CYMBIAN
ENVIRO-SOCIAL CONSULTING SERVICES

Biophysical Specialist Study Report for the Bravo 5 Power Line Route Alternatives

Draft Report

This is a report compiled for Zitholele Consulting as part of the Bravo Integration Project.

Compiled By:

Cymbian Enviro-Social Consulting Services

Konrad Kruger

Glen Louwrens

Brett Coutts

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CYMBIAN Enviro-Social Consulting Services (PTY) Ltd.
Reg. No. 2006/022502/07 • P.O. Box 1679, Cresta, 2118
Tel: +27 11 678 6680 • Fax: +27 476 4108 • info@cymbian.co.za

PURPOSE OF THIS DOCUMENT

Eskom propose to construct a 400 kV overhead power line, by-passing the existing Duvha substation, to form a new Bravo-Vulcan line near Emahlahleni, Mpumalanga. This by-pass line is planned to be approximately 10 km in length. The area to be investigated for this by-pass line is a 5 km corridor to the north-west of the existing Duvha substation.

As part of the environmental authorisation specialist studies have to be undertaken in order to inform the Environmental Impact Assessment Report (EIR). This report details the findings for Geology, Climate, Surface Water, Topography, Soils, Land Capability, Land Use, Flora, Fauna (especailly avifauna), Wetlands and Visual Impacts.

Zitholele Consulting appointed Cymbian Enviro-Social Consulting Services to undertake the aformentioned specialist studies. The purpose of this document is therefore to present the findings of the aforementioned assessments and to provide management measures to protect sensitive features located on site.

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1.0 INTRODUCTION

1.1 Project background

The growing demand for electricity is placing increasing pressure on Eskom's existing power generation and transmission capacity. Eskom is committed to implementing a Sustainable Energy Strategy that complements the policies and strategies of National Government. Eskom aims to improve the reliability of electricity supply to the country, and in particular to provide for the growth in electricity demand in the Gauteng and Mpumalanga provinces. For this reason, Eskom obtained environmental authorisation to construct the new Bravo Power Station between Bronkhorstspruit and Emahlahleni in 2007. Construction of this power station has commenced will civil and earthworks as noted during site investigations.

The construction and operation of the Bravo Power Station requires not only the construction of the Power Station itself, but also the construction of additional auxiliary structures such as power lines. The Bravo Integration Project spans the provinces of Gauteng and Mpumalanga and will be handled as five individual Environmental Impact Assessments (EIA), namely (Figure 1):

Phase 1: Sol – Camden By-Pass Power Line

The intention of Bravo 1 is to build two 400 kV bypasses lines for Zeus substation, the two 400 kV lines from Sol Substation and the two 400 kV power lines from Camden power station will be disconnected from Zeus substation and joined to each other to form two Camden- Sol 400 kV power lines. The location of the two by-pass lines is planned to be within approximately 10 km radius of the Zeus substation. The project is located within the Govan Mbeki District Municipality.

Phase 2: Apollo and Kendal loop in and loop out lines

Eskom propose to construct four new 400 kV overhead power lines, located within the Emalahleni Local Municipality in Mpumalanga, to loop in and out of Bravo Power Station. The existing Kendal-Apollo line will be looped in and out of Bravo to form the Bravo-Apollo and Bravo-Kendal lines. In addition, the existing Duvha-Minerva 400 kV overhead power line will be looped in and out of Bravo Power Station, to form the Bravo-Duvha and Bravo-Minerva lines. The study area in which the alternatives were selected is within the 10 km radius surrounding the new Bravo Power Station and each of the alternative 400 kV power lines will be not exceed 10 km in length.

Phase 3: Construction of a 400kV power line from Bravo Power Station to Lulamisa Substation

In order for the Bravo power station to be integrated within the existing Eskom infrastructure, Eskom propose to construct a new 400kV power line from the new Bravo Power Station to the existing Lulamisa substation, near Diepsloot. This line will be approximately 150 km in length. The construction of this proposed 400 kV power line is aimed to ensure sufficient electricity supply to the Diepsloot and Johannesburg North areas, where currently frequent electricity shortages are experienced. The alternative Bravo power line corridors are located on the eastern Highveld of Southern Africa. The corridors cover an area from Emahlaheni in the east, to Diepsloot in the west.

