieput. One of the world's ancient tribes, the !Khomani San, own farms and still reside in the Mier area. The lack of fresh water is a major constraint on development in the Mier area, since water pumped from underground sources is of poor quality, as a result most of the area is used for grazing by livestock or game. More than half of the 6 000 people living in Mier have never left the area. Even so, the biggest asset of Mier is the rich culture and history of its people ([www.greenkalahari.co.za](http://www.greenkalahari.co.za)).

The municipality has indicated that there is a pressing need for houses, especially low cost houses, as well as serviced plots within all of the communities within the Mier Municipal Area. This is reflected by the housing backlog contained in the 2009/10 version of the Mier IDP (BVi, 2011). The Mier Municipality residential project, are proposing the development of a number of low cost housing at the towns of Rietfontein, Groot Mier, Askham, Welkom, Loubos and Noenieput to alleviate some of the housing problems of the Municipality.

Loubos is an extremely small town located in a region with low population densities. The town, which is predominantly residential does, supports various other central functions such as places of worship and educational facilities support the local community and its surroundings. Loubos is located on the remainder of Farm 585, Gordonia road (Mier Municipality), owned by the Mier Municipality. The town is situated in the central western section of the Mier Municipality on the old road linking Rietfontein with Groot-Mier, northeast of Rietfontein and approximately 264 km north-north-west of Upington. No formal land use management system has been adopted by the Mier Municipality at this stage and the land use rights on the property may be described as being undetermined. The Mier Municipality has instructed Macroplan Town and Regional Planners to rezone and subdivide the remainder of Farm 585 in order to establish 154 new development stands in Loubos, 140 of which are single residential Ervin, in response to the growing housing need in the municipality.

The specific location has been chosen for the following reasons:

- It is located on Municipal owned land.
- The specific location was chosen by the Municipality and local town planners in order to try and integrate the new Ervin with the rest of Loubos.
- It is suitably placed in terms of services.

Since, the study area and its immediate surrounding may still be covered by natural veld a Biodiversity Scan of the proposed location was commissioned in order to evaluate the environmental impact(s) of the proposed project and to establish whether further and more in depth studies would be required. Since the need for additional housing is very apparent this biodiversity study will mainly aim to minimise the environmental impact through correct placement.

From an ecological perspective the three proposed site location make overall sense for the following reasons:

- It is basically enclosed by the existing Loubos settlement.
- For the most part the proposed sites are already disturbed to some degree as a result of “residential creep”. Myriad pedestrian walkways crisscross the property, while it is also used as a playground and grazing for domestic animals belonging to the local inhabitants.
- The proposed sites are non in pristine condition.

Significant biodiversity features encountered during the site visit.

- Small streams / drainage lines were encountered on two of the proposed locations.
- In addition, a number of *Boscia albitrunca* was observed on two of the sites (Protected in terms of the NFA).

However, by establishing a river corridor along the river, within the development, and by taking into account the location of the protected trees (which could easily be avoided) it might be possible to establish the proposed development without significant impacts on these features.

## 1.1 TERMS OF REFERENCE

EnviroAfrica (Pty) Ltd was appointed by BVi Consulting Engineers (Upington) as the independent Environmental Assessment Practitioner (EAP) to undertake the Basic Assessment (EIA) Process for the proposed development. PB Consult was appointed by EnviroAfrica to conduct a Biodiversity Scan of the proposed site.

PB Consult was appointed within the following terms of reference:

- Complete a Biodiversity Scan of the proposed site in order to determine whether any significant features will be impacted as a result of the proposed development.
- Make recommendations on impact minimisation should it be required
- 
- Consider short- to long-term implications of impacts on biodiversity and highlight irreversible impacts or irreplaceable loss of species.

The study includes the following:

- A brief discussion of the local environment in order to give some background on the ecological factors influencing the ecological drivers associated with the specific area.
- A brief discussion of the vegetation types expected and encountered with emphasis on protected species encountered.



- A species list encountered during the site visit.
- Determination of the occurrence, or possible occurrence of threatened or sensitive plant species, and sensitive plant communities, on the basis of the field survey and records obtained from the South African National Biodiversity Institute (SANBI) and available literature.
- Assessment of habitat sensitivity, incorporating faunal distribution on the hand of the field survey and from available literature.
- An evaluation of the potential impact of the proposed project on habitat and species using Van Schoor's method for impact evaluation.
- A discussion of significant impacts focusing on possible mitigation and amendments to the development proposal.

## 2. APPLICABLE LEGISLATION

**Constitution of the Republic of South Africa (1996):** of special relevance in terms of environment is section 24

**Conservation of Agricultural Resources Act 43 of 1983 (CARA):** supports conservation of natural agricultural resources (soil, water, plant biodiversity) by maintaining the production potential of the land and combating/preventing erosion; for example, by controlling or eradicating declared weeds and invader plants.

**Hazardous Substances Act 15 of 1973:** to control substances that may cause injury, ill-health, or death through their toxic, corrosive, irritant, strongly sensitizing or flammable nature, or by the generation of pressure

**National Environmental Management Act 107 of 1998 (as amended):** replaces the Environmental Conservation Act (ECA) and establishes principles for decision-making on matters affecting the environment, and for matters connected therewith.

- **Environmental Impact Assessment Regulations (R543 of 2010):** procedures to be followed for application to conduct a listed activity.

**National Environmental Management: Air Quality Act 39 of 2004 (NEMAQA):** replaces the Atmospheric Pollution Prevention Act (No. 45 of 1965).

**National Environmental Management: Biodiversity Act 10 of 2004 (NEMBA):** supports conservation of plant and animal biodiversity, including the soil and water upon which it depends.

- **National list of ecosystems that are threatened and in need of protection (GN 1002 of 9 December 2011).**

**National Environmental Management: Protected Areas Act 57 of 2003 (as amended Act 31 of 2004) (NEMPAA):** To provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes.

**National Environmental Management: Waste Act 59 of 2008 (NEMWA):** To reform the law regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development.

- **List of Waste Management Activities that have, or are likely to have a detrimental effect on the environment (GN 718 of 3 July 2009):** Identifies activities in respect of which a waste management license is required.

**National Forests Act 84 of 1998 (as amended):** supports sustainable forest management and the restructuring of the forestry sector.

- **List of protected tree species (GN 716 of 7 September 2012)**

**National Heritage Resources Act 25 of 1999:** supports an integrated and interactive system for the management of national heritage resources, including supports soil, water and animal and plant biodiversity.

**National Veld and Forest Fire Act 101 of 1998 (NVFFA):** protects soil, water and plant life through the prevention and combating of veld, forest, and mountain fires

**National Water Act 36 of 1998 (NWA):** promotes the protection, use, development, conservation, management, and control of water resources in a sustainable and equitable manner.

**Northern Cape Nature Conservation Act 9 of 2009 (NCNCA):** To provide for the sustainable utilization of wild animals, aquatic biota and plants.

## **2.1 NORTHERN CAPE NATURE CONSERVATION ACT 9 OF 2009**

On the 12<sup>th</sup> of December 2011, the new Northern Cape Nature Conservation Act 9 of 2009 (NCNCA) came into effect, which also provides for the sustainable utilization of wild animals, aquatic biota and plants. Schedule 1 and 2 of the act give extensive lists of specially protected and protected fauna and flora species in accordance with this act. The NCNCA is a very important Act in that it put a whole new emphasis on a number of species not previously protected in terms of legislation.

It also put a new emphasis on the importance of species, even within vegetation classified as “Least Threatened” (in accordance with GN 1002 of 9 December 2001, promulgated in terms of the National Environmental Management Biodiversity Act 10 of 2004). Thus even though a project may be located within a vegetation type or habitat previously not considered under immediate threat, special care must still be taken to ensure that listed species (fauna & flora) are managed correctly.

### 3. DEFINITIONS & ABBREVIATIONS

#### 3.1 DEFINITIONS

**Construction:** means the period of the project during which the actual works are carried out, deemed to include site establishment, site preparation, the works, maintenance period and decommissioning.

**Construction site:** means the area influenced and affected by the construction activities or under the control of the Contractor often referred to as “the Site”.

**Contaminated water:** means water contaminated by the Contractor's activities, *e.g.* concrete water and runoff from plant/ personnel wash areas.

**Environment:** means the surroundings within which humans exist and that are made up of:

- the land, water and atmosphere of the earth;
- micro-organisms, plant and animal life;
- any part of the combination of the above two bullets and the interrelationships between them;
- the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being

**Environmental Aspect:** any element of any construction activity, product or services that can interact with the environment.

**Environmental Control Officer:** a suitably qualified environmental agent responsible for overseeing the environmental aspects of the Construction phase of the EMP.

**Environmental Impact:** any change to the environment, whether adverse or beneficial, wholly or partially resulting from any construction activity, product or services.

**No-Go Area(s):** an area of such (environmental/aesthetical) importance that no person or activity are allowed within a designated boundary surrounding this area.

**Owner:** the owner, or dedicated person, responsible for the management of the property on which the proposed activity will be performed.

**Solid waste:** means all solid waste, including construction debris, chemical waste, excess cement/concrete, wrapping materials, timber, tins and cans, drums, wire, nails, food and domestic waste (*e.g.* plastic packets and wrappers).

**Precautionary principle:** means the basic principle, that when in doubt or having insufficient or unreliable information on which to base a decision, to then limit activities in order to minimise any possible environmental impact.

**Watercourse:** in this report the author uses a very simplified classification system to define the difference between rivers, streams or a drainage lines encountered in the Northern Cape.

- River: A river is a natural watercourse with a riverbed wider than 3m, usually freshwater, flowing toward an ocean, a lake, a sea or another river. In a few cases, a river simply flows into the ground or dries up completely before reaching another body of water. The flow could be seasonal or permanent.

- Stream: A small river or natural watercourse with a riverbed of less than 3 m, usually freshwater, flowing toward an ocean, a lake, a sea or another river. In a few cases, a river simply flows into the ground or dries up completely before reaching another body of water. The flow could be seasonal or permanent.
- Drainage line: A very small and poorly defined watercourse, mostly on relatively flat areas, which only flows for a short period after heavy rains, usually feeding into a stream or river or dries up completely before reaching another body of water.

