

## **5. ASSUMPTIONS, GAPS AND LIMITATIONS**

### **5.1. LOCATION OF DELTA-EPSILON (MASA - SELOMO) 6 X 765kV POWER LINES TO NGWEDI SUBSTATION**

In the Final Environmental Impact Report (FEIR) for the Delta-Epsilon (Masa - Selomo) 6 X 765kV transmission power line project, it was recommended that the three 765kV power lines to Ngwedi substation be situated in Corridor D which runs east of, and then south of the Pilanesberg Nature Reserve and which is substantially closer to the load centre and therefore would be closer to the proposed Ngwedi substation sites than the Corridor C\_B3 alignment.<sup>31</sup>

However, either Corridor C\_B3 or Corridor D could be utilised depending on the environmental considerations. If this is the case it is assumed that this 765kV power lines are situated in the same corridor as the proposed turn-in-turn-out power lines from Matimba-Midas to Mogwase substation.

As the decision from DEA on Delta-Epsilon (Masa-Selomo) 6 X 765kV Power Line Project was not available at the time of writing this report, the study has taken into consideration both scenarios in which either Corridor (Corridor CB\_3 or Corridor D) to Ngwedi can be used.

### **5.2. PUBLIC PARTICIPATION PROCESS**

Certain limitations are found with any public participation process. The most important are:

- I&APs not registering and therefore not partaking in public events and the public participation process.
- I&APs not attending public events.
- I&APs focusing on issues that do not relate to the potential impact assessment of the proposed project.

### **5.3. SPECIALIST ASSESSMENTS**

**Avifauna**<sup>32</sup>: the following limitations were identified by the visual impact specialist:

The study made the assumption that sources of information used for the assessment were reliable. However, the SABAP data covers the period 1986-1997. Bird distribution patterns fluctuate continuously according to availability of food and nesting substrate. For a full discussion of potential inaccuracies in SABAP data, see Harrison et al, 1997. This factor may potentially detract from the accuracy of the predicted results:

**Biodiversity**<sup>33</sup>: Limitations identified by the biodiversity specialist were:

- Not all areas could be investigated in detail and not all species could be located or identified during a single survey that was conducted during the winter period.
- Because rare and endemic species normally don't occur in great densities and because of customary limitations in the search and identification of Red Listed species, the detailed investigation of these species was not possible and results are ultimately based on estimations.
- Results presented in this report are based on a snapshot investigation of the study area and not on the detailed long-term investigation of all environmental attributes and the varying degrees of biological diversity that may be present in the study area. No concrete conclusions may therefore be drawn with regards to biological diversity or conservation strategies as far as this study area is concerned.

<sup>31</sup> EIA for Masa (Delta)-Epsilon (Selomo) 6 x 765kV Transmission Power Lines

<sup>32</sup> Mogwase (Ngwedi) Substation & Associated Turn-in project, Avifaunal Assessment. EIA Report. October 2010.EWT

<sup>33</sup> Terrestrial Biodiversity & Ecology EIA Report, Bathusi Environmental Consulting, October 2010.

- Biodiversity information only has bearing on the site as indicated on accompanying maps. This information cannot be applied to any other area, however similar in appearance or any other aspect, without proper investigation.
- No definite conclusions may be drawn with regards to biological diversity or conservation strategies as far as the report or the study area is concerned as additional information may come to light during a later stage of the process or development.

**Heritage**<sup>34</sup>: Constraints identified by the cultural heritage survey were:

- Due to the subterranean nature of some cultural remains, the cultural heritage report should not be construed as a record of all archaeological and historic sites in the area.

**Social**<sup>35</sup>: the social assessment exercise reflected the following limitations:

- It was assumed that the size of construction and maintenance workforce are similar for the different power line and substation options.
- It was assumed that the decommissioning and construction phases are similar, the decommissioning phase was not assessed separately.

**Visual**<sup>36</sup>: the following limitations were identified by the visual impact specialist:

- Uncertainty regarding future projects and plans for the area.

**Floodlines**<sup>37</sup>: the following limitations were identified by the Hydrology specialist:

- Nature of study is an indicative floodline. Therefore the extent and accuracy of data and results should not be viewed outside of this context. Results can only be used for planning exercises.
- No calibration of model was possible
- Extent of model was limited to analysis of a number of separate sections, as opposed to continuous terrain model. Floodlines are therefore based on results at sections, and extrapolated between sections using contour information.