Phase 4: Two new 90 km Kendal –Zeus 400 kV Power Lines

Eskom propose to construct two new 400 kV power lines, one from Bravo to Zeus and the other one from the Kendal Power Station (near Ogies) to the Zeus substation (near Secunda), Mpumalanga. These lines will run parallel to each other and will be approximately 90 km in length. The three alternative route corridors will be 5 km wide. These three alternative corridors merge into two corridors approximately 30 km from the Zeus substation.

Phase 5: New 10km Bravo-Vulcan Power Line

Eskom propose to construct a 400 kV overhead power line, by-passing the existing Duvha Power Station, to form a new Bravo-Vulcan line near Emahlahleni, Mpumalanga. This by-pass line is planned to be approximately 10 km in length. The area to be investigated for this by-pass line is a 10 km radius surrounding the existing Duvha Power Station. This report details the biophysical findings for the Bravo 5 project.

Eskom Transmission has appointed Zitholele Consulting (Pty) Ltd, an independent company, to conduct an EIA to evaluate the potential environmental and social impacts of the proposed project. Zitholele Consulting has in turn appointed Cymbian Enviro-Social Consulting Services to undertake the bio-physical specialist studies required, including:

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

Additional to the abovementioned assessments, all fauna observed were noted. These were noted to further inform the occurrence of sensitive species.

1.2 Regional setting and project locality

The Bravo Integration Project will span the provinces of Gauteng and Mpumalanga, stretching from Secunda, Ogies and Middelburg in Mpumalanga, to Bronkhorstspruit, Midrand and Kayalami in Gauteng. Refer to Figure 1 for a locality map for the entire Bravo Integration Project.

This report details the biophysical assessments undertaken for the Bravo 5 study area. The Bravo 5 site is located east of Emahlahleni, in the vicinity of the Duvha Power Station. This study area will include 3 route alternatives by-passing Duvha Power Station near Emahlahleni, Mpumalanga and connecting the line to the existing grid as shown in Figure 2.

1.3 Study scope

As part of the environmental authorisation process for the aforementioned project it is required for the Environmental Impact Assessment Process that certain biophysical specialist studies be undertaken. Zitholele Consulting appointed Cymbian Enviro-Social Consulting Services to undertake the following biophysical specialist studies:

- A Geology, Soil and Land Capability Assessment;
- A Topographical Assessment;
- A Visual Assessment;
- An Ecological Assessment and
- An Ornithological Assessment.

The Geology, Soil and Land Capability Assessments were conducted using a Geographic Information System (GIS) as well as a site investigation to identify soils on site. The Topographical and Visual assessment were completed using a GIS. The Ecological assessment was conducted by first undertaking a literature review and then followed up with site investigations to confirm the findings of the literature review. During the Ecological site investigations, all fauna were noted and identified.

1.4 Study approach

Cymbian undertook the aforementioned specialist studies during a week site visit conducted from the 17th - 18th of November 2008. The study area encompassed the area within a 5 km buffer zone or corridor width encompassing the power line alternatives.

Transects were walked on either side of the power line alternatives in which vegetation, soil, fauna and wetland characteristics were sampled. Each sampling point was marked using a GPS for mapping purposes, photos of each sampling point were also taken.

