6 RECEIVING ENVIRONMENT

The environment consists of interacting physical, biological, social, economic and cultural factors. It is essential that the baseline conditions of an environment are characterised in order to be in a position to accurately predict the potential effects a development may have on that environment. As such, this section describes the existing environmental baseline conditions of the project site and its surroundings.

6.1 BIOPHYSICAL BASELINE

This section provides an overview of the biophysical components of the receiving environment.

6.1.1 Climate

Rainfall

The study area normally receives approximately 450mm of rain per year (SAWS,1998). Most rainfall occurs during the summer months (October to March). The area receives the lowest average rainfall (0mm) in June and the highest average rainfall (50mm) in February.

Temperatures

The average midday temperatures range from 19.1°C in June to 33.2°C in January. The lowest temperatures are experienced in July, with an average minimum temperature of one degree Celsius during the night (1).

Wind

The prevailing winds within the project area are generally light to moderate and from the north to northeast.

Extreme Weather Conditions

Extreme weather conditions which occur within the project area include thunderstorms during the rainy summer months, which may be accompanied by lightning, heavy rain, strong winds and sometimes hail. The area also occasionally experiences frost during winter months.

6.1.2 Landscape and Topography

The area is characterised by a very flat topography on the floodplain of a valley, dominated by farmlands. The Ga-Mogara River runs in a south to

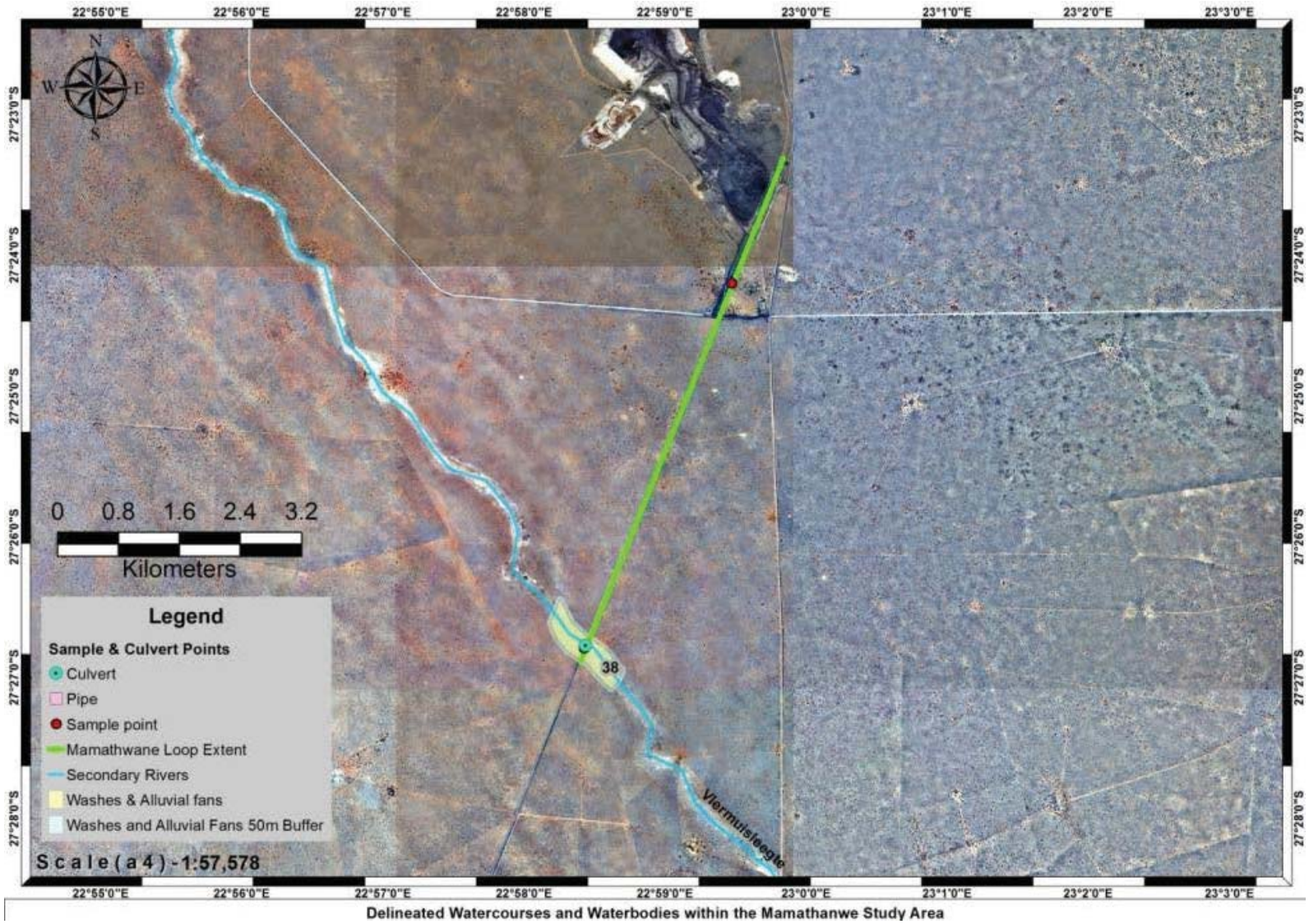
(1) http://www.saexplorer.co.za/south-africa/climate/hotazel_climate.asp. Accessed 8 October 2012.

north direction approximately 13.5km west of the project site. The Vlermuisleegte River, a tributary of Ga-Mogara River, extends along the southern section of the site. There are north south running mountains approximately 40km west and approximately 30km east of the project site.

6.1.3 Hydrology

Within the broader landscape, the Ga-Mogara River which is more than 10km west of the project site is a significant ecological feature. A single watercourse crossing traverses the southern portion of the project site in the form of a wash associated with the Vlermuisleegte watercourse, which is indicated on the 1:50 000 topographic map (2722BD), as well as the 1:50 000 DWA river dataset (Middleton & Bailey 2008)(refer to *Figure 6.1*). The watercourse lacks clearly defined channel banks, but is characterised by tall Grey Camel Thorn *Acacia haematoxylon* trees that are associated with deep sands and dry watercourses (Van Wyk, 1997). This river system runs in a south east to north west direction and feeds into the larger Ga-Mogara River that runs in a south to north direction located to the west of the project site.

Figure 6.1 Vlermuisleegte Watercourse within Mamathwane Study Area



Delineated Watercourses and Waterbodies within the Mamathanwe Study Area

6.1.4 Geohydrology

The area has an aquifer classification of minor, i.e. a moderately yielding aquifer system of variable water quality (Hydrogeological map series of the Republic of South Africa, 2003). The dissolved solid concentrations (mg/L) of the groundwater are between 301-500mg, and the borehole distribution for the area is between 6-10 per square kilometer.

