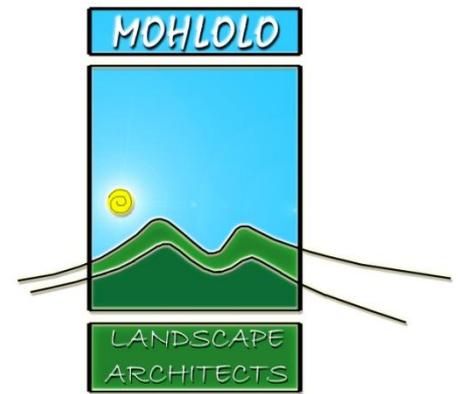


Mohlolo Landscape Architects



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SEBAYENG STRUCTURE PLAN: DESKTOP STRATEGIC ENVIRONMENTAL STUDY

INTRODUCTION

MLA was appointed to do a desktop Strategic Environmental Study of the general area of Sebayeng as well as the area proposed for extension of the Sebayeng village. The desktop study was complimented by a site visit to obtain a thorough idea of the site conditions.

Purpose of the study

The rapid expansion of the Sebayeng village could result in unplanned settlement and poor service delivery within the area. Therefore a need has been identified for the planned expansion of the Sebayeng village.

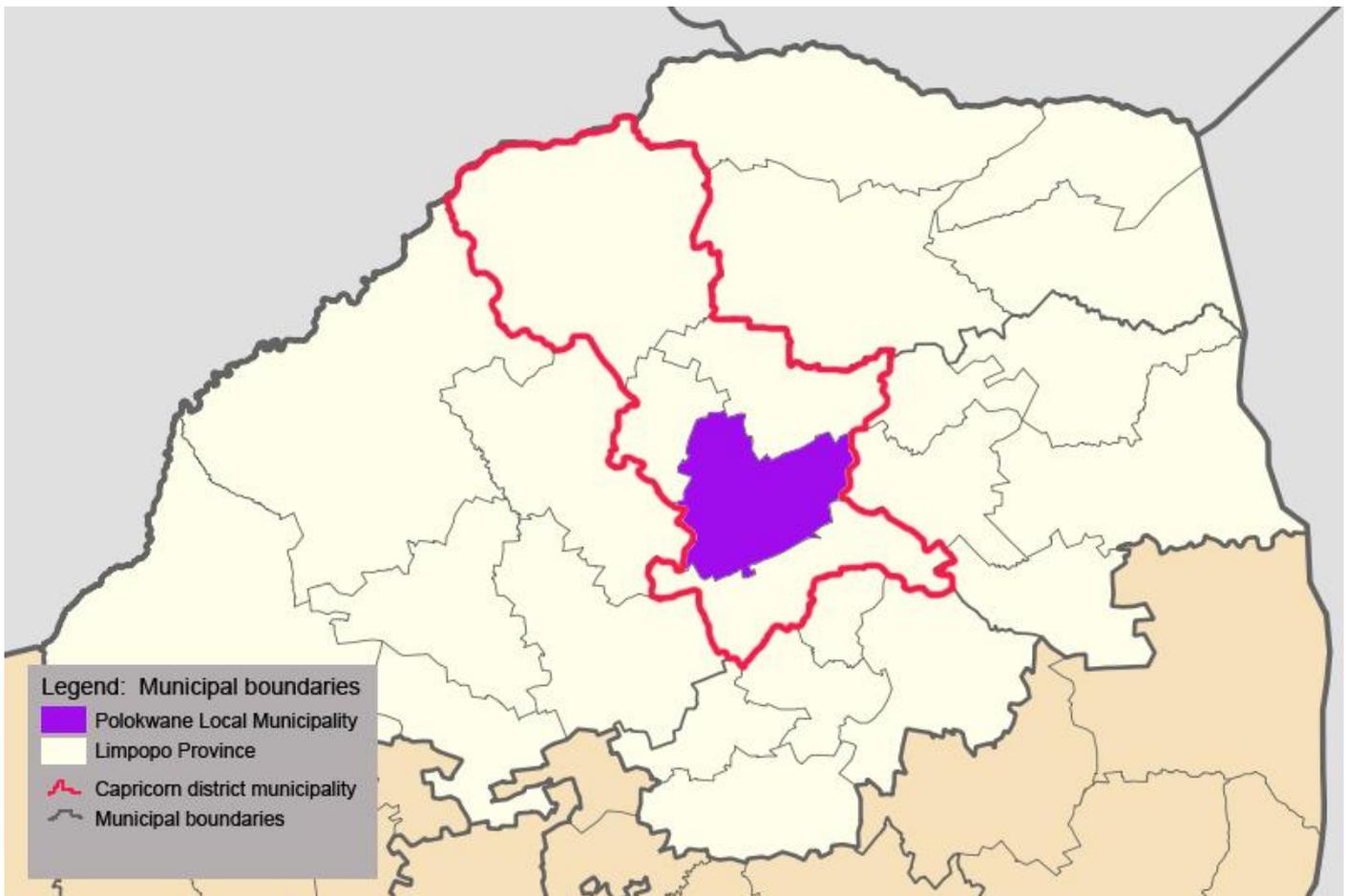
The above has led to the need for a Strategic Environmental Assessment:

- Obtain an understanding of the site, it's biophysical attributes, and the role it plays within the local and regional context;
- Ensure that the environmental (ecological, social and economic) aspects are well understood by decision makers and that it pro actively informs the sustainable utilization of Sebayeng;
- Identify sustainable activities, plans and/or programs

Description of the study area

The study area is located approximately 40km east of Polokwane between Mankweng and the R81 to Mooketsi. The character of the area is semi-rural with an urban street-block pattern and small stands served by gravel roads, surrounded by large areas of veld. The Village of Sebayeng has an estimated population of 16000.

The aim of the proposed development plan is to ensure that responsible development takes place within the area and that the inevitable extension of the town takes place in a more formal pattern. The professional team intends to make use of this document as a guideline to encourage developers to stay within the development boundaries and to respect and protect the zero-development zones.



Map 1: Municipal boundaries

Terms of reference

The office of Hannes Lerm & Associates set the following objectives for the study:

- A summary of the results from the State of the Environment Report;
- A study of the environmental attributes of the area;
- An ecological sensitivity analysis;
- An assessment of the environment with regards to the ecological integrity of the area;
- Compile a list of environmental objectives to ensure sustainable development;
- An assessment of the heritage, cultural and archaeological attributes of the area;
- Set environmental parameters as identified in the Environmental Management Framework;
- Identify the areas where various levels of development can take place (no-go areas-development areas);
- Identify pollution sources; and
- Identify indicators that could determine the thresholds and development parameters.

