



RIETFontein

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 Scientist 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: pbconsult@vodamail.co.za		Mr. Bernard de Witt Tel: +(27) 21 – 851 1616 Fax: +(27) 86 – 512 0154 Email: bernard@enviroafrica.co.za
SUMMARY OF POSSIBLE SIGNIFICANT BIODIVERSITY FEATURES		
Geology & soils	Geology & soils vary only slightly in the larger study 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. Possible Impact = low
Land use and cover	Covered by natural veld in relative good condition. Utilized for grazing.	The area is been utilised for grazing by the local inhabitants. Species diversity is low and represents a woody drought resistant low shrubland sparsely vegetated with a low percentage of grasses. The grazing potential is expected to be low. Possible Impact is considered to be low and localised.
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, and site 2 falls within a proposed conservation area. However, its environmental sensitivity classification was rated as relatively low. Because of the sites location (next to Rietfontein) its localised and small impact the possible impact is considered as low-medium (very localised).
Conservation priority areas.	In terms of the draft Siyanda EMF	According to the EMF the site 2 may fall within a proposed conservation area. Because of the sites location (next to Rietfontein) its localised and small impact the possible impact is considered as low-medium (but localised).
Sensitivity index	In terms of the draft Siyanda EMF	According to the EMF, the proposed site falls within an area identified as of low environmental sensitivity (2). Possible Impact low and localised.
Protected plant species	Protected species observed. None	No protected plant species was observed. The number of species per broad geographical levels for these biomes is low and it is therefore very unlikely that any single species will be confined to the proposed site alone. Possible impact = low.
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. The activity is thus not expected to have a significant impact on fauna or avi-fauna. Possible Impact low.
Rivers & wetlands	A number of smaller streams and drainage lines were observed on both sites.	There are no formal rivers on either of the proposed sites, but a number of drainage channels and small streams draining water from the area were encountered. 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 or suitably incorporated within the storm water planning for these town additions. . Impact low-medium.
Invasive alien infestation	<i>Prosopis</i> species was observed on both sites.	All invasive alien species must be removed during the construction. Possible Impact = positive.
RECOMMENDATION		
<p>In summary it is concluded that the proposed sites are both located on relative natural veld (slightly impacted by grazing and urban creep). The number of species per broad geographical levels for this biome is low and it is therefore very unlikely that any single species will be confined to any of the proposed sites alone. In addition no protected species were encountered. The impact on individual species is thus regarded as very low. The impact on sensitive habitats, however, is regarded as low-medium, because of the fact that shrubland has a high conservation value within the draft Siyanda EMF and site 2 may be located within a future conservation area as well as the presence of various small drainage lines/streams. On the other hand, because of the localised nature of the impact the impact on ecosystem function is regarded as very low, cumulative impact on ecology is regarded as very low and finally the impact on economic use of the vegetation is regarded as very low. The proposed project will thus have a permanent, but localised impact, which can, through the implementation of impact minimisation actions, be controlled and further reduced.</p> <p>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.</p>		

CONTENTS

Independence & conditions	i
Relevant qualifications & experience of the author.....	i
Contents.....	iii
1. Introduction: Rietfontein	6
1.1 Terms of reference.....	7
2. Applicable legislation.....	8
2.1 Northern Cape Nature Conservation Act 9 of 2009	9
3. Definitions & Abbreviations.....	10
3.1 Definitions.....	10
3.2 Abbreviations	12
4. References	13
5. Project Description	14
5.1 Methods.....	15
6. Description of Environment.....	16
6.1 Location & Layout	16
6.2 Topography	18
6.3 Climate	18
6.4 Geology & Soils	18
6.5 Landuse and Cover	19
6.6 Broad scale vegetation types expected	19
6.6.1 Kalahari Karroid Shrubland	20
6.7 Vegetation encountered	20
6.7.1 Rietfontein site 1.....	20
6.7.2 Rietfontein Site 2	21
6.7.3 Flora	22
6.8 Significant and/or protected plant Species.....	23
6.9 Fine-Scale mapping (CBA's).....	23

6.9.1	Summary of findings according to the EMF	24
6.10	Fauna and Avi-fauna	26
6.11	Rivers and wetlands	26
6.12	Invasive alien infestation.....	27
7.1	Significant biodiversity features encountered	29
8.	Biodiversity Assessment	30
8.1	Nature of the Impact.....	30
8.1.1	Parameters of the impact	30
8.1.2	Possible issues / impacts associated with construction	31
8.2	Evaluation of Significant Impacts	31
8.2.1	Threatened or protected ecosystems.....	31
8.2.2	Special habitats	32
8.2.3	Corridors and or conservancy networks	33
8.2.4	Threatened or endangered species	33
8.2.5	Protected species.....	34
8.2.6	Direct impacts	34
8.2.7	Indirect impacts	35
8.2.8	Cumulative impacts	36
8.3	The no-go option.....	36
9.	Recommendations & Impact Minimization	37
9.1	Impact minimization	38
9.1.1	General	38
9.1.2	Site specific	38