6.1.5 Biodiversity

National Vegetation Types

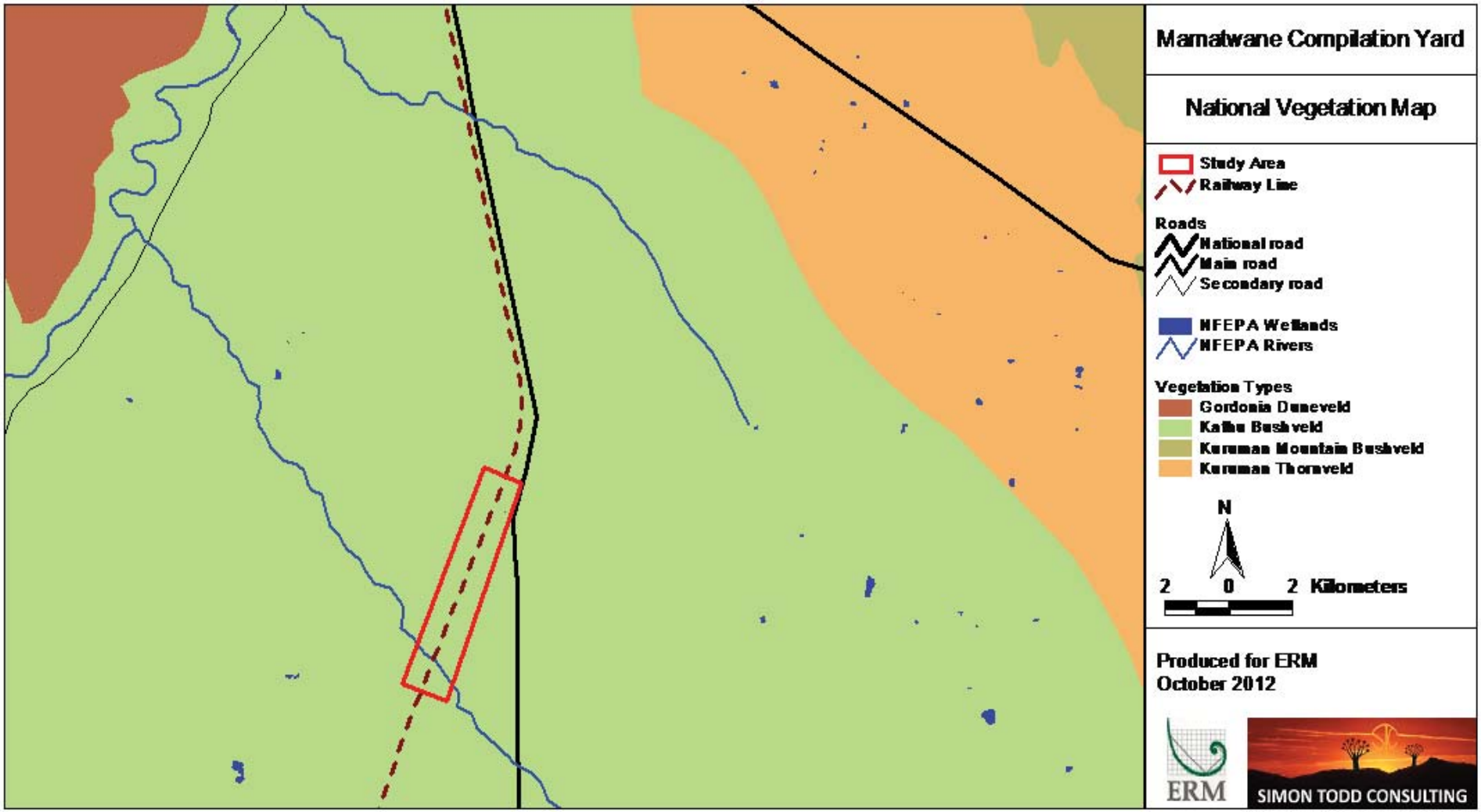
According to the national vegetation map (Mucina & Rutherford 2006) the project site is entirely within the Kathu Bushveld vegetation type (see *Figure 6.2*). This vegetation unit occupies an area of 7,443 km^2 and extends from around Kathu and Dibeng in the south through Hotazel and to the Botswana border between Van Zylsrus and McCarthysrus.

The study area is associated with Aeolian red sand and surface calcrete, deep sandy soils of the Hutton and Clovelly soil forms. The Kathu Bushveld vegetation type is still largely intact, with less than two percent transformed by mining activity, and classified as Least Threatened [1]. However, it is poorly conserved and does not currently fall within any formal conservation areas.

Although no endemic species are restricted to this vegetation type a number of Kalahari endemics are known to occur in this vegetation type, such as False Umbrella Thorn *Acacia luederitzii* var *luederitzii*, Silverbrush Grass *Anthephora argentea* and Kalahari Buffalo Grass *Panicum kalaharense*. Other vegetation types which occur in the broad vicinity include Gordonia Duneveld and Kuruman Thornveld. These other vegetation types are also classified as Least Threatened. There are no listed vegetation types known from the project site.

[1] Least threatened in terms of the classification system found in Mucina & Rutherford, 2006. The system provides a classification of vegetation types into four levels (from Critically Endangered to Least Threatened) based on percentage of untransformed areas with this vegetation type and biodiversity targets.

Figure 6.2 Broad-scale Vegetation Types



Source: Simon Todd, 2012.

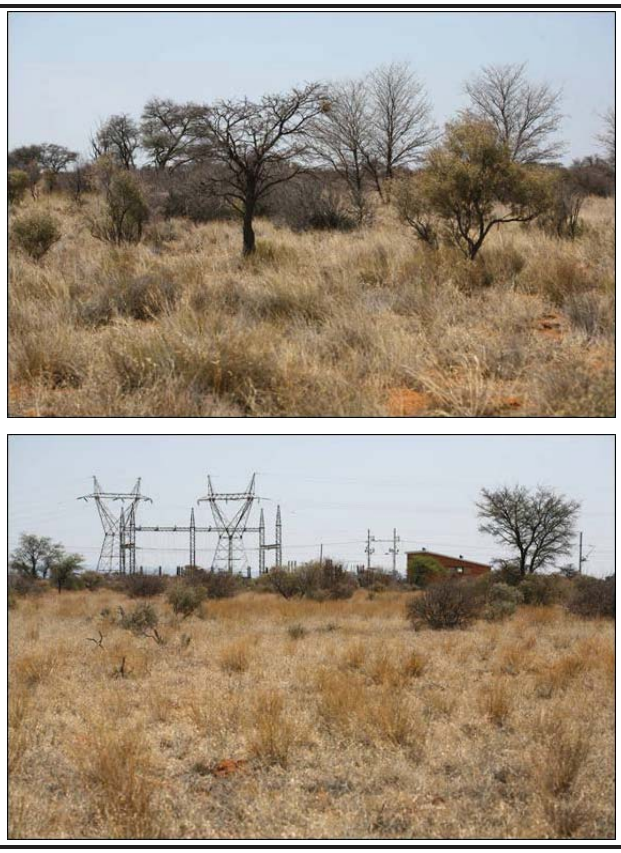
On-site Vegetation Types

Within the project site, the vegetation consists of a tree layer, comprised mainly of Grey Camel Thorn *Acacia haematoxylon,* Black Thorn *Acacia mellifera,* Camel Thorn *Acacia erioloba,* Silver Cluster-Leaf *Terminalia sericea* and Velvet Brandybush *Grewia flava*, with a grassy under storey consisting mainly of perennial grass species including Lehmann Lovegrass *Eragrostis lehmanniana* and Bushman Grass *Stipagrostis uniplumis*. There are some occasional shrubs present, such as January Bush *Gnidia polycephala*. Other large woody species that occurred at the site as scattered individuals or localised clumps include Karee *Searsia lancea,* Candle Thorn *Acacia hebeclada* and Kriedoring *Lycium hirsutum*.

The overall flora diversity at the project site is considered low and there is little variation in the vegetation present. Apart from the Grey Camel Thorn *Acacia haematoxylon* and the Camel Thorn *Acacia erioloba*, there were no other threatened or protected species observed at the project site.

Examples of the project site vegetation is shown in *Figure 6.3*, indicating the dominance of Camel Thorn *Acacia erioloba* and Grey Camel Thorn *Acacia haematoxylon* at the site, the relatively dense grass layer and the flat topographical nature of the project site

Figure 6.3 Examples of Project Site Vegetation



Source: Simon Todd, 2012.

Flora Species of Conservation Concern

According to the South African National Biodiversity Institute (SANBI) Integrated Biodiversity Information System (SIBIS) database, 202 plant species have been recorded from the four quarter degree squares 2722 BD and DB and 2723AC and CA maps. Although the study area does not contain very high plant diversity, this is nevertheless a relatively low total, suggesting that the study area has not been very well sampled in the past. Only one species, Camel Thorn *Acacia erioloba* is of conservation concern and is listed as Declining[1] by the South African Red Data List of Plants (2012). Several nationally protected tree species may occur on the project site including Grey Camel Thorn *Acacia haematoxylon* and Camel Thorn *Acacia erioloba* which are dominant species on the project site and Sheperd's Tree *Boscia albitrunca* which is widespread in the study area but was not observed on the project site.

