7 BASELINE RECEIVING ENVIRONMENT

This section details the receiving environment at the project location. Although the aim of this report is to detail the vegetation, wetlands and, soil and land capability component of the receiving environment; certain additional factors have been included, as they provide perspective to the soil and vegetation study. These include geology, topography, climate, surface water and land use.

Zitholele Consulting (Pty) Ltd appointed Cymbian Enviro-Social Consulting Services to undertake the Biophysical Specialist Studies for this project, including:

- Vegetation Assessment;
- Soil and Land Capability Assessment;
- Wetland Delineation;
- Geology; and
- Visual.

The Heritage Impact Assessment was conducted by Julius Pistorius, the Social Assessment was undertaken by Master Q Research (Pty) Ltd and the Avi-fauna assessment was Mr. Chris van Rooyen.

For more information on this section please refer to Appendix R.

7.1 Bio-Physical Environment

This section details the bio-physical receiving environment at the project location. Although the aim of this section is to detail the vegetation, wetlands, soil and land capability, certain factors have been included as they provide perspective to the soil and vegetation sections.

For more information on this section please refer to Appendix R.

7.1.1 Geology

Data Collection

A desktop screening assessment, using a Geographic Information System (GIS) tool, was undertaken of the geological environment. The geological data was taken from the Environmental Potential Atlas Data (ENPAT) from the DEAT as well as geological data supplied by the Gauteng Department of Agriculture, Conservation and Environment (GDACE).

Regional Description

The underlying geology is shale, sandstone or mudstone of the Madzaringwe Formation (Karoo Supergroup), or the intrusive Karoo Suite dolerites which feature prominently in the area. Quartzite ridges of the Witwatersrand Supergroup and the Transvaal Supergroup comprising the Pretoria Group as well as the Selons River Formation of the Rooiberg Group are also characteristic of the area.

The volcanic Rooiberg Group is part o fthe Bushveld Magmatic Province, a voluminous suite of Precambrian magmatic rocks that also includes the Lebowa Granite Suite and the largest known terrestrial mafic intrusion, the Rustenburg Layered Suite. The Rooiberg Group comprises volcanic units that are up to 400 m thick, together with interbedded, thin, laterally extensive sedimentary strata. The lithology of the area comprises several geological sequences (refer to Figure 6).

The oldest rocks are the sedimentary rocks comprising the Transvaal Supergroup, Pretoria Group, Silverton (shales), Magaliesberg (quartzites) and Rayton (quartzites, shales and subgreywacke) Formations. The Pretoria Group is approximately 6-7 km thick and comprises predominant mudrocks alternating with quartzitic sandstones, significant interbedded basaltic-andesitic lavas, and subordinate conglomerates, diamictites and carbonate rocks, all of which have been subjected to low grade metamorphism.

Overlying the Transvaal Supergroup are the sedimentary rocks of the Karoo Supergroup, Dwyka Group (tillites, shale), the Ecca Group (shales, sandstones, conglomerates and coal beds in places near the base and the top). The other dominant rock type is the rocks collectively referred to as the Transvaal diabase. These are probably related to an early intrusive phase of the Bushveld Complex. They are intrusive into all horizons of the Transvaal Supergroup, and are particularly prolific in the strata of the Pretoria Group. The diabase sills can vary in thickness from 1m to >300m, occurring characteristically at the contact between the shales and quartzites. Because chemical decomposition is relatively far advanced in these warm humid areas, relatively deep residual soils can be expected. The rocks of the Bushveld Complex - the Rustenburg Layered Suite (the anorthosites, gabbros and norites of the Critical, Main and Upper Zones), the Rashoop Granophyre Suite (granophyres and pseudogranophyres) and the Lebowa Granite Suite (medium to coarse grained, pink or grey granite and porphritic granite) also occur.