LIST OF FIGURES

Figure 1: Google image indicating the route walked during the site visit as well as GPS reference points taken (if any)	15
Figure 2: General location of the town within South Africa.....	16
Figure 3: Showing the town in relation to the immediate surrounding towns	17
Figure 4: Land use map for the proposed Rietfontein development (Macroplan)	17
Figure 5: Average rainfall, temperature and night-time temperatures for Rietfontein (www.saexplorer.co.za)	18
Figure 7: Vegetation map of SA, Lesotho and Swaziland (2006).....	19
Figure 8: Google overview of the proposed Rietfontein site 1	21
Figure 8: Google overview of the proposed Rietfontein site 2	22
Figure 9: A copy of the Draft Vegetation Assessment Conservation Priorities in the Siyanda EMF (Location mark with red arrow)	25
Figure 10: South African National Veldfire Risk Classification (March 2010).....	28

LIST OF TABLES

Table 1: Identified need for low cost housing in the Mier Municipality (BVi, 2011).....	14
Table 2: GPS coordinates for Rietfontein, Local settlement and the proposed new development	16
Table 3: Vegetation status according to the 2004 National Spatial Biodiversity Assessment.....	20
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: Summary of biodiversity features encountered and their possible significance.....	29

LIST OF PHOTOS

Photo 1: Rietfontein site 1: View of the vegetation encountered (west to east).....	20
Photo 2: Rietfontein site 2 – view of the vegetation encountered (west to east)	21

1. INTRODUCTION: RIETFONTEIN

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).

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.

Rietfontein is an 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. Rietfontein (like Loubos) is located on the remainder of Farm 585, Gordonia RD (Mier Municipality), owned by the Mier Municipality. The town is situated in the central western section of the Mier Municipality on the R31, approximately 4km east of the Rietfontein border post, approximately 263 km north-north-west of Upington. The proposed new development sites are located in two sections, one next to the northern parts of town, west of Eland Street and one next to in the southern sections of town, to the west of the existing neighbourhoods. 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 120 new development stands in Rietfontein, 109 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 Rietfontein.
- It is suitably placed in terms of services.

Since, the two study area are 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.

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 12th 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 2011, 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. 18th 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. 31st 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		
	Groot Mier	40		40		
	Welkom	70		70		
	Askham	100		100		
New Developments (Greenfields)	Groot Mier	178	178	178	178	178
	Welkom	103	103	103	103	103
	Loubos	138	138	138	138	138
	Rietfontein	107	107	107	107	107
	Askham	100	100	100	100	100
Totals		1130	626	1130	626	626

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 (if any)