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<sup>34</sup> Cultural Heritage Survey, Francois P. Coetzee, UNISA, November 2010.

<sup>35</sup> Social Scoping Report, Draft 2, Nonyana Hoohlo & Associates, November 2010.

<sup>36</sup> Visual Impact Assessment for Proposed Ngwedi Substation & associated turn-ins. October 2010.NLA

<sup>37</sup> Flood Assessment Report. Mogwase Substation and Associated Turn-Ins. November 2010. PBAI.

## **6. DESCRIPTION OF THE STUDY AREA**

### **6.1. CLIMATE**

The North West Province has climatic conditions that vary from arid conditions in the west, semi- arid in the central regions to temperate in the east. The average rainfall is between 300mm to 700mm annually, however the study area is situated in the eastern parts of the province and receives an average over 600mm rainfall per annum. The majority of the rainfall occurs in the summer months peak period occurs early summer with most rainfall occurring in December.

Summers are typically hot whilst winters are mild to cold. The temperatures can reach as high as 40°C although typically daily average temperatures of 32°C are common in summer. The average daily minimum temperatures in July are 9°C. Seasonal fluctuations in mean temperatures between the warmest and the coldest months range between 12°C and 15°C.

Relative humidity in winter is between 28-30% whilst in summer it ranges between 66 – 68%. This gives rise to high potential evapo-transpiration rates a situation in which evaporation exceeds precipitation.<sup>38</sup>

The study area falls within Zone 2 tornado area. This is classified as weak, moderate and strong thunderstorms which generally occur 50 to 80 thunder days per year, and with gust wind speeds at ground level of 25-30m/s.

### **6.2. TOPOGRAPHY AND SLOPES**

The Rustenburg area consists of a relatively flat landscape intersected by drainage lines and a mountain range. A series of ridges and koppies are situated mostly in the central parts, with various mountain ranges and ridges making up the most prominent topographic features of the area.

The study area has a flat to rolling topography and the proposed sites are situated on relatively flat areas. To the north of the study area is surrounded by the Pilanesberg Mountain range and by smaller mountains including the Swartkop Mountain to the west.