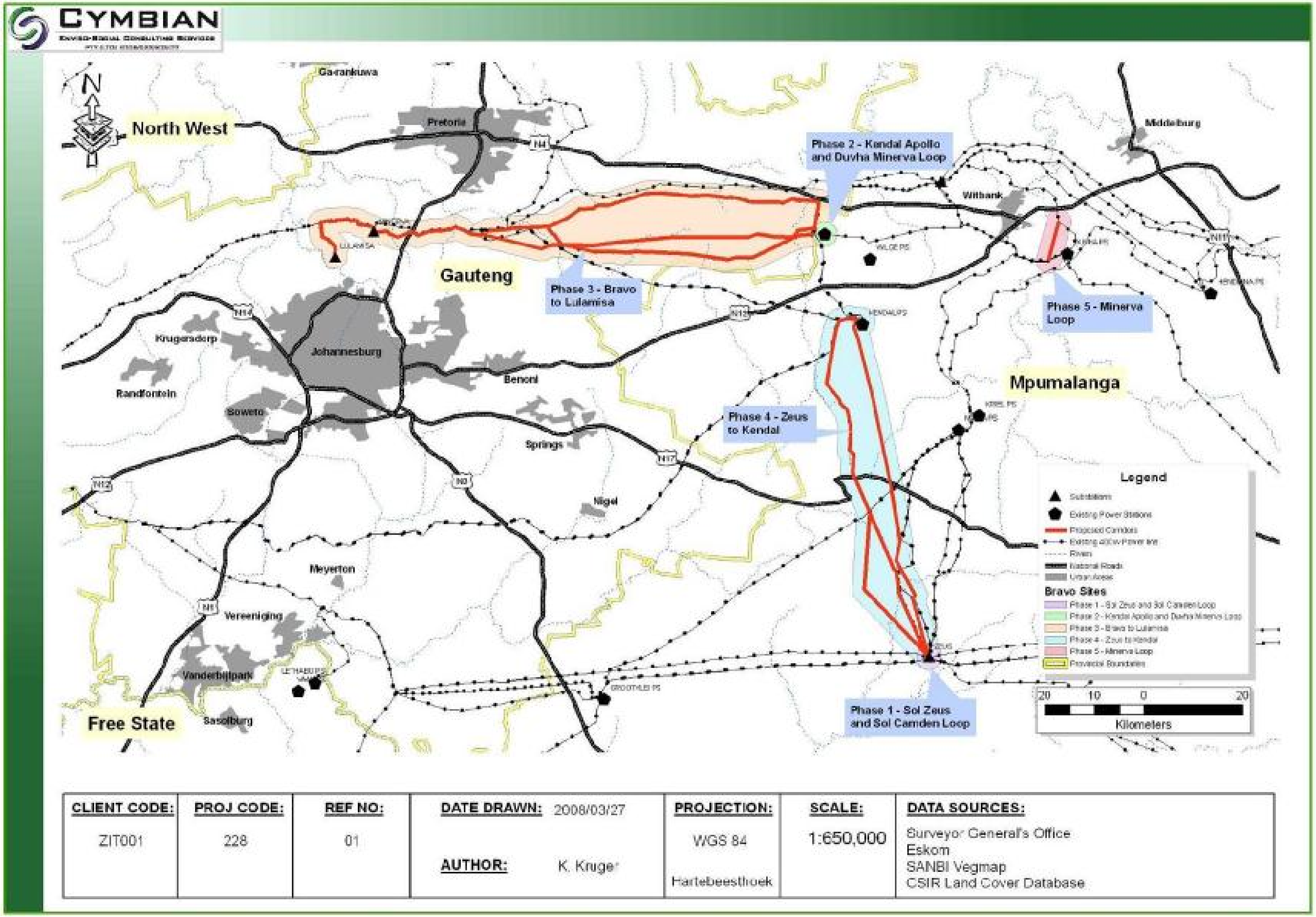

Figure 1: Site Location

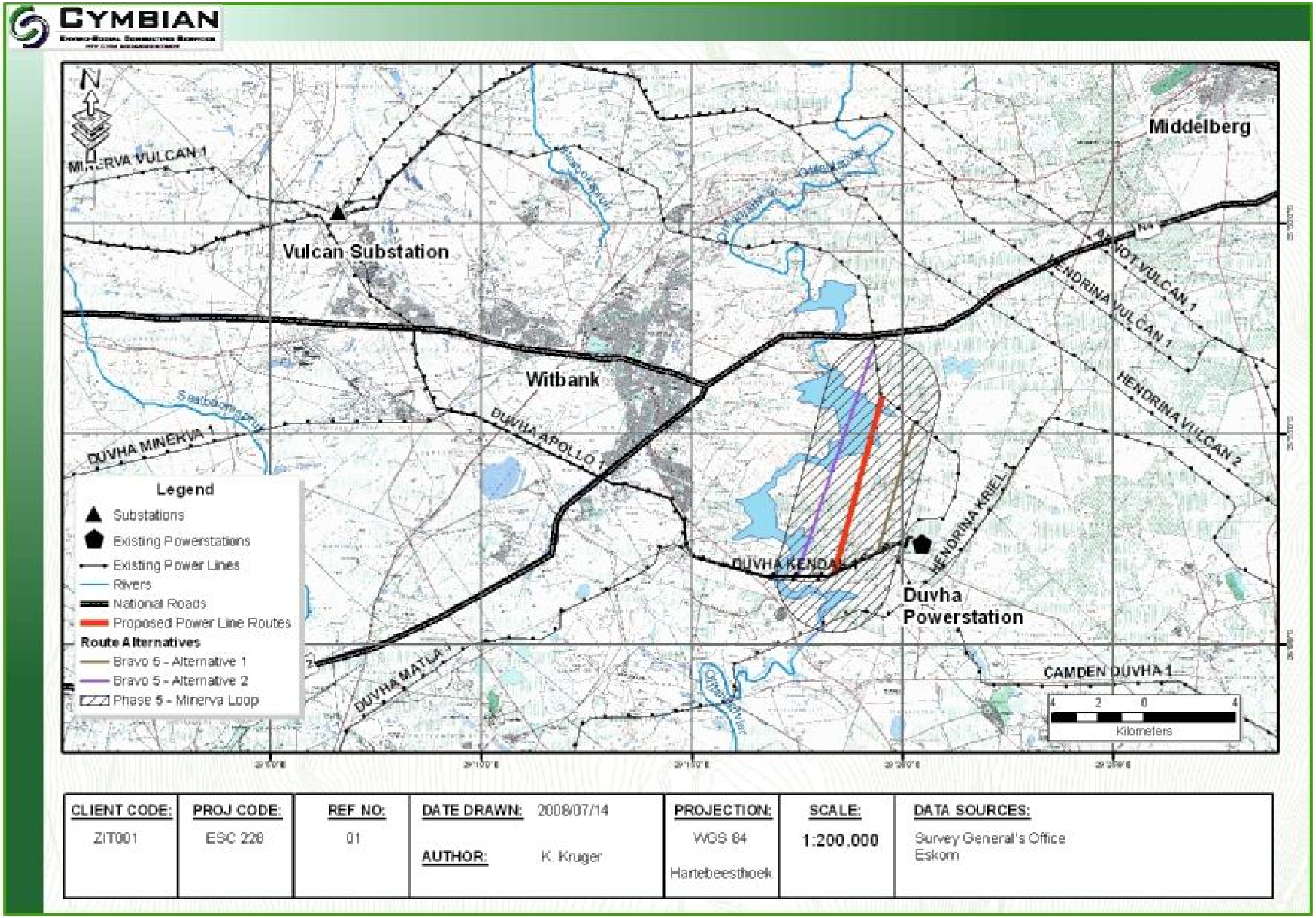

Figure 2: Bravo 5 Site Map

1.5 Project team

The technical project team consists of:

- **Konrad Kruger** – Landscape Ecologist and Environmental Consultant
- **Glen Louwrens** – Conservation Ecologist and Junior Environmental Consultant
- **Brett Coutts** – Conservation Ecologist and Junior Environmental Consultant

Konrad Kruger graduated from the University of Pretoria with a BSc Honours in Geography in 2003. Konrad has been involved in a variety of environmental projects in the last three years and has become specialised in undertaking specialist studies, mapping and environmental consulting. Konrad has undertaken GIS mapping for mining, residential as well as industrial developments. Konrad is also an experienced land ecologist and will provide expertise for this project in terms of soil surveys, land capability assessments and mapping. He is currently in the process of acquiring his MSc in Geography (Landscape Ecology) from the University of Pretoria.

Glen Louwrens graduated from the University of the Witwatersrand with a BSc Honours in Zoology and Ecology in 2007. Currently a Junior Environmental Consultant at Cymbian Enviro-Social Consulting Services, he is experienced in GIS mapping and can provide expertise in terms of faunal and floral surveys.

Brett Coutts graduated from the University of the Witwatersrand with a BSc Honours in Zoology and Ecology in 2007. His Honours year was based with the Endangered Wildlife Trust (EWT), working on the porcupine quill trade. He has worked for Hydromulch between 2007 and 2008 as a junior project manager on environmental rehabilitation projects. Currently a Junior Environmental Consultant at Cymbian Enviro-Social Consulting Services, he is experienced in rehabilitation projects, population dynamics of small mammals and can provide expertise in terms of faunal and floral surveys.

1.6 Assumptions and Limitations

The following assumptions were made during the assessment:

- The information provided regarding the provided by Zitholele Consulting and ESKOM is accurate;
- If the corridors could not be accessed, data from adjacent sites could be used;
- A corridor width of 5 km was used;
- Fauna, flora and wetland delineation studies can only be completed during the summer months;
- Power line design will be similar to the existing high voltage power lines on site.

2.0 DETAILED PROJECT DESCRIPTION

2.1 Project Alternatives

Several strategic alternatives were considered at the conceptual phase of the Bravo Power Station EIA. This strategic information was again revisited during the planning phase of the Bravo Integration Project.