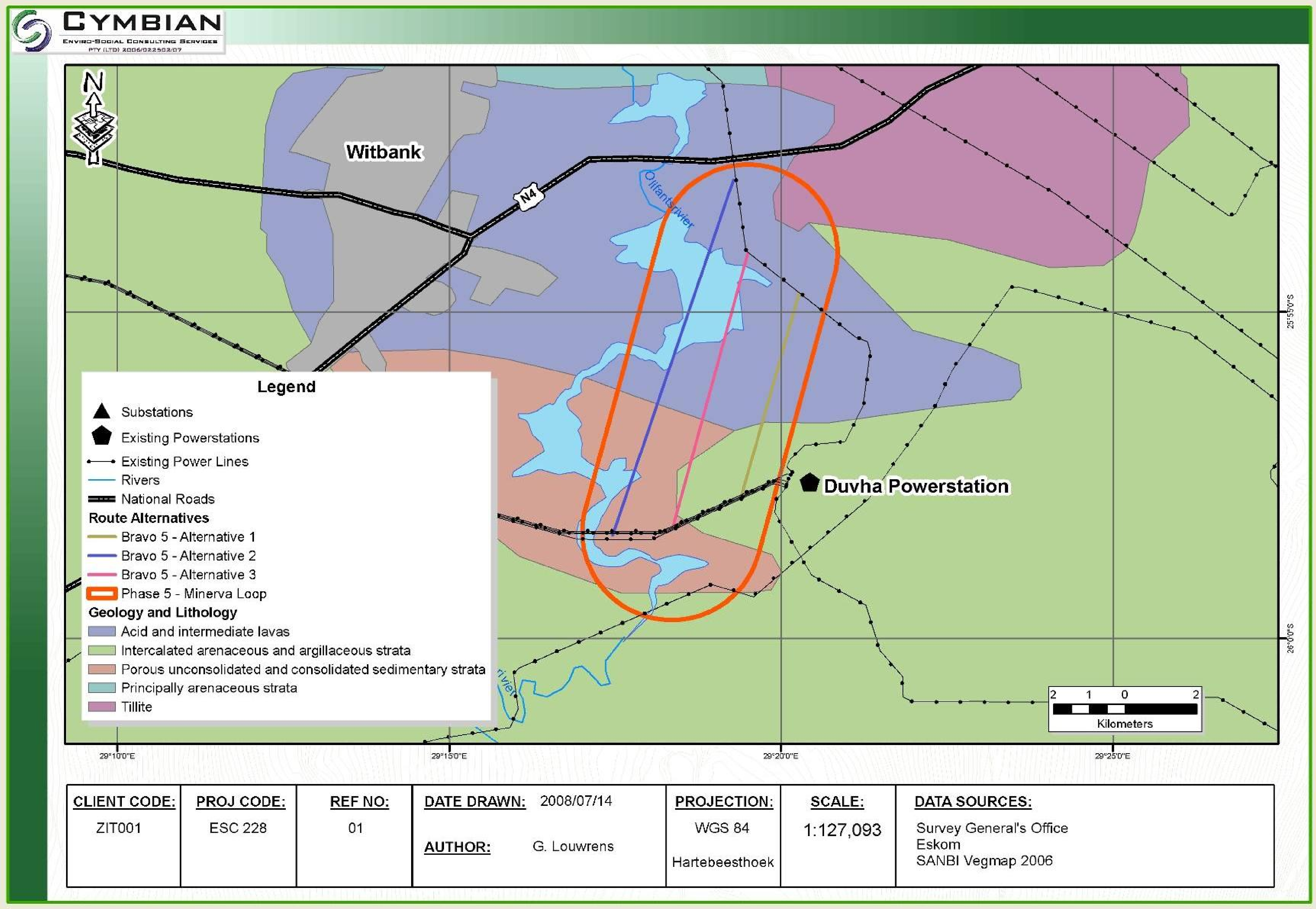

FIGURE 6: REGIONAL GEOLOGY AT DUVHA POWER STATION.

7.1.2 Climate

Data Collection

Climate information was attained using the Climate of South Africa database, as well as from The Vegetation of South Africa, Lesotho and Swaziland (Mucina and Rutherford 2006)[2].

Regional Description

Mpumalanga's climate is mild to sub-tropical with hot, wet summers and cold, dry winters. Mean annual precipitation ranges from less than 500 mm in the eastern Lowveld and 700 mm in the western Highveld to more than 1100 mm in the escarpment.

The study area displays warm summers and cold winters typical of the Highveld climate. The average summer and winter daytime temperatures (AVD) are 25°C and 20°C, respectively. The region falls within the summer rainfall region of South Africa, rainfall occurs mainly as thunderstorms (Mean Annual Precipitation 726mm) and drought conditions occur in approximately 12% of all years. Mean annual potential evaporation of 1926mm indicates a loss of water out of the system. The region experiences frequent frosts, with mean frost days from 13-42 days (higher at higher elevations), winds are usually light to moderate with the prevailing wind direction is north-westerly during the summer and easterly during winter.