### 3.2 ABBREVIATIONS

BGIS	Biodiversity Geographical Information System
CARA	Conservation of Agricultural Resources Act 43 of 1983
CBA	Critical Biodiversity Areas (Municipal)
DAFF	Department of Agriculture Forestry and Fisheries
DEA	Department of Environmental Affairs
DENC	Department of Environment and Nature Conservation (Northern Cape Province)
EAP	Environmental assessment practitioner
EIA	Environmental impact assessment
EMF	(Municipal) Environmental Management Framework
EMP	Environmental management plan
NCNCA	Northern Cape Nature Conservation Act 9 of 2009
NEMA	National Environmental Management Act, Act 107 of 1998
NEMAQA	National Environmental Management Air Quality Act 39 of 2004
NEMBA	National Environmental Management Biodiversity Act, Act 10 of 2004
NEMPAA	National Environmental Management Protected Areas Act 57 of 2003
NEMWA	National Environmental Management Waste Act 59 of 2008
NFA	National Forests Act 84 of 1998
NSBA	National Spatial Biodiversity Assessment
NVFFA	National Veld and Forest Fire Act 101 of 1998
NWA	National Water Act 36 of 1998
SABIF	South African Biodiversity Information Facility
SANBI	South African National Biodiversity Institute
SIBIS	SANBI's Integrated Biodiversity Information System
SKEP	Succulent Karoo Ecosystem Project
WWTW	Wastewater Treatment Works

#### 4. REFERENCES

- Acocks, J.P.H. 1953.** Veld types of South Africa. *Mem. Bot. Surv. .S. Afr.* No. 28: 1-192.
- Alias, D. & Milton S. 2003.** A collation and overview of research information on *Boscia albitrunca* (shepherd's tree) and identification of relevant research gaps to inform protection of the species. Research report done for the Department of Water affairs and Forestry. 18<sup>th</sup> August 2003.
- BVi. 2011.** Business plan for Phase 1A: Mier Municipal housing project. Unpublished report (U10139C) prepared by BVi Consulting Engineers (Upington) for the Mier Municipality. August 2011.
- De Villiers C.C., Driver, A., Brownlie, S., Clark, B., Day, E.G., Euston-Brown, D.I.W., Helme, N.A., Holmes, P.M., Job, N. & Rebelo, A.B. 2005.** Fynbos Forum Ecosystem Guidelines for Environmental Assessment in the Western Cape. Fynbos Forum, c/o Botanical Society of South Africa: Conservation Unit, Kirstenbosch, Cape Town.
- Forsyth, G.G., FJ Kruger, F.J., & Le Maitre, D.C. 2010:** National veldfire risk assessment: analysis of exposure of social, economic and environmental assets to veldfire hazards in South Africa. CSIR Report No: CSIR/NRE/ECO/ER/2010/0023/C. March 2010.
- Government Notice No 1002, 9 December 2011.** National list of Ecosystems that are threatened and in need of protections. In terms of section 52(1)(a) of the National Environmental Management Biodiversity Act, 2004 (Act 10 of 2004).
- Low, A.B. & Rebelo, A.(T.)G. (eds) 1996.** *Vegetation of South Africa, Lesotho and Swaziland.* Dept of Environmental Affairs and Tourism, Pretoria.
- Mucina, L. & Rutherford, M.C. (eds.) 2006.** The vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.
- Raimondo, D., Von Staden, L., Foden, W., Victor, J.E., Helme, N.A., Turner, R.C., Kamundi, D.A. & Manyama, P.A. (eds) 2009.** Red List of South African plants 2009. *Strelitzia* 25. South African National Biodiversity Institute, Pretoria.
- SANBI. 2006.** South African National Botanical Institute: Biodiversity GIS Home. <http://bgis.sanbi.org> (as updated)
- SANBI. 2012.** Red List of South African Plants version 2012.1. Downloaded from Redlist.sanbi.org.
- Seymour, C. & Milton, S. 2003:** A collation and overview of research information on *Acacia erioloba* (Camelthorn) and identification of relevant research gaps to inform protection of the species. Research report done for the Department of Water affairs and Forestry. 31<sup>st</sup> August 2003.
- Siyanda Draft EMF Report. 2008.** Draft Environmental Framework report for the Siyanda District Municipality. A joined project between Siyanda District Municipality, Department of Tourism, Environment and Conservation, Department of Environmental Affairs and Tourism, Northern Cape. In association with MetroGIS & Mosakong Management. 2008.
- Van Rooyen, M.W., Van Rooyen, N.; Bothma, J. du P. & Van Den Berg, H. M. 2008.** Landscapes in the Kalahari Gemsbok National Park, South Africa. Koedoe [online]. 2008, vol.50, n.1, pp. 99-112. ISSN 0075-6458.

## 5. PROJECT DESCRIPTION

The municipality has indicated that there is a pressing need for houses, especially low cost houses, as well as serviced plots within all of the communities within the Mier Municipal Area. This is reflected by the housing backlog contained in the 2009/10 version of the Mier IDP. The backlog within the Mier Municipal area was 1380 (Refer to Table 1). The Mier Municipality does not have the financial- and/or human resources available to initiate this development process on their own. The municipality is supported by COGHSTA (Northern Cape) and BVi Consulting Engineers.

The need in terms of housing of phase 1a, covered in the BVi (2011) business plan, in the Mier area are as follows:

**Table 1: Identified need for low cost housing in the Mier Municipality (BVi, 2011)**

Description	Project	Houses	Town Planning	Geo-Tech	Land Surveying	EIA (1A)
Fill in Houses	Rietfontein	114		114		
	Loubos	55		55		
	Philandersbron	70		70		
	Klein Mier	55		55		
	Loubos	40		40		
	Welkom	70		70		
	Loubos	100		100		
New Developments (Greenfields)	Loubos	178	178	178	178	178
	Welkom	103	103	103	103	103
	Loubos	138	138	138	138	138
	Rietfontein	107	107	107	107	107
	Loubos	100	100	100	100	100
<b>Totals</b>		<b>1130</b>	<b>626</b>	<b>1130</b>	<b>626</b>	<b>626</b>

The Mier Residential Project aims at providing for the need for additional formal Ervin and housing through “in-fill” development within existing build-up areas and the servicing of new areas for formal Ervin (Greenfields). Since the Mier townships were formally planned and developed, before the current EIA legislation, no EIA are needed for existing formal towns (“in fill” development). However, environmental authorization is needed for the development of the new or “greenfield” developments. This biodiversity scan is only applicable to these latter developments.

Greenfield development will entail the construction and placement of all services (water, electricity and sewerage systems) and road infrastructure to service the new town extensions. Since the need for such housing is very apparent this biodiversity study will mainly aim to minimise the environmental impact through correct placement.



## 5.1 METHODS

Desktop studies were conducted, coupled by a physical site visit during September 2012. The timing of the site visit was reasonable in that essentially all perennial plants were identifiable and although the possibility remains that a few species may have been missed, the author is confident that a fairly good understanding of the biodiversity status in the area was obtained.

The survey was conducted by walking through the site and examining, marking and photographing any area of interest (Refer to Figure 1 underneath). Confidence in the findings is high. During the site visit the author endeavoured to identify and locate all significant biodiversity features, including rivers, streams or wetlands, special plant species and or specific soil conditions which might indicate special botanical features (e.g. rocky outcrops or silcrete patches).

Figure 1: Google image indicating the route walked during the site visit as well as GPS reference points taken



A number of the protected tree, *Boscia albitrunca* (Sheppard's tree), were encountered, as well a small streams and drainage lines on some of the sites.

## 6. DESCRIPTION OF ENVIRONMENT

The aim of this description is to put the study area in perspective with regards to all probable significant biodiversity features which might be encountered within the study area. The study area has been taken as the proposed site and its immediate surroundings. During the desktop study significant biodiversity features associated with the larger surroundings was identified, and were taken into account. The desktop portion of the study also informs as to the biodiversity status as classified in the National Spatial Biodiversity Assessment (2004) as well as in the recent National list of ecosystems that are threatened and in need of protection (GN 1002, December 2011), promulgated in terms of the National Environmental Management Biodiversity Act (NEM: BA), Act 10 of 2004. It also aims to take Municipal Environmental Management Frameworks (EMF's) and Municipal Critical Biodiversity Areas (CBA's) into account where applicable.

### 6.1 LOCATION & LAYOUT

Loubos is situated in the central western section of the Mier Municipality on the old road linking Rietfontein with Groot-Mier, northeast of Rietfontein and approximately 264 km north-north-west of Upington in the Northern Cape Province (Siyanda District Municipality) (Figure 2 - 4).

Figure 2: General location of the town within South Africa

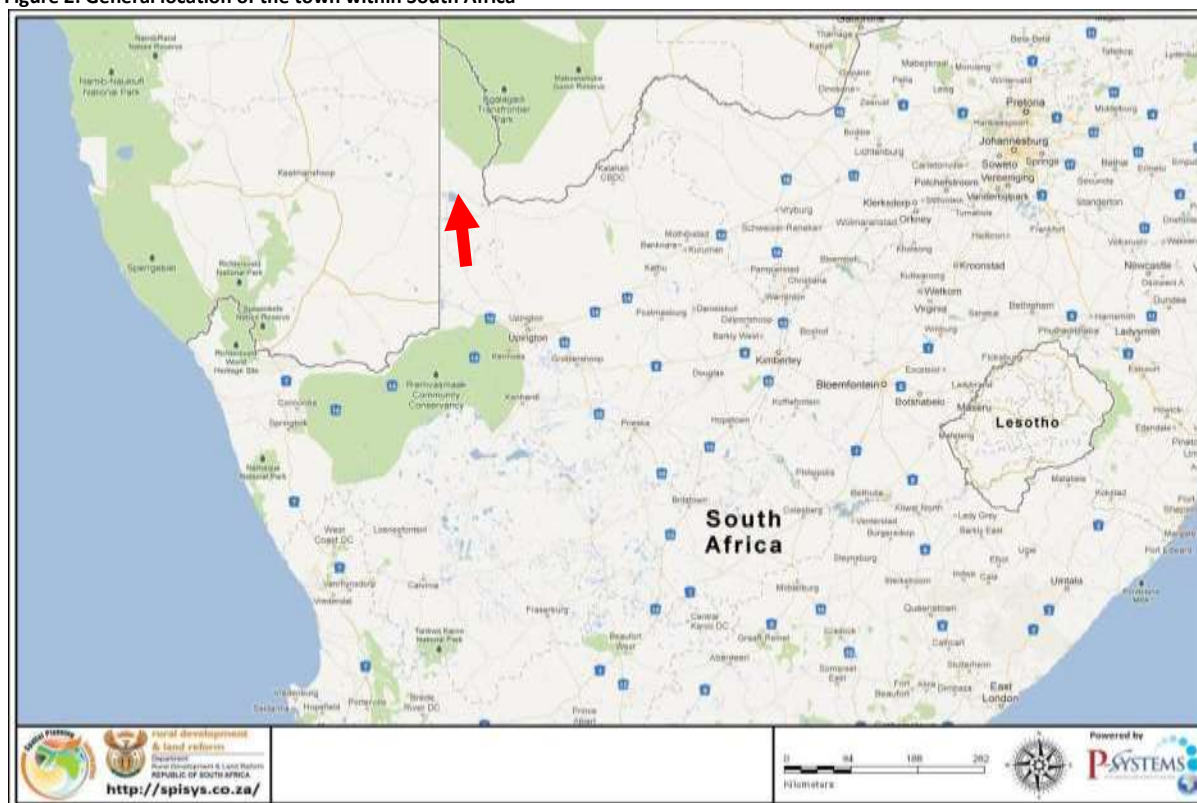


Table 2: GPS coordinates for Loubos, Local settlement and the proposed new development