Purpose of this document

This report attempts to present the existing situation of the study area from a biophysical, social and economic perspective. This will provide the baseline from which the desired state of the environment will be compiled.

The assessment included collecting available and relevant information for the purpose of understanding the environment of the study area.

A more detailed description of the overall SEA process and steps to it are provided in the section below.

The report documents the results of a desktop strategic environmental assessment for the proposed area for development in Sebayeng. The following factors were taken into consideration during the process:

- Biophysical:
 - Terrestrial ecology
 - Riverine ecology
 - Hydrology
- Socio-economic
 - Agricultural potential
 - Recreational potential
 - Heritage
 - Access to site
 - Visual
 - Infrastructural development
 - Generation of employment by project
- Environmental

APPROACH & METHODOLOGY

Focus of an SEA

An SEA focuses on integrating environmental issues into the formulation of plans and program's. The process aims at evaluating the opportunities that the environment offers to development and the constraints that it imposes. Tonk and Verheem (1998) define a SEA to be a structured, proactive process that strengthens the role of environmental issues in strategic decision making, and Sadler (1995) recognizes the need to integrate environmental (biophysical, social and economic) considerations into the earliest stages of planning development. Essentially a SEA is an instrument that should be used to encourage and promote sustainable utilization.

Overall Approach

The process focussed on understanding the biophysical, social and economic environment and the values there-of. Strategies will be developed to guide the appropriate land uses. Monitoring, evaluation and reporting systems will be proposed whereby activities within each zone can be controlled and mitigated, as appropriate.

The above mentioned systems and approaches will be developed and formulated using a GIS system with appropriate plans. This scale will facilitate decision making at a local scale.

The various steps of the project include:

- **Status Quo Report:** This phase included an assessment of the existing environment (biophysical, social and economic) by means of investigation of existing data and information. This was ground truthed and verified by means of a field visit.
- **Strategic Planning Framework:** In this step an overall framework will be developed for the utilization of the study area. Strategic Development zones as well as development guidelines, processes & action plans will be developed.

DESCRIPTION OF THE NATURAL ENVIRONMENT

Summary from the state of the environment report for South Africa

South Africa's terrestrial ecosystems are under great pressure due to rapid population growth and the associated activities. Only 6% of South Africa's land is under formal protection. The remainder of the terrestrial resources are under great pressure due to alien invasive species, degradation of soil etc. that results in the rapid degradation of indigenous vegetation. The general Sebayeng area is considered to form part of the terrestrial ecosystems. Unemployment levels in South Africa is very high and results in unsustainable use of resources, activities that contribute to pollution and a very high dependency on already degraded natural resources. People are completely dependent on the natural environment. It is therefore important that impact studies be done to determine the impact of human beings on the environment and vice versa so as to determine the most appropriate means of conserving the environment and the livelihoods of human beings.

The Sebayeng area

Approximately a quarter of the general Sebayeng area has been developed as domestic housing in the rural context of South Africa. The area in general has suffered mild to severe degradation in some areas. The remainder of the area is utilised for grazing and subsistence farming. The rocky section of the area is not used for subsistence farming at all and to limited extent used for grazing purposes.

Activities and Fauna within the general Sebayeng Area



Domestic cattle grazing



Donkeys



Domestic goats



Subsistence farming



Domestic gardening



Domestic dog



Typical kraal types in Matheding village



Rehabilitated borrow pit



Illegal dumping



Cutting of trees for fire wood



Typical growth form of trees that are cut

Photo 1 to 12: Activities and fauna within the general Sebayeng Area

Geology

The geology of the general area is predominantly a very stable block of ancient continental crust, known as the Kaapvaal craton (Mucina & Rutherford, 2006).

The geology of the centre of the general area from the North eastern to the South eastern corner can be described as medium to coarse-grained grey and pink biotite granite of the Turfloop Granite. The northern corner of the area's geology can be described as Leucocratic migmatite and gneiss, grey and pink hornblende-biotite gneiss, grey biotite gneiss, minor muscovite-bearing granite, pegmatite and gneiss of the Hout River Gneiss. In the North eastern corner of the site the geology is described as Leucocratic migmatite and gneiss, grey and pink hornblende-biotite gneiss, grey biotite gneiss; minor muscovite - bearing granite, pegmatite and gneiss of the Hout River Gneiss.

The area proposed for development consists mainly of the the Turfloop granite and partly of the Hout River Gneiss.

Soils

The central bushveld bioregion is known for the deep red weakly structured soil with a loamy to clay texture. The two soil groups dominating the central bushveld is soil group A4 and E1. Soil group A4 is red, massive or weakly structured soil with medium to high base status. It includes well darined Lixisols, Cambisols and Luvisols. The land type is known as Ae. The soil group E1 has limited pedological development, it is usually on hard and weathering rock, with or with intermittent diverse soils. It includes Leptosols, Regosols, Calcisols and Durisols. The land types for this soil group includes Af and Ha.

In the general Sebayeng area the G1 soil group should also be mentioned. G1 is rock with limited soils which includes Leptosols, Regosols, Durisols, Calcisols and Plinthosols. The land types associated with this soil group is Ib and Ic.

Various soil types has been identified in the general area surrounding Sebayeng including: Glenrosa, Bainsvlei, Mispah.

Course sandy soils with low organic content occur throughout the study area. The area is underlain by quartzite and granitic material. The soils are relatively deep and have an reddish sandy loam A-horizon of 1m to 1,m deep.