The nearest weather station is the Middelburg station, with data available for a 25 year period from 1925-1950. The AVD temperature recorded for this period was 15.5°C, with an average daily maximum and minimum of 23.9°C and 7.1°C, respectively. Precipitation data for the Middelburg station is available

7.1.3 Surface Water

Data Collection

The surface water data was obtained from the WR90 database from the Water Research Council. The data used included catchments, river alignments and river names. In addition water body data was obtained from the CSIR land cover database (1990) to show water bodies and wetlands.

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[2] *The Vegetation of South Africa, Lesotho and Swaziland*, Mucina and Rutherford 2006.

Site Description

The Duvha power station and the proposed power line route alternatives are located almost entirely within the quaternary catchment B11G, only a small section of Alternative 2 falls within the quaternary catchment B11J. Major drainage features in this catchment include the Witbank Dam and the Olifants River.

The site is bisected by numerous unnamed tributaries or streams of the Olifants River and Witbank Dam, all of these appear to be non-perennial and drain into the Witbank Dam and Olifants River. The Witbank Dam and Olifants River in turn drain northwards from the site.

The Witbank Dam and Olifants River located on site as illustrated in Figure 7 and Figure 8 below. The streams, Olifants River and Witbank Dam support a number of faunal and floral species uniquely adapted to these aquatic ecosystems and therefore all surface water bodies are earmarked as sensitive features and should be avoided as far as possible.

Alternative 2 and 3 traverse large sections of the Witbank Dam, with Alternative 2 stretching over some 3500 m and Alternative 3 stretching across some 994 m of the dam. This renders Alternative 2 and 3 not technically feasible, since the longest section of dam crossing stretches some 1500 m and 728 m respectively, both these distances exceed the maximum distance between pylons of 350 m. Thus, Alternative 1 is the only technically feasible alternative because it traverses only two of the streams on site. Although these streams support sensitive fauna and flora species, applying a buffer zone of 50 m around them in which no pylons are to be placed is a sufficient mitigation measure.

FIGURE 7: THE WITBANK DAM ON SITE.