Critical Biodiversity Areas

No fine-scale conservation planning has been conducted for this area. The site also does not fall within a National Protected Areas Expansion Strategy focus area, indicating that it has not been recognized as a potentially important area for future conservation efforts.

The habitats present at the project site are widely available across an extensive area surrounding the site and the potential for broad-scale fragmentation or loss of connectivity is low. In terms of the broad-scale processes operating at the site, the flat, open nature of the site suggests that few such ecological gradients and processes are likely to be operating across the site.

Within the broader landscape, the Ga-Mogara River, which is more than 10km to the west of the site, is a significant ecological feature that may be important for dispersal and broad-scale ecological processes. However, the development would not have an impact on that ecosystem.

Mammals

The site falls within the distribution range of 48 terrestrial mammal species, and 8 eight bat species, indicating that the mammalian diversity at the site is potentially high. Those species associated with rocky habitats are however not likely to occur at the project site, which is restricted to deep Kalahari sands.

Five terrestrial mammal species of conservation concern may occur in the area, the Brown Hyaena *Hyaena brunnea* (Near Threatened), Black-footed Cat *Felis nigripes* (Vulnerable), Leopard *Panthera pardus* (Near Threatened), Honey Badger *Mellivora capensis* (SARDB Endangered) and Ground Pangolin *Smutsia temminckii* (Vulnerable).

[1] The species is declining but the population has not yet reached a threshold of concern

Given that the area is currently used for livestock grazing, the abundance of larger predators such as Leopard and Brown Hyena in the area is likely to be very low as a result of persecution from farmers. There is a high probability that the other listed species occur in the area as the habitat is broadly suitable for all three. The Black-footed Cat, Honey Badger and Ground Pangolin are however widely distributed across the arid and semi-arid parts of South Africa and the development of the site would not constitute significant habitat loss for these species, a single individual of which has a home range far exceeding the extent of the study area.

In addition, the proposed project site is in close proximity to a large amount of human activity and disturbance (especially in the form of mining) and it therefore unlikely that there are large populations of these shy species in the area.

Avifauna

The avifauna in area around the site has not been well sampled in the past and both South African Bird Atlas Projects (SABAP), SABAP1 and SABAP2 do not have many records from the area. According to SABAP2 only 140 species have been recorded from the area. This list does not include any listed species and is very depauperate (lacking in numbers) of raptors, suggesting that less common species are not well represented. Taking the list for the Kathu area as being more representative, there are at least 10 listed species known from the broader area which may occur at the site. This includes the Black Stork, Martial Eagle, Secretarybird, White-backed Vulture, Bateleur, Black Harrier, Lesser Kestrel, Lanner Falcon, Kori Bustard and Ludwig's Bustard. Several of these species have very low reporting rates suggesting that they are probably not resident in the area; nevertheless this list suggests that the area is likely to be fairly important from an avifaunal perspective.

Reptiles

The project site lies in or near the distribution range of 33 reptile species, indicating that the reptile diversity at the site is likely to be of relatively low diversity. Based on distribution maps and habitat requirements, the composition of the reptile fauna is likely to comprise two tortoises, 11 snakes, 13 lizards and skinks, one chameleon and five geckos. The actual number of species present at the site is likely to be significantly lower as species associated with rocky habitats are not likely to be present. Reptile fauna is likely to be characterised by species associated with sandy substrates or those with wide habitat tolerance. Species commonly encountered in the area include the Cape Cobra *Naja nivea*, Kalahari Sand Snake *Psammophis trinasalis*, Ground Agama *Agama aculeata* and Spotted Sand Lizard *Pedioplanis lineoocellata*. No listed reptiles are known from the area and there are also no narrow endemics which occur in the area, indicating that the reptiles at the site are likely to be largely widespread species of low conservation concern.

Amphibians

The site lies within the distribution range of 11 amphibian species, of which only three or four are likely to occur at the site. There is no natural surface water at the site and no areas where water is likely to collect for any prolonged length of time. As a result, only those species able to persist away from perennial water are likely to occur at the project site. The Giant Bullfrog *Pyxicephalus adspersus* is the only species of conservation concern which occurs in the area, but as there is no breeding habitat for this species in or near the site, the site is not likely to be significant for the Giant Bullfrog. The species which are likely to occur at the site, such as sand and rain frogs, are widespread species associated with sandy substrates which characterise the broad area and the project site is not likely to be of above-average significance for these species either.

Project Site Sensitivity Assessment

The only feature of higher ecological significance that could be identified within the study area is the Vlermuisleegte drainage system towards the southern extent of the project site. This is an ephemeral drainage system that carries water only during exceptional circumstances. It is characterised by the presence of large Camel Thorn *Acacia erioloba* trees. The rest of the project site is an open plain on deep sand and cannot be differentiated in terms of ecological sensitivity.

Within this area the major sensitive feature of the site is the abundance of the protected tree species Camel Thorn *Acacia erioloba* and Grey Camel Thorn *Acacia haematoxylon*, which are ubiquitous across the site and it would not be possible to develop the site without some impact on these species.

The project site is very flat which will reduce the erosive capacity of any runoff generated from the project site. In addition, the deep sandy soils have a high infiltration capacity with the result that any runoff generated will be quickly absorbed by the adjacent areas receiving the runoff. As a result the risk and likelihood of water erosion at the project site is low.

The existing railway line, the Mamathwane Manganese Mine as well as the R380 (which bisects the railway line), all generate significant noise, human activity and disturbance. As a result, the ecological value of the site is already low and the site does not appear to have any ecological characteristics to distinguish it from the surrounding landscape or suggest that it would be of above average importance for biodiversity or ecological processes.

6.1.6 Protected Areas

The project site is not located within any protected areas, as defined in terms of the National Environmental Management: Protected Areas Act (No. 57 of 2003, as amended by Act No 15 of 2009). The nearest protected area to the project site is the Tswalu Kalahari Nature Reserve, located approximately

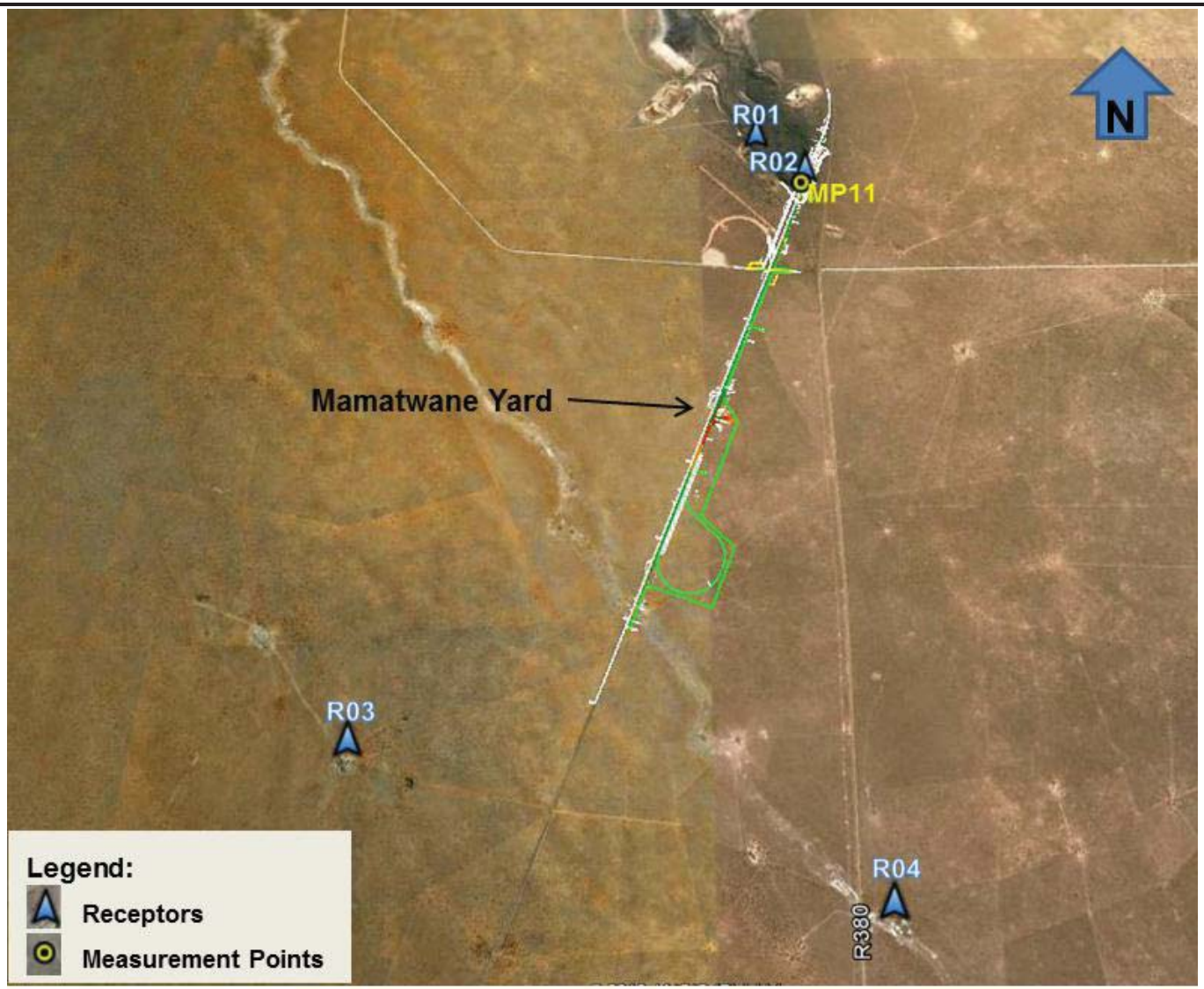
55km west north - west of the project site. Given the distance from the project site, it is unlikely to be affected by the project.