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

Rietfontein 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

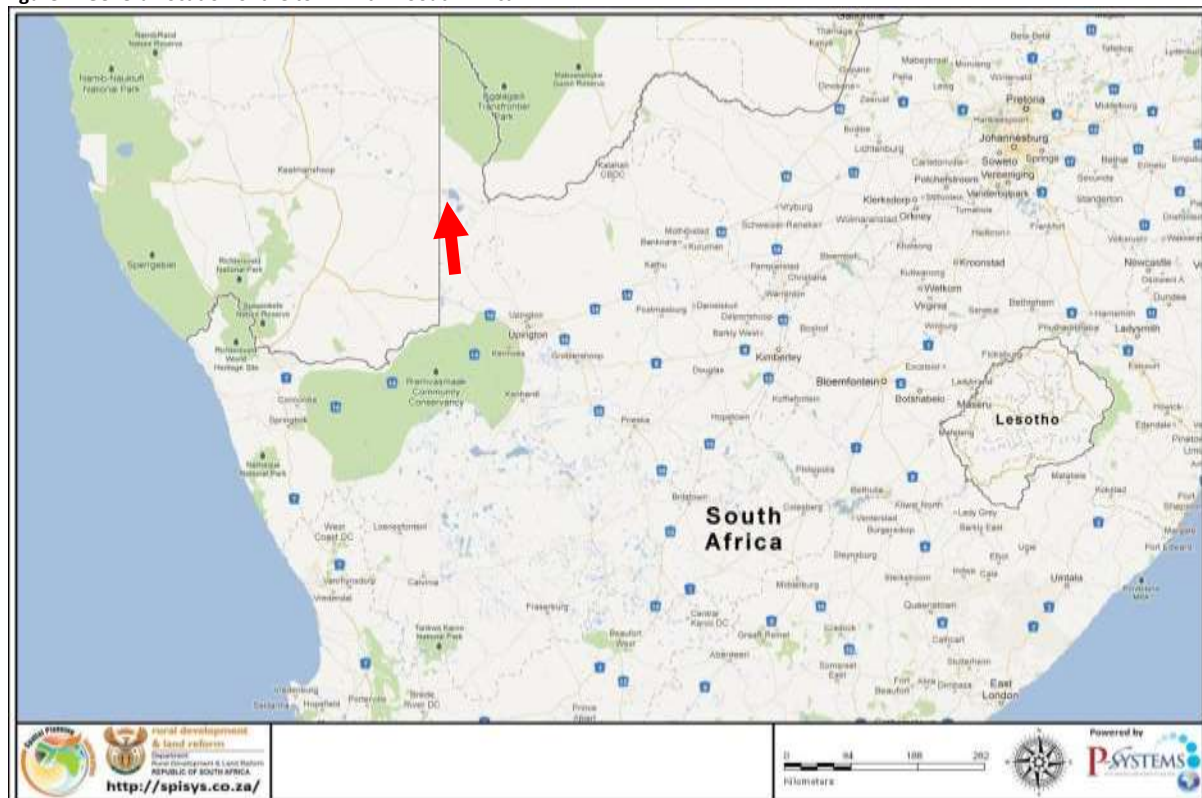


Table 2: GPS coordinates for Rietfontein, Local settlement and the proposed new development

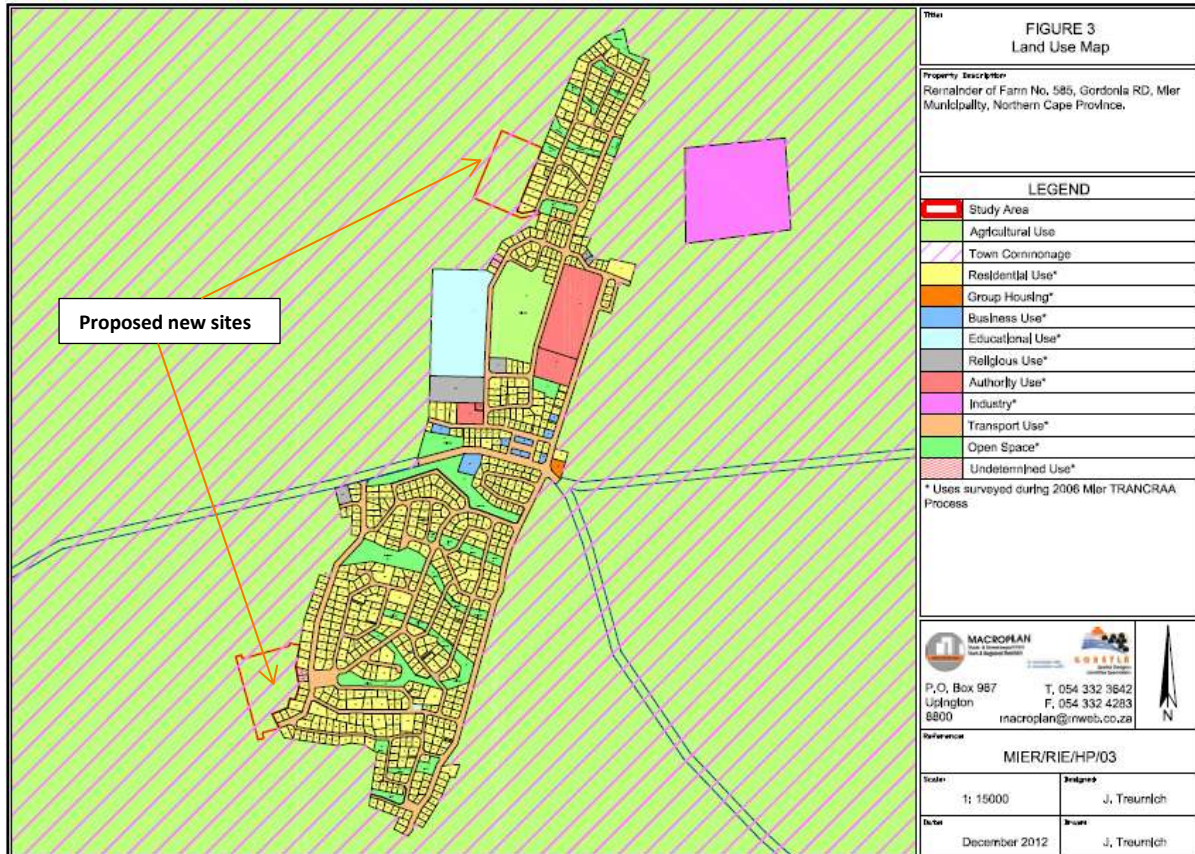
DESCRIPTION	LATITUDE AND LONGITUDE	ALTITUDE
Rietfontein Site 1	S26 44 09.5 E20 01 41.9	853 m
Rietfontein Site 2	S26 45 06.5 E20 01 10.6	864 m

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: Land use map for the proposed Rietfontein development (Macroplan)



Please note that the remainder of Farm 585, Gordonia RD is 1627.3752 ha in extent, of which only 8.5 ha will be involved with this proposed development.