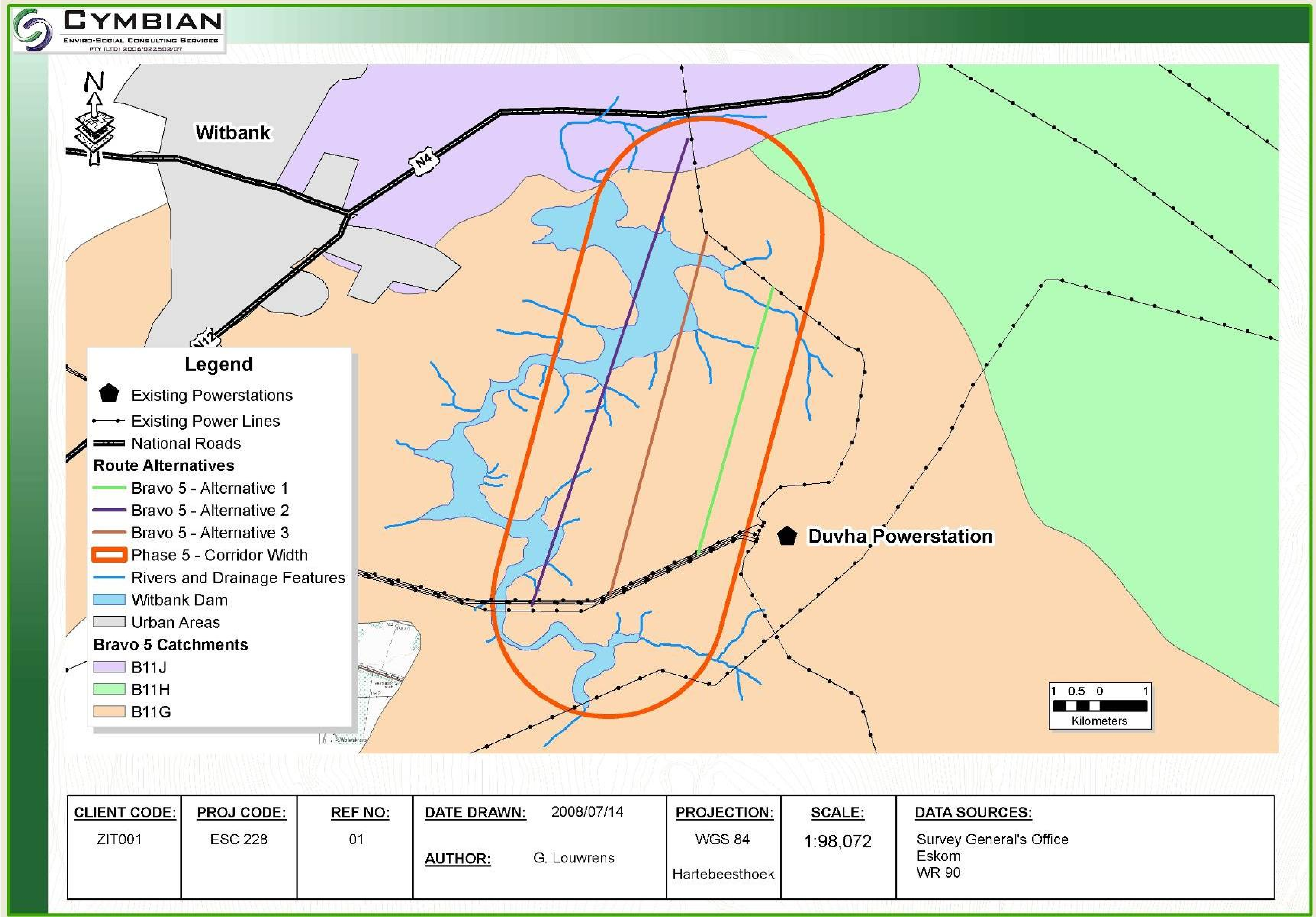

FIGURE 8: REGIONAL SURFACE WATER AND DRAINAGE FEATURES AT DUVHA POWER STATION.

7.1.4 Topography

Data Collection

The topography data was obtained from the Surveyor General's 1:50 000 toposheet data for the region, namely 2529CD. Contours were combined from the topo mapsheets to form a combined contours layer. Using the Arcview GIS software the contour information was used to develop a digital elevation model of the region as shown in Figure 9 below.

Regional Description

The topography of the region is typified by slightly to moderately undulating plains, including some low hills and pan depressions. Some small scattered wetlands and pans occur in the area, rocky outcrops and ridges also form part of significant landscape features in the area. Altitude ranges between 1520-1780 metres above mean sea level (mamsl), but can reach also reach as low as 1300 mamsl.

Site Description

The study area's topography is representative of the region, that being slightly to moderately undulating plains and grassland of the Highveld plateau. This undulating topography gives rise to the number of streams and rivers in the area, which form at the bottom of the gently rolling hills. Elevations range from 1600 metres above mean sea level (mamsl) in the east to 1520 mamsl in the centre of the site.

Figure 9 below illustrates the digital elevation model created from the contours of the region. The low lying areas are clearly visible in light green and orange while the higher areas are shown in white and brown. The general slope of the terrain of the site is northwards and towards the centre of the site.