6.1.7 Noise and Vibration

The project site is located directly adjacent to the Mamatwane Manganese Mine and sinter plant. As such, the noise environment around the site is of an industrial nature, with high constant noise levels owing to the existing manganese plant, which operates on a continuous basis. In contrast, the noise environment further away from the project site, the manganese mine and the sinter plant is that of a typical rural area.

In terms of nearby noise receptors, two farm houses, which belong to Transnet, are situated next to the railway line on the western side of the project site. In addition to this, two farm houses are located approximately 4 km to the south of the project site. The baseline noise monitoring point (MP11) and the sensitive receptors described above are shown in Figure 6.4 below.

Figure 6.4 Mamatwane Yard Noise Monitoring Point and Receptors



The recorded average measured daytime and night-time noise levels were 53.0 dB(A) and 50.3 dB(A) respectively, and fell well within the SANS guidelines for industrial districts of 70 dB(A) and 60 dB(A). The noise environment was dominated by vehicular traffic on the R380, the mining operations, as well as the train operations to and from the manganese plant and mine.

6.1.8 Air Quality

The project site is a remote site mostly used for farming (sheep and cattle) and extensive mining. There are no measurements of ambient air quality at the site. However, ambient monitoring of manganese has been done at Van Zyl's Rus and Kuruman since 1999 (DEA. 2009b). Measured concentrations at these two residential sites are below the WHO annual ambient air quality guideline of 0.15 $\mu g/m^3$. The fraction of manganese ore in the airborne dust is consistently less than 2% at both sites. With no major sources of air pollution in the project area other than the mines, and on the evidence of the monitoring results, air quality is expected to be relatively good at the Compilation Yard.

6.2 SOCIOECONOMIC BASELINE

The following section provides a description of the socio-economic environment within which the proposed project is located. The description provided in this section is based on publically available and high level secondary information, as well as primary data gathered from interviews with affected landowners and CDWs in the area.

6.2.1 Directly Affected Farm Portions

The project is expected to directly affect four privately-owned commercial farms. The combined size of the farms is approximately 3,556ha. ***Table 6.1*** provides a list of the affected farms, the individual sizes of the farms as well as the size of land to be acquired for the Project.

Table 6.1 Size of the Project Affected Farms

Name of Farm	Size of Farm	Land Required for the Project	Land Ownership
Portion 3 of Remainder of the farm Moab No. 700	100ha	0.6779ha	Privately owned
Portion of Remainder of Portion 1 of the farm Shirley No 367	1,700ha	103.40ha	Privately owned
Portion of Remainder of Portion 2 of the farm Walton No 390	856ha	18.65ha	Privately owned
Portion 2 of Remainder of the farm of Walton No 390	900ha	1.7ha	Privately owned

Source: Pers. Comms with affected landowners, April/May2012

Portion of Remainder of Portion 1 of the farm Shirley No. 367, is divided by the railway line into two sections (west and east). Transnet will need to purchase a

portion of the land, to accommodate for the project. According to the landowners there are no known and/or pending land claims on any of the four properties.

6.2.2 *Provincial and District Overview*

The Northern Cape Province is the largest province in South Africa, measuring 361,830km^2. It is, however, the least populated Province in the country, with a population density of 3.1 persons/ km^2. The primary Metropolitan areas within the Northern Cape are Kimberly and Upington. Smaller District towns include Douglas, De Aar, Prieska, Victoria West, Hopetown and Colesburg. Its economy is dominated by mining, agricultural (sheep and cattle) and tourism activities.

Major challenges faced by the Province include high unemployment (26.7 percent) and low income levels (median monthly earnings of R2 100) (1). In addition to this, low education levels are regarded as another concern for the region. With respect to this, the 2011 census data shows that 11 percent of the Northern Cape population has no education, 24 percent has primary education and approximately 35 percent has secondary education. Only 8 percent were reported to have higher education in 2011.

The Northern Cape economy is dominated by mining, agriculture (predominantly sheep and cattle) and tourism activities (2)

In turn, John Taolo Gaetsewe District Municipality is approximately 27,283 km^2 in land size. The District is divided into three Local Municipalities namely, Joe Morolong, Ga-Segonyana and Gamagara. Similarly to the Province, the District's economy is dominated by mining, agriculture and tourism activities. The District has one of the highest populations in the Province and a high population growth of nearly two percent. This is attributed to the booming mining sector. Even though the mining sector is booming, only 29 percent of the population is classified as employed and a significantly high number of people (53 percent) are classified as economically inactive (EIAP); include people children, elderly, disabled, and those who choose not to seek employment. The reasons for a high percentage of EIAP are unclear.

Table 6.2 (3) and *Figure 6.5* provide a statistical summary of the socio-economic indicators for the Province and John Taolo Gaetsewe District Municipality.

(1) StasSA: Monthly earnings of South Africans, 2010
(2) http://www.tradeinvestsa.co.za/news/982513.htm
(3)SatsSA, 2012, 'Census 2011 Northern Cape Municipal Report', Report No. 03-01-51.

Table 6.2 ***Socio-economic Indicators: Northern Cape Province and John Taolo Gaetsewe District Municipality***

Indicators	Northern Cape Province	John Taolo Gaetsewe District Municipality
DEMOGRAPHIC INDICATORS		
Population Size	1,145 861	224,799
Population Growth Rate	1.44%	1.60%
Rural/Urban Split	70% rural and 30% urban	Mostly rural, dominated by mining and commercial agricultural activities (cattle).
Racial Composition in %		
African/Black	50	85
Coloured	40	9
White	7	5
Indian/Asian	1	0.5
Other includes foreign nationals	2	0.5
SOCIO-ECONOMIC INDICATORS in %		
Levels of Education		
No Schooling	11	23
Primary Schooling	24	35
Secondary Schooling	35	25
Grade 12	22	12
Tertiary	8	5
Employment & Unemployment Rates in %		
Employment	40 (1)	29
Unemployment	20	18
Economically Inactive People (EIAP).	40	53
Annual Economic Growth Rate in %		
Annual Economic Growth Rate	2.4	2.2