6.2 TOPOGRAPHY

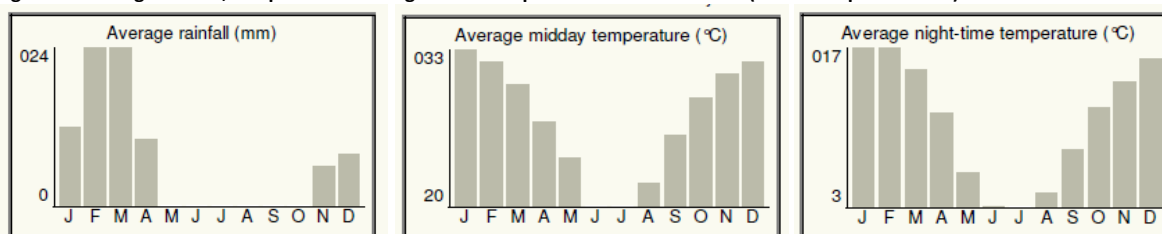
The northern section of the study area is traversed by a two drainage lines/furrows which will have to be accommodated within the layout. The site has a downward slope in a general eastern direction. Elevation data for the northern section varies from 850 – 857 m.

The southern section's topography has a similar slope direction, but with significant drainage lines to take into account. Elevation data for the southern section varies from 860 – 866 m.

6.3 CLIMATE

All regions with a rainfall of less than 400 mm per year are regarded as arid. Separate information for Rietfontein 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 Rietfontein per month. It receives the lowest rainfall (0 mm) in May and the highest (24 mm) in February. The temperatures at Rietfontein 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 Rietfontein 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).

Figure 5: Average rainfall, temperature and night-time temperatures for Rietfontein (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 Cenozoic Kalahari Group sands and small patches also on calcrete outcrops and screes on scarps of intermittent rivers (mekgacha). Dwyka Group tillites outcrops found in places. The soils are deep, red-yellow, apedal, freely drained, with a high base status, typical of Ae land type.

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 Nama Karoo Biome (Northern Bushmanland). All of these properties are used mainly for livestock grazing and or game farming (Refer to Figure 4). No intensive farming has been observed (lack of irrigation water). It is expected that natural fauna and avi-fauna may still be present, although limited or impacted as a result of the urban activities of the nearby town. Very little game is expected to be encountered (none was observed).

Both sites are still covered by natural vegetation, of which that on site 1 is in relative good condition, while that on site 2 are more degraded and impacted as a result of urban associated activities.

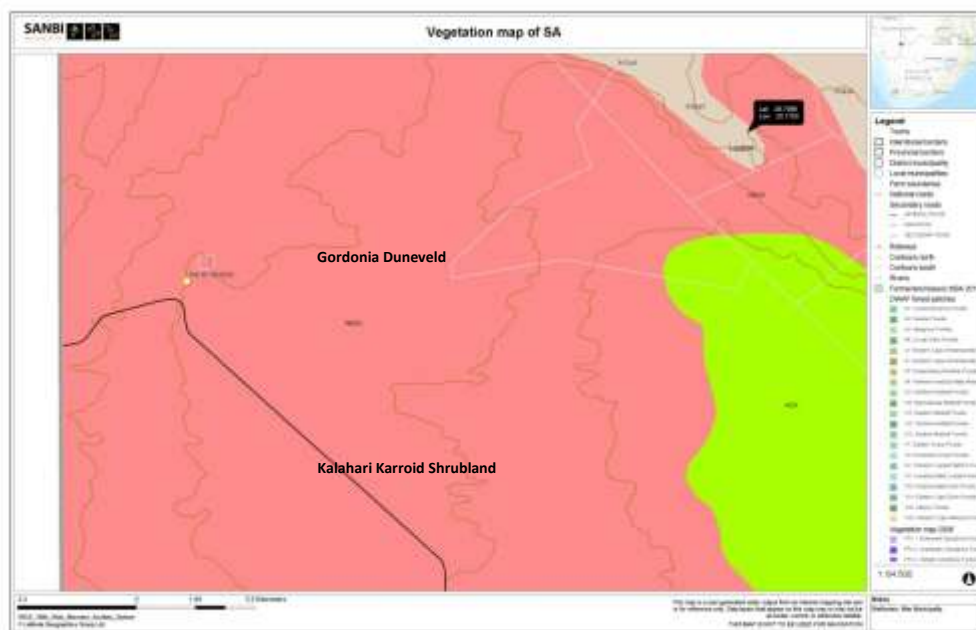
The main biodiversity features of this area are:

- Natural veld still supported by these sites.
- The seasonal drainage lines found on site 1.