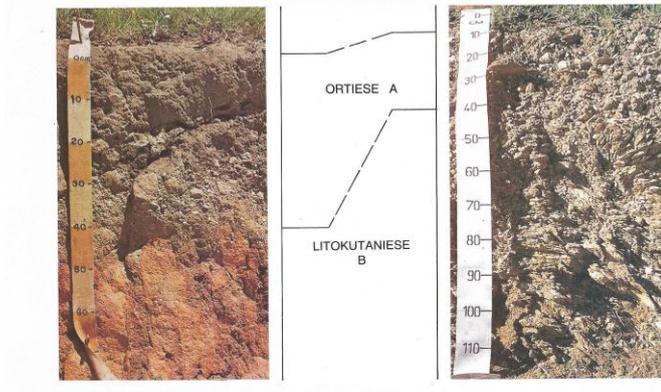


Photo 13: Glenrosa soil vorm

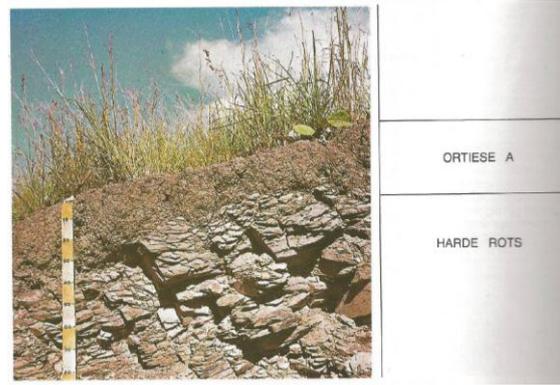


Photo 14: Mispah soil vorm

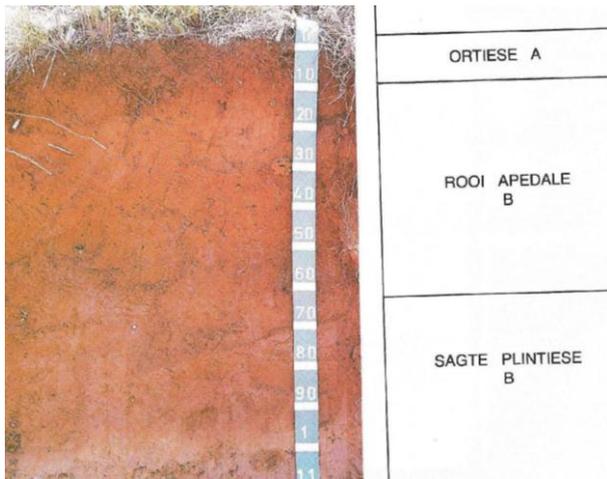
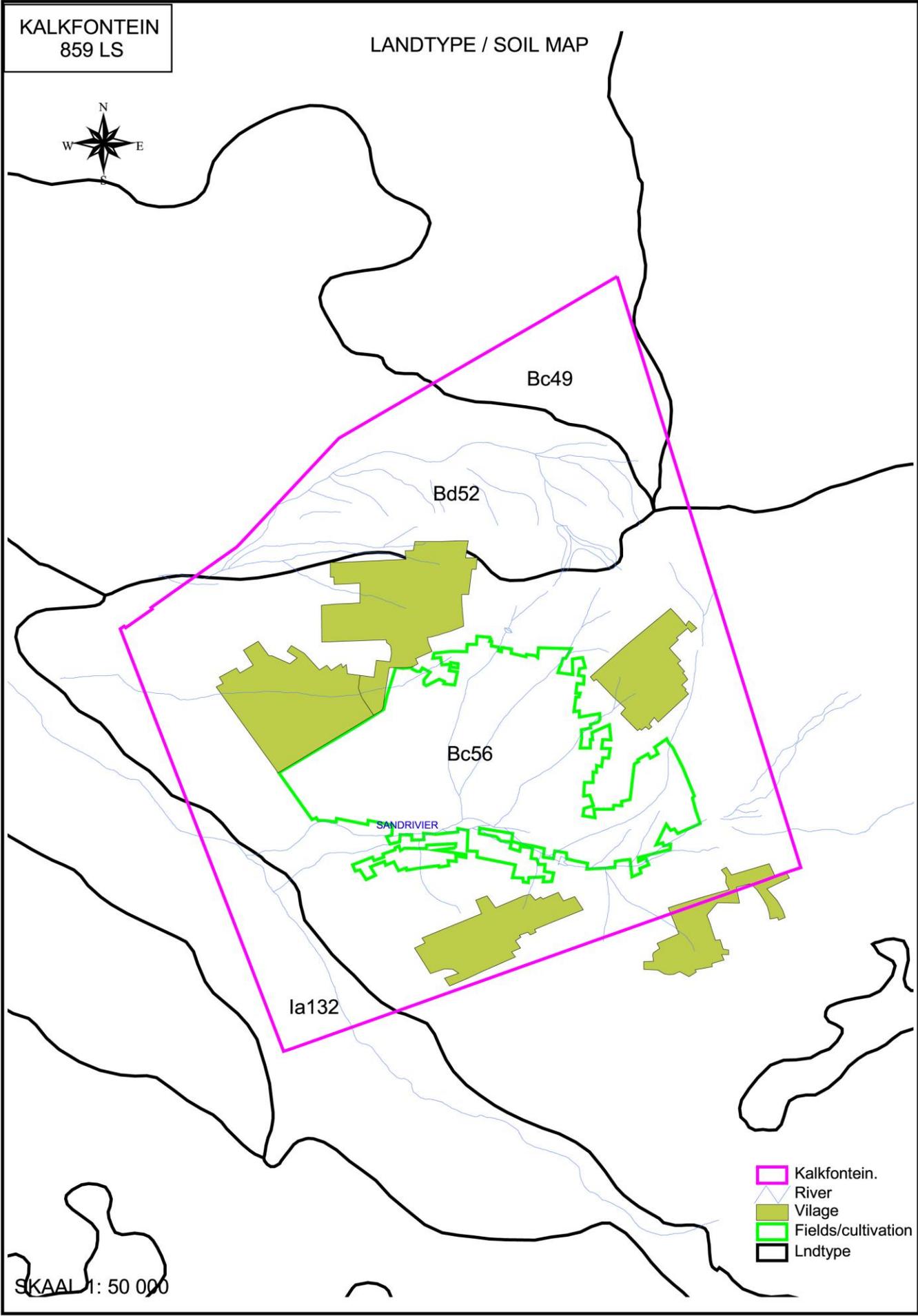


Photo 15: Bainsvlei soil vorm



Map 2: Land type/ Soil map (H. du Preez)