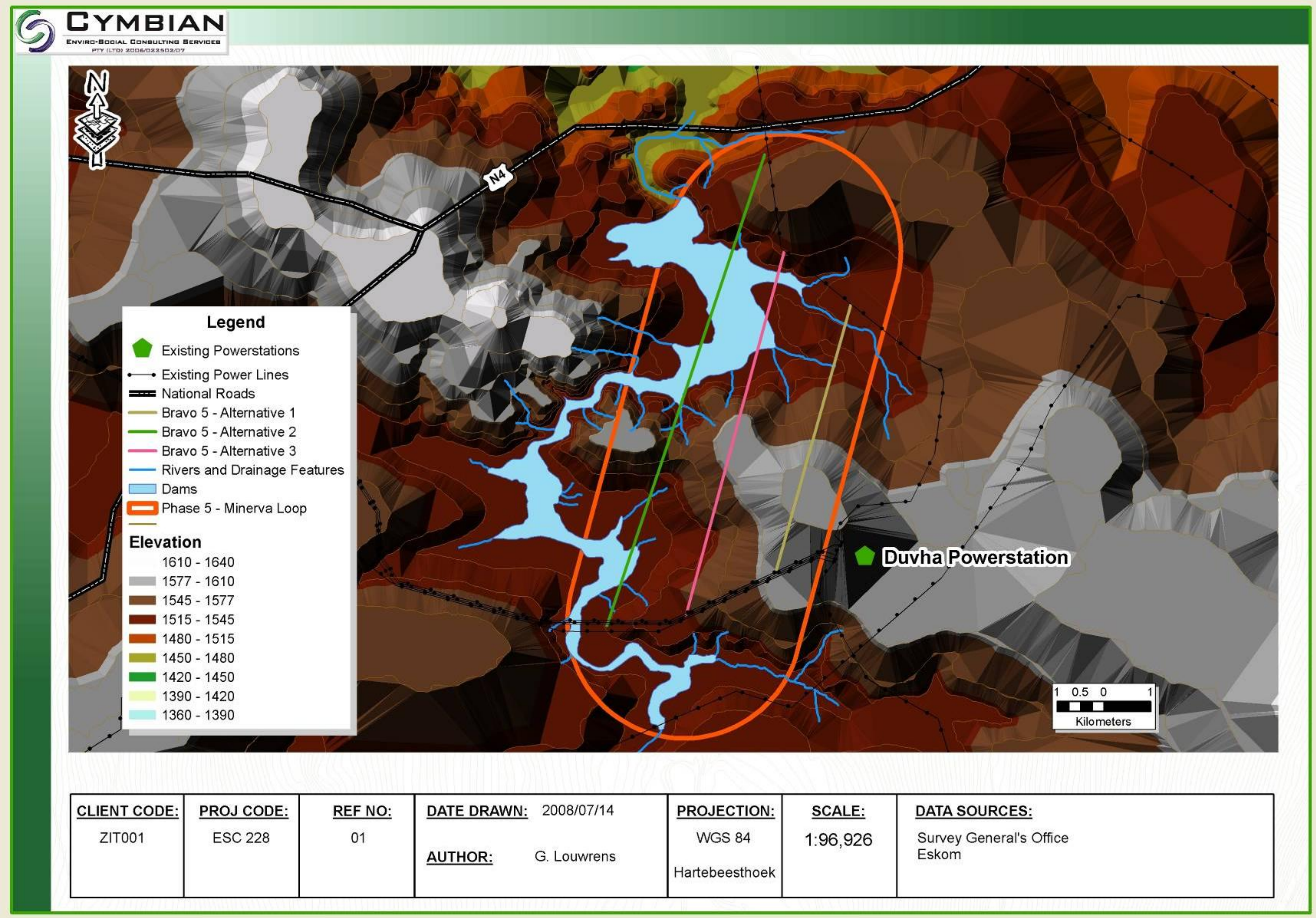

FIGURE 9: TOPOGRAPHY AT DUVHA POWER STATION.

7.1.5 Soils

Data Collection

The site visit was conducted on the 17th - 18th November 2008. Soils were augered at 150m intervals along the proposed power line routes using a 150 mm bucket auger, up to refusal or 1.2 m. Soils were identified according to Soil Classification; a taxonomic system for South Africa (Memoirs on the Natural Resources of South Africa, no. 15, 1991). The following soil characteristics were documented:

- Soil horizons;
- Soil colour;
- Soil depth;
- Soil texture (Field determination)
- Wetness;
- Occurrence of concretions or rocks; and
- Underlying material (if possible).

Regional Description

The soils in the region are mostly derived from the geology of the region namely, predominantly shale, sandstone or mudstone of the Madzaringwe Formation (Karoo Supergroup) and are generally deep sandy soils with a red to yellow-brown colour. The Quartzite and Rocky Ridges of the area generally support shallow Glenrosa and Mispah soils, while Melanic and Clay soils are present along streams, rivers and dams.

Site Description

During the site visit four main soil forms were identified namely, Mispah, Clovelly, Hutton and Katspruit. Each of the soil forms are described in detail in the sections below and Figure 10 illustrates the location of the soil types. The land capability (agricultural potential) of the abovementioned soil form is described in more detail in Section 7.1.6.