2.2 Design Alternatives

The primary motivating factors behind the consideration of underground power lines include the following:

1.) Areas prone to significant infrastructure damage due to extreme weather conditions, on an annual basis, usually consider underground power lines. The cost of power line replacement over the life of the infrastructure is usually more cost effective in such areas;

2.) The visual impact of underground power lines is much less than those of overhead power lines, and are usually considered in highly sensitive visual landscapes, such as wide open wilderness spaces and tourism facilities e.g. game farms and nature reserves.

The primary motivating factors behind the consideration of overhead power lines include the following:

1.) The cost of overhead lines is between 250% and 400% less. Eskom have a responsibility to provide cost effective and reliable energy resources;

2.) Overhead circuits can often be worked on while they are still energized. Nearly all work on underground circuits is performed while things are de-energized and grounded.

3.) Underground cables need a larger conductor to handle the same amperage as a smaller overhead conductor. This is due to the difficulty of dissipating heat to the earth. Larger conductors means higher cost.

4.) Overhead distribution circuits are much easier to modify to serve customers or make other changes. A simple set of fuses on an overhead circuit might cost ~R2 000.00, yet the underground equivalent costs over ~R10 000.00.

5.) An overhead line can generally span and not disturb sensitive features such as cultural resources sites, streams, most wetlands, isolated steep slopes, or a sensitive species location to mention a few. Underground lines however require the construction of a trench and results in a disturbed area of approximately 15 m in width for the entire length of the line.

As none of the areas affected by the proposed Bravo Integration Project are annually affected by extremely damaging environmental events, or fall within highly sensitive visual environments, it was decided to implement the more cost effective overhead power line alternative.

2.3 Route Alternatives

The various route alternatives were analysed within the 5 km buffer zone or corridor width encompassing the power line alternatives. The following criteria were used to determine appropriate route alternatives: regional environmental information; engineering feasibilities; economic implications as well as existing Eskom power lines and servitudes. The following three alternatives were identified (Figure 2):

Alternative 1:

Alternative one is to construct the proposed 400 kV by-pass line approximately 1.5 km towards the north-west of the Duhva Power Station. This alternative will be approximately 7.4 km in length.

Alternative 2:

Alternative two is to construct the proposed by-pass line approximately 4 km towards the north-west of the Duhva Power Station. This alternative will be approximately 10.5 km in length but may not be technically feasible due to it traversing the Olifants River and the Witbank Dam.

Alternative 3:

Alternative three is to construct the proposed by-pass line approximately 2 km to the north-west of the Duhva Power Station. This alternative will be approximately 9.5 km. The construction will take place outside of Eskom property, but may avoid crossing the Olifants River. Alternative 3 is currently the Eskom preferred alternative.

2.4 No-Go Alternative

The No-Go alternative will also be assessed further in the EIA. In the case that none of the three alternatives is suitable for the proposed power lines, the recommendation would be that the proposed power line not be constructed and further alternative alignments, or project solutions be generated.

2.5 Major Activities of the Project

The project involves 21 major activities:

1. Environmental Impact Study.
2. Negotiations for the servitude.
3. Land survey to determine the exact routing of the line and tower placement.
4. Profiling work to produce the profiles for construction.
5. Pegging of bend tower by a Transmission surveyor.
6. Erection of camp sites for the Contractors' workforce.
7. Negotiations with landowners for access roads to the servitude.
8. Servitude gate installation to facilitate access to the servitude.
9. Vegetation clearing to facilitate access, construction and the safe operation of the line.
10. Establishing of access roads on the servitude where required as per design parameters.
11. Pegging of tower positions for construction by the contractor.
12. Transportation of equipment, materials and personnel to site and stores.
13. Installation of foundations for the towers.
14. Tower assembly and erection.
15. Conductor stringing and regulation.
16. Taking over the line from the contractor for commissioning.
17. Final inspection of the line, commissioning and hand over to the Grid Line and Servitude Manager for operation.
18. Rehabilitation of disturbed areas.
19. Signing off of all Landowners upon completion of the construction and rehabilitation.
20. Handing over and taking over of the servitude by the Grid Environmental Manager.
21. Operation and maintenance of the line by the Grid.

2.6 Project Timeframes

The primary project milestones are represented in Table 1 below.

Table 1: Primary milestones for the Bravo 5: 400kV by-pass line.