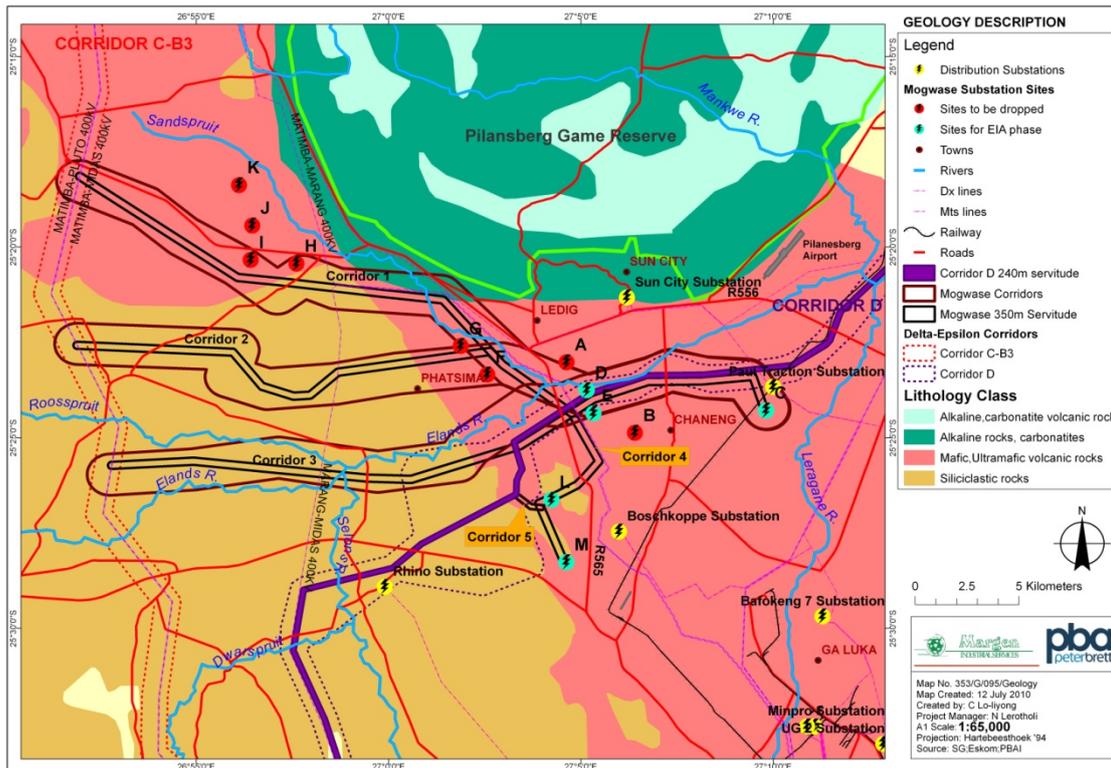
### **6.3. GEOLOGY**

The Bushveld Igneous Complex largely dominates the regional geology according to the North West State of the Environment Report<sup>35</sup>, which comprise of the Pilanesberg Complex, the Transvaal Sequence and also the Rustenburg Layered Suite.

The Mogwase study area is found within the western belt on the Rustenburg Layered Suite and also has the Transvaal Sequence/ Supergroup and the Pilanesberg Alkaline intrusion (Figure 17). The Pilanesberg Complex is an alkaline intrusion that was created as a result of within-plate magmatism resulting in alkaline and carbonitite volcanic rocks. It is a circular igneous complex of 530km<sup>2</sup> and lies at the junction of the Bushveld Complex. The intrusion core are a combination of alkali, feldspar, syenite and lava.

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<sup>38</sup> North West Province State of the Environment Report, 2002.



**Figure 17: Geological Map**

The Transvaal Supergroup which is characterized by the Pretoria Group forms the lower zone and is mainly siliciclastic rocks. These rocks consist of alterations of pyroxenites (mainly magnesium-iron silicates), arenites and anorthosites (rocks consisting of almost pure feldspar-sodium aluminates).<sup>39</sup>

The Rustenburg Layered Suite is found within the Critical Zone and is characterized by mafic and ultramafic volcanic rocks extending over an area of 65 000km<sup>2</sup>.<sup>40</sup> The rocks are a layering of norites (intermediate in composition between the pyroxenites and anorthosites), clinopyroxenites and gabbro and chromitites.<sup>36</sup> The Critical Zone is the most economically rich for platinum group metals namely the Merensky Reef and the underlying UG2 Reef.<sup>37</sup> Both reefs are an important and rich source of platinum, palladium, rhodium, ruthenium, iridium and osmium.

