7 BASELINE RECEIVING ENVIRONMENT

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;
- Visual; and
- Avifauna.

The Heritage Impact Assessment was conducted by Julius Pistorius and the Social Assessment was undertaken by Master Q Research (Pty) Ltd.

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

The geological analysis was undertaken through the desktop evaluation using a Geographic Information System (GIS) and the relevant data sources. The geological data was taken from the Environmental Potential Atlas Data from the DEAT. Data was supplemented with on site observation during site visits conducted on the 8th – 12th September 2008 and the 3rd – 7th November 2008.

Regional Description

The lithology of the area comprises several geological sequences as illustrated in Figure 6. From the Figure it is clear that the study area is dominated by Dolerite flows along with Arenite. These main two geologies are prevalent for more than 80% of the study area. Several small sections of Granite, Shale and Tillite also occur within the study area.

The Arenite (sandstone) overlies the majority of the Mpumalanga coal fields and has been extensively disturbed by opencast mining operations all over the study area. This geology weathers to form the main agricultural red and brown soils of the province.

The Dolerite originates from lave intrusions throughout the area and can be distinguished by the “dinosaur egg” weathering of the rock. The Dolerite in the region weathers to a dark clayey soil that is not ideal for cultivation and is mostly used for grazing.

FIGURE 6: DOLERITE (LEFT) AND SANDSTONE (RIGHT) ARE THE TWO MAIN GEOLOGIES FOUND ON SITE

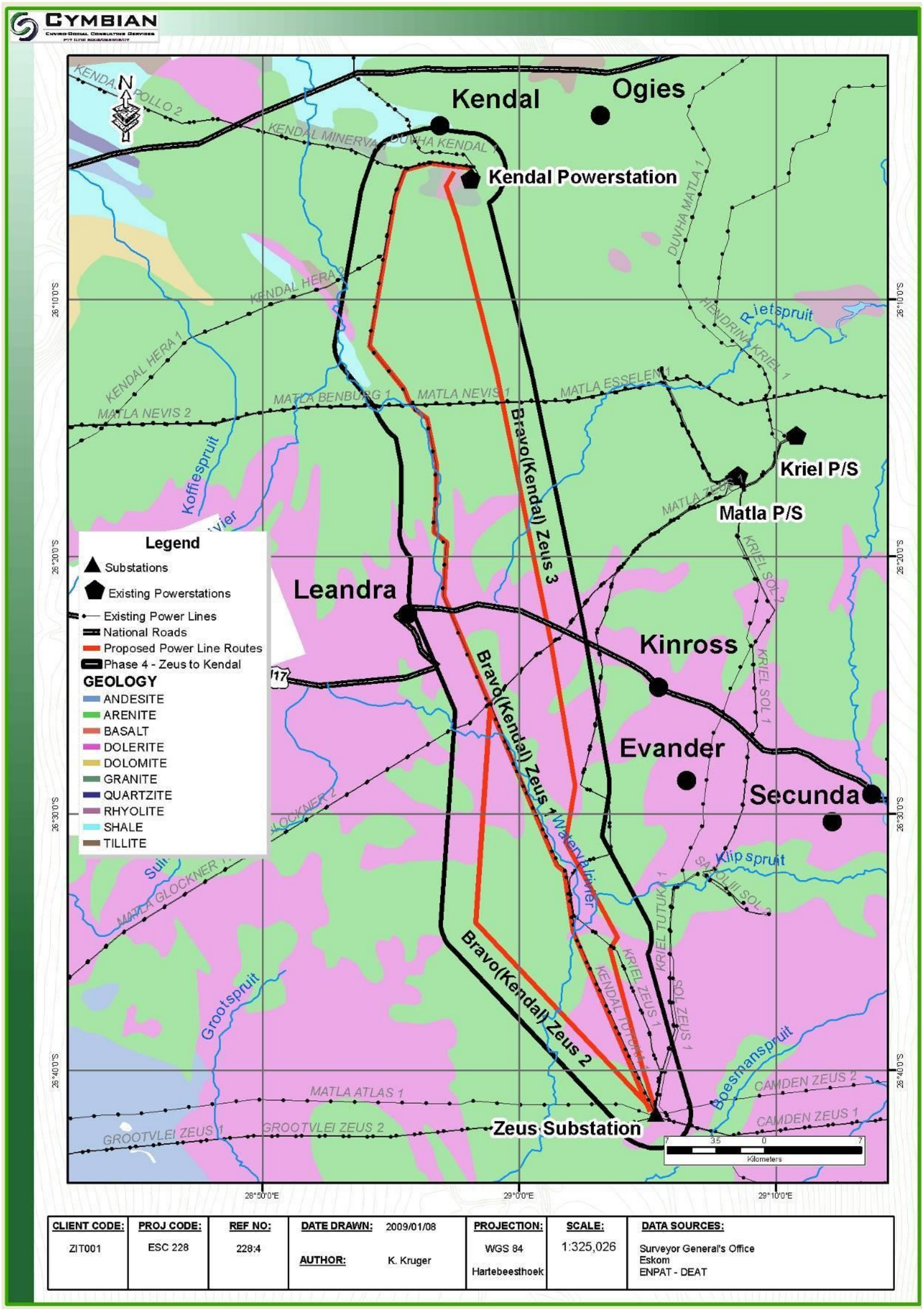

FIGURE 7: REGIONAL GEOLOGY

7.1.2 Climate

Data Collection

Climate information was attained using the climate of South Africa database, as well as from Air Quality Impact Assessment for the Proposed New Coal-Fired Power Station (Kendal North) in the Witbank Area undertaken by Airshed Planning Professionals[2].

Regional Description