DESCRIPTION	LATITUDE AND LONGITUDE	ALTITUDE
Loubos Site 1	S26 42 50.4 E20 06 49.8	818 m
Loubos Site 2	S26 42 36.6 E20 07 04.0	817 m
Loubos Site 3	S26 42 30.9 E20 06 42.3	821 m



Figure 3: Showing the town in relation to the immediate surrounding towns



The Municipality in consultation with local town planners proposes to locate the new Ervin on a portion of the Farm 585, Mier Municipality (land owned by the Municipality).

Figure 4: Google image giving an indication of the proposed location for the proposed new developments



Please note that the remainder of Farm 585, Gordonia RD is 1627.3752 ha in extent, of which only 31.8 ha will be involved with the proposed development.

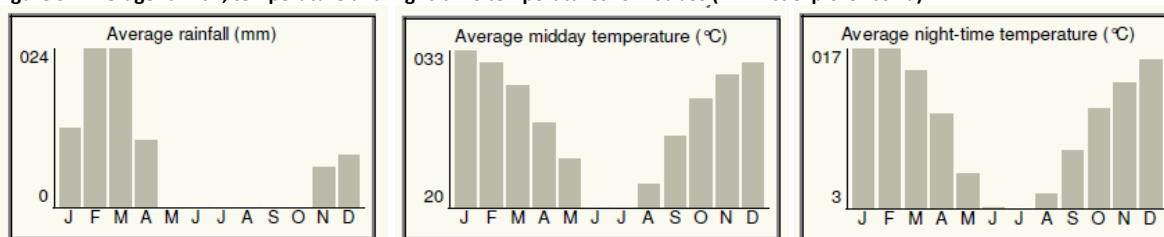
## 6.2 TOPOGRAPHY

The whole of the Loubos settlement is characterised by an extremely flat and hard topography, with a slight downward slope towards the furrow found on its northern boundary. The rest of the study area displays this same flat topography, but is traversed by small furrows due to the site's slight downward slope in an eastern direction. Elevation data in Table 2 shows that the mean elevation of the elevation varies from 817 – 821 m.

## 6.3 CLIMATE

All regions with a rainfall of less than 400 mm per year are regarded as arid. Separate information for Loubos could not be found, but the climate is similar to that of Askham for which the following holds true. Askham normally receives about 84 mm of rain per year, with most rainfall occurring mainly during summer. The chart below (lower left) shows the average rainfall values for Loubos per month. It receives the lowest rainfall (0 mm) in May and the highest (24 mm) in February. The temperatures at Loubos is typical of a desert climate in summer reaching between approximately 30°- 40°C during the day and the middle twenties in the evening. Winter goes to the other end of the scale with daylight temperatures measuring around 20°C and the evenings between 0°- 5°C. The monthly distribution of average daily maximum temperatures (centre chart below) shows that the average midday temperatures for Loubos range from 20°C in June to 33°C in January. The region is the coldest during July when the mercury drops to 2.9°C on average during the night. Consult the chart below (lower right) for an indication of the monthly variation of average minimum daily temperatures ([www.saexplorer.co.za](http://www.saexplorer.co.za)).

Figure 5: Average rainfall, temperature and night-time temperatures for Loubos ([www.saexplorer.co.za](http://www.saexplorer.co.za))



## 6.4 GEOLOGY & SOILS

According to Mucina and Rutherford (2006) and the SANBI Biodiversity Geographical Information System, the geology and soils for this area is described as aeolian sand underlain by superficial silcretes and calcretes of the Cenozoic Kalahari Group. Mostly fixed parallel sand dunes with Af land type almost exclusively (Mucina & Rutherford, 2006). No special soils or geology features (e.g. quartz patches or broken veld), which could support special botanical features, were observed during the site visit (or are expected).

## 6.5 LANDUSE AND COVER

The proposed housing project location is situated within the Eastern Kalahari Bushveld Bioregion. All of these properties are used mainly for livestock grazing and or game farming (Refer to Figure 8). No intensive farming has been observed (lack of irrigation water). At present the proposed site and in fact all of the available Municipal land on the remainder of Erf 122, Loubos is used for livestock grazing by the local community. Although natural fauna and avi-fauna may still be present, it is expected that it would be limited to avi-fauna, insects and maybe some reptile's species. The location of the proposed study area (next to and within the existing Loubos settlement) ensures that very little game is expected to be encountered (none was observed).

All three of the sites has been almost totally degraded or transformed (urban creep and associated activities), with very little natural veld remaining. All three of the sites now basically represents open areas used for playgrounds, informal roads, footpaths and grazing.

The main biodiversity features of this area are:

- the seasonal drainage lines found on site 2 & 3;
- the protected trees observed (e.g. *Boscia albitrunca*).
- Please note one protected species listed in terms of schedule 2 of the Northern Cape Nature Conservation Act (NCNCA) was observed (refer to Paragraph 6.8).

Figure 6: National land cover map indicating the Landcover expected

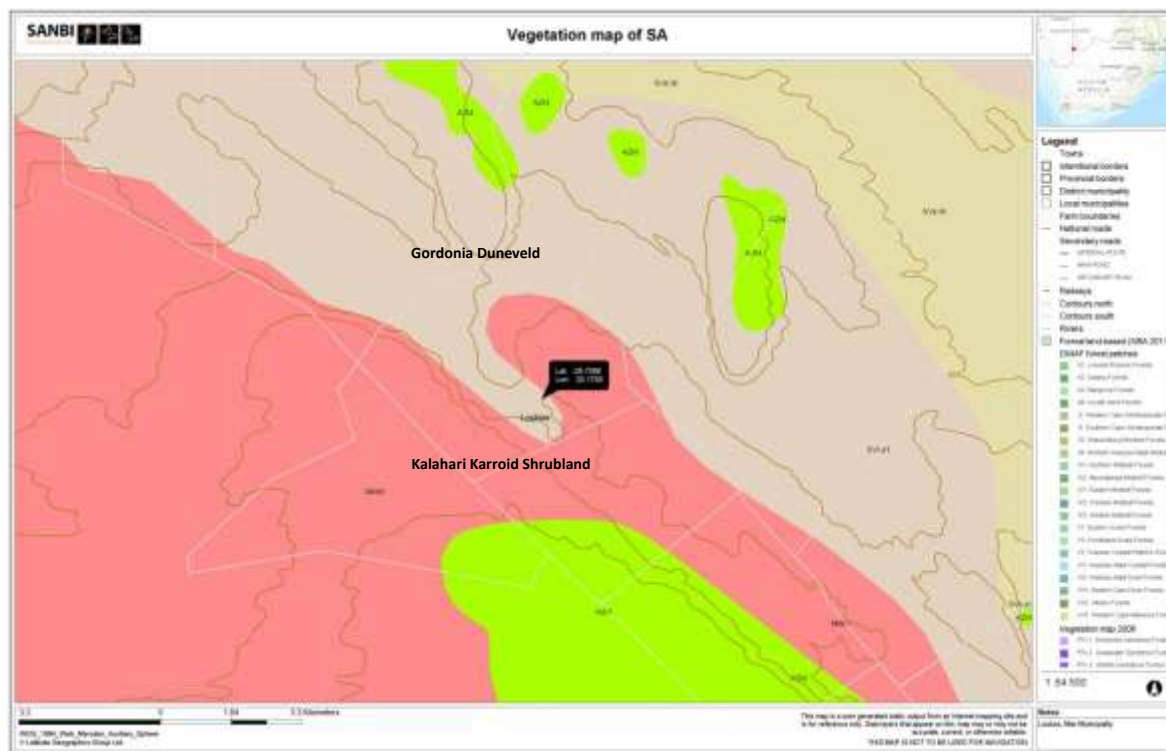


## 6.6 BROAD SCALE VEGETATION TYPES EXPECTED

In accordance with the 2006 Vegetation map of South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2006) two broad vegetation types is expected on the sites, namely *Gordonia Duneveld* (Brown in Figure 7) and

Kalahari Karroid Shrubland (Pink in Figure 7). However, very little natural veld remains on any of the sites and as a result the vegetation types will not be discussed in any detail.

Figure 7: Vegetation map of SA, Lesotho and Swaziland (2006)



According to the *National list of ecosystems that are threatened and in need of protection* (GN 1002, December 2011), both Gordonia Duneveld and Kalahari Karroid Shrubland are classified as “Least Threatened”.

Table 3: Vegetation status according to the 2004 National Spatial Biodiversity Assessment

VEGETATION TYPE	NATIONAL STATUS 2011	REMAINING	CONSERVATION TARGET	FORMALLY CONSERVED
Gordonia Plains Shrubland	Least Threatened	99.2 %	21 %	0.1 %
Gordonia Duneveld	Least Threatened	99.8 %	16 %	14.2 %

#### 6.6.1 *Gordonia Duneveld*

Gordonia Duneveld is described as occurring on parallel dunes about 3-8 m above the plains. Open shrubland with ridges of grassland dominated by *Stipagrostis amabilis* on the dune crests and *Acacia haematoxylon* on the dune slopes, also with *A. mellifera* on lower slopes and *Rhigozum trichotomum* in the interdune strata.