**6.4. MUNICIPAL DEMARCATION**

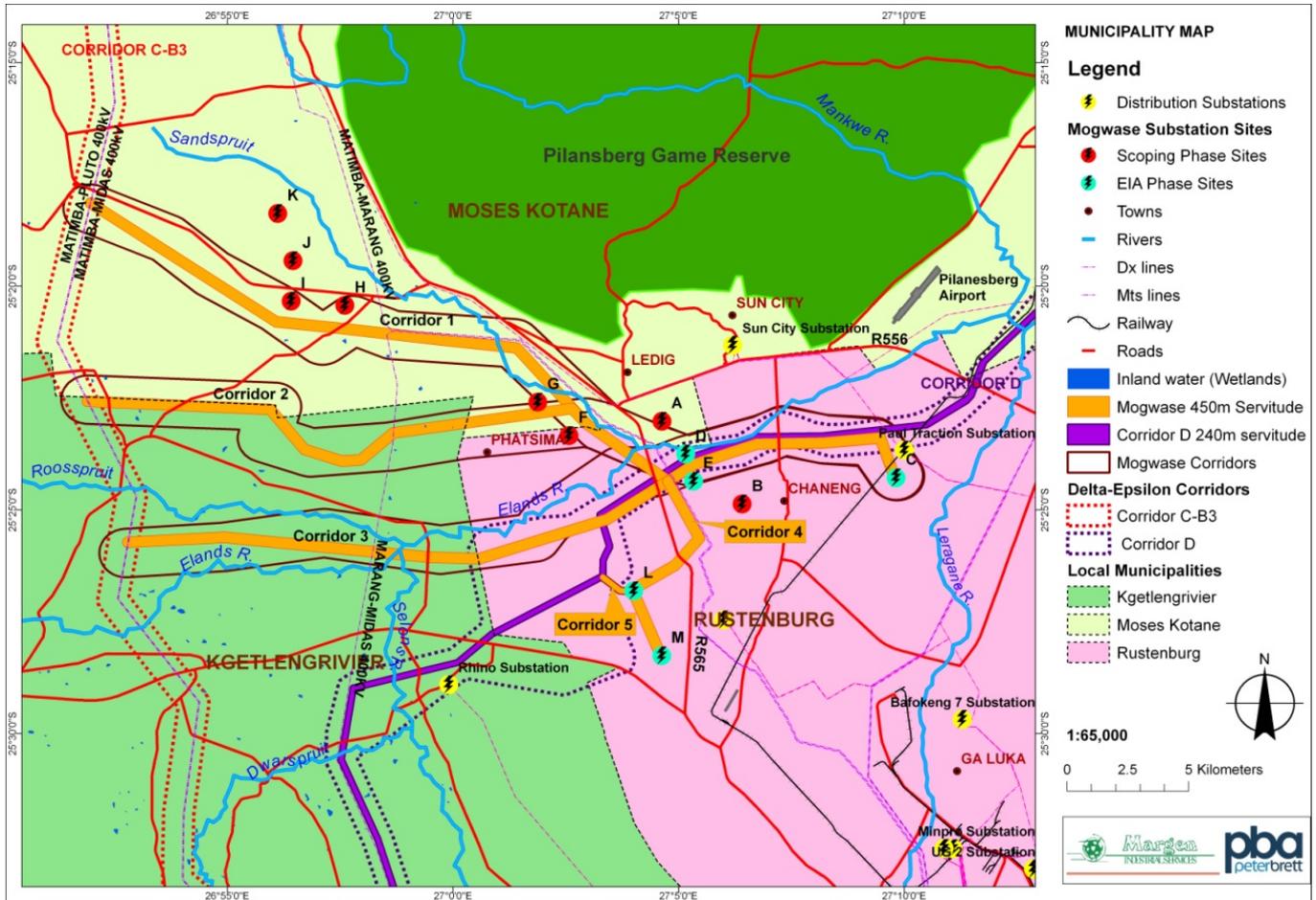
The project area falls under the jurisdiction of the Bojanala Platinum District Municipality (DM). The DM extends over an area of approximately 18,332km<sup>2</sup>, with a population density of 69 people per km<sup>2</sup> and an average household size of 3.5. The DM comprises of five Local Municipalities (LM), of which three namely Kgetlengrivier, Moses Kotane and Rustenburg LMs will be affected by the proposed project. Moses Kotane LM is approximately 5215.43 km<sup>2</sup>, Kgetlengrivier 3973.31 km<sup>2</sup> and Rustenburg 3491.99 km<sup>2</sup> in size.<sup>41</sup>

<sup>39</sup> Cousins, C.A (1959). The Bushveld Igneous Complex: The Geology of South Africa's Platinum Resources. Johannesburg Consolidated Investment Company Limited.

<sup>40</sup> [http://www.implats.co.za/reports/2009/AR/f/IMPLATS\\_RR2009.pdf](http://www.implats.co.za/reports/2009/AR/f/IMPLATS_RR2009.pdf)

<sup>41</sup> Bojanala District Municipality Growth and Development Strategy

The municipality comprise of settlement patterns that are on opposite ends of the spectrum. Moses Kotane LM and Kgetlengrivier for example have scattered settlements whereas Rustenburg LM has concentrated settlements. Large portions of the farms in the study area are tribal land that falls under the jurisdiction of Traditional Authorities. Affected tribal authorities are namely the Bafokeng, Bakubung ba Ra Theo, Bapo II and Batlhalerwa. Figure 18 presents the proposed project within the context of the respective municipal boundaries.



**Figure 18: Municipal Boundary Map**

**6.5. LAND USE**

Land use patterns in the eastern parts of the province were according to the North West Province State of the Environment report driven mainly by the mining opportunities and by agricultural development, which required towns and cities as service centres.

The land use in the study area is a mixture of different activities, which include Agriculture Mining, Conservation and Tourism and Built – up areas, as reflected by Figure 19 below. The developments in the area are driven by different stakeholders namely the private landowners, mines, municipal, and tribal authorities.

- Land use is more mixed. The Pilanesberg Nature Reserve is a key landmark in the area, and it forms the eastern part of the Heritage Park. This Heritage Park will extend to the Madikwe National Park and is currently in the planning stages of its establishment.
- Existing linear infrastructure includes the N4 national road running west to Botswana, the railway line to the east of the Pilanesberg (running north-south), and three existing transmission power line corridors running north-south; one east of the Pilanesberg and two west of it.