The study area displays warm summers and cold winters typical of the Highveld climate. The region falls within the summer rainfall region of South Africa, rainfall occurs mainly as thunderstorms (Mean Annual Precipitation 662 mm) and drought conditions occur in approximately 12% of all years. Mean annual potential evaporation of 2 060 mm indicates a loss of water out of the system.

The region experiences frequent frosts, with mean frost days of 41 days, winds are usually light to moderate, with the prevailing wind direction north-westerly during the summer and easterly during winter. In addition to frost the area is prone to hail storms during the summer time. Such a storm was experienced during the site visits and the hail stones are illustrated in Figure 8 below.

FIGURE 8: HAIL STONES FROM A STORM EVENT IN NOVEMBER 2008 (SECUNDA)

[2] *Air Quality Impact Assessment for the Proposed New Coal-fired Power Station (Kendal North) in the Witbank Area. Report No.: APP/06/NMS-01 Rev 0.2, 2006.*

Ambient Temperature

Air temperature is important, both for determining the effect of plume buoyancy (the larger the temperature difference between the plume and the ambient air, the higher the plume is able to rise), and determining the development of the mixing and inversion layers.

Long -term average (2003) maximum, mean and minimum temperatures for Kendal 2 is given in Table 8.

TABLE 8: LONG TERM TEMPERATURE DATA FOR KENDAL (AIRSHED, 2006)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Maximum	31	32	32	29	24	20	22	24	29	30	30	32
Mean	21	22	20	18	13	10	10	12	18	20	21	22
Minimum	15	15	12	11	6	4	3	4	10	13	14	15

Annual maximum, minimum and mean temperatures for Kendal 2 are given as 32°C, 3°C and 17°C, respectively, based on the 2003 record. Average daily maximum temperatures range from 32°C in December to 20°C in July, with daily minima ranging from 15°C in January to 3°C in July.

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.

Site Description

The study area falls within the Olifants River (Catchment B) and Vaal River (Catchment C) Primary Catchments as shown in Figure 9 (Northern section) and Figure 10 (Southern section).