6.6 BROAD SCALE VEGETATION TYPES EXPECTED

In accordance with the 2006 Vegetation map of South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2006) only one broad vegetation types is expected on the sites, namely Kalahari Karroid Shrubland (Pink in Figure 7).

Figure 6: 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) 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
Kalahari Karroid Shrubland	Least Threatened	99.2 %	21 %	0.1 %

6.6.1 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 umbellate*, *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 Rietfontein site 1

The natural veld encountered on site 1 one can be described as a sparse karroid type vegetation on a very rocky substrate. The vegetation structure is that of a hardy drought resistant shrubland (apart from single *Prosopis* trees next to the some of the seasonal streams) reaching only 0.5 m in height (Photo 1).

Photo 1: Rietfontein site 1: View of the vegetation encountered (west to east)



Species diversity was low but very homogeneous, dominated by a combination of the following: *Rhigozum trichotomum* (forming only a low shrub), *Thesium lineatum*, *Acacia hebeclada*, *Kleinia longiflora*, *Monechma* species, *Hermannia* species (no flowers), *Aptosimum spinescens*, *Geigeria filifolia*, *Blepharis mitrata* and *Ziziphus mucronata* (occasionally near seasonal streams).

Figure 7: Google overview of the proposed Rietfontein site 1



6.7.2 Rietfontein Site 2

The vegetation found on site 2 was very similar to that of site 1 one, but even less dense. Species encountered and species composition was also similar. Only single individuals of *Prosopis* were encountered.

Photo 2: Rietfontein site 2 – view of the vegetation encountered (west to east)



Two very shallow furrows or drainage lines were present running from west to east towards the existing settlement (Refer to Figure 8).

Figure 8: Google overview of the proposed Rietfontein site 2



6.7.3 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. Both sites showed low species diversity with hardy woody shrubs dominating the landscape. Grasses were almost absent.

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>Aptosimum spinescens</i>	Doringviooltjie	SCROPHULARIACEAE	
<i>Geigeria filifolia</i>	Verweerbos	ASTERACEAE	
<i>Hermannia species</i>		STERCULIACEAE	
<i>Kleinia longiflora</i>	Sjambokbos	ASTERACEAE	
<i>Prosopis grandulosa</i>	Honey mesquite	FABACEAE	Category 2 invader
<i>Rhigozum trichotomum</i>	Driedoring	BIGNONIACEAE	
<i>Cf. Thesium lineatum</i>	Witstormbos	SANTALACEAE	
<i>Ziziphus mucronata</i>	Blinkblaar wag- ['] n-bietjie	RHAMNACEAE	

6.8 SIGNIFICANT AND/OR PROTECTED PLANT SPECIES

The National Forests Act (NFA) of 1998 (Act 84 of 1998) provides for the protection of forests as well as specific tree species (GN 716 of 7 September 2012). In addition to the NFA the Northern Cape Nature Conservation Act 9 of 2009 (NCNCA) came into effect on the 12th 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.

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.

No protected species was encountered on either site.

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, site 2 may fall within a proposed conservation area.