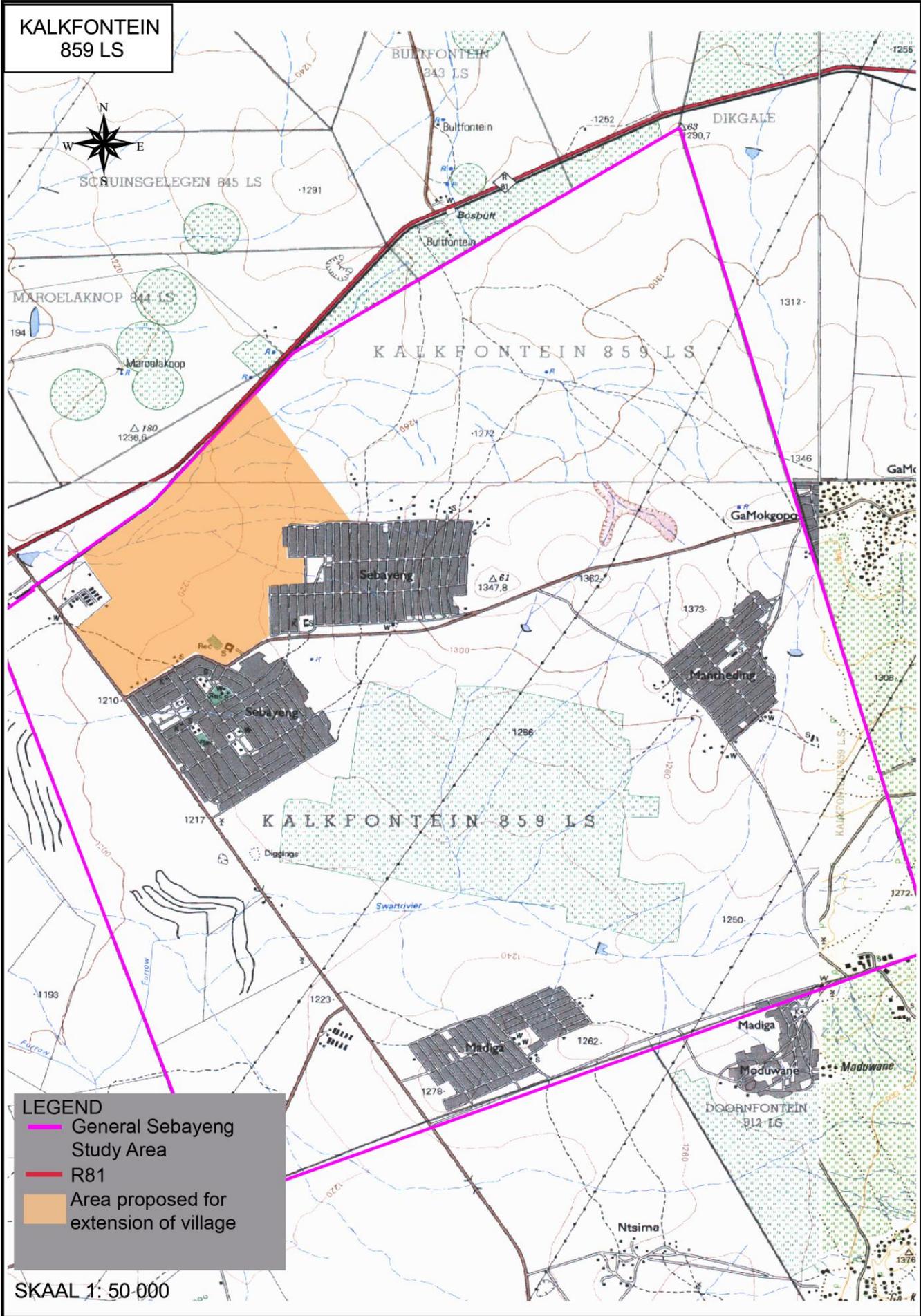
Hydrology

The entire project area contains well-drained deep soils. There are two main streams with their tributaries that drain the study area. These are the Swart River and the Turfloop river, both of which are large non-perennial streams. The proposed development area lies north of the Swart River and east of the Turfloop River, and will not cross either river, but crosses a number of tributaries of the Turfloop River. It is however proposed that the proponent consider the investigation of alternative sites within the area to ensure that the proposed area for development is the most appropriate. In the area it is difficult to observe the difference between the average plant growth and that of the river bed and subsistence farming is practiced right up to the centre of the river. On the aerial photograph one can clearly make out the river, but upon investigation during the site visit, it was clear that the river contains similar plant growth to its surrounding area and only a little more dense than that of the surrounding plant growth.

There are several detention ponds in the area, but no dams were observed as such. Seasonal wetlands occur in some areas within the general study area and close to the river. No prominent wetland features were observed in the proposed development area.

Wetlands

Wetlands are areas where terrestrial and aquatic ecosystems come together. In a wetland, the water table is at or near the surface of the ground. The land is either temporarily or permanently covered with shallow water. The depth of the water table changes from year to year and season to season, depending on the amount of rainfall and how much groundwater is used (e.g. absorbed by plants or pumped out by people with bore holes and well points). Wetlands can be found from the tops of mountains right down to the sea. Rivers link the wetlands within a catchment. Typical Wetland plants include emergent plants like reeds, rushes and sedges found in this section of the western tributary. Wetlands are home to a wide variety of both invertebrates and vertebrates, which depend on the water for all or part of their life cycles. Animal groups that are plentiful in wetland areas include insects (both larvae and adults), fish, amphibians, birds and mammals. Wetlands are a very important migratory habitat and form a very important part in migration corridors. Wetlands are constantly under threat and in South Africa more than 50% of wetlands have already been destroyed. Wetlands play a vital role in the natural purification of water as well as a habitat for endemic species. It is therefore of utmost importance that the green corridor be maintained and that the wetland be protected.



Map 3: Map of area (1:50000)

Topography and drainage

The study area slopes fairly gently (average slope 1:24 or 4%) from east to west over most of the area, with the northern and southern quadrants sloping to the north and south respectively. There are a number of non-perennial drainage lines that cross the site, although they are not obvious on the ground. The only named stream in the study area is the Swart River which flows in the southern third of the study area, also in a westerly direction. All these drainage lines generally feed into the Turfloop River, which flows in the low-lying areas on the western boundary of the site. The highest point in the study area is located close to the eastern boundary of the study area, and is occupied by the Village of Mantheding. There are some rock outcrops in this area that form a habitat for natural vegetation and fauna.

Climate and Atmosphere

Climatic information is based on statistics from the Pietersburg Weather Station recorded between 1961 and 1990.