According to Mucina & Rutherford (2006), important taxa include the following: Small Tree: *Acacia mellifera* subsp. *detinens*; Tall Shrubs: *Grewia flava* and *Rhigozum trichotomum*; Low Shrubs: *Aptosimum albomarginatum*, *Monechma incanum* and *Requienia sphaerosperma*; Succulent Shrubs: *Lycium bosciifolium*, *L. pumilum* and *Talinum cafferum*; Graminoids: *Schmidtia kalahariensis*, *Brachiaria glomerata*, *Bulbostylis hispidula*, *Centropodia glauca* (Kalahari-Gha Grass), *Eragrostis lehmanniana*, *Stipagrostis ciliata*, *S. obtusa* and



*S. uniplumis*; Herbs: *Hermbstaedtia fleckii*, *Acanthosicyos naudinianus*, *Hermannia tomentosa*, *Limeum arenicolum*, *L. argute-carinatum*, *Oxygonum dregeanum* subsp. *canescens* var. *canescens*, *Sericorema remotiflora*, *Sesamum triphyllum* and *Tribulus zeyheri*.

Biogeographically important taxa (Kalahari endemics) include: Tall Shrub: *Acacia haematoxylon*; Graminoids: *Stipagrostis amabilis*, *Antheophora argentea* and *Megaloprotachne albescens*; Herbs: *Helichrysum arenicola*, *Kohautia ramosissima* and *Neuradopsis austro-africana*.

#### 6.6.2 Kalahari Karroid Shrubland

The vegetation type is described as low Karroid shrubland on flat, gravel plains. Karoo elements meet here with northern floristic elements, indicating a transition to the Kalahari region and sandy soils.

Important taxa includes the Small Tree: *Acacia mellifera*, *Parkinsonia africana* and *Boscia foetida*; Tall Shrubs: *Rhigozum trichotomum*; Low Shrubs: *Hermannia spinosa*, *Limeum aethiopicum*, *Phaeoptilum spinosum*, *Aizoon schellenbergii*, *Aptosimum albomarginatum*, *A. lineare*, *A. marlothii*, *A. spinescens*, *Barleria rigida*, *Hermannia modesta*, *Indigorera heterotricha*, *Monechma genistifolium*, *Tephrosia dregeana* etc.; Herbs: *Dicoma capensis*, *Chamaesyce inaequilatera*, *Amaranthus praetermissus*, *Barleria lichtensteiniana*, *Cucumis africanus*, *Geigeria ornativa*, *Hermannia abrotanoides*, *Monsonia umbellata*, *Sesamum capense* etc.; Succulent Herbs: *Giseka africana*, *G. pharnacioides* and *Trianthema parvifolia*; Graminoids: *Aristida adensionis*, *Enneapogon desvauxii*, *Eragrostis annulata*, *E. homomalla*, *E. porosa*, *Schmidtia kalahariensis*, *Stipagrostis anomala*, *S. ciliata*, *S. uniplumis* and *Tragus racemosus*.

### 6.7 VEGETATION ENCOUNTERED

The following is a discussion of the vegetation and other significant environmental features encountered on site. The author did not attempt to identify all species but rather concentrated on identifying and marking protected plant species or any other biodiversity feature of significance.

#### 6.7.1 Loubos site 1

The purpose of this site is to formalise the existing community hall, sport grounds and school already located on these properties. These facilities have been in existence for a long time and will be included in the layout in order to accommodate it on an individual property zoned as Authority zone. This zoning will allow for future community facilities on the property as well.

From an environmental viewpoint, both these properties are basically transformed and only support natural vegetation in the form of hardy species that were able to resist the associated urban pressures.

Figure 8: Loubos Site 1 – Existing community hall, sport fields and school



Apart from a few indigenous *Acacia* species no other species of interest were encountered on the school grounds (Photo 1). A number of *Prosopis* trees was encountered which should be removed.

Photo 1: Loubos school grounds



Photo 2: Loubos community hall and sport fields







Of ecological interest on the grounds covered by the community hall and sporting grounds is a large *Acacia* cf. *karroo*, one beautiful individual of *Boscia albitrunca* (Sheppard's tree) as well as a number of low *Boscia foetida* individuals. Outside the property a number of other species were encountered, which includes: *Aptosimum spinescens*, *Acacia hebeclada*, *Cadaba aphylla*, *Hermannia* species, *Kleinia longiflora*, *Radyera urens*, *Rhigozum trichotomum*, *Ziziphus mucronata*.

#### 6.7.2 Loubos Site 2

Ecologically speaking, of the 3 proposed site, this is most probably the in the better general condition, but could still only be described as heavily disturbed and dominated by *Prosopis* trees. The southern portion of this site is used as a sporting field as well as an informal dumping site, while numerous footpaths criss-cross the property.

Figure 9: Google overview of the proposed Loubos Site 2, indicating the drainage corridor in blue



Natural vegetation was in poor condition and no protected species was observed on the site. However, a prominent drainage channel crosses the property (Figure 9 and Photo 5).

Photo 3: Loubos site 2 - looking over the southern portion of the proposed site (from east to west)



Again only hardy woody species remain, which is dominated by the listed invasive *Prosopis* tree. The remaining woody species includes: *Acacia hebeclada*, *Lycium cf. bosciifolium*, *Acacia cf. karroo*, *Ziziphus mucronata* and *Rhigozum trichotomum*.

Photo 4: Loubos Site 2 – A view of the site from northwest to southeast



Photo 5: Loubos Site 2 – A view of the drainage furrow indicated on figure 9 (looking from east to west)



Other species encountered included one of the *Aptosimum spinescens*, *Zygophyllum* species and *Kleinia longiflora*. The east-west drainage furrow shown in Picture 5 and the larger seasonal stream north of the proposed site are probably the only features of some biodiversity significance. Both of these are already impacted to some degree. The larger dry stream to the north of the property will not be impacted by the proposed development, but should be protected with a river corridor. The smaller furrow in the southern



portion of the proposed site, depicted in Photo 5, should also be considered for protection (if possible) or must be considered in the storm water design.

### 6.7.3 Loubos Site 3

The proposed site 3 is located to the northwest of Loubos and is enclosed to the south, west and east, with existing housing development and as a result site 3 are also heavily impacted and basically transformed. Again only hardy woody species remains, including a number of protected *Boscia* trees. There is also a seasonal stream to the north of the proposed site, which must be considered as a significant biodiversity feature.

Figure 10: A Google overview (proposed Loubos Site 3), indicating the stream to the north and significant features encountered



Photo 6: Loubos Site 3 – A view over the site (northwest to southwest)



The remaining vegetation consisted of mostly of woody shrubs and small trees found as single remaining individuals sparsely scattered throughout the property. Next to the seasonal stream shrubs and trees were more concentrated and included a number of *Boscia albitrunca* (Refer to Table 5 and Figure). Other species

encountered scattered throughout the site includes a number of the invasive alien *Prosopis* tree as well as the following indigenous species: *Acacia hebeclada*, *Aptosimum spinescens*, and *Kleinia longiflora*, *Lycium cf. bosciifolium*, *Rhigozum trichotomum*, *Ziziphus mucronata* and *Zygophyllum species*.

Photo 7: Loubos Site 3 – A view of the river to the north of the proposed site



#### 6.7.4 Flora

Please note that this study never intended to be full botanical assessment. However, a scan of significant species was done during the site visit, and even though the author does not claim that all species encountered were identified, all efforts were made to do just that. All three of the sites were basically transformed as a result of urban associated activities and as a result, very low species diversity was encountered. Grasses were almost absent, which can most probably be ascribed to constant grazing and very low rainfall.

Table 4: List of species encountered on the sites (excluding grass species)

SPECIES NAME	COMMON NAME	FAMILY	STATUS
<i>Acacia hebeclada</i>	Trassiebos	FABACEAE	
<i>Acacia karroo</i>	Soetdoring	FABACEAE	
<i>Aptosimum spinescens</i>	Doringviooltjie	SCROPHULARIACEAE	
<i>Boscia albitrunca</i>	Sheppard's tree	CAPPARACEAE	Protected in term of the NFA
<i>Boscia foetida</i>	Stinkwitgat	CAPARACEAE	Protected in terms of NCNCA (Schedule 2)
<i>Cadaba aphylla</i>	Swartstorm	CAPARACEAE	
<i>Hermannia species</i>		STERCULIACEAE	
<i>Kleinia longiflora</i>	Sjambokbos	ASTERACEAE	
<i>Lycium cf. bosciifolium</i>	Slapkriedoring	SOLANACEAE	
<i>Prosopis grandulosa</i>	Honey mesquite	FABACEAE	Category 2 invader
<i>Radyera urens</i>	Wilde kalbas	MALVACEAE	
<i>Rhigozum trichotomum</i>	Driedoring	BIGNONIACEAE	
<i>Tribulus terrestris</i>	Dubbeltjie	ZYGOPHYLLACEAE	Weed
<i>Ziziphus mucronata</i>	Blinkblaar wag-'n-bietjie	RHAMNACEAE	

An almost total lack of bulb and succulent species was consistent throughout the site, and only single individuals of *Aptosimum spinescens*, *Cadaba aphylla* (outside site 1), *Hermannia*, *Kleinia longiflora*, *Radyera urens* (outside site 1), and *Zygophyllum* were encountered. Hardy woody species are basically the only remaining vegetation, of which the alien invasive *Prosopis* tree is one of the dominant species. *Acacia hebeclada*, *Kleinia longiflora*, *Lycium*, *Rhigozum trichotomum* are relative abundant, with single individuals of *Ziziphus mucronata* (mostly near one of the seasonal streams) was also encountered. A number of the protected *Boscia albitrunca* and *B. foetida* tree/shrubs were observed (Site 1, & Site 3).

## 6.8 SIGNIFICANT AND/OR PROTECTED PLANT SPECIES

**Loubos Site 1:** Features of ecological importance on this site are the presence of the *Boscia albitrunca* tree (protected in terms of NFA) and *Boscia foetida* individuals (Protected in terms of NCNCA, Schedule 2). However, all mature indigenous tree species should be regarded as of ecological importance and should be considered for conservation. NB: Please note that no further development is planned on Site 1, and it will presently only be formally rezoned in accordance with the Northern Cape Planning and Development Act, 7 of 1998 (thus no further development or impact anticipated).

**Loubos Site 2:** Natural vegetation was in poor condition and no protected species was observed on the site.

**Loubos Site 3:** Natural vegetation is heavily impacted and basically transformed. Again only hardy woody species remains, but this includes a number of protected *Boscia albitrunca* trees.

The National Forests Act of 1998 (Act 84 of 1998) provides for the protection of forests as well as specific tree species (GN 716 of 7 September 2012). **One listed protected species (namely *Boscia albitrunca*) were encountered within the study area.** Refer to Table 6 for location data on the individual trees encountered.