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

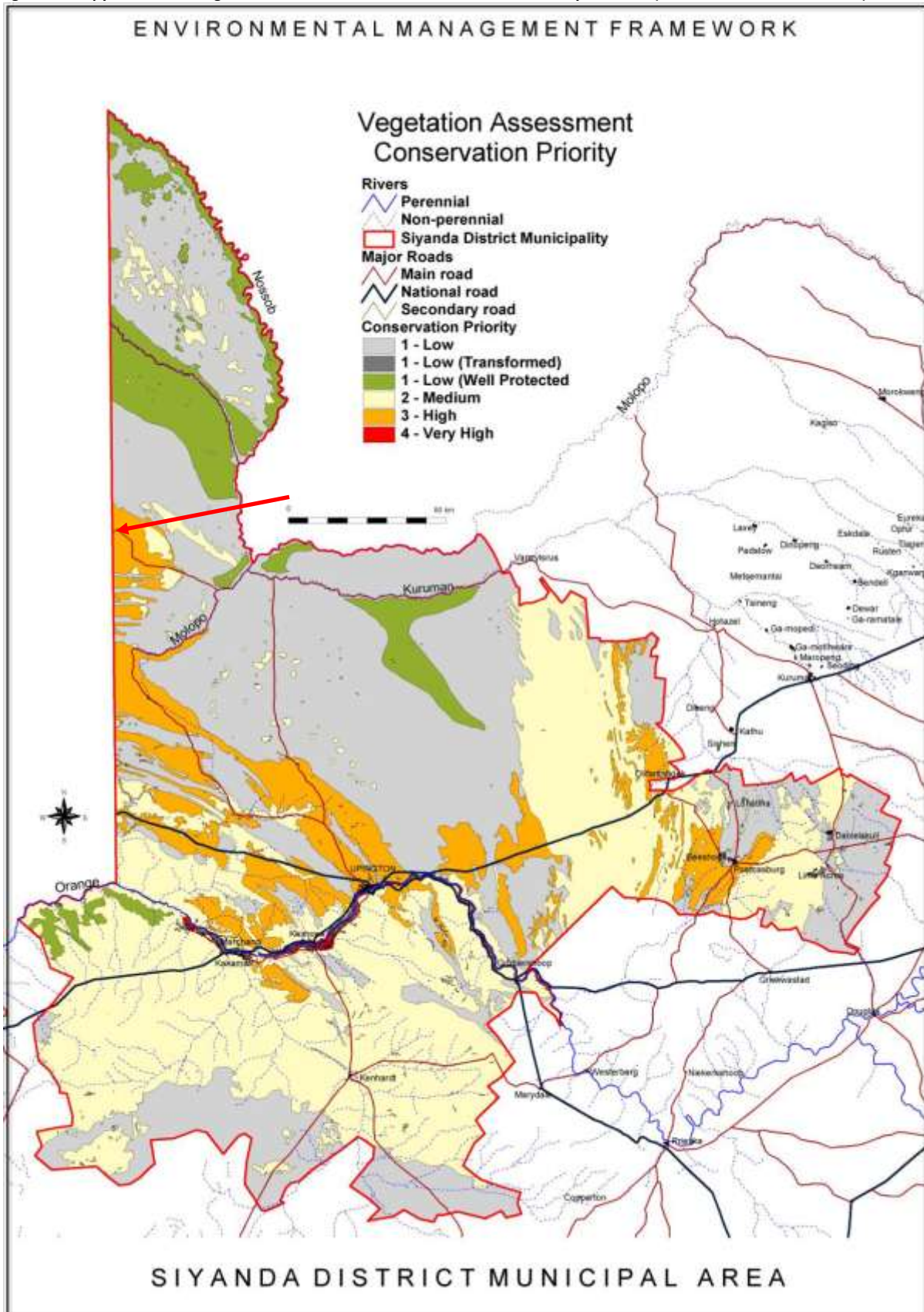
Sensitivity Index: According to Map 14 of the Draft EMF, the proposed site falls within an area identified as of relative low environmental sensitivity (2) in an index which starts at Transformed and then are given values of 0-8 (8 being of high environmental sensitivity).

Control Zones: According to Map 15, the proposed site location falls within control zone 3 area, which is described as a potential high to very high vegetation conservation areas.

In summary, Shrubland in the Siyanda EMF was given a high conservation value and should be considered for conservation. As such a large portion of land below the R31 (in which Site 2 falls) is being proposed as a future conservation area. According to the Sensitivity index map, however, the specific site is not considered to be of major environmental sensitivity?

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

Figure 9: 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 Rietfontein 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 either of the proposed sites, but a number of drainage channels and small streams draining water from the area were encountered. All of these drainage lines and small seasonal streams drain water from the slightly higher elevated western side of Rietfontein towards and beyond the eastern side of the town of Rietfontein. 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 or suitably incorporated within the storm water planning for these town additions.

6.12 INVASIVE ALIEN INFESTATION

A number of *Prosopis grandulosa* (a category 2 invader) were encountered scattered on both sites. 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 on both sites and its immediate surroundings.