- Ecologically, outside the formal conservation areas (the Pilanesberg Nature Reserve, Magaliesberg, Vaalkop Dam and Marico Bosveld Nature Reserves), the central area is more impacted by formal and informal development than the northern area, though the mountainous areas and the N4 national road corridor are generally in better condition. These run east-west across the study area and will be affected by the power lines in some way.
- There are also sensitive heritage “hot spots” around the Pilanesberg area (mainly north-west and west). These should be avoided.

#### **6.5.1. Built – up areas**

Major settlements in the study area are namely Ledig, Chaneng and Phatsima, all of which have a mixture of land uses comprising of residential, commercial, recreational and Industrial land uses.

Other infrastructural developments include telephone and power lines, roads between the residential areas (municipal and mine roads). The main roads in the area are the R556 towards Brits and the R565 towards Rustenburg. Other transport systems are the railway line that passes adjacent to proposed substation Site C and Pilanesberg Airport north east of the area.

#### **6.5.2. Conservation and Tourism**

Pilanesberg Nature Reserve is situated immediately to the north, whilst Vaalkop Dam Nature Reserve is approximately 23km to the east and Magaliesberg Nature Area approximately 24km to the south of the study area. The latter two fall outside the study area and are thus not included in the map. None of the proposed substation sites are situated within the buffer zone of the conservation area, but Corridor Option 1 is likely to affect the Pilanesberg Nature reserve buffer zone and might have to be realigned.

Tourism initiatives are still a significant feature of the study area, though these are generally seen to be more private initiatives at varying levels, and sometimes mixed with other farming (cattle) activities. Exceptions are the Pilanesberg and Sun City/ Lost City.

#### **6.5.3. Agriculture**

Extensive tracts of land within the study area are used for agricultural purposes. Irrigated farms that would be concentrated around the river systems are considered high impact area in terms of safety due to transmission lines and the use of centre pivots. Corridor 2 and 3 cross over cultivation land, which comprises of both dry land and irrigated farms. Other farms within the area are game farms.