Milestones	Date
Final Scoping Report	20 October 2008
Undertake Specialist Studies	15 January 2008
Draft EIR and EMP	10 February 2009
Stakeholder Engagement on EIR / EMP	11 March 2009
Finalise EIR and EMP	6 April 2009
Submission to Relevant Authorities	7 April 2009
Environmental Authorisation	19 May 2009
Appeal Period	21 July 2009
Commence with Construction	To be advised
Construction (including EMP Auditing)	To be advised
Completion of Construction (including Rehabilitation)	To be advised
Close out Audit	To be advised

3.0 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.

3.1 Geology

3.1.1 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 Department of Environmental Affairs and Tourism (DEAT) as well as geological data supplied by the Gauteng Department of Agriculture, Conservation and Environment (GDACE).

3.1.2 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 3).

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.

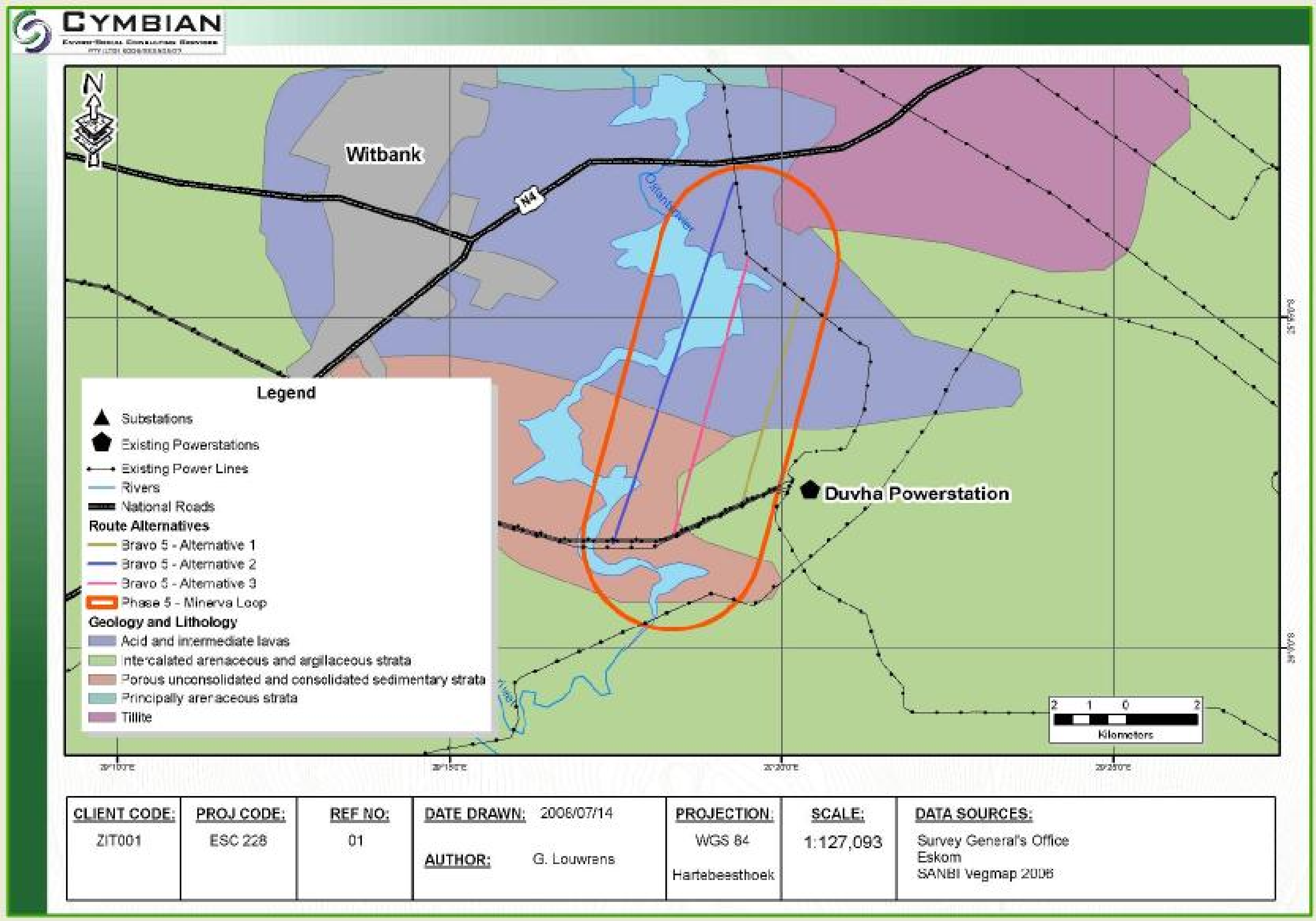

Figure 3: Regional Geology

3.2 Climate

3.2.1 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)[1].