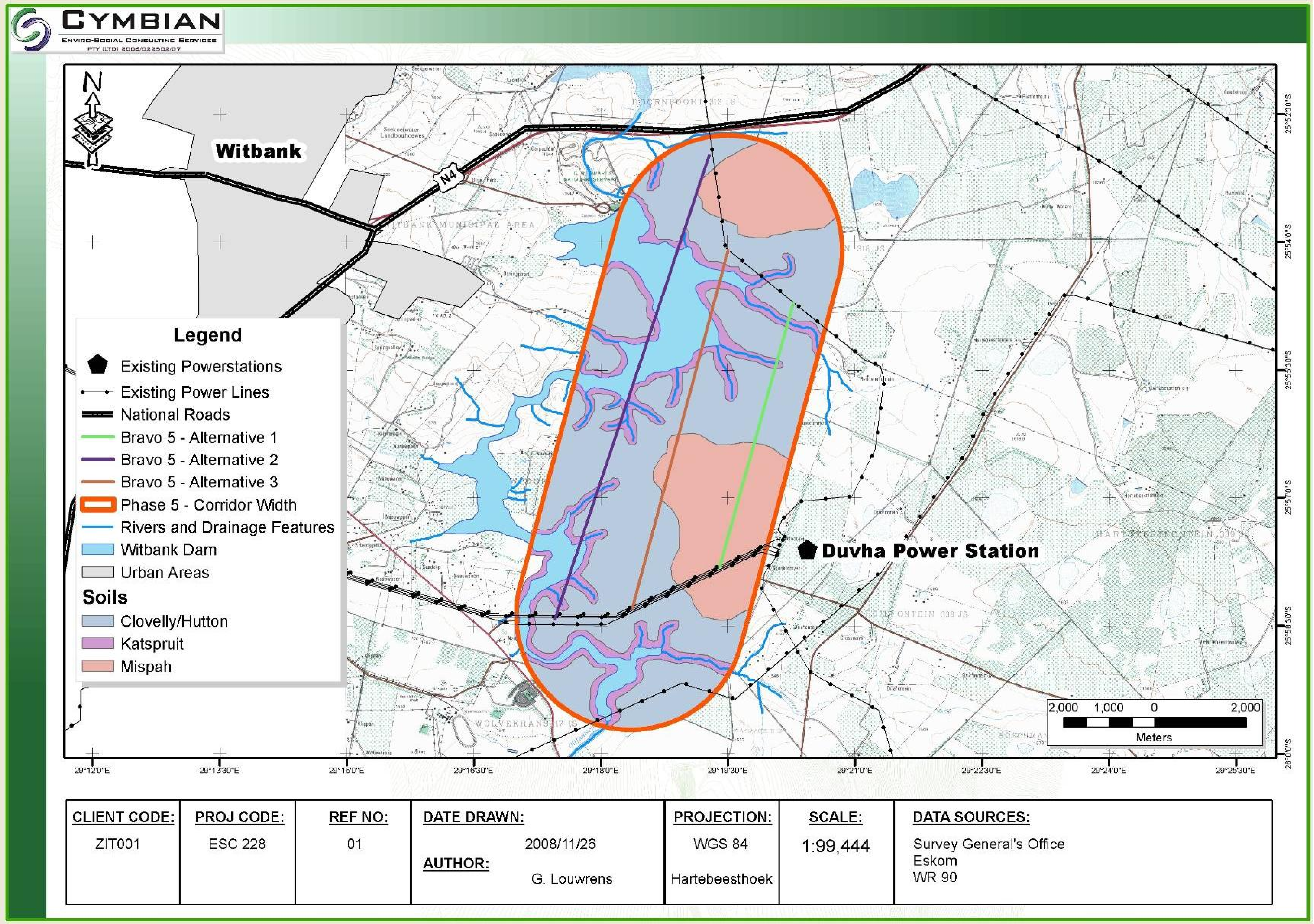

FIGURE 10: REGIONAL SOILS AT DUVHA POWER STATION.

Mispah soil form

The Mispah soil form is characterised by an Orthic A – horizon overlying hard rock. Mispah soil is horizontally orientated, hard, fractured sediments which do not have distinct vertical channels containing soil material. There is usually a red or yellow-brown apedal horizon with very low organic matter content. Please refer to Figure 11 for an illustration of a typical Mispah soil form.