Table 5: NFA protected tree species with a geographical distribution that may overlap the broader study area

SPECIES NAME	COMMON NAME	TREE NO.	DISTRIBUTION
<i>Acacia erioloba</i>	Camel Thorn Kameeldoring	168	In dry woodlands next to water courses, in arid areas with underground water and on deep Kalahari sand
<i>Boscia albitrunca</i>	Shepherds-tree Witgat/Matopie	130	Occurs in semi-desert and bushveld, often on termitaria, but is common on sandy to loamy soils and calcrete soils.
<i>Acacia haematoxylon</i>	Grey Camel Thorn Vaalkameeldoring	169	In bushveld, usually on deep Kalahari sand between dunes or along dry watercourses.

In addition to the above the Northern Cape Nature Conservation Act 9 of 2009 (NCNCA) came into effect on the 12<sup>th</sup> of December 2011, which also provides for the sustainable utilization of wild animals, aquatic biota and plants. Schedule 1 and 2 of the act give extensive lists of specially protected and protected fauna and flora species in accordance with this act. One protected species, in terms of schedule 2, was encountered within the proposed site, namely *Boscia foetida*.

Table 6 gives the GPS co-ordinates of the protected trees encountered within the site and Figure 8 & 10 for location on the two sites.

Table 6: A list of protected trees encountered during the site visit, referenced by GPS waypoints (WG84 format)

Waypoint no.	SPECIES NAME	COMMON NAME	NUMBER OF TREES	LOCATION
112	<i>Boscia albitrunca</i>	Sheppard's tree		S26 42 27.8 E20 06 36.6
113	<i>Boscia albitrunca</i>	Sheppard's tree		S26 42 27.2 E20 06 36.4
114	<i>Boscia albitrunca</i>	Sheppard's tree		S26 42 26.4 E20 06 37.9
115	<i>Boscia albitrunca</i>	Sheppard's tree		S26 42 25.8 E20 06 38.3
116	<i>Boscia albitrunca</i>	Sheppard's tree		S26 42 25.4 E20 06 38.7
117	<i>Boscia albitrunca</i>	Sheppard's tree		S26 42 25.9 E20 06 38.9
118	<i>Boscia albitrunca</i>	Sheppard's tree		S26 42 26.2 E20 06 39.5
119	<i>Boscia albitrunca</i>	Sheppard's tree		S26 42 26.4 E20 06 39.6
120	<i>Boscia albitrunca</i>	Sheppard's tree		S26 42 26.6 E20 06 39.5
121	<i>Boscia albitrunca</i>	Sheppard's tree		S26 42 26.0 E20 06 41.7
122	<i>Boscia albitrunca</i>	Sheppard's tree		S26 42 44.7 E20 06 59.1
123	<i>Boscia foetida</i>	Stinkwitgat		S26 42 44.8 E20 06 57.8
124	<i>Boscia foetida</i>	Stinkwitgat		S26 42 44.8 E20 06 56.2
125	<i>Boscia foetida</i>	Stinkwitgat		S26 42 45.3 E20 06 56.3

### 6.8.1 *Sheppard's tree*

Photo 6 show a beautiful full grown Sheppard's tree encountered on site. According to Alias & Milton (2003) *Boscia albitrunca* is a keystone species in arid southern Africa, where it primarily provides browse to livestock and game, shade and food and shelter to other animals including invertebrates and birds. The laws of numerous African traditions strictly prohibit destruction of this tree. The wood is not favoured as a fuel wood and has no commercial value, although it is sometimes used in rural areas for making household items such as tables, chairs, spoons and dishes.

This species is under threat, however, owing to intense use of its branches to supplement livestock feed, particularly in times of drought. Its nutritious foliage suggests that this species obtains nutrients from ground water and perhaps also from the concentration of nutrients beneath its canopy because of animal activities. It therefore contributes to nutrient cycling in mainly oligotrophic sands, as well as performing other ecological services such as reducing nutrient leaching, mitigating soil degradation, preventing soil erosion, sequestering carbon and replenishing organic matter.

This species is observed to establish beneath other large trees within its environment, primarily *A. erioloba*, which serve as resting and perch sites for animals and birds, making the species dependent on large tree species in arid savannah. Therefore, threats to species that provide these micro-sites also constitute a threat to *B. albitrunca*. Within the arid Kalahari, indiscriminate removal of Camelthorn (*Acacia erioloba*) trees could reduce the availability of suitable germination sites (Alias & Milton, 2003).

## 6.9 FINE-SCALE MAPPING (CBA's)

Although a draft version of the Siyanda District Municipal, Environmental Management Framework (EMF) is available it has not been approved or published. No fine-scale mapping is as yet available for this area and as a result no critical biodiversity areas or biodiversity support areas has been promulgated for this area.

However, the proposed priorities for conservation in the Siyanda District is depicted on Maps 12a (Refer Figure 15) and 12b within this document, based on local occurrence, the national conservation target, the national ecosystem status and the national protection level of the vegetation types. A proposal is made for the prioritisation of vegetation types in the Siyanda District.

The landcover of the Siyanda district reflects the results of the 2000 national landcover determination and is depicted on Map 13 from which it is evident that most of the area is in a natural state and the most significant spatial impact on the environment has come from mining which occupies an area of almost 7% of the total area.

A sensitivity index is shown on Map 14 of the Draft EMP. The main factors that were used to compile the index include the following:

- The erosion potential of soil where soils with a high erosion potential were awarded a sensitivity of 1;
- The conservation priority of veld types for veld types with a medium conservation priority were awarded a sensitivity count of 1 those with a high conservation priority were awarded a count of 2 and those with a very high conservation priority were awarded a count of 3;
- Topographical areas with a high variance in shape and form were awarded a sensitivity count of 1;
- All watercourses, drainage lines and pans (including a 32m buffer on either side) were awarded a sensitivity count of 2; and
- All transformed areas were awarded a sensitivity count of -1.

Environmental control zones are depicted on Map 15 of the EMF. The purpose of environmental control zones is to indicate areas that require a specific type or regime of control due to unique environmental elements that occur in these areas. It may or may not be linked to the application of EIA legislation and should be dealt with at a more strategic level where it should serve as a guide for decision-making and planning.

### 6.9.1 Summary of findings according to the EMF

According to the Siyanda Environmental Management Framework the proposed site falls within the following categories according to the various maps.

**Conservation priority areas:** According to Map 12a the site falls within an area regarded as having a High (3) conservation priority (shrublands). According to Map 12b, the site, however, does not fall within a proposed conservation area.

**Landcover:** According to Map 13 of the Draft EMF, it would seem as if the proposed site falls within the area marked as Shrubland.

**Sensitivity Index:** According to Map 14 of the Draft EMF, the proposed site falls within an area identified as of low environmental sensitivity (0-1) in an index which starts at Transformed and then are given values of 0-8 (8 being of high environmental sensitivity).

**Control Zones:** According to Map 15, the proposed site location falls mainly within a control zone 7 area, which is described as a Low control zone. (This zone is relatively less sensitive than the other zones and no special parameters, except those already implemented or required by law, are proposed for this zone). A portion of the development may however, also fall within a control zone 2, which is regarded as areas of potential wind erosion.

#### 6.9.2 Key Environmental issues identified in the EMF

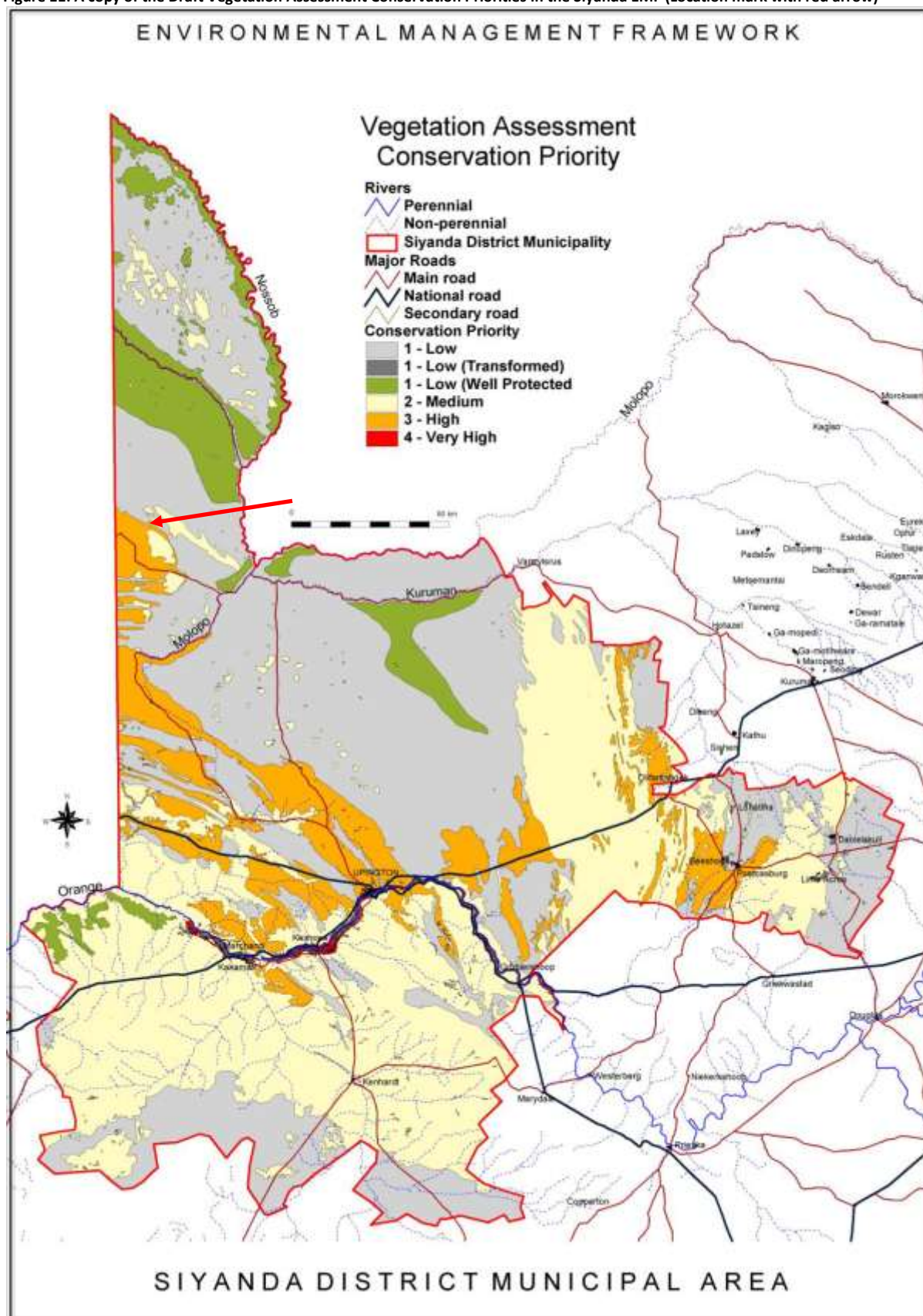
The following are considered to be the main environmental issues that may cause negative impacts and have to be addressed in the EMF:

- The conservation of the remaining Lower Gariep Alluvial Vegetation along the Orange River;
- the protection of vegetative groundcover across the area against overgrazing and other activities such as 4x4 and quad bike driving;
- the effect that inappropriate irrigation may have on the salination of soil in places;
- the provision of services, especially water to small populations in remote areas that may be unsustainable over the long term;
- the extensive use of firewood for cooking and heating that may be a threat to especially the protected Camel Thorn trees in places; and
- the rehabilitation of mining areas, especially along scenic routes that may have potential for further tourism development.