The main river in the northern section of the site is the Wilge River along with the Kromdraai Spruit and the Riet Spruit. All these watercourses drain primarily northwards towards the Olifants River. Several non-perennial streams and drainage lines also occur throughout the area, draining towards the main rivers.

The southern section of the site drains towards the Vaal River and the main tributaries are the Waterval River, The Klip Spruit and the Boesman Spruit. The main drainage direction is southeast towards the Vaal River.

The streams and their associated dams 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.

As illustrated in the Figures below, it is evident that the Alternative 1 route is aligned along several streams, while Alternative 2 crosses very close to Leeupan. Alternative 3 does not traverse along any streams, but it

does cross several. It should be noted that a large number of the existing power lines in the area are aligned along streams and drainage lines. The reasoning behind this was not to interfere with the farming activities that take place in all the surrounding areas. The recent emphasis on environmental impact limitation has however changed this perception, and it is now preferred that power lines avoid water courses. The streams support sensitive fauna and flora species which are described in more detail in the sections below. On the basis of the above it would be best to utilise Alternative 3, as this alternative avoids the most of the streams.

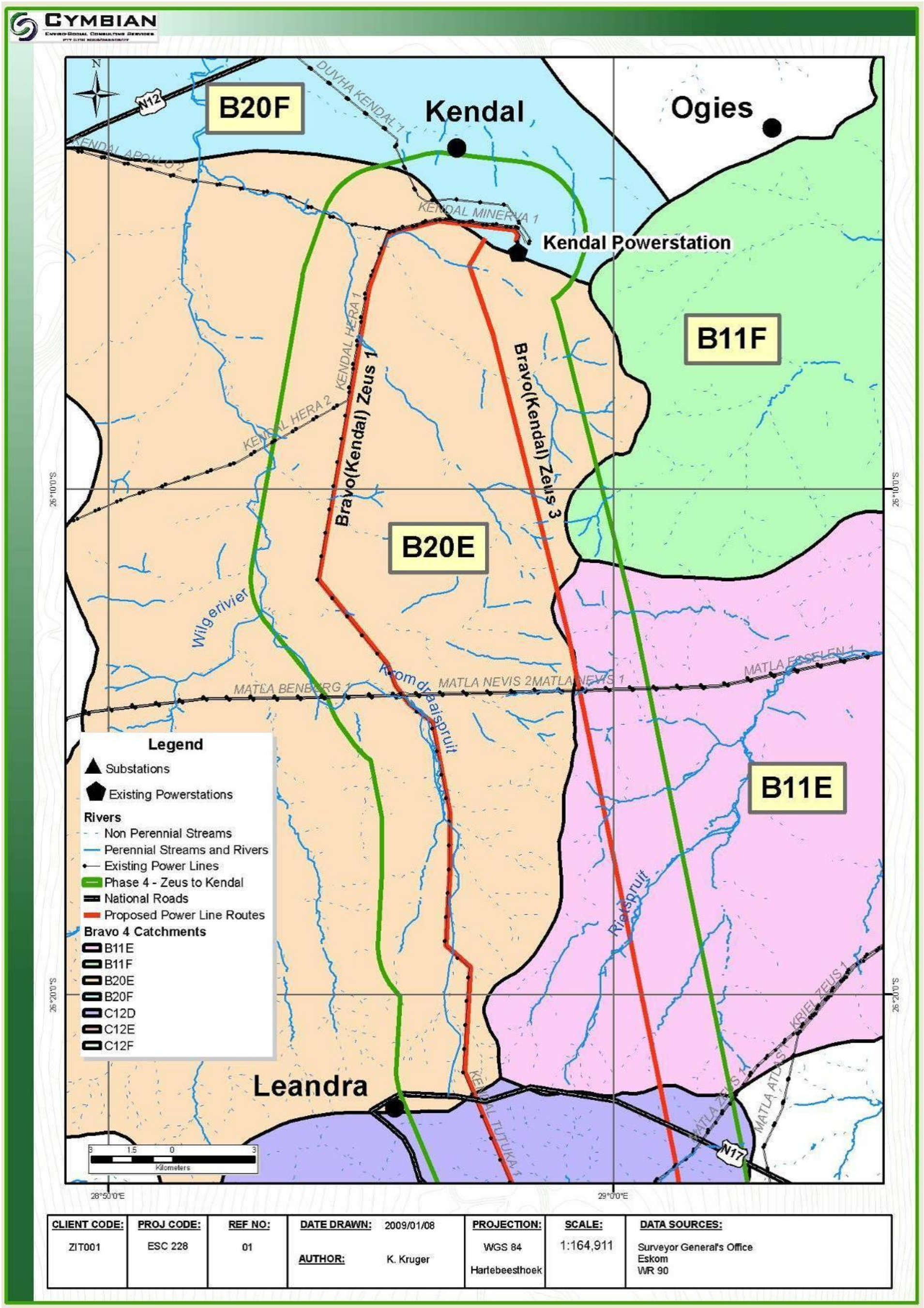

FIGURE 9: SURFACE WATER AND DRAINAGE FEATURES OF THE NORTHERN SECTION OF THE SITE

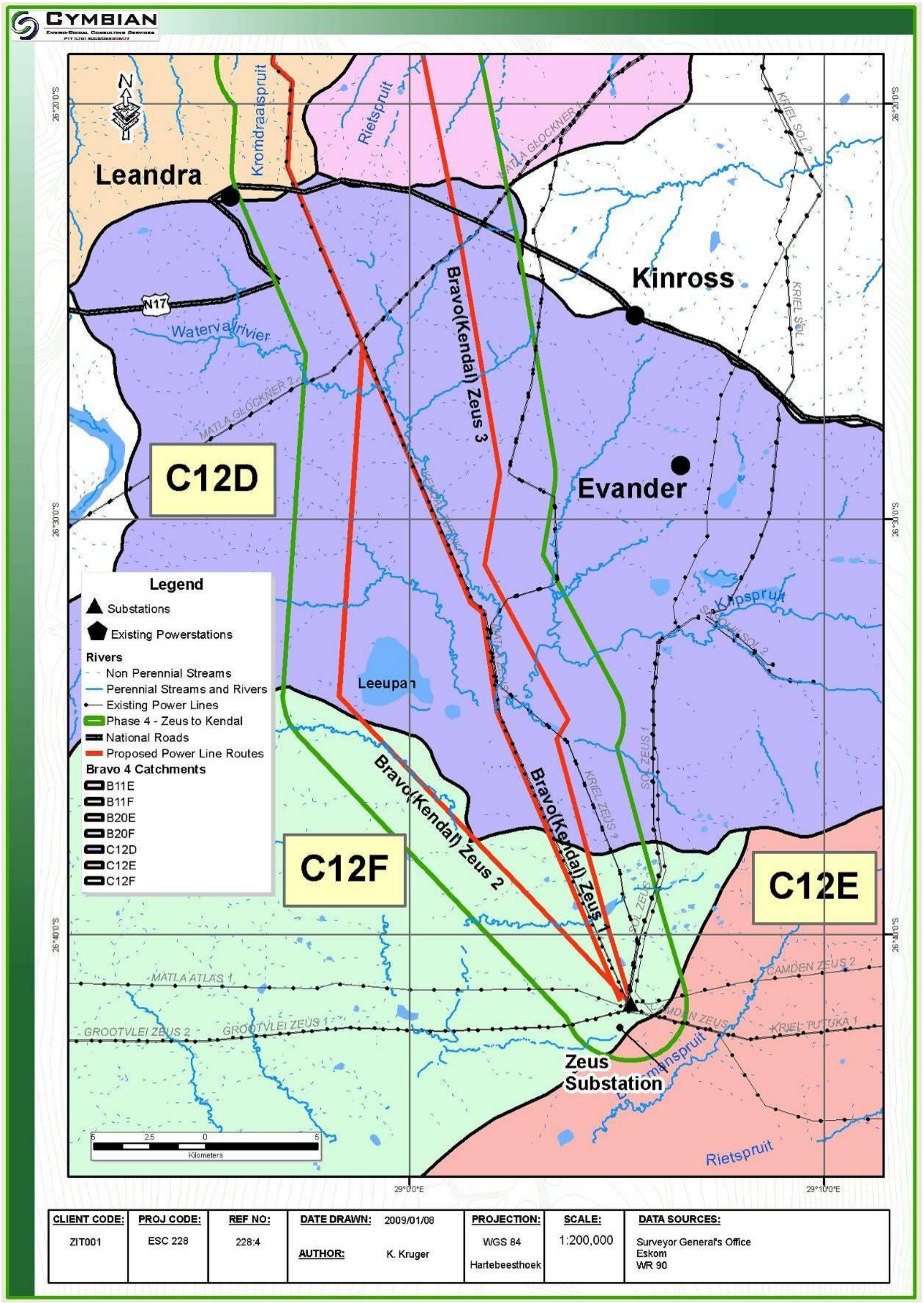

FIGURE 10: SURFACE WATER AND DRAINAGE FEATURES OF THE SOUTHERN SECTION OF THE SITE

The Waterval River along which a significant section of Alternative 1 is aligned.

Leeupan, a significant water body found along the Alternative 2 alignment. Note Secunda in the background (left) and the angling club (right).

Waterval River showing existing power line crossings

Kromdraai Spruit, another stream that is traversed by the Alternative 1 alignment for a considerable distance.

FIGURE 11: PHOTOGRAPHS OF THE SURFACE WATER RESOURCES ENCOUNTERED ON SITE

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 2628 BB, BD, DB and 2629 AA, AC and CA. Contours were combined from the topo mapsheets to form a combined contour layer. Using the Arcview GIS software the contour information was used to develop a digital elevation model of the region as shown in Figure 12 below.

Regional Description

The topography of the region is gently undulating to moderately undulating landscape of the Highveld plateau. 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 1420-1800 metres above mean sea level (mamsl).

Site Description

The study area's topography is representative of the region, that being gently undulating 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 1480 metres above mean sea level (mamsl) in the north to 1760 mamsl in the central parts of the site.

Figure 12 below illustrates the digital elevation model created from the contours of the region. The low lying areas are clearly visible in light blue while the higher areas are shown in brown. The watershed along the N17 highway is clearly visible in the centre of the site, from which the water drains either northwards or southwards.

Although the height difference is clear on the map, the higher lying areas in this region are not classified as ridges.