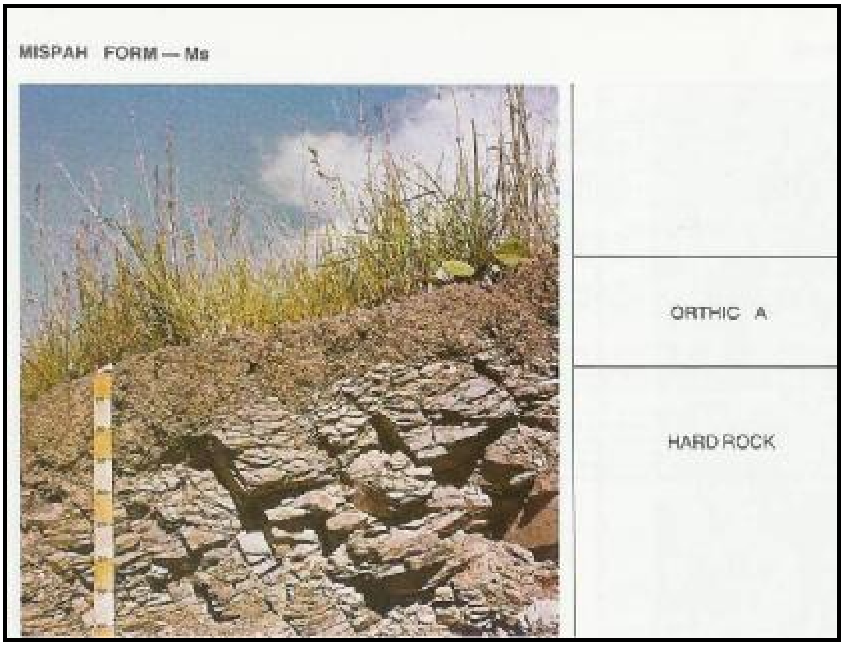

FIGURE 11: MISPAH SOIL FORM (MEMOIRS ON THE NATURAL RESOURCES OF SOUTH AFRICA, NO. 15, 1991).

Clovelly Soil Form

Clovelly soils can be identified as an apedal "yellow" B-horizon as indicated in Figure 12 below. These soils along with Hutton soils are the main agricultural soil found within South Africa, due to the deep, well-drained nature of these soils. The soils are found on the valley slopes and constitute 44.6 % (1 178 ha) of the site.

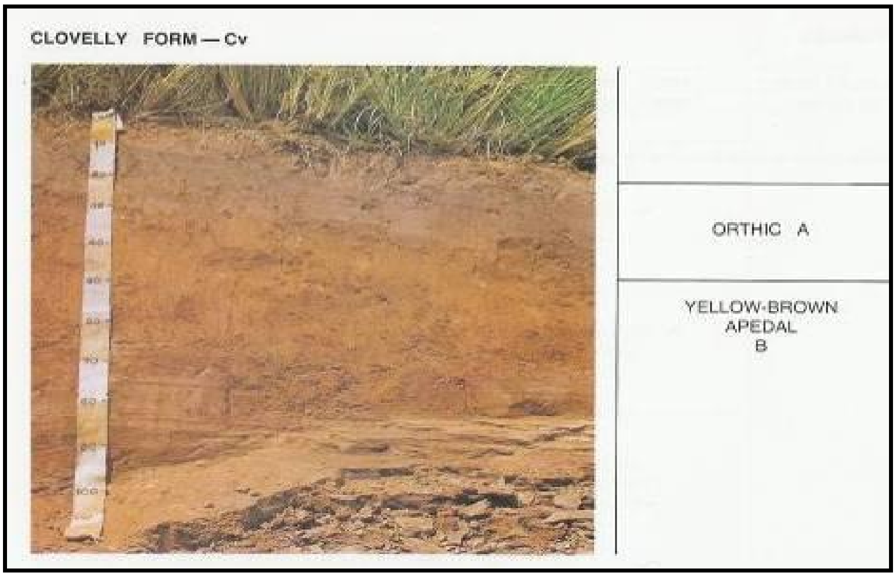

FIGURE 12: CLOVELLY SOIL FORM (SOIL CLASSIFICATION, 1991)