

8.1 Topography

The ENPAT (2003) database revealed no topographical heterogeneous areas being present (slopes exceeding 8%) in the study area. Although the ENPAT database slope classes is based on a high contour interval (probably 100m) and smaller areas are unlikely to be identified during a routine assessment, no such areas were observed during the brief site investigation, as well as from Google Earth images. The topography of the study site is categorised as 'Slightly undulating plains' (ENPAT, 2003). Altitude of the study area varies around 1,600m above sea level.

Varied topography is recognised as a powerful influence contributing to the high biodiversity of southern Africa. Landscapes composed of spatially heterogeneous abiotic conditions provide a greater diversity of potential niches for plants and animals than do homogeneous landscapes. The species richness and biodiversity has been found to be significantly higher in areas of geomorphological heterogeneity.

Ridges and rocky outcrops are characterised by high spatial variability due to the range of differing aspects, slopes and altitudes all resulting in differing soil (e.g. depth, moisture, temperature, drainage, nutrient content), light and hydrological conditions. Temperature and humidity regimes of microsites vary on both a seasonal and daily basis. Moist cool aspects are more conducive to leaching of nutrients than warmer drier slopes. Variation in aspect, soil drainage and elevation/altitude has been found to be especially important predictors of biodiversity. It follows that ridges will be characterized by a particularly high biodiversity.

Many conservation important plants and animals occupy ridges. Due to their threatened status, Red Data species require priority conservation efforts in order to ensure their future survival. Ridges may have a direct effect on temperature/radiation, surface airflow/wind, humidity and soil types. Ridges also influence fire in the landscape, offering protection for those species that can be described as "fire-avoiders". Because of the influence of topography on rainfall, many streams originate on ridges and control water inputs into wetlands. The protection of the ridges in their natural state is therefore a first step in ensuring the normal functioning of ecosystem processes on a larger scale. In contrast, transformation of ridges will alter these major landscape processes. For example, water runoff into streams and wetlands will increase, causing erosion.

8.2 Surface Water²

Water, salt and processes linked to concentration of both are the major controls of the creation, maintenance and development of peculiar habitats. Habitats formed in and around flowing and stagnant freshwater bodies, experience waterlogging (seasonal or permanent) and flooding (regular, irregular or catastrophic), leading to formation of special soil forms. Invariably, both waterlogged and salt-laden habitats appear as 'special', deviating strongly from the typical surrounding zonal vegetation. They are considered to be of azonal character (Mucina & Rutherford, 2006). Water, in conjunction with geology, soil, topography and climate, is responsible for the creation of remarkably many types of habitats. Water chemistry, temperature and temporary changes in both, together with the amount of water (depth of water column), timing of occurrence (regular tides or irregular floods) and speed of its movement (discharge, flow and stagnation) are the major factors shaping the ecology of biotic communities occupying such habitats (VEGMAP, 2006).

² For a detailed illustration of the presence of areas of surface water within the study area, the reader is referred to the wetland report that is addressed separately to this assessment.

Areas of surface water contribute significantly towards the local and regional biodiversity due to atypical habitat that is present within ecotonal areas. Ecotones (areas or zones of transition between different habitat types) are occupied by species occurring in both the bordering habitats, and are generally rich in species due to the confluence of habitats. In addition to daily visitors that utilise the water sources on a frequent basis, some flora and fauna species are specifically adapted to exploit the temporal or seasonal fluctuation in moisture levels in these areas, exhibiting extremely low tolerance levels towards habitat variation. Ecotonal interface areas form narrow bands around areas of surface water and they constitute extremely small portions when calculated on a purely mathematical basis. However, considering the high species richness, these areas are extremely important on a local and regional scale. Rivers also represent important linear migration routes for a number of fauna species as well as a distribution method for plant seeds.

The Lekwa Municipality, in which the study area is situated, comprises approximately 20,950ha of wetlands. No RAMSAR sites are present in the Lekwa Municipality. Areas of surface water are present in the study area in the form of rivers, perennial and non-perennial streams, artificial and natural impoundments and, in particular, moist grassland/ seepages and ephemeral grasslands. Larger rivers and streams include the Leeuspruit in the east and the Wolwespruit in the southeast. The study area is situated within the Vaal Primary Catchment area (refer Figure 5).

8.3 Geology

The major geological formations of the region are illustrated in Figure 6. The following geological formations are represented in the study area:

- Vryheid Arenites - sedimentary rock composed of sand-sized fragments irrespective of composition, thick beds of yellowish to white cross-bedded sandstone and grit, which alternate with beds of soft, dark-grey, sandy shale and a few seams of coal;
- Karoo Dolerite – a dark coloured crystalline igneous rock that abundantly intrudes the Karoo Sequence, giving rise to many characteristic flat-topped hills, therefore typically present in steep hills, mountains and escarpment landforms. Sills and dykes often exert structural control in the landscape, and may be seen as present on flat-topped hills, or as the crest of waterfalls; and
- Volksrust Shales – exhibiting dark grey shale, siltstone and sandstone. Fossils are scarce and consist of fish scales and fragments of petrified wood.

Figure 5: Areas of surface water in the region (with emphasis on the study area)