The study area lies in the summer rainfall region and has a warm climate. Frost is rare. The highest temperatures occur during December and January. The daily average high is 28,1 degrees Celsius in January and the highest recorded temperature is 36,8 degrees Celsius. The average minimum winter temperature is 4,4 degrees Celsius in July with a record low of -3,5 degrees Celsius in 1964. The mean annual daily variation is 15 degrees Celsius.

The mean annual precipitation for the region is 478mm. Most precipitation falls between October and March with the peak period being December/January. Rainfall between the months of May and September is generally low with the average precipitation rate for the period June to August being 4,6mm.

Large-scale surface airflow over the region is dominated throughout the year by easterly and north-easterly winds. October and November are typically windy with wind speeds up to 13.8m/s. The frequency of southerly winds increases during June and July.

The ambient air quality was not measured, but a visual inspection showed no point sources of pollution and clear air in general.

Fauna and Flora

The general Sebayeng area falls within the Savanna biome. Almost the entire Limpopo Province can be classified as part of the Savanna biome. The Savanna biome does not occur at high altitudes and is found at altitudes between 1500 to 1800 meters. The savanna biome is generally associated with seasonal rainfall, with wet summer and dry winter months. The savanna also has a distinct dry season.

It is widely known that the savanna is occupied by the earth's richest large mammal fauna. Many of these fauna are directly or indirectly dependent on plants. Within the general Sebayeng area the

veld is utilised for grazing purposes by domestic cattle and donkeys. These type of grazers can be considered as bulk grazers, that do not exercise a high degree of selective grazing. There are also limited amounts of goats that is classified as concentrate grazers.

The site contains two habitats with higher than average biodiversity levels, namely the drainage lines and the granite koppies/outcrops in the Mantheding area. Since these areas harbour above average levels of biodiversity they should be assigned a use that is compatible with conserving and increasing the existing biodiversity, (e.g. Public Open Space, conservation, etc).

Flora



Aloe marlothii



Typical shrubs and groundcover in the general area



Granite koppie



Plants displaying invasive properties



Chondropetalum tectorum



Bulb specie



Opuntia humifosa



Acacia karroo



Exotic shrub



Opuntia stricta



Sclerocarye birrea

Photo 16 to 26: Fauna observed

Vegetation type

The central bushveld features plains with a layer of low to medium-high deciduous trees and shrubs. The central bushveld is also known for its almost continuous herbaceous layer that is dominated by grass species. The vegetation type within which the Sebayeng study area falls is the Polokwane Plateau Bushveld located on the higher lying plains around Polokwane. The tree layer is short and open. In general this vegetation type has a very well developed grass layer that is predominantly utilised for grazing.

Table 1: Important taxa recorded in the Polokwane Plateau Bushveld vegetation type (Mucina & Rutherford, 2006)

Scientific name	Scientific name
Acacia caffra	Asparagus africanus
Acacia permixta	Momordica balsamina
Acacia rehmanniana	Rubia petiolaris
Acacia karroo	Aristida diffusa
Acacia tortilis subsp. Heteracantha	Bracharia nigropedata
Combretum molle	Digitaria eriantha subsp. Eriantha
Ormocarpum kirkia	Eragrostis curvula
Ziziphus mucronata	Themeda triandra
Aloe marlothii subsp. Marlothii	Aristida congesta
Acacia hebeclada subsp. hebeclada	Cymbopogon caesius
Gymnosporia senegalensis	Cynodon dactylon
Combretum hereroense	Digitaria diagonalis
Diospyros lycioides subsp. Sericea	Diheteropogon amplexans
Euclea crispa subsp. crispa	Elionurus muticus
Heteromorpha arborescens var.	Eragrostis gummiflua