According to the EMF maps and the summary underneath the main environmental issues identified for the broad scale area would be the medium conservation status given to shrubland in good condition.



Figure 11: A copy of the Draft Vegetation Assessment Conservation Priorities in the Siyanda EMF (Location mark with red arrow)



### 6.10 FAUNA AND AVI-FAUNA

Although natural fauna and avi-fauna may still be present, it is expected that it would be limited to avi-fauna, insects and maybe some reptile's species. Because of the proximity to the town of Loubos and the current land-use it is not expected that game will be encountered in the vicinity of the site (none has been observed). However, it is a known fact that many animal and bird species associate with large *Acacia erioloba* as well as *Boscia albitrunca* trees and the removal of mature trees of these species will have an impact on such wildlife (even though very localised).

**Mammals:** The site falls within the distribution range of approximately 50 mammal species indicating moderate diversity. Human activity in the area is medium-high and it is highly unlikely that a fair representation of these mammals will be found on the property. Even though the impact will be permanent, it is highly unlikely that it will pose a significant impact on mammal species and as a result the impact is deemed negligible.

**Reptiles:** The site falls within the distribution range of approximately 30 reptile species, indicating low diversity. As a result of the open planes on site the reptile composition is likely to be dominated by species which inhabit open areas, such as snakes, lizards and geckos. Human activity in the area is medium-high and it is highly unlikely that large numbers of these species will be present on site. As such, the impact on reptiles should be negligible.

**Amphibians:** The site falls within the distribution range of approximately 10 amphibian species. However, no suitable breeding places were observed on the proposed site and it is highly unlikely that the proposed development will have any significant impact on amphibian species. In addition, most amphibians require perennial water and will thus not be affected at all.

**Avi-fauna:** The site falls within the distribution range of approximately 200 bird species known from the broad area. But because of the medium-high human activity it is not expected that a fair representation of these species will be encountered on site or its immediate vicinity. Apart from the possible impact on mature trees (mentioned above) the proposed activity is not expected to have a significant impact on avi-fauna. However, it remains important that all larger indigenous trees must be protected wherever possible in order to minimise the possible impact (although localised) on bird species.

### 6.11 RIVERS AND WETLANDS

Rivers maintain unique biotic resources and provide critical water supplies to people. South Africa's limited supplies of fresh water and irreplaceable biodiversity are very vulnerable to human mismanagement. Multiple environmental stressors, such as agricultural runoff, pollution and invasive species, threaten rivers that serve the world's population. River corridors are important channels for plant and animal species movement,

because they link different valleys and mountain ranges. They are also important as a source of water for human use. Vegetation on riverbanks needs to be maintained in order for rivers themselves to remain healthy, thus the focus is not just on rivers themselves but on riverine corridors.

With the exception of the Orange River all the rivers in the Siyanda District Municipal area are non-perennial rivers and the last recordings of flows in the lower reaches of the Molopo and Kuruman Rivers were in 1933 and again in the 1974/5 and 1975/6 season. There are no formal rivers on the proposed site, but a number of drainage channels and small streams draining water from the area. Although most of these drainage lines are basically storm water channels with little riparian vegetation they should still be seen as significant biodiversity features, which should be protected by adequate river corridors.

The seasonal Swartbas River, runs just south of Loubos, and because of the flatness of the area in the Loubos vicinity pans might occur during heavy rain, especially to the south of the small town. There are no formal rivers on any of the proposed site, but a seasonal stream runs just north of the proposed site 3 (a 32 m corridor should be observed) and a larger drainage furrow runs just north of the proposed site 2 (not impacted by the proposed development). One smaller furrow was also observed within the proposed site 2. Ideally this furrow should also be protected, but as it is relative small with very little associated riparian vegetation, it could also be incorporated within a storm water system.

#### 6.12 INVASIVE ALIEN INFESTATION

A large number of *Prosopis grandulosa* (a category 2 invader) were encountered scattered throughout the town of Loubos. According to regulation 15 and 16 of CARA all category 2 plants has the proven potential of becoming invasive, but may have certain beneficial properties. The regulations makes provisions for category 2 plants to be retained in special areas demarcated for that purpose, but those occurring outside demarcated areas must be controlled.

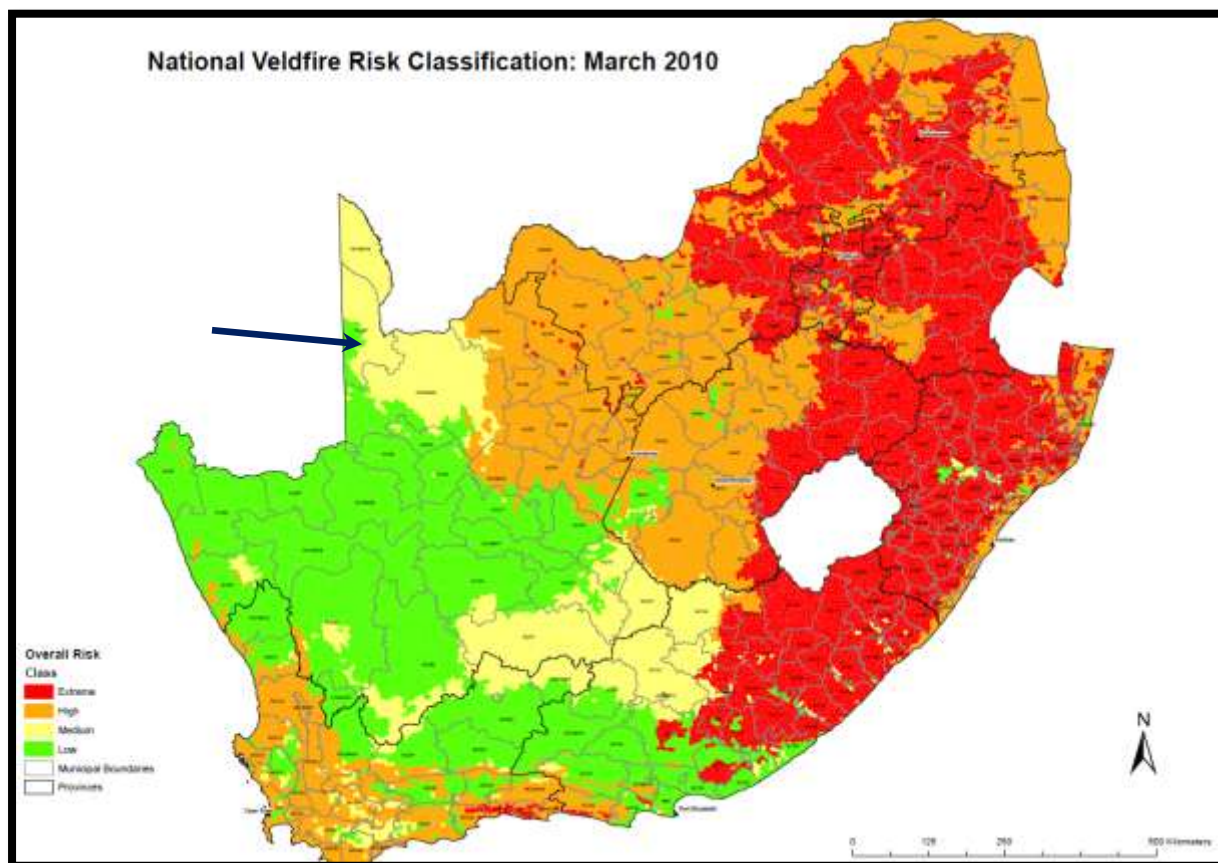
In this case all *Prosopis* individuals should be removed.

#### 7. VELD FIRE RISK

Loubos is situated on the border between Kalahari Karroid Shrubland and Gordonia Duneveld. Kalahari Karroid Shrubland is part of the Nama Karoo Biome, which is not prone to fire, but Gordonia Duneveld is part of the Savanna Biome (Mucina & Rutherford, 2006) which is prone to veldfires. According to Forsyth (2010), the main fire issue relates to its effects on the number and size of woody plants in the savanna mixture, which in turn determines the productivity and quality of the grasses. Frequent, high-intensity fires suppress trees and thus promote grasses, while protection from fire, and lower intensity fires (often associated with high levels of grazing, and correspondingly lower grass fuel loads) allows woody plants to increase, the widespread "bush

encroachment” phenomenon. According the revised veldfire risk classification of March 2010 (Forsyth, 2010) in terms of the National Veld and Forest Fire Act 101 of 1998, the site is located in an area classified as a **“Low–Medium Fire Risk”** area.

Figure 12: South African National Veldfire Risk Classification (March 2010)



The purpose of the revised fire risk classification is to serve as a national framework for implementing the National Veld and Forest Fire Act, and to provide a basis for setting priorities for veldfire management interventions such as the promotion of and support to Fire Protection Associations. In the fire-ecology types and municipalities with High to Extreme fire risk, comprehensive risk management strategies are needed.

Loubos is situated in the Mier local Municipal area and has a **low-medium fire risk classification**. Although, the fire risk is not considered high or extreme it is still important that during construction and operation the site must adhere to all the requirements of the local Fire Protection Association (FPA) if applicable, or must adhere to responsible fire prevention and control measures.