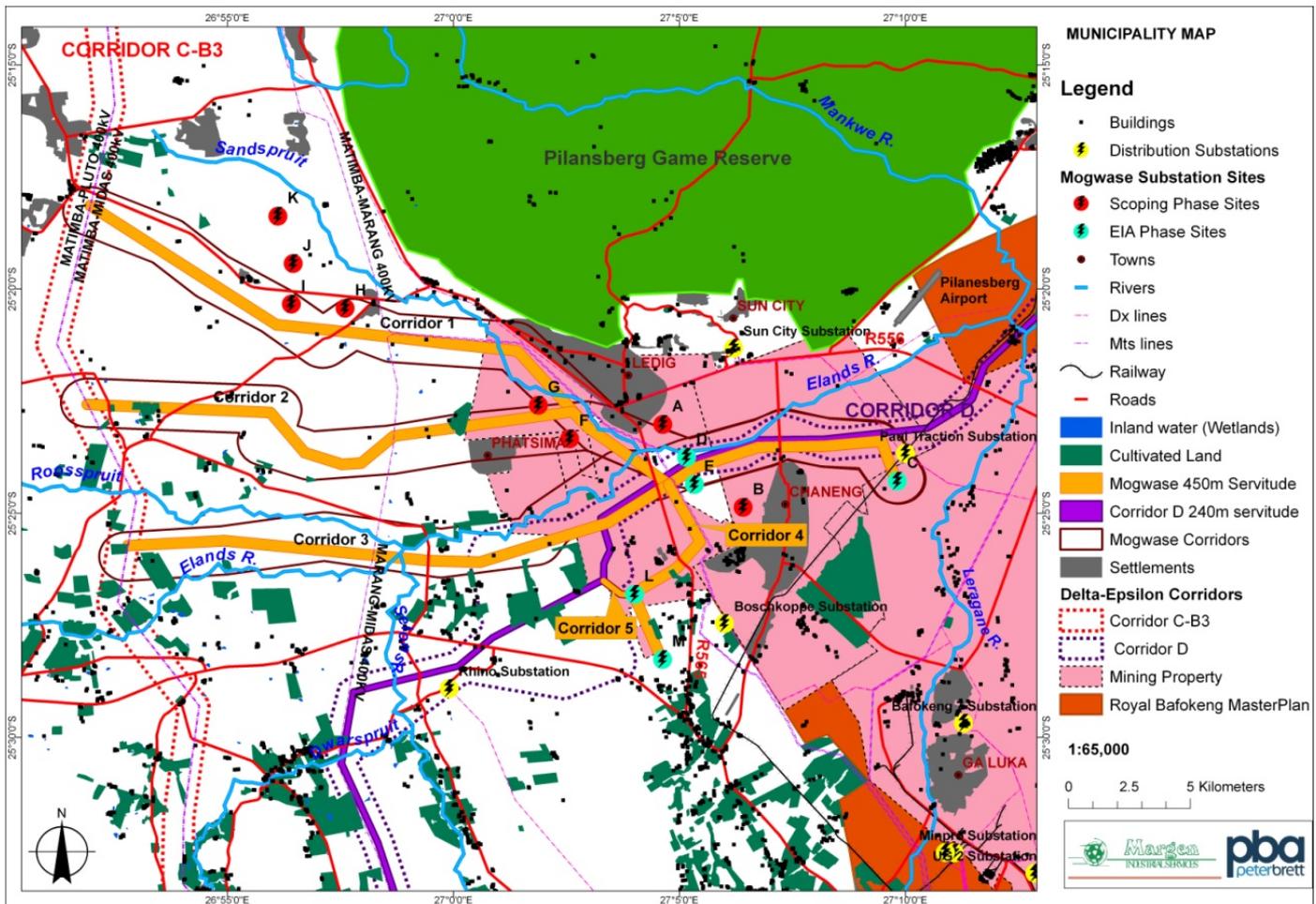


Figure 19: Land Use Map

#### 6.5.4. Surface Water

The study area falls within the Crocodile (West) Marico Water Management Area (WMA). This WMA lies primarily within the North West Province with parts of it in the northern region of Gauteng and the southwestern corner of the Limpopo Province (Table 12). Along the north-western side, the WMA borders on Botswana.<sup>42</sup> The Crocodile and Marico rivers are the two main rivers in this WMA, which at their confluence forms the Limpopo River that flows eastwards to the Indian Ocean.

The main rivers in the study area are the Hex and Elands rivers (Figure 20), which are tributaries of the Crocodile River. The Hex River is a source of water supply for many in the region. It has been impounded upstream by the Bospoort Dam and downstream by the Vaalkops Dam. The Elands River also drains into the Vaalkops Dam.

<sup>42</sup> River Health Programme (2005). State-of-Rivers Report: Monitoring and Managing the Ecological State of Rivers in the Crocodile (West) Marico Water Management Area. Department of Environmental Affairs and Tourism. Pretoria.

**Table 12: River Systems in the Project Area**

MAIN RIVER	PRIMARY	SECONDARY	TERTIARY
Crocodile	Groot Marico	Klein Marico	
	Pienaars	Apies	
	Elands	Selons	Koster
		Brakfonteinspruit	
	Hex	Waterkloofspruit	
	Magalies	Scheerpoort	Nouklip-oog
		Maloneys-oog	
	Swartspruit		
	Hennops	Rietspruit	
	Jukskei	Klein Jukskei	
	Sterkstroom		
	Bloubankspruit		

Two unique wetland groups exist in the project area. One group is the eyes, mires and peat lands associated with the karst landscape which dominates large parts of the North West Province and that underlay a variety of the biomes. The second group are the endorheic pans. These pans are as diverse in character as they are in setting. They vary from small permanently inundated pans to temporary pans from the wetter east to the more arid western parts of the province.

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The overall ecological status for the Elands Sub-Management Area is fair. This ability relates directly to the capacity of the system to provide a variety of goods and services (RHP,2005).This, therefore implies that has the Elands Sub-Management Area has relatively lower conservation value and that this catchment (in terms of biota and habitat) is not very sensitive to flow modifications and has a substantial capacity for use (www.rustenburg.gov.za)<sup>43</sup>.

However, there is a range of diverse instream habitats (waterfalls, rapids and pools) as well as many wetlands in the upper reaches of the Elands River. In the lower reaches, there is cattle and game farming with some overgrazing. Diversity of habitats is low with some deep valleys

<sup>43</sup> <http://www.rustenburg.gov.za/uploads/Environment%20Website/SOW.htm>. 18 August 2010. 09:15.

and pools in the Pilanesberg area. The Vaalkop Dam and the Pilanesberg Nature Reserve provide some protection of the indigenous vegetation in the area as well as a number of game farms along the river.