Source: StatsSA: Population Census 2011

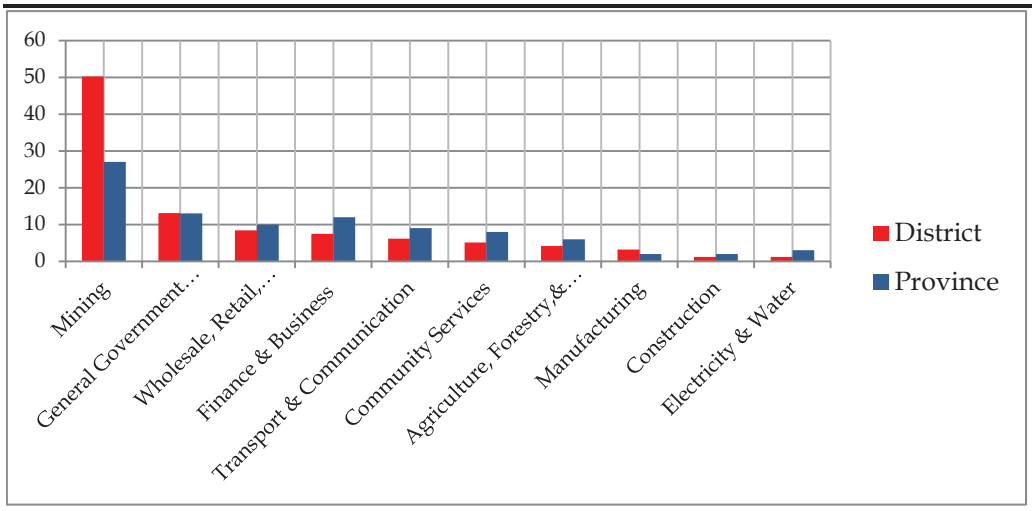
The major challenges facing the JTG DM include:

- low levels of education with 23 percent of the population with no formal education;
- high level of unemployment, with 75 percent of the population with no recordable income;
- large income discrepancies within the district municipality; and
- skills available in the DM are not aligned to the job opportunities that are present.

The economic activities of the Province and District are summarised in *Figure 6.5* below. Mining; government services; wholesale, retail, catering and accommodation; finance and business; community services; and agriculture, forestry and fishing sectors are the most dominant economic sectors.

(1) Stats SA, Quarterly Labour Force Survey, Quarterly 1, Jan- March 2012

Figure 6.5 Percentage Sectoral Contributions: Province and District



Source: Stats SA, Gross Domestic Product, Third Quarter, 2011

6.2.3 *Local Municipal Overview*

Joe Morolong LM is the largest of the two project affected Local Municipalities, with an aerial extent of 5, 813km²; while Gamagara LM is smaller comprising of 2,619km². Gamagara LM is located in the south- western section of the Province and District, along the N14 National Road between Upington and Vryburg; whereas Joe Morolong LM is located in the north-eastern side of the Province and shares a border with Botswana. Gamagara LM has five towns, namely Kathu, Sesheng, Dibeng, Dingleton and Olifantshoek. Joe Morolong LM has three towns namely, Hotazel, Santoy and Van Zylsrus as well as 190 smaller towns and villages.

A significant portion of Municipal land is used for mining (iron ore and manganese ore) and commercial farming (cattle and goats). The single most important factor that has guided the development in Gamagara LM is the iron ore mine at Sishen, which is one of the largest open- pit mines in the world.

Livestock farming predominantly consists of cattle and goats. Game farming and hunting are also increasing becoming popularity. At the same time, many of farmers in the Municipalities are selling entire farms and/or portions of their land to renewable energy developers (specifically solar power). According to the farms, sustaining agricultural activities in the area is hard due to water scarcity and selling portions or their entire farms to renewable energy developers helps generate additional income.

Table ***6.3*** shows that while the population of Gamagara LM has grown by six percent since the 2001 Population Census, the population of Joe Morolong LM has declined by one percent. This is attributed to the unmatched skills levels to the employment opportunities available in the areas. Outmigration is a common trend in the Province as a whole; while other people move into the

Province others move out. In addition, Joe Morolong LM has an estimated 77 percent of the population is considered as EIAP and employment figures stand at nine percent. There are no clear reasons for this trend.

Table ***6.3*** provides a statistical summary of the socio-economic indicators for the Municipalities.

Table 6.3 ***Socio-economic Indicators: Gamagara and Joe Morolong Local Municipality***

Indicators	Gamagara Local Municipality	Joe Morolong Local Municipality
DEMOGRAPHIC INDICATORS		
Population Size	41,617	89,530
Population Growth Rate	6%	-1% The population has decreased due to out-migration and as people move to other areas in search of employment
Rural/Urban Split	Over 50% of the Municipalities' area is rural and characterised by commercial agricultural activities (livestock) and mining activities.	
Racial Composition in %		
African/Black	55	97
Coloured	29	2
White	14	1
Indian/Asian	0	0
Other (incl. foreign national)	2	0
SOCIO- ECONOMIC INDICATORS		
Levels of Education in %		
No Schooling	22	23
Primary Schooling(1)	26	32
Secondary Schooling	26	28
Grade 12	18	13
Tertiary	8	4
Employment and Unemployment Rates in %		
Employment rate	49	9 (2)
Unemployment rate	17	14
Economically Inactive People (EIAP)	34	77

6.2.4 *Economic Sectors and Contribution*

There is limited statistical data available regarding the sectoral contributions to the economy of the project affected LMs. According to LMs' Integrated Development Plans (IDPs) the main economic sectors are mining, agriculture, tourism, transportation, and trade.

Mining Activities

Some of the mines currently operating in the LMs includes (refer to *Figure 6.6* below):

(1) Includes those with some primary education and those who have completed primary education
(2) Joe Morolong Local Municipality Annual Report 2010-2011

- Mamatwane Manganese Mine and Sinter which is situated directly adjacent to the project site. It is owned by South African Manganese Corporation Limited (SAMANCOR's) and BHP Billiton.
- Wessels Underground Manganese Ore Mine, and the railway terminus owned by Black Rock.
- The Tshipi Manganese Project (located directly west of Mamatwane Mine) owned by Jupiter Mines and Tshipi.
- United Manganese of Kalahari (UMK), located 13km south of Hotazel and 42km north of Kathu.
- Kumba Iron Ore Ltd/ or Sishen Iron Ore Mine is the principal mine operator in Kathu. Sishen Mine is one of the largest open-pit mines in the world and in 2011, the mine produced 38,9 million tonnes (Mtpa) of iron ore. The Sishen Mines have significantly contributed to the economic growth and diversification of the economy in the LM. These contributions include sports facilities, a golf club, country club, transportation services, personal and community services, conference facilities, shopping centres, civic works, catering and accommodation.