abyssinaca

Lippia javanica

Rhus pyroides var pyroides

Tephrosia rhodesica

Triumfetta pilosa var tomentosa

Anthospermum rigidum subsp. Rigidum

Gymnosporia glaucophylla

Hirpicium bechuanense

Lantana rugosa

Senecio burchellii

Sida rhombifolia

Solanum panduriforme

Aloe cryptopoda

Eragrostis racemosa

Eragrostis superba

Eustachys paspaloides

Panicum maximum

Pogonarthria squarrosa

Sporobolus africanus

Felicia mossamedensis

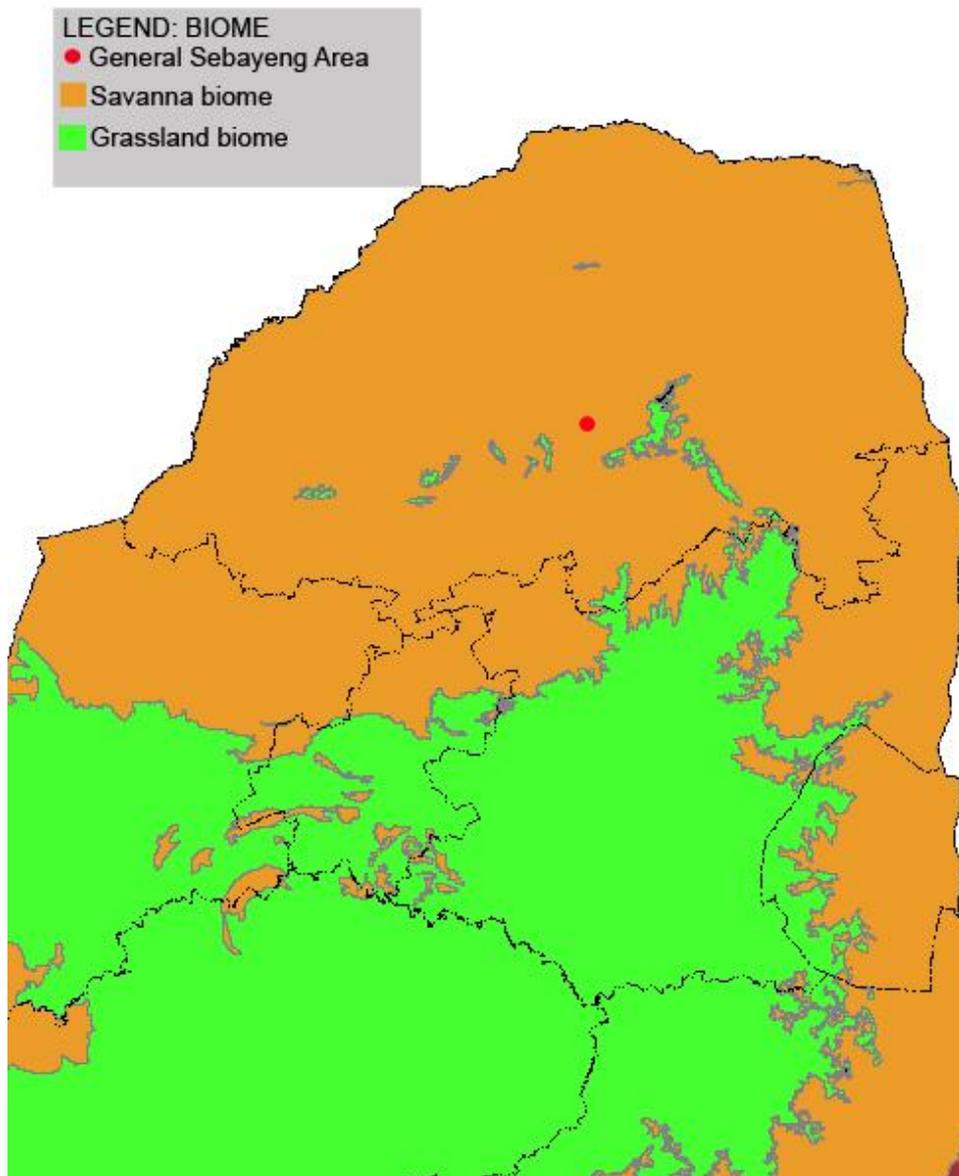
Hermbstaedtia odorata

Pollichia camprestris

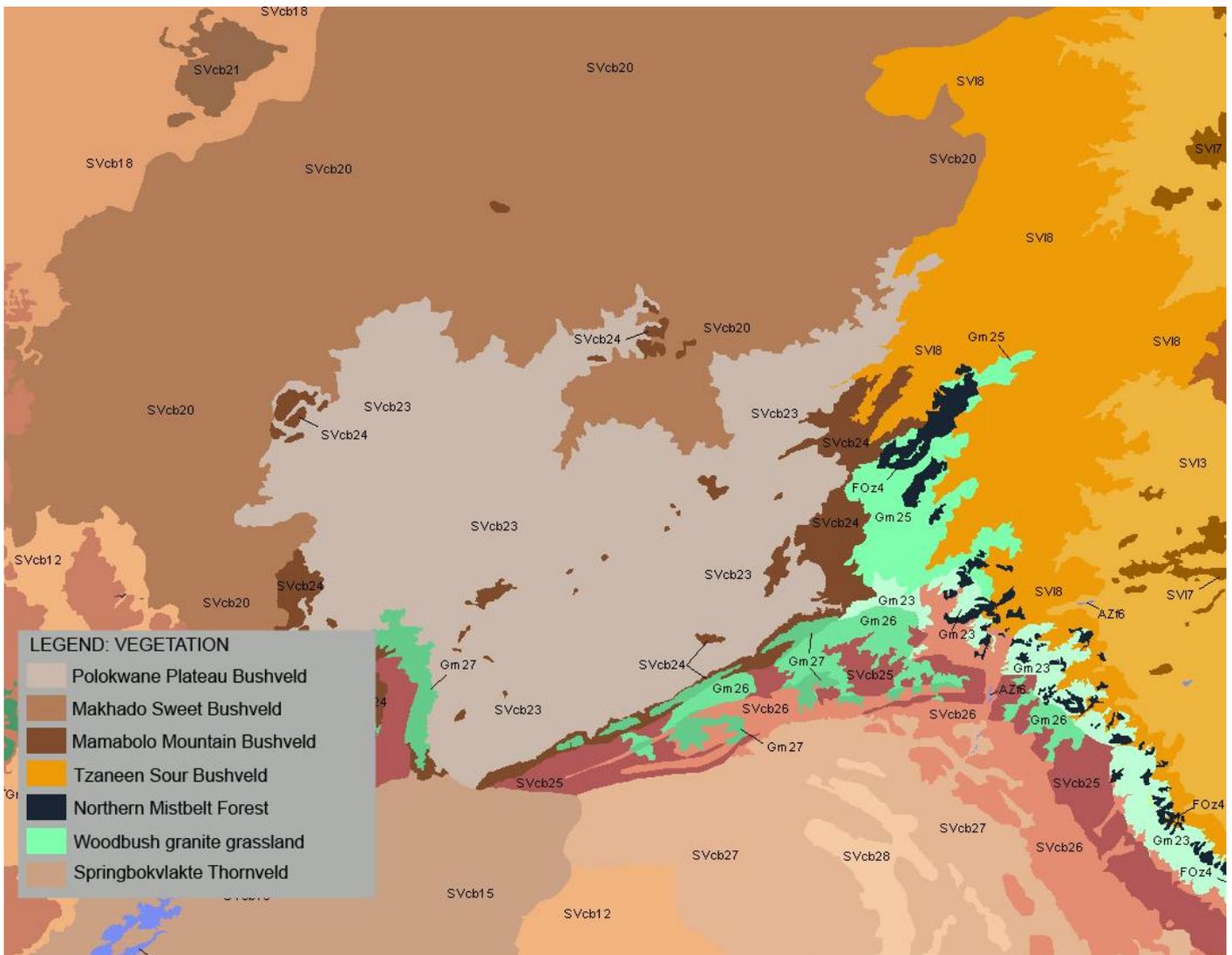
Eulophia petersii

Hypoxis hemerocallidae

Aloe greatheadii var. greatheadii



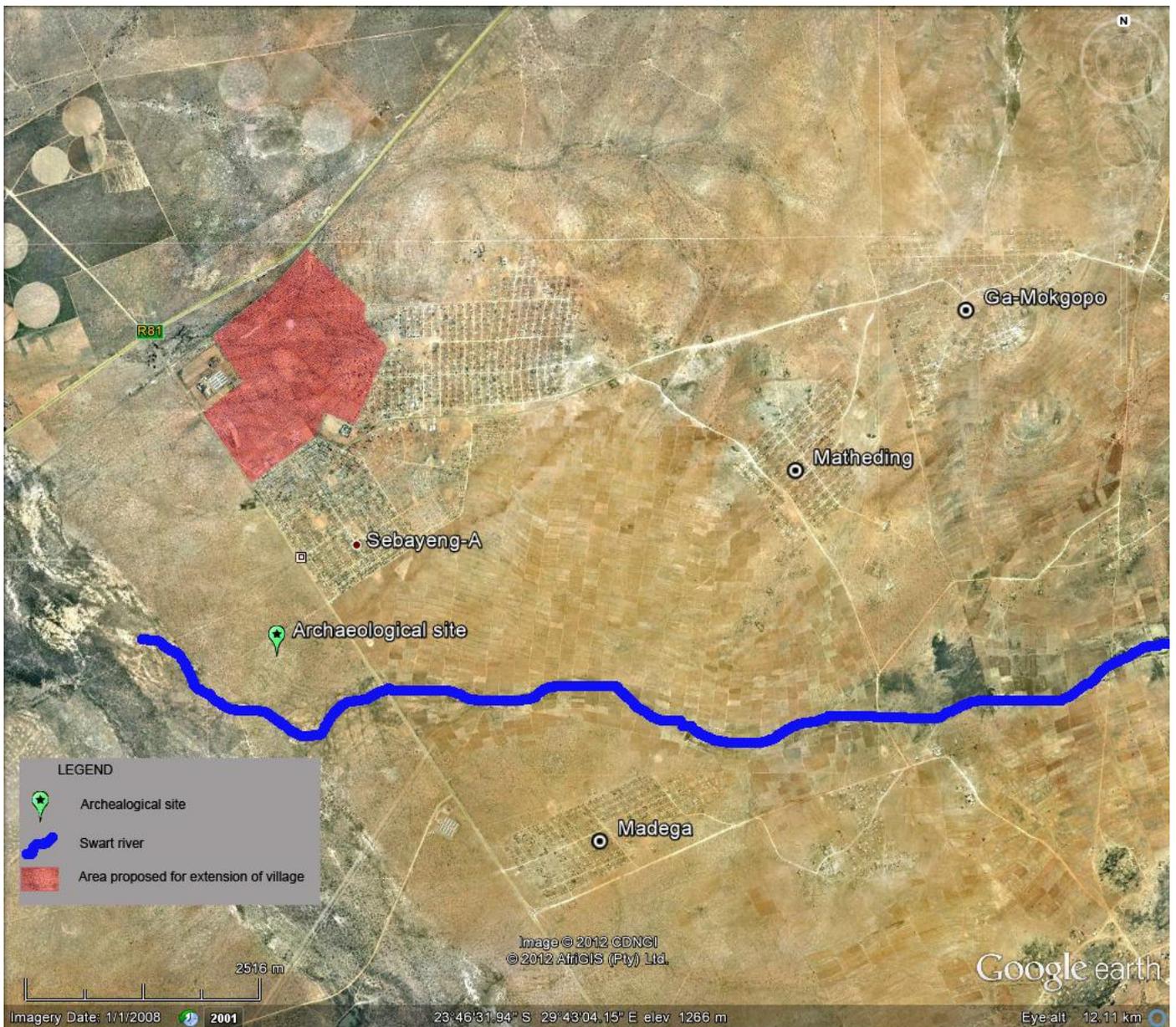
Map 4: Biome



Map 5: Vegetation type

Heritage resources

In a previous impact assessment undertaken by Newtown Landscape Architects a phase 1 archeological survey was undertaken. During this survey a historically significant site was encountered. The site is thought to be a pre-colonial African (Sotho or Ndebele) settlement of around 2 hectares in extent. The archaeological sites are located within the general study area, but a detailed study was not undertaken for the proposed area for development. It is therefore recommended that a detailed archaeological study be undertaken for the specific area.



Map 6 (Google earth, 2012)

The centre of the settlement has the following co-ordinates:

23° 47" 20' S

29° 41" 05.6' E

Visual analysis

The visual quality of the general area can be described as medium due to the presence of litter and poor maintenance of structures. This can be ascribed to poor service delivery within rural areas as well as poverty. The visual quality of the proposed area for development can also be described as medium as there is little groundcover leaving soil exposed, dumping of domestic waste and building rubble and invasive plant species. It is assumed that should the area be developed as an extension of the township that it will have no major impact on the visual quality of the area as the proposed area of development will suit the current land use.

TOWN PLANNING ASSESSMENT

Land use analyses

The general area is mainly used for subsistence farming, which includes grazing. Formally developed areas are found in the Sebayeng and Mantheding Villages. A section of the Sebayeng village was allocated for RDP housing development and has been well established. The Sebayeng village can be described as a functional township establishment, and has various basic services provided for in the area. Various schools, a clinic, a filling station, various shops and paved roads to the west of the Sebayeng Village as well as through the Sebayeng village is well established in the area. Furthermore the Sebayeng village is located approximately ... km from the Mall of the North, which offers various shopping options. Although some sections of the Sebayeng village are formally planned it is clear that the natural expansion of the area is inevitable. It is therefore of utmost importance that proper planning for the expansion of the village is undertaken. The Western boundary of the Sebayeng village is bordered by a road connecting Sebayeng and Mankweng. The area proposed for the expansion of the village is located to the North of the Sebayeng Village, between the village and the railway line. This area is mainly used for grazing purposes.

There are two hatcheries located within the study area that is managed by LUNDS. The hatcheries however do not seem to function at full capacity and could be considered as a community project. Several informal sports fields have been established in the general area.