7. VELD FIRE RISK

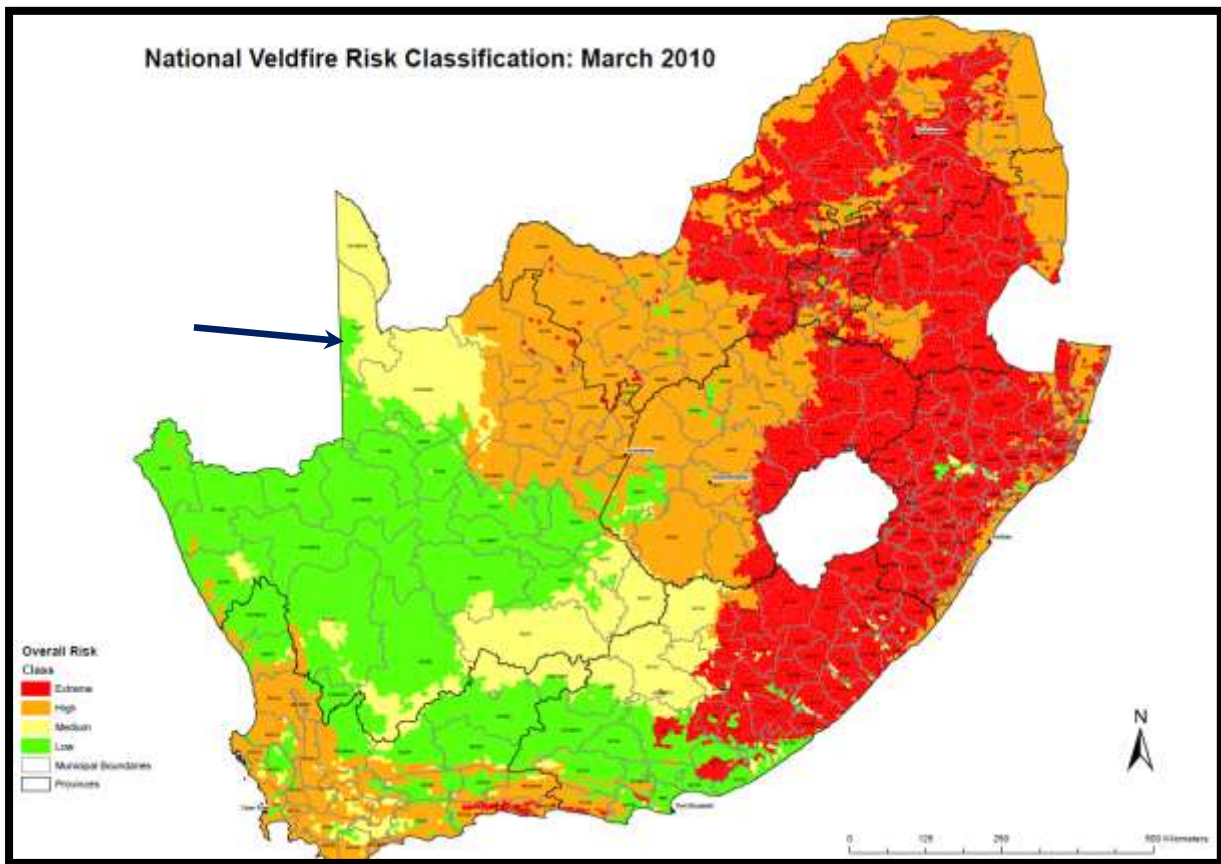
Rietfontein is situated on the border between South Africa and Namibia and supports Kalahari Karroid Shrubland. Kalahari Karroid Shrubland is part of the Nama Karoo Biome, which is not prone to fire (Mucina & Rutherford, 2006).

The revised veldfire risk classification (Forsyth, 2010) in terms of the National Veld and Forest Fire Act 101 of 1998, was promulgated in 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.

Rietfontein is situated in an area supporting Karroid shrubland, which has been classified with a **low fire risk classification**. Although, the fire risk is low 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.

Figure 10: South African National Veldfire Risk Classification (March 2010)



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 6: 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.	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. Possible Impact = low
Land use and cover	Covered by natural veld in relative good condition. Utilized for grazing.	The area is been utilised for grazing by the local inhabitants. Species diversity is low and represents a woody drought resistant low shrubland sparsely vegetated with a low percentage of grasses. The grazing potential is expected to be low. Possible Impact is considered 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, and site 2 falls within a proposed conservation area. However, its environmental sensitivity classification was rated as relatively low. Because of the sites location (next to Rietfontein) its localised and small impact the possible impact is considered as <u>low-medium</u> (very localised).
Conservation priority areas.	In terms of the draft Siyanda EMF	According to the EMF the site 2 may fall within a proposed conservation area. Because of the sites location (next to Rietfontein) its localised and small impact the possible impact is considered as <u>low-medium</u> (but localised).
Sensitivity index	In terms of the draft Siyanda EMF	According to the EMF, the proposed site falls within an area identified as of low environmental sensitivity (2). Possible <u>Impact low and localised</u>.
Protected plant species	Protected species observed. None	No protected plant species was observed. The number of species per broad geographical levels for these biomes is low and it is therefore very unlikely that any single species will be confined to the proposed site alone. Possible impact = low.
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. The activity is thus not expected to have a significant impact on fauna or avi-fauna. Possible Impact <u>low</u>.
Rivers & wetlands	A number of smaller streams and drainage lines were observed on both sites.	There are no formal rivers on either of the proposed sites, but a number of drainage channels and small streams draining water from the area were encountered. 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 or suitably incorporated within the storm water planning for these town additions. . Impact <u>low-medium</u>.
Invasive alien infestation	<i>Prosopis</i> species was observed on both sites.	All invasive alien species must be removed during the construction. Possible Impact = positive.
Erosion	Karroid Shrubland is not considered prone to erosion.	Possible impact = 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 natural vegetation with a high conservation value, which might also be located within a future conservation area (Draft Siyanda EMF).
- Establishment of a construction associated infrastructure during the construction phase.
- Temporary storage areas.
- Waste management and control.