Hospitality Sector

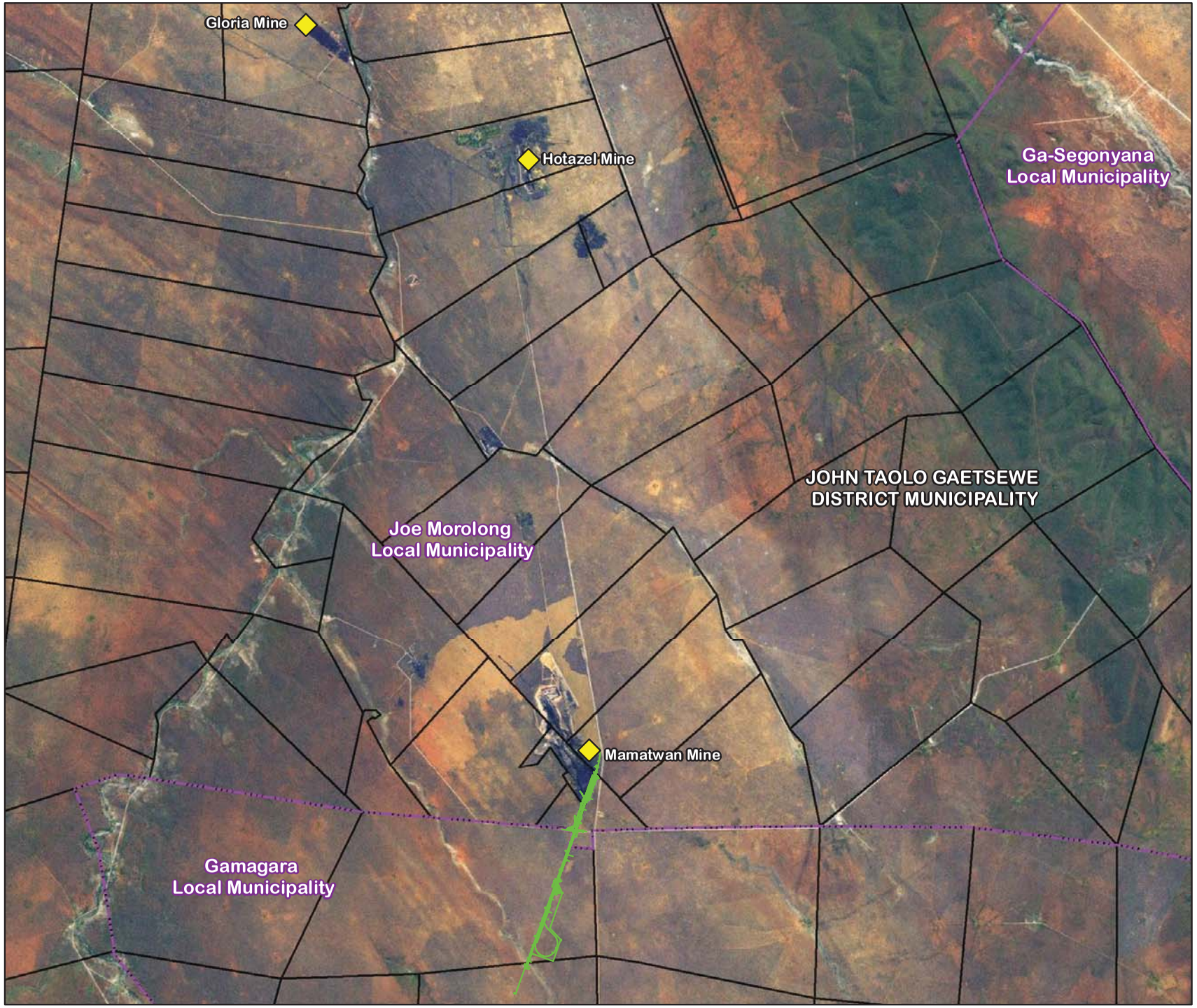
The hospitality industry is well developed in the LMs. This is facilitated by the continuously growing mining industry and a lack of accommodation for the mine workers. The mining companies have resorted to long term booking of local hospitality accommodation to house its workers. Many people in the urban areas of the LMs have converted their homes into B&Bs as a means of capturing the benefits that come with the presence of the mines and its workers.

Transportation Sector

The road transport sector plays an important role in the economy of the LMs due to the mining sector. This sector contributes between four and five percent annually on the economy of the LMs. Currently the railway line services cannot meet the demand set by the mines. As a result, most mines likely transport a large portion of their minerals by road which has led to an increase in the road transportation industry. Even though the local businesses are benefiting from this, the public road infrastructure is being negatively affected due to the number and frequency of heavy loaded vehicles using it daily and road maintenance appears insufficient.

Agricultural Sector

The agricultural sector's contribution to the economy is limited to 3.8 and 4 percent at a local and provincial level respectively, which is due to the shortage of water in the LMs and Province as well as the arid climate and semi-desert conditions that are prevalent in the region.



Legend

- Mines
- Proposed Compilation Yard
- Local Municipalities
- Cadastral Farm Portions

SCALE:

0 1 2 3 4 5

Kilometers

N

TITLE:

Location of Surrounding Mines in the Immediate Region

CLIENT:

Transnet

DATE: June 2013	CHECKED: MP	PROJECT: 0172056
DRAWN: AB	APPROVED: SHC	SCALE: 1 : 175 000

DRAWING: Map Showing Mines.mxd | REV: 0

ERM
Great Westerford Building
240 Main Road
Rondebosch, 7725
Cape Town, SOUTH AFRICA
Tel: +27 21 681 5400
Fax +27 21 686 073

Projection:Transverse Mecator, CM 23, Datum: WGS 84
Source: Chief Directorate National Geo-Spatial Information
2722BD_2001_ED2_GEO.TIF
Inset: ESRI Data and Maps

SIZE: A4

T:\GIs Projects\0172056_Transnet Hatch Mn Ore Line Upgrade\Mapping\MXD\EIA_Report_Maps\Map Showing Mines.mxd

6.2.5 *Socio-economic Indicators of the Project Affected Farms*

There are approximately ten people residing permanently on the project affected farms; including the landowners and their workers.

All the farms are used to breed livestock (sheep, cattle, and game farming), as well as horses. On the remainder of Portion 2 of farm Walton No. 390, the landowner mines the mineral diatomite, which is naturally occurring, silicon rich sedimentary rock made up of fossilized hard-shelled plant algae. According to the landowner, there is an estimated 40,000 tons of diatomite at present on this farm. The landowner processes it for sale as a flea and tick remedy for livestock and pets, as well as processing it to produce a multivitamin supplement suitable for human consumption.

Existing Infrastructure on the site and in close proximity to the Site

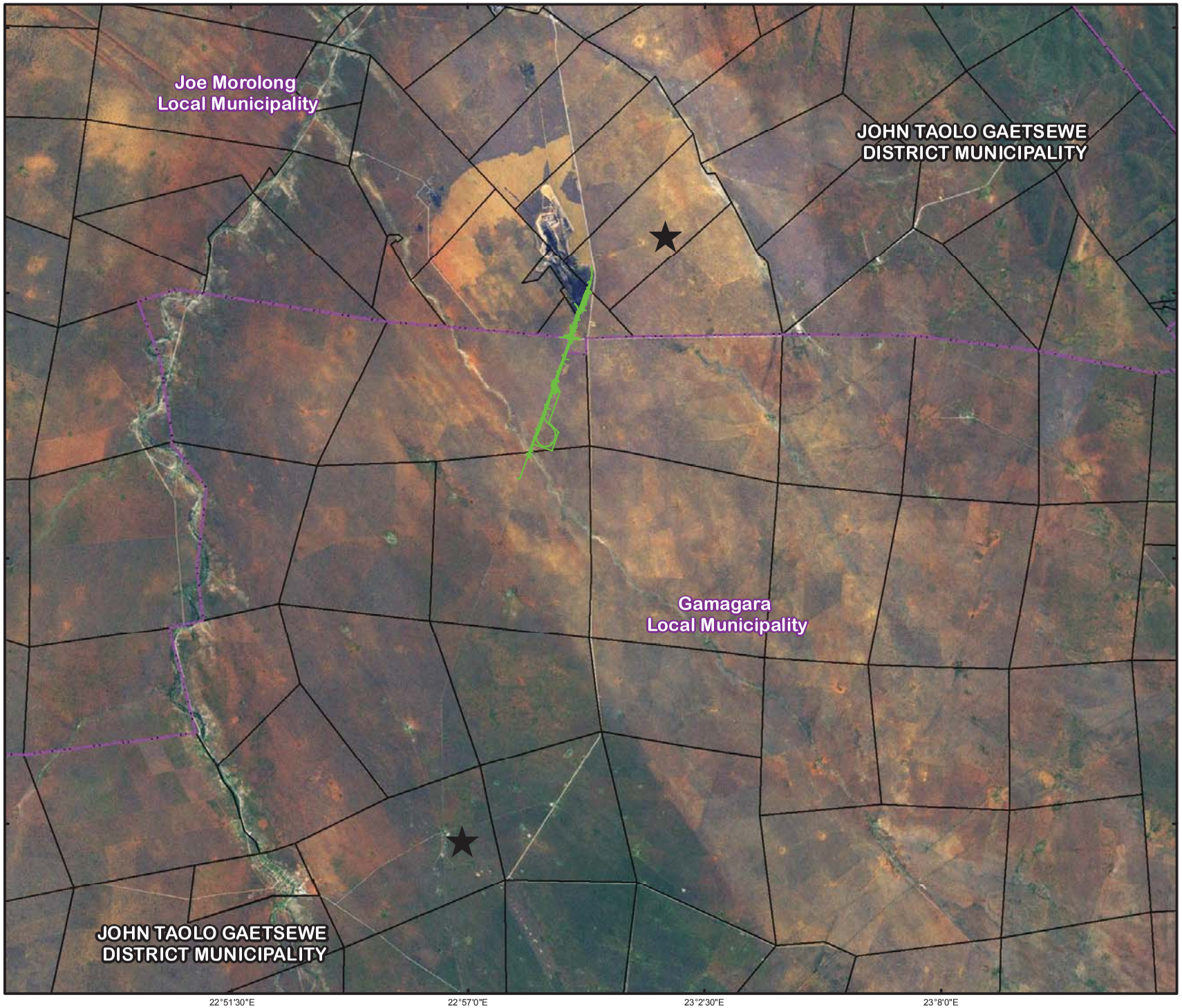
Below is a list of infrastructure on site, project affected farms, as well as infrastructure found within five kilometres of the site:

- Four main farm houses;
- Farm workers' accommodation;
- Handling pens;
- Fenced off grazing areas (for rotational grazing) and property fences;
- Mamatwane Eskom substation;
- Eskom 132 kV overhead power line;
- Mamathwane station building;
- Vaal- Gamagara water pipeline which runs from Paarl River to Black Rock on Portion of remainder of portion 2 of farm Walton No 390; and
- Mamatwane Mine immediately adjacent to the north of the existing compilation yard; (see *Section 6.2.4* and *Figure 6.7).*

Figure 6.7 Existing Mamathwane Yard

Solar Power Plant – future development close to the Project Area

The Adams PV Solar Energy Facility is proposed on Farm Adams 328, directly opposite the Mamatwane Mine. The facility will have a generating capacity of 19MW and will cover an area of less than 20ha. The proposed facility is accessible via the R380, the same road used for access by the surrounding mines and surrounding landowners. A map outlining proposed renewable energy facilities in the region are presented below.



Legend

- Renewable Energy Facilities
- Proposed Compilation Yard
- Local Municipalities
- Cadastral Farm Portions

SCALE:

0 1 2 3 4 5

Kilometers

N

TITLE:

Location of Renewable Energy Facilities proposed in the Region

CLIENT:

Transnet

DATE: June 2013	CHECKED: MP	PROJECT: 0172056
DRAWN: AB	APPROVED: SHC	SCALE: 1 : 175 000

DRAWING: Map Showing REFs.mxd — REV: 0

ERM
Great Westerford Building
240 Main Road
Rondebosch, 7725
Cape Town, SOUTH AFRICA
Tel: +27 21 681 5400
Fax +27 21 686 073

Projection:Transverse Mecator, CM 23, Datum: WGS 84
Source: Bing Maps ©2010 Microsoft Corporation
Inset: ESRI Data and Maps

SIZE: A4

T:\GIs Projects\0172056_Transnet Hatch Mn Ore Line Upgrade\Mapping\MXD\EIA_Report_Maps\Map Showing REFs.mxd

6.2.6 *Some Bulk Services and Infrastructure*

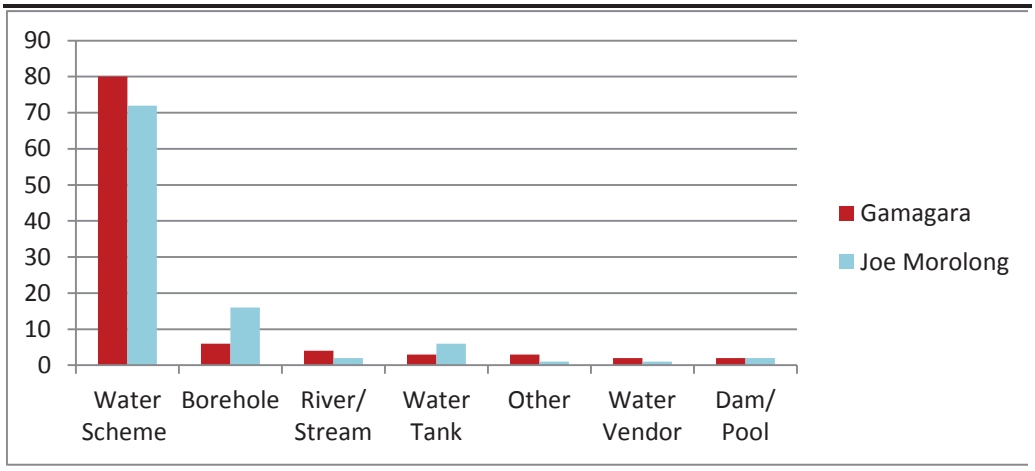
This section provides a description of the public services, specifically water sources and supply, roads and access as well as crime and policing levels.

Water Supply

The Northern Cape Province is one of the driest Provinces in the country due to limited rainfall. As such, the District relies heavily on the Vaal- Gamagara Scheme as its main water source. This scheme involves water being abstracted from the Vaal River and treated (at a water treatment works 60km west of Kimberley), before being piped as far north as Hotazel. The scheme therefore fulfils an important strategic role in supplying potable water to a number of towns, settlements and mines in the Northern Cape region. In addition to piped water, water is also supplied to the area through the various mining operations in the region.

Both project affected LMs receive water from the Vaal-Gamagara Water Scheme. The majority of the population in the Gamagara LM (80 percent) and in the Joe Morolong LM (72 percent) receive their water from the regional/local water schemes. This ensures that the three-quarters of the population have clean drinking water. The remaining quarter of the population in the LMs source its water from boreholes, water-tanks, dams and other sources. According to the Population Census 2011, six percent of the population in Gamagara LM and 16 percent of the population in Joe Morolong LM use underground water sources, specifically boreholes. This group comprises mainly of farmers who have on-site boreholes used to provide water for their livestock and households. The dissemination of water supply sources for both Municipalities is shown in *Figure 6.9* below.

Figure 6.9 Water Sources in Gamagara and Joe Morolong Local Municipalities



Source: Population Census 2011

The project affected farms predominantly use boreholes as a source of water for livestock and domestic uses. Two of the landowners use dams as an additional source of water, see *Table 6.4*.

Table 6.4 Directly affected farms and their sources of water

Name of Farm	Water Infrastructure
Portion 3 of Remainder of the farm Moab No. 700	Boreholes, dams
Portion of Remainder of Portion 1 of the farm Shirley No 367	Boreholes
Portion of Remainder of Portion 2 of the farm Walton No 390	2 boreholes, 2 dams, & Vaal-Gamagara Water Pipeline
Portion 2 of Remainder of the farm of Walton No 390	Boreholes

Source: Pers. Comms., with the affected landowners

Roads and Access

Major (national roads) and Regional roads in the LMs are tarred and maintained by SANRAL and Provincial authorities. Secondary roads used mostly by farmers, mines and Transnet are often not tarred but gravel and graded often.
The project area is located off the R380 (regional road) and is accessible via a gravel service road located next to the railway line. The R380 is tarred and extensively used by heavy loaded vehicles and passenger vehicles. The heavy load vehicles comprise mainly trucks from the various mines operating in the area. The road that leads to the railway service road is used extensively by the Mamatwane Mine to transport minerals from site. It is also used by the project affected landowners to access the R380.

Figure 6.10 Railway Service Road

6.2.7 Crime and Policing

According to the landowners the common crimes that occur in the area are poaching (game) and livestock theft. The landowners stated that poachers and thieves gain access to their farms through the fencing found along the railway reserve as it is poorly maintained. They are also concerned about the presence of construction workers on site as they fear that the workers might

steal some of their game and livestock. Furthermore, the landowners are concerned about the compensation for the stolen livestock and game.