3.2.2 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

3.3 Surface Water

3.3.1 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.

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

3.3.2 Site Description

The Duvha powerstation 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 4 and Figure 5 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 4: The Witbank Dam on site.

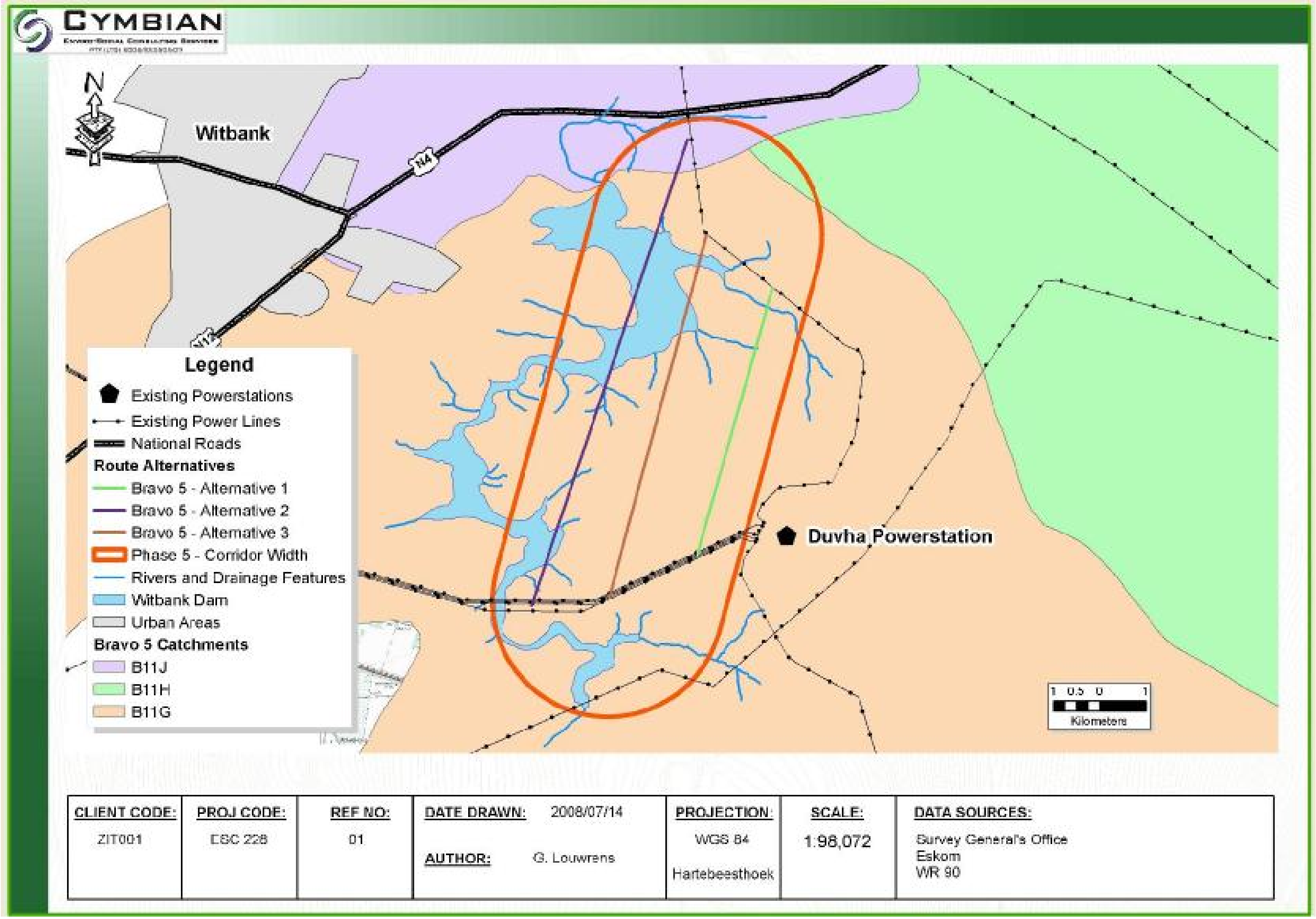

Figure 5: Surface water and drainage features

3.4 Topography

3.4.1 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 6 below.