8.2 EVALUATION OF SIGNIFICANT IMPACTS

The main drivers in this vegetation type would be grazing pressure (herbivore), and could determine plant community composition and occurrence of species. Grazing may be an important factor in regulating competitive interaction between plants. 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**.

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, site 2 may fall within a proposed conservation area.

Landcover: According to Map 13 of the Draft EMF, 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 relative low environmental sensitivity (2) 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 within control zone 3 area, which is described as a potential high to very high vegetation conservation areas.

In summary, Shrubland in the Siyanda EMF was given a high conservation value and should be considered for conservation. As such a large portion of land below the R31 (in which Site 2 falls) is being proposed as a future conservation area. According to the Sensitivity index map, however, the specific site is not considered to be of major environmental sensitivity?

The proposed housing development is considered to have a permanent, but localised impact on wildlife and avi-fauna. Taking the above into account it is clear that the proposed project will have an impact on natural vegetation which is considered to be of high conservation value and might be located within a proposed future conservation area. In addition a number of small drainage lines/streams were also encountered on both sites.

On the other hand, because of the localised nature of the impact the impact on ecosystem function is regarded as very low, cumulative impact on ecology is regarded as very low and finally the impact on economic use of the vegetation is regarded as very low.

The impact on threatened or protected ecosystems is thus rated as low-medium.

Mitigation:

- 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, and site 2 may fall within a proposed future conservation area. However, the specific site was given a relative 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 various drainage furrows were encountered on both proposed sites. 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 or suitably incorporated within the storm water planning for these town additions.

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-medium.

Mitigation:

- Protect the smaller furrow within 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).

Because of the localised impact of the housing project and because the site are already impacted by the Rietfontein 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

The National Forests Act (NFA) of 1998 (Act 84 of 1998) provides for the protection of forests as well as specific tree species (GN 716 of 7 September 2012). In addition to the NFA the Northern Cape Nature Conservation Act 9 of 2009 (NCNCA) came into effect on the 12th 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.

No protected species was encountered during the site visit. 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.

It is thus considered possible but unlikely that the project will have a significant impact on protected species.

The impact is thus rated as low.

Mitigation:

- 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 are encountered.

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 30).
- Loss of local biodiversity and threatened plant species (Refer to page 31)
- Loss of ecosystem connectivity (Refer to page 33)

Both sites still support natural vegetation (shrubland) which, according to the draft Siyanda EMF is considered to be of high conservation value. In addition site 2 might be located within a proposed future conservation area. However, the impact will be localised, no special habitats were encountered, no protected species were encountered, it will not lead to significant loss of ecological processes, biodiversity or ecosystem connectivity and is not expected to have any significant impact on wildlife or avi-fauna.

Taking the above into account the direct impact on the environment is **rated as low-medium.**

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

- 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 or suitably incorporated within the storm water planning for these town additions.
- Permits must be obtained for the removal of any protected species which might be encountered.
- 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:

- Establishment of a temporary construction associated infrastructure or 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 low-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.

Having discussed the various possible environmental impacts above, it is concluded that:

- The proposed sites are both located on relative natural veld (slightly impacted by grazing and urban creep).
- The number of species per broad geographical levels for this biome is low and it is therefore very unlikely that any single species will be confined to any of the proposed sites alone. In addition no protected species were encountered. The impact on individual species is thus regarded as very low.
- The impact on sensitive habitats, however, is regarded as low-medium, because of the fact that shrubland has a high conservation value within the draft Siyanda EMF and site 2 may be located within a future conservation area as well as the presence of various small drainage lines/streams.
- On the other hand, because of the localised nature of the impact the impact on ecosystem function is regarded as very low, cumulative impact on ecology is regarded as very low and finally the impact on economic use of the vegetation is regarded as very low.

The proposed project will thus have a permanent, but localised impact, which can, through the implementation of impact minimisation actions, be controlled and further reduced.

On the whole the cumulative impact is considered to be low-medium.

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 localised and is situated within a vegetation type not considered by National Spatial Biodiversity Indicators as sensitive. However, local environmental planning initiatives (Siyanda Draft EMF, 2008) regard shrubland as of high potential conservation value and as such the footprint must be carefully evaluated. 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 proposed development, the most significant possible impacts identified are:

- In summary, Shrubland in the Siyanda EMF was given a high conservation value and should be considered for conservation.
- In addition, Site 2 might fall within an area that is being proposed as a future conservation area (According to the Siyanda EMF, Sensitivity index map, however, the specific site is not considered to be of major environmental sensitivity?).
- 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).
- Permits must be obtained for the removal of any protected species which might be encountered.
- 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*

- Although most of the drainage lines are basically storm water channels with little associated riparian vegetation they should still be seen as significant biodiversity features and should be protected by adequate river corridors or suitably incorporated within the storm water planning for these town additions.