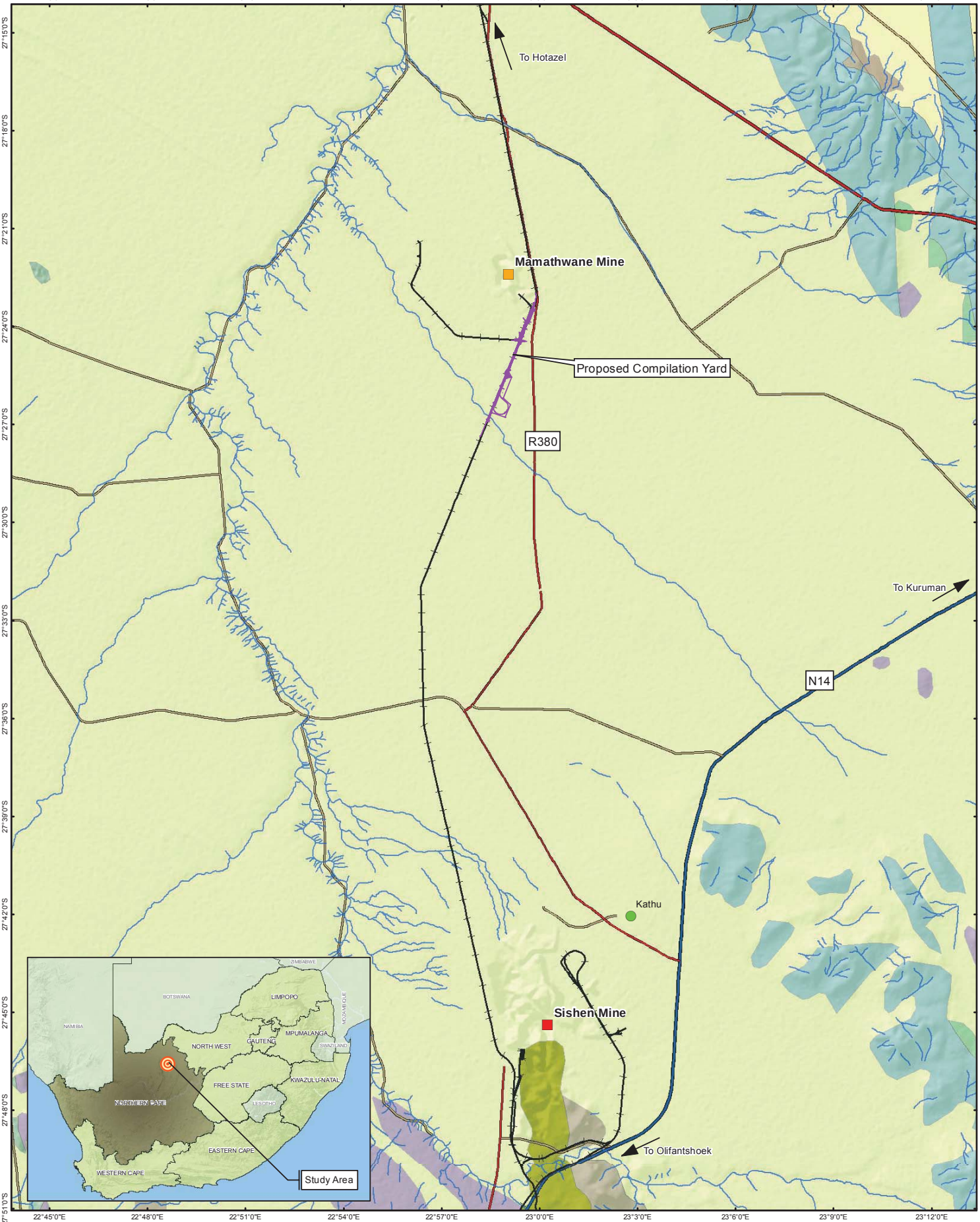
6.3 PALAEONTOLOGY, ARCHAEOLOGY AND CULTURAL HERITAGE

6.3.1 *Cultural Heritage*

The broader stretch of railway line between Hotazel and Kimberley has previously been recognised to consist of a variety of archaeological and heritage resources. These artefacts/ resources include remains of diamond mining activities, stone walling and South African war fortifications. These types of artefacts are mainly situated outside of the railway line reserve.

6.3.2 *Palaeontology*

The project site is situated in the most southern part of the Kalahari Group deposit (refer to *Figure 6.11*). In general, the quality of fossil preservation may be compromised in areas due to intense tectonic deformation, while extensive dolerite intrusion has compromised fossil heritage in portions of the Karoo Supergroup sediments (e.g. Ecca Group) due to resulting thermal metamorphism. In addition, pervasive calcretisation and chemical weathering of many near-surface bedrocks in the Northern Cape has further compromised their original fossil heritage in many areas (e.g. Ecca Group outcrop).



Legend

- Mamathwane Mine
- Sishen Mine
- Towns
- Proposed Compilation Yard
- Existing Railway
- River
- National Freeway Route
- Arterial Route
- Main Road
- Secondary Road

Geology

- Andesite
- Diamictite
- Dolomite
- Banded Ironstone Formation
- Sand
- Shale

SCALE: 0 2 4 6 8 10 Kilometres

N

DATE: Oct 2012	CHECKED: NB	PROJECT: 0172056
DRAWN: AT	APPROVED: SHC	SCALE: 1 : 200 000

TITLE:

Geology Map of the Transnet Mamathwane Compilation Yard

DRAWING: Transnet_Geology_Map5_A3_Portrait.mxd

REV: X

CLIENT:

Transnet SOC Ltd

ERM
ERM Southern Africa
175 Lunnon Road
Hillcrest, Pretoria
Tel: +27 12 362 0008
Fax: +27 12 362 8368

Projection:Geographic, Datum: WGS 84
Source:Geology ENPAT (2001)
Inset Map: ESRI Data and Maps

SIZE: A3

C:\Users\De14\Documents\Thurlow Mapping\PRIVATE WORK\ERM\CONTRACT\GIS\0172056_TRANSNET\MXD\Transnet_Geology_Map5_A3_Portrait.mxd

The fossil record of the Kalahari Group is generally sparse and low in diversity. The Gordonia Formation dune sands were mainly active during cold, drier intervals of the Pleistocene Epoch that were inimical to most forms of life, apart from hardy, desert-adapted species. Porous dune sands are not generally conducive to fossil preservation. However, mummification of soft tissues may have occurred and migrating lime-rich groundwater derived from the underlying bedrocks (including, for example, dolerite) may lead to the rapid calcretisation of organic structures such as burrows and root casts.

Occasional terrestrial fossil remains that might be expected within this unit include, calcretised rhizoliths (root casts) and termitaria (e.g. Hodotermes, the harvester termite), ostrich egg shells (Struthio) and shells of land snails (e.g. Trigonephrus) (Almond 2008, Almond & Pether 2008). Other fossil groups such as freshwater bivalves and gastropods (e.g. Corbula, Unio) and snails, ostracods (seed shrimps), charophytes (stonewort algae), diatoms (microscopic algae within siliceous shells) and stromatolites (laminated microbial limestones) are associated with local watercourses and pans. Microfossils such as diatoms may be blown by wind into nearby dune sands (Du Toit 1954, Dingle et al., 1983). These Kalahari fossils (or subfossils) can be expected to occur sporadically but widely, and the overall palaeontological sensitivity of the Gordonia Formation is therefore considered to be low.

Underlying calcretes of the Mokolanen Formation might also contain trace fossils such as rhizoliths, termite and other insect burrows, or even mammalian trackways. Mammalian bones, teeth and horn cores (also tortoise remains, and fish, amphibian or even crocodiles in wetter depositional settings such as pans) may be occasionally expected within Kalahari Group sediments and calcretes, notably those associated with ancient, Plio-Pleistocene alluvial gravels.

6.3.3 Archaeology

Archaeological resources in the Northern Cape include pre-historical and historical sites predominantly found adjacent to rivers, hilltops and pans. These include rock art, Iron Age sites as well as historical sites related to the railway system, diamond digging in Kimberley (1871 to 1914) and the South African War (1899 to 1902).

Although the project site is located adjacent to the existing manganese ore railway line and the area has been largely disturbed, the possibility of finding a high density of stone tools in areas is good based on archaeological work done in the vicinity of the site (Becker, 2012).