## 7.1 SIGNIFICANT BIODIVERSITY FEATURES ENCOUNTERED

The table underneath gives a summary of biodiversity features encountered during the site visit and a short discussion of their possible significance in terms of regional biodiversity targets.

**Table 7: Summary of biodiversity features encountered and their possible significance**

BIODIVERSITY ASPECT	SHORT DESCRIPTION	SIGNIFICANCE RATING
Geology & soils	Geology & soils vary only slightly in the larger study area, with sandy soils found over most of the area.	No special features have been encountered (e.g. true quartz patches or broken veld) and the impact on geology and soils is expected to be very localised and low. In addition much of the area is already impacted. <b>Impact = low</b>
Land use and cover	Transformed with very little natural veld remaining, utilised for urban settlement and stock grazing.	All of the sites have been heavily impacted (basically transformed) as a result of urban settlement and associated activities. As long as the protected species is incorporated within the layout design the impact is expected to be <u>low and localised</u> .
Vegetation types	Kalahari Karroid Shrubland	Classified as “Least threatened”, but according to the draft Siyanda EMF, shrubland in good condition is given a high conservation priority, but the specific site does not fall within a proposed conservation area or a CBA area and was given a very low (0-1) environmental sensitivity classification. <b>Impact low.</b>
Conservation priority areas.	In terms of the draft Siyanda EMF	According to the EMF the site also does not fall within a proposed conservation area. <b>Impact low/localised.</b>
Sensitivity index	In terms of the draft Siyanda EMF	According to the EMF, the proposed site falls within an area identified as of very low environmental sensitivity (0-1). <b>Impact low</b> and localised.
Protected plant species	Protected species observed. 11 x <i>Boscia albitrunca</i> (protected in terms of NFA) 3 x <i>Boscia foetida</i> (Protected in terms of NCNCA).	Protected tree species was observed on site (both <i>Boscia albitrunca</i> & <i>B. foetida</i> ). Fortunately almost all of the trees are located just outside of any of the proposed development areas. However, on the proposed Site 3, a number of <i>Boscia albitrunca</i> is found next to the drainage furrow to the north of the site. If a 32m corridor is observed along this stream, no protected species should be impacted.  If the corridor is observed, the impact is expected to be much reduced (only single individuals) and may be regarded as local and relative <u>low</u> .  However, if the protected species are to be removed the impact will be a much more significant <u>medium</u> (although still localised).
Fauna & Avi-fauna	The site is used for live-stock grazing and is in close proximity to constant human activity.	Although natural fauna and avi-fauna may still be present, it is expected that it would be limited to avi-fauna, insects and maybe some reptile's species (proximity to the town of Loubos and the current land-use). Apart from the possible impact on mature trees and the associated impact on wildlife the activity is not expected to have a significant impact on fauna or avi-fauna. <b>Impact low.</b>
Rivers & wetlands	The site is used for live-stock grazing and is in close proximity to constant human activity.	Although natural fauna and avi-fauna may still be present, it is expected that it would be limited to avi-fauna, insects and maybe some reptile's species (proximity to the town of Loubos and the current land-use). Apart from the possible impact on mature trees and the associated impact on wildlife the activity is not expected to have a significant impact on fauna or avi-fauna. <b>Impact low.</b>
Invasive alien infestation	One drainage furrow observed in Site 2 (seasonal streams outside of footprint)	Although most of these drainage lines are basically storm water channels with little riparian vegetation they should still be seen as significant biodiversity features, which should be protected by adequate river corridors. <b>Impact low.</b>
Erosion	Prosopis species was observed	All invasive alien species must be removed during the construction. <b>Impact positive.</b>

In summary, the proposed sites is all located on highly disturbed areas (grazing and urban creep) with little natural veld remaining. If protected species are all retained, the impact on individual species is regarded as very low, the impact on sensitive habitats is regarded as low to very low, the impact on ecosystem function is regarded as very low (but erosion prevention measures must be assured), cumulative impact on ecology is regarded as very low and finally the impact on economic use of the vegetation is regarded as very low.

## 8. BIODIVERSITY ASSESSMENT

Biological diversity, or biodiversity, refers to the variety of life on Earth. As defined by the United Nations Convention on Biological Diversity, it includes diversity of ecosystems, species and genes, and the ecological processes that support them. Natural diversity in ecosystems provides essential economic benefits and services to human society—such as food, clothing, shelter, fuel and medicines—as well as ecological, recreational, cultural and aesthetic values, and thus plays an important role in sustainable development. Biodiversity is under threat in many areas of the world. Concern about global biodiversity loss has emerged as a prominent and widespread public issue.

The objective of this study was to evaluate the biological diversity associated with the study area in order to identify significant environmental features which should be avoided during development activities and or to evaluate short and long term impact and possible mitigation actions in context of the proposed development.

As such the report aim to evaluate the biological diversity of the area using the Ecosystem Guidelines for Environmental Assessment (De Villiers *et. al.*, 2005), with emphasis on:

- Significant ecosystems
  - Threatened or protected ecosystems
  - Special habitats
  - Corridors and or conservancy networks
- Significant species
  - Threatened or endangered species
  - Protected species

### 8.1 NATURE OF THE IMPACT

The construction of the proposed low cost housing entails:

- the layout planning and location of the proposed housing within the larger site;
- clearing of the footprint (including topsoil);
- installation of Municipal works (water, sewerage and electricity) and associated infrastructure (e.g. roads);
- construction of housing; and
- rehabilitation of the construction footprint (outside the designated housing area) on completion of the project.

#### 8.1.1 Parameters of the impact

Extent of the impact:       Local.

Duration of the impact:    Permanent

- Probability or likelihood: The probability or likelihood that the impact will occur if the project is approved is very likely.
- Severity of the impact: The severity of the impact is considered to be medium to low depending on the impact minimisation actions implemented.

### 8.1.2 Possible issues / impacts associated with construction

The following possible environmental impacts were identified while doing the site visit and discussing the project with the engineers and land-owners:

- The possible impact on protected species in terms of the NFA.
- The possible impact on protected plant species as described in the “List of protected tree species” (GN 716 of 2012) and the “Protected Species” list (Schedule 1 & 2 of the NC Nature Conservation Act 9 of 2009).
- Establishment of a construction camp and site offices as well as the possibility of labourer’s facilities during construction.
- Temporary storage areas.
- Waste management and control.

## **8.2 EVALUATION OF SIGNIFICANT IMPACTS**

The main drivers in this vegetation type would be fire and grazing pressure (herbivore), and could largely determine plant community composition and occurrence of rare species. Grazing may be an important factor in regulating competitive interaction between plants (e.g. *Acacia mellifera* encroachment is often seen as a sign of overgrazing or bad veld management). Certain species can act as important “nursery” plants for smaller species and are also important for successional development after disturbance. Tortoises and mammals can be important seed dispersal agents. Watercourses, wetlands, upland- down land gradients or vegetation boundaries are all significant ecological features.

### 8.2.1 Threatened or protected ecosystems

The site visit confirmed that the vegetation mostly conforms to Kalahari Karroid Shrubland, classified as “Least Threatened”. Recently the *National list of ecosystems that are threatened and in need of protection* (GN 1002, December 2011), was promulgated in terms of the National Environmental Management Biodiversity Act (NEM: BA), Act 10 of 2004. According to this National list, the vegetation type **remains classified as Least Threatened**. However, almost all of the sites have been heavily impacted over time and very little natural veld remains.

According to the Draft Siyanda Environmental Management Framework the proposed sites within the following categories according to the various maps.

**Conservation priority areas:** According to Map 12a the site falls within an area regarded as having a High (3) conservation priority (shrublands). According to Map 12b, the site, however, does not fall within a proposed conservation area.

**Landcover:** According to Map 13 of the Draft EMF, it would seem as if the proposed site falls within the area marked as Shrubland.

**Sensitivity Index:** According to Map 14 of the Draft EMF, the proposed site falls within an area identified as of low environmental sensitivity (0-1) in an index which starts at Transformed and then are given values of 0-8 (8 being of high environmental sensitivity).

**Control Zones:** According to Map 15, the proposed site location falls mainly within a control zone 7 area, which is described as a Low control zone. (This zone is relatively less sensitive than the other zones and no special parameters, except those already implemented or required by law, are proposed for this zone). A portion of the development may however, also fall within a control zone 2, which is regarded as areas of potential wind erosion.

The proposed housing development will have a permanent, but localised impact on wildlife and avi-fauna. It is a known fact that many animal and bird species associate with large *Boscia albitrunca* trees and the removal of mature trees of these species will have an impact on such wildlife (even though very localised).

Taking the above into account it is clear that the proposed project will have little impact on natural vegetation, but might impact on single protected plants. **The impact on threatened or protected ecosystems is thus rated as low.**

Mitigation:

- The proposed housing layout should take into account all mature indigenous tree species and should aim to minimise the impact on these. In addition it should also aim to minimise the impact on any other protected species that might be encountered on site. On-site micro- adjustment of the final layout must be done in order to minimise the impact on as many of the protected species as possible.
- Permits must be obtained for the removal of any protected species which cannot be avoided.
- All larger watercourses should be protected by a 32 m river corridor as per Siyanda EMF.

### 8.2.2 Special habitats

The vegetation itself is not considered to belong to a threatened or protected ecosystem. However, shrubland in this area is classified as of high conservation priority within the Draft Siyanda EMF, but the specific site was



given a very low sensitivity index in the same report. No special habitats, were encountered on site (e.g. quartz patches or broken veld), which could sustain significant smaller ecosystems.

There are no formal rivers on any of the proposed site, but two a seasonal stream runs just north of the proposed site 3 (a 32 m corridor should be observed) and a larger drainage furrow runs just north of the proposed site 2 (not impacted by the proposed development). One smaller furrow was also observed within the proposed site 2. Ideally this furrow should also be protected, but as it is relative small with very little associated riparian vegetation, it could also be incorporated within a storm water system.

It is considered unlikely that the proposed project will have a significant impact on special habitats if the impact mitigation recommendations are adhered to. **The impact is thus rated as low.**

Mitigation:

- Observe a 32 m corridor from the edge of the seasonal stream just north of the proposed site 3.
- Protect the smaller furrow within Site 2 or incorporate it into a storm water system.

#### **8.2.3 Corridors and or conservancy networks**

Looking at the larger site and its surroundings it shows excellent connectivity with remaining natural veld in almost all directions. Corridors and natural veld networks are still relative unscathed (apart from road networks). However, very little natural veld remains on any of the proposed sites.