Infrastructure within the general Sebayeng Area



Railway line



Road between Sebayeng and Mankweng



Graveyard



Hatcheries managed by LUNDS



Pumphouse



Electrical servitude



Culverts where Swart River and road intersects



Sebayeng-Dikgale Regional Water Scheme: Reservoir



Church within Sebayeng



SAPS Station in Sebayeng



RDP Housing in Sebayeng

Infrastructure within the general Sebayeng Area



Typical housing types in Sebayeng Village



Cellphone antenna and reservoir



Sport fields



Typical housing in Matheding village with granite koppie in background



Detention dam



Shop



Pre-School

Photo 27 to 47: Infrastructure

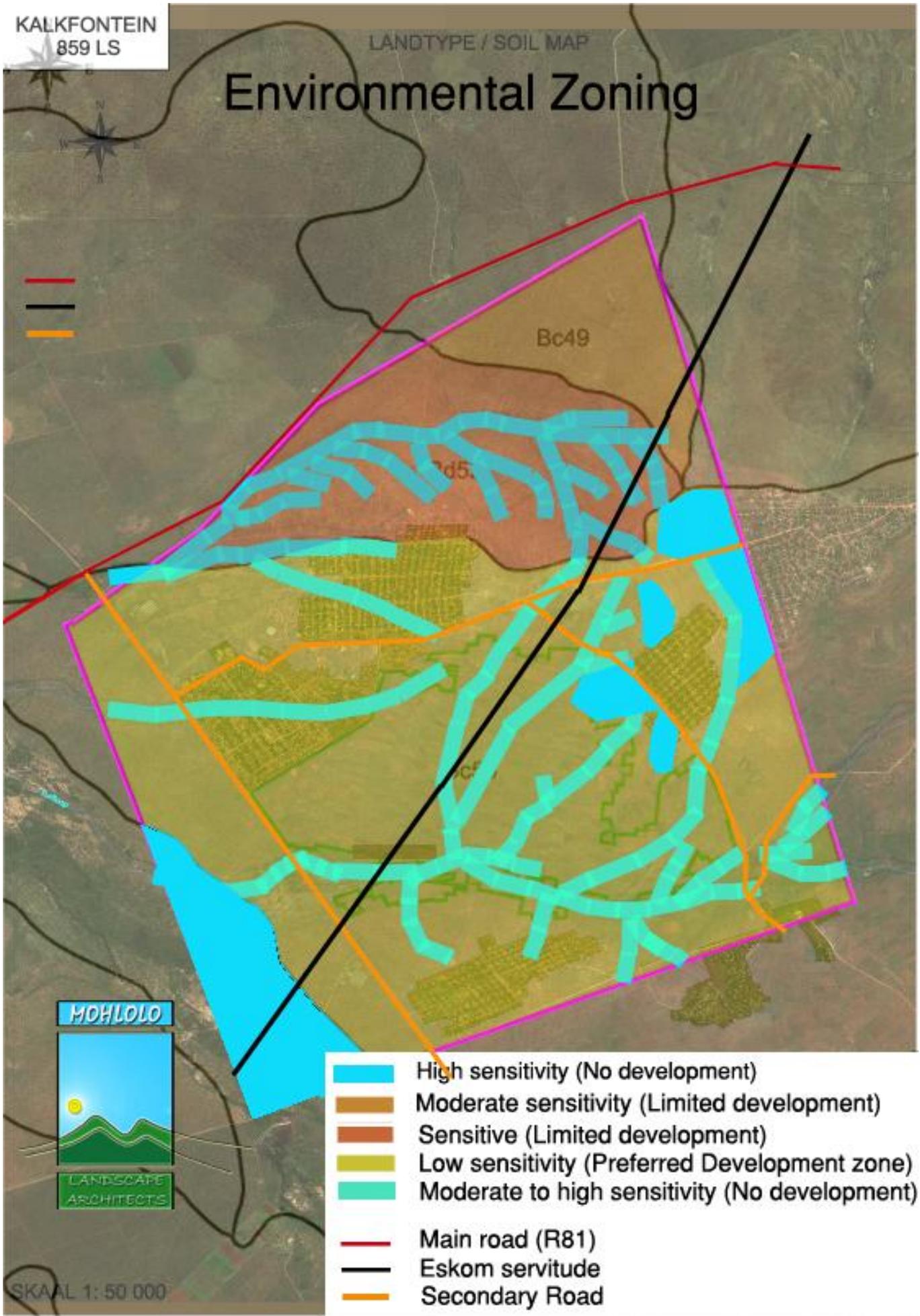
Proposed future development

From the above discussion it is clear that expansion of the area under investigation is inevitable. It is therefore proposed that a professional town planning process be undertaken to ensure responsible expansion of the area and to encourage the conservation of certain natural elements. Several basic services are already available within the Sebayeng Village. Some of these basic services are already under severe pressure due to informal expansion of the area. Formal planning will ensure that the services adapt to the expansion of the area.

PUBLIC PARTICIPATION

Due to time and financial constraints a public participation process did not form part of the study undertaken. It is therefore proposed that a full public participation process be undertaken as part of further future investigations forming part of formal township establishment. In general it does not seem that the community would oppose to the formal development of the village. The public participation process should be undertaken as part of a proper Environmental Impact investigation as required by legislation.

Map 7: DEVELOPMENT ZONING MAP



CONCLUSION

Flora and Fauna

The flora in the area under investigation is moderately to severely degraded due to subsistence farming methods and overgrazing of the groundcover layer. The groundcover layer has been severely denuded. Although a lot of exposed soil was observed, erosion does not seem to be a major issue in the general study area.

Further research recommended

The recommendations are as follows:

It is recommended that a full Environmental Impact Study be undertaken upon the initiation of the town planning phase. The EIA study should include specialist studies to ensure that all aspects of the environment are studied in detail. The Desktop Strategic Environmental Assessment should only be used as a guideline to determine the most appropriate area for the expansion of the Sebayeng village.

Future Environmental Impact Assessment

The following activities are listed in the National Environmental Management Act, Act 107 of 1998 Environmental Impact Assessment Regulations as set out in Government Notice no R543 of 2010 are assumed to form part of the proposed extension of the village:

The transformation of undeveloped, vacant or derelict land to –

- (i) residential, retail, commercial, recreational, industrial or institutional use, inside an urban area, and where the total area to be transformed is 5 hectares or more, but less than 20 hectares, or
- (ii) residential, retail, commercial, recreational, industrial or institutional use, outside an urban area and where the total area to be transformed is bigger than 1 hectare but less than 20 hectares

The above requires an environmental impact assessment process.

OUTCOME OF INVESTIGATION

The environmentalist has no objection to the general proposed area for development as it falls within the less sensitive area. The following principles are recommended for the study area:

- That the drainage lines in the study area be kept free of development and be zoned as public open space or conservation. Any urban agriculture taking place should be practised on sustainable principles to prevent siltation and eutrophication of the rivers;

- That the overgrazed areas be developed first and that protected species be removed and transplanted if they are affected by infrastructure installations;
- That a floodline determination be done and that no stands be developed and sold if they fall within the 1:100 year floodline;
- That any heritage sites identified in the Heritage Assessment be documented properly before being demolished;
- That any wetlands within the greater Sebayeng area be identified and signposted and that development be kept at least 50m away from the highwater mark;
That no further development take place in the immediate vicinity of the granite koppies observed in the area of Mantheding village.
- That streets be planned parallel or diagonally across the contours as far as possible to prevent unpaved streets from eroding and silting up the rivers
- That borrow pits for civil works be identified early and rehabilitated as part of the construction contract(s);

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