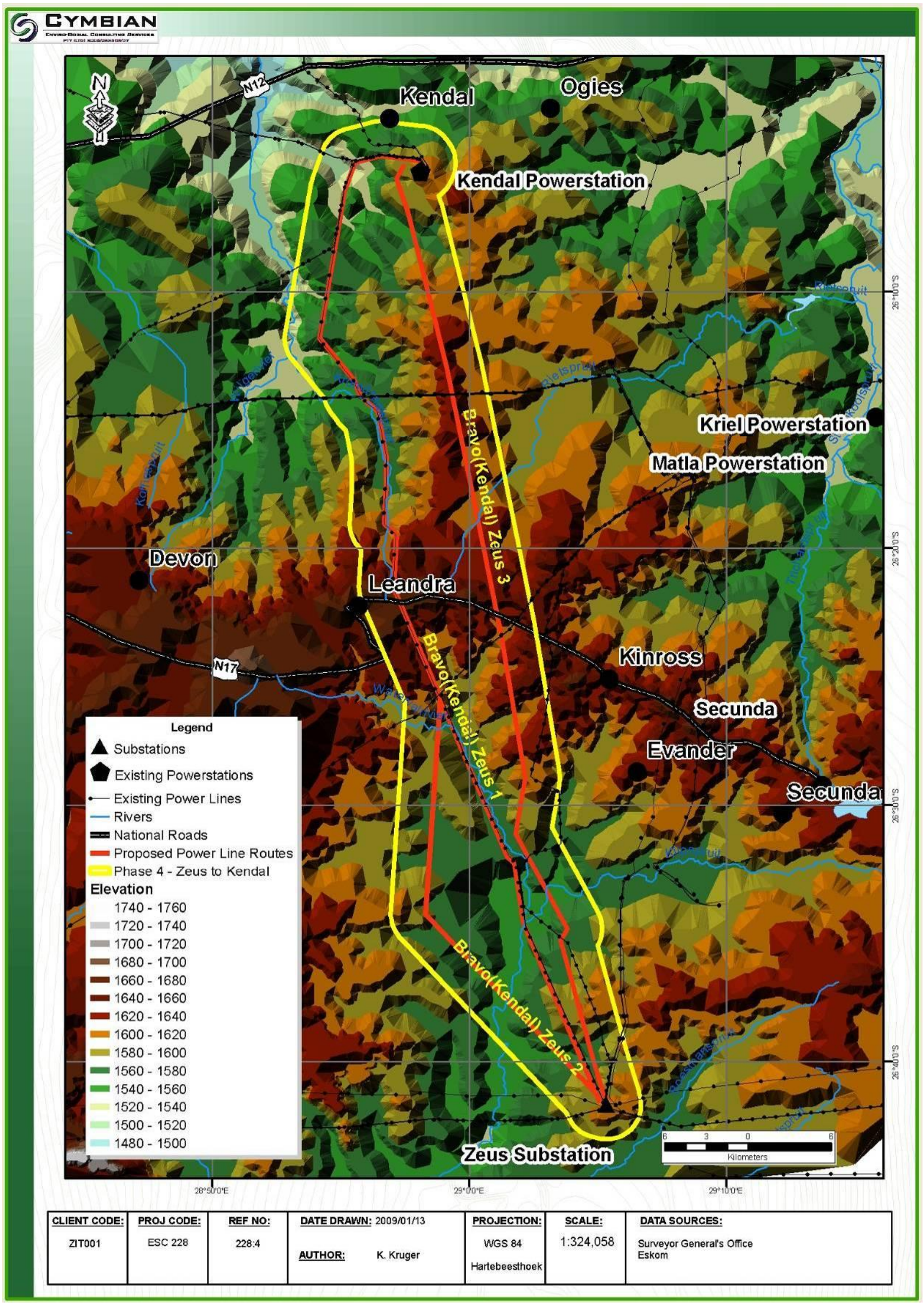

FIGURE 12: TOPOGRAPHY OF SITE

7.1.5 Soils

Data Collection

The site visits were conducted on the 8th – 12th September 2008 and the 3rd – 7th November 2008. Soils were augered at 300 m 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), or the intrusive Karoo Suite dolerites which feature prominently in the area. The soils on the sandstones are generally deep with a brown colour, while the dolerites generally form dark clay soils.

Site Description

During the site visit several soil forms were identified including Mispah, Avalon, Clovelly, Katspruit, Longlands, Wasbank, Rensburg, Arcadia, Willowbrook, Steendal, Milkwood, Inhoek, Kroonstad, Westleigh, Dresden, Glencoe, Bainsvlei, Shortlands, Sterkspruit and Witbank. In order to simplify the assessment, the soil forms have been grouped into management units that have similar characteristics, and therefore would require similar management. These units are agricultural soils, disturbed soils, rocky soils, wetlands soils and transitional soils. Each of the soil management units are described in detail in the sections below and Figure 13 and Figure 14 illustrates the location of the soil units. The land capability (agricultural potential) of the abovementioned soils are described in more detail in Section 7.1.6.