Because of the localised impact of the housing project and because the site are already impacted by the Loubos settlement it is highly unlikely that it will have any significant additional impacts on corridors or conservancy networks. **The impact is thus rated as very low.**

#### **8.2.4 Threatened or endangered species**

No threatened or endangered species were recorded during the site visit, however, this does not rule out their presence as they may be subject to seasonable rainfall and may not have been observable during the time of the site visit, since the composition of the vegetation layers will fluctuates with seasonal rainfall (Van Rooyen *et. all*, 1984, *vide* Mucina & Rutherford, 2006). However, it must be noted that the vegetation type is considered “Least Threatened” and that this classification is based on plant species diversity and turnover as well as habitat transformation. The number of species per broad geographical levels for these biomes is low (Van Rooyen, 1988, *vide* Mucina & Rutherford, 2006). It is therefore very unlikely that any red data species will be confined to the proposed site alone.

Taking the above into account it is highly unlikely that the proposed project will have a significant or long term effect on threatened or endangered species. **The impact is thus rated as low.**

#### 8.2.5 Protected species

One protected tree species in terms of the National Forests Act of 1998 (Act 84 of 1998) have been observed and might be impacted during the construction namely: *Boscia albitrunca* (Sheppard's tree), refer to Table 6 for location data on the individual trees encountered.

In addition to the above the Northern Cape Nature Conservation Act 9 of 2009 (NCNCA) came into effect on the 12<sup>th</sup> of December 2011, which also provides for the sustainable utilization of wild animals, aquatic biota and plants. Schedule 1 and 2 of the act give extensive lists of specially protected and protected fauna and flora species in accordance with this act. Even though this study never intended to be full botanical assessment, a scan of significant species was done during the site visit, and though the author does not claim that all species were recorded, only one listed protected species in terms of NCNCA was encountered during the site visit. However, as a pre-cautionary measure all viable herb-, bulbs- and succulent plant species encountered within the footprint should be removed and replanted through a dedicated search and rescue operation.

Taking the above into account it is possible but unlikely that the project will have an impact on any of the protected species observed. **The impact is thus rated as low** (with mitigation).

#### Mitigation:

- Observe a 32 m corridor from the edge of the seasonal stream just north of the proposed site 3, which include almost all of the protected species encountered on this site.
- The proposed housing layout should take into account all mature indigenous tree species and should aim to minimise the impact on these. In addition it should also aim to minimise the impact on any other protected species that might be encountered on site.
- As a pre-cautionary measure all viable herb-, bulbs- and succulent plant species encountered within the footprint should be removed and replanted through a dedicated search and rescue operation.
- Permits must be obtained for the removal of any protected species which cannot be avoided.

#### 8.2.6 Direct impacts

As the name suggest, direct impacts refers to those impacts with a direct impact on biodiversity features and in this case were considered for the potentially most significant associated impacts (some of which have already been discussed above).

- Direct loss of vegetation type and associated habitat due to construction and operational activities.

- Loss of ecological processes (e.g. migration patterns, pollinators, river function etc.) due to construction and operational activities. (Refer to page 32).
- Loss of local biodiversity and threatened plant species (Refer to page 33)
- Loss of ecosystem connectivity (Refer to page 35)

The vegetation itself is not considered to belong to a threatened or protected ecosystem. No special habitats were encountered on site. It is possible but unlikely that the proposed project will have an impact protected species. The proposed housing development will also have very little impact on vegetation, wildlife and avifauna.

Taking the above into account the direct impact on the environment is **rated as low** (with mitigation).

**Mitigation:** The following is some mitigation which will minimise the impact of the solar plant location and operation.

- Observe a 32 m corridor from the edge of the seasonal stream just north of the proposed site 3, which include almost all of the protected species encountered on this site.
- The proposed housing layout should take into account all mature indigenous tree species and should aim to minimise the impact on these. In addition it should also aim to minimise the impact on any other protected species that might be encountered on site.
- Permits must be obtained for the removal of any protected species which cannot be avoided.
- As a pre-cautionary measure all viable herb-, bulbs- and succulent plant species encountered within the footprint should be removed and replanted through a dedicated search and rescue operation.
- Only existing access roads should be used for access to the terrain.
- Access roads must be clearly demarcated and access must be tightly controlled (deviations may not be allowed).
- Indiscriminate clearing of areas must be avoided (all remaining areas to remain as natural as possible).
- All topsoil (at all excavation sites) must be removed and stored separately for re-use for rehabilitation purposes. The topsoil and vegetation should be replaced over the disturbed soil to provide a source of seed and a seed bed to encourage re-growth of the species removed during construction.
- Once the construction is completed all further movement must be confined to the access tracks to allow the vegetation to re-establish over the excavated areas.
- Rehabilitation must be done after construction.

### 8.2.7 *Indirect impacts*

Indirect impacts are impacts that are not a direct result of the main activity, but are impacts still associated or resulting from the main activity. The following possible indirect impacts were associated with the proposed project:

- The possible impact on protected plant species as described in the “List of protected tree species” (GN 716 of 2012) and the “Protected Species” list (Schedule 2 of the NC Nature Conservation Act 9 of 2009).
- Establishment of a construction camp and site offices as well as labourers facilities.
- Temporary storage areas (e.g. pipe’s and fittings and concrete mixing material).
- Waste management

It is very likely that the proposed project will have indirect impacts. It is considered that indirect impacts will have a similar impact as direct impacts, which will lead to a cumulative effect on the environment. However, indirect impacts can be much reduced through good environmental control during construction. **On its own the impact is considered to be medium.**

Mitigation:

- Appoint a suitably experience ECO during the construction phase of the project.

### 8.2.8 *Cumulative impacts*

In order to comprehend the cumulative impact, one has to understand to what extent the proposed activity will contribute to the cumulative loss of ecological function and other biodiversity features on a regional basis. Both vegetation types was classified as “Least Threatened”, No special habitats were encountered on site (e.g. quartz patches or broken veld), which could sustain significant smaller ecosystems. There are no formal rivers on the proposed site, but a number of drainage channels and small streams draining water from the slightly higher ground just west of Loubos drain rain water onto the relative flat area in the general location of the Loubos settlement. Although most of these drainage lines are basically storm water channels with little riparian vegetation they should still be seen as significant biodiversity features, which should be protected by adequate river corridors. The direct impacts will be permanent but localised, while indirect impacts can be much reduced through good environmental control.

The proposed project will thus have a permanent, but very localised impact. **On the whole the cumulative impact is considered to be low-medium.** With the implementation of impact minimisation actions the impact can easily be reduced to low.

### 8.3 THE NO-GO OPTION

The “No-Go alternative” does not signify significant biodiversity gain or loss especially on a regional basis. However, it will ensure that none of the potential impacts above occur. The current status quo will remain and there will be no immediate additional impact on the vegetation, protected species or river corridors. However, normal growth within the town and its associated urban activities will over time have a further impact, which might be better managed through controlled development.

On the other hand the local municipality and governments have a socio-economic responsibility to provide basic living. Over the long term the proposed project is likely to be one of the viable solutions with acceptable environmental impact.

## 9. RECOMMENDATIONS & IMPACT MINIMIZATION

Because of the identified need for low cost housing developments in the Mier Municipal area and the socio-economical responsibility of all Governments it is highly unlikely that the “No-Go” option will be an option. Other locations may be looked at, but ultimately the need for housing will remain (and most probably increase). It is also clear that the Municipality and Town Planners considered various options carefully before approaching the EAP with the most viable options. Even though the impact will be permanent, it will also be very localised and is situated within a vegetation type not considered by either National Spatial Biodiversity Indicators or by local environmental planning initiatives (Siyanda Draft EMF, 2008) as a sensitive area. However, various protected tree species (NFA) as well as one protected species in terms of NCNCA was encountered. Various impact minimisation recommendations are given in this report, which will reduce the cumulative impact of the proposed development to a very large degree. The major impact minimisation recommendation is associated with good environmental planning and control during construction.

Having evaluated and discussed the various biodiversity aspects associated with the project it is clear that none of the sites are considered of major biodiversity significance. In fact most of the areas are already degraded to a large extent and constitutes the most logical place for extension. The most significant impacts associated with the project will be:

- The possible impact on protected species.
- The impact on the small seasonal streams and drainage lines.

It is, however, considered highly unlikely that the proposed project will contribute significantly to any of the following:

- Significant loss of vegetation type and associated habitat.
- Loss of ecological processes (e.g. migration patterns, pollinators, river function etc.) due to construction and operational activities.
- Loss of local biodiversity and threatened plant species.
- Loss of ecosystem connectivity

**With the available information to the author's disposal it is recommended that project be approved since it is not associated with significant environmental impact, provided that mitigation is adequately addresses.**

## 9.1 IMPACT MINIMIZATION

### 9.1.1 General

- All construction must be done in accordance with an approved construction and operational phase Environmental Management Plan (EMP), which must be developed by a suitably experienced Environmental Assessment Practitioner.
- A suitably qualified Environmental Control Officer must be appointed to monitor the construction phase in terms of the EMP and the Biodiversity study recommendations as well as any other conditions which might be required by the Department of Environmental Affairs.
- An integrated waste management system must be implemented during the construction phase.
- All rubble and rubbish (if applicable) must be collected and removed from the site to a suitable registered waste disposal site.
- All alien vegetation should be removed from the larger property.
- All efforts must be made to protect all mature indigenous trees within the proposed final footprint (and any other protected species that might be encountered on site). On-site micro- adjustment of the final Ervin must be done in order to minimise the impact on as many of the protected species as possible.
- Permits must be obtained for the removal of any protected species which cannot be avoided.
- As a pre-cautionary measure all viable herb-, bulbs- and succulent plant species encountered within the footprint should be removed and replanted through a dedicated search and rescue operation.
- Indiscriminate clearing of areas must be avoided (all remaining areas to remain as natural as possible).
- All topsoil (the top 15-20 cm at all excavation sites), must be removed and stored separately for re-use for rehabilitation purposes. The topsoil and vegetation should be replaced over the disturbed soil to provide a source of seed and a seed bed to encourage re-growth of the species removed during construction.
- Once the construction is completed rehabilitation must be implemented.

### 9.1.2 Site specific

- Observe a 32 m corridor from the edge of the seasonal stream just north of the proposed site 3, which include almost all of the protected species encountered on this site.
- Protect the smaller furrow within Site 2 or incorporate it into a storm water system.



**Figure 13: Google image showing the Loubos site, with river corridors which should be protected in blue**