The sub-optimal condition of the Elands River is mainly as a result of:

- Sedimentation resulting from the slate quarries and agriculture.
- High infestation of alien plant species.
- Inadequate management of some sewage treatment facilities.
- Informal settlements contributing to organic pollution.
- Platinum mining operations - nutrient rich return flows.
- Urban settlements - spillages and discharges reducing water quality.

The Hex River is in a poor ecological status. Drivers for this status include:

- Mining operations - river diversions and polluted discharges and seepages.
- Road construction - river diversions for the N4 Platinum Toll Highway and mining activities.

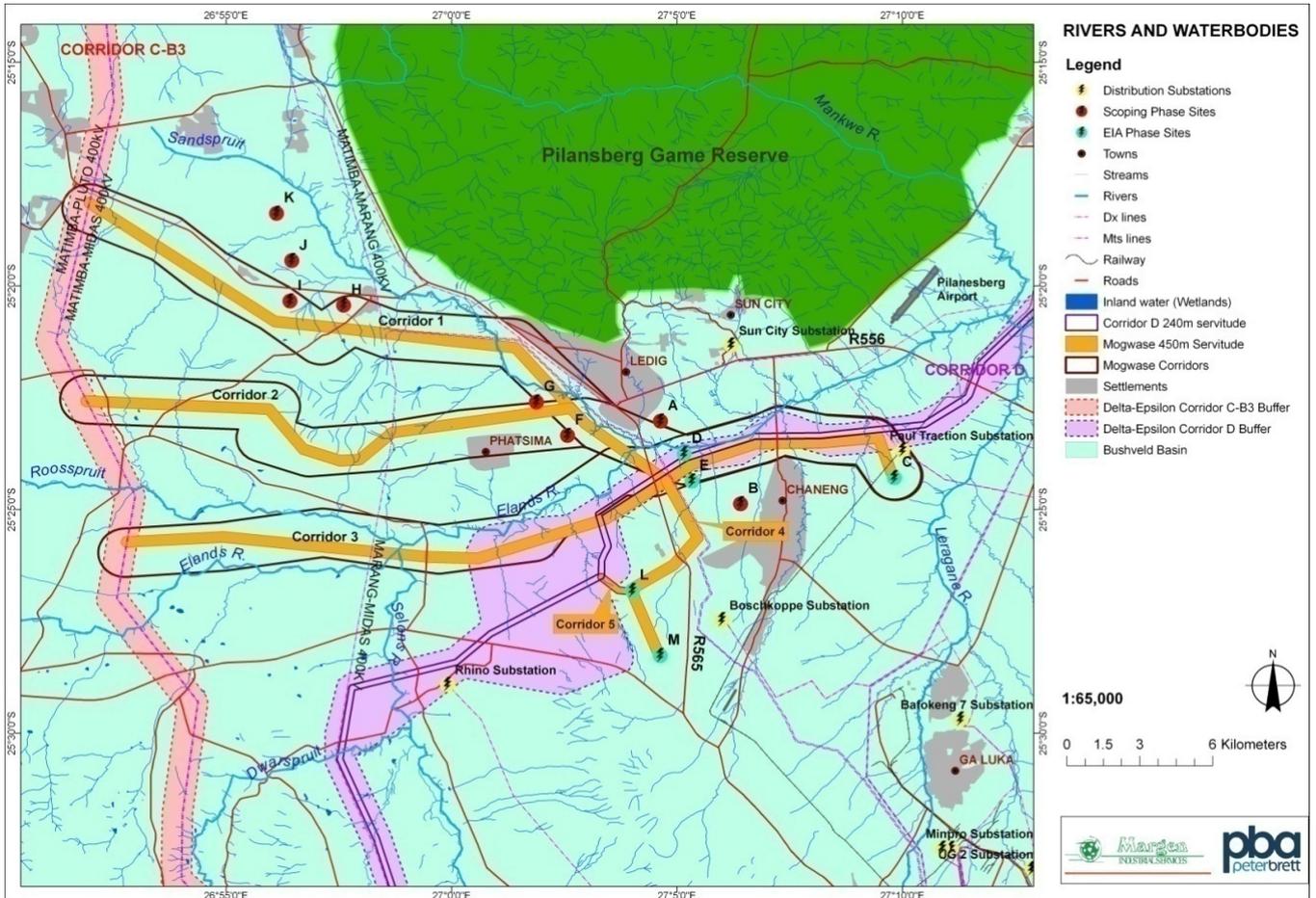


Figure 20: Rivers and Waterbodies in the Study Area