3.4.2 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.

3.4.3 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 6 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.

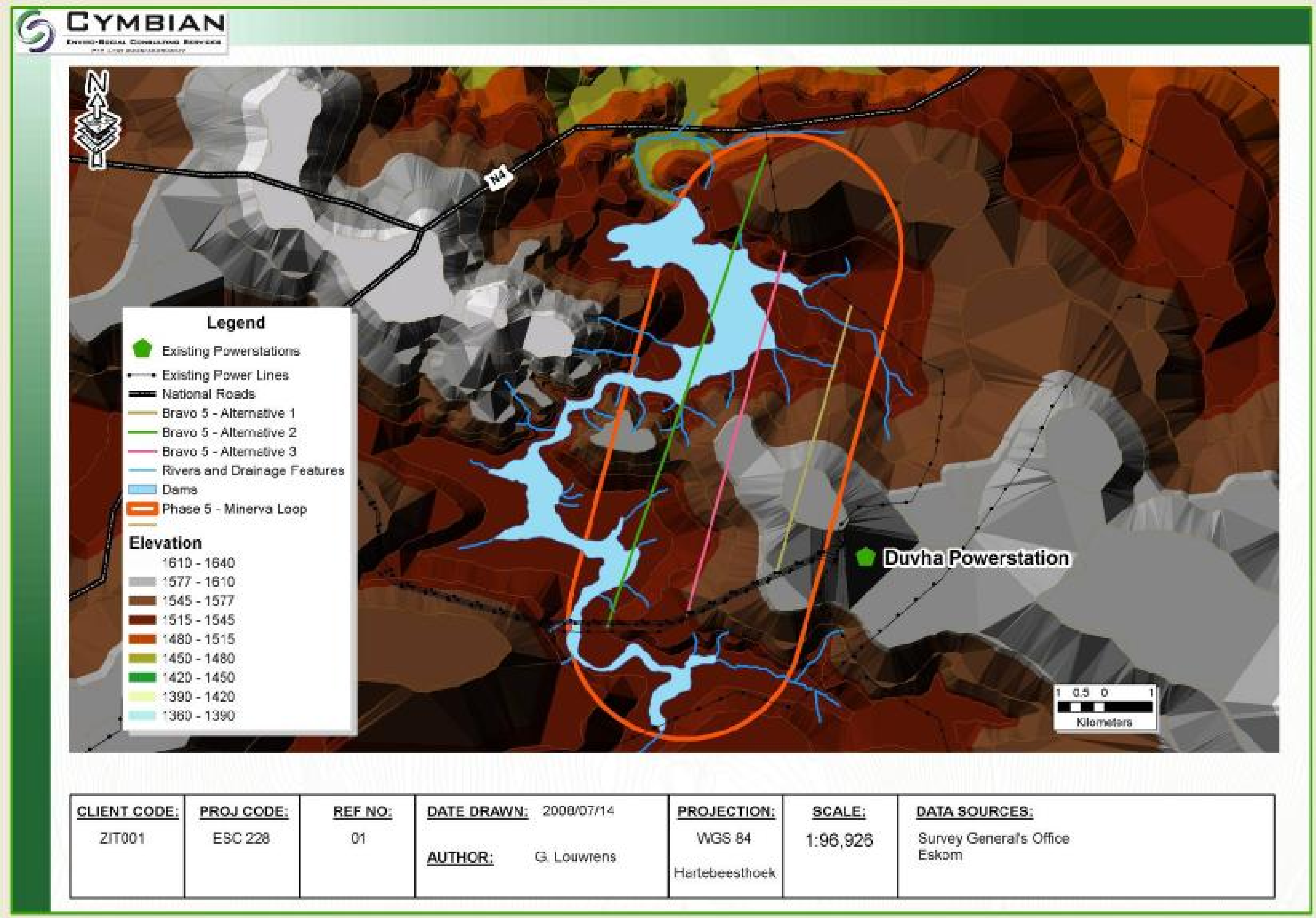

Figure 6: Topography of Site

3.5 Soils

3.5.1 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).

3.5.2 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.

3.5.3 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 7 illustrates the location of the soil types. The land capability (agricultural potential) of the abovementioned soil form is described in more detail in Section 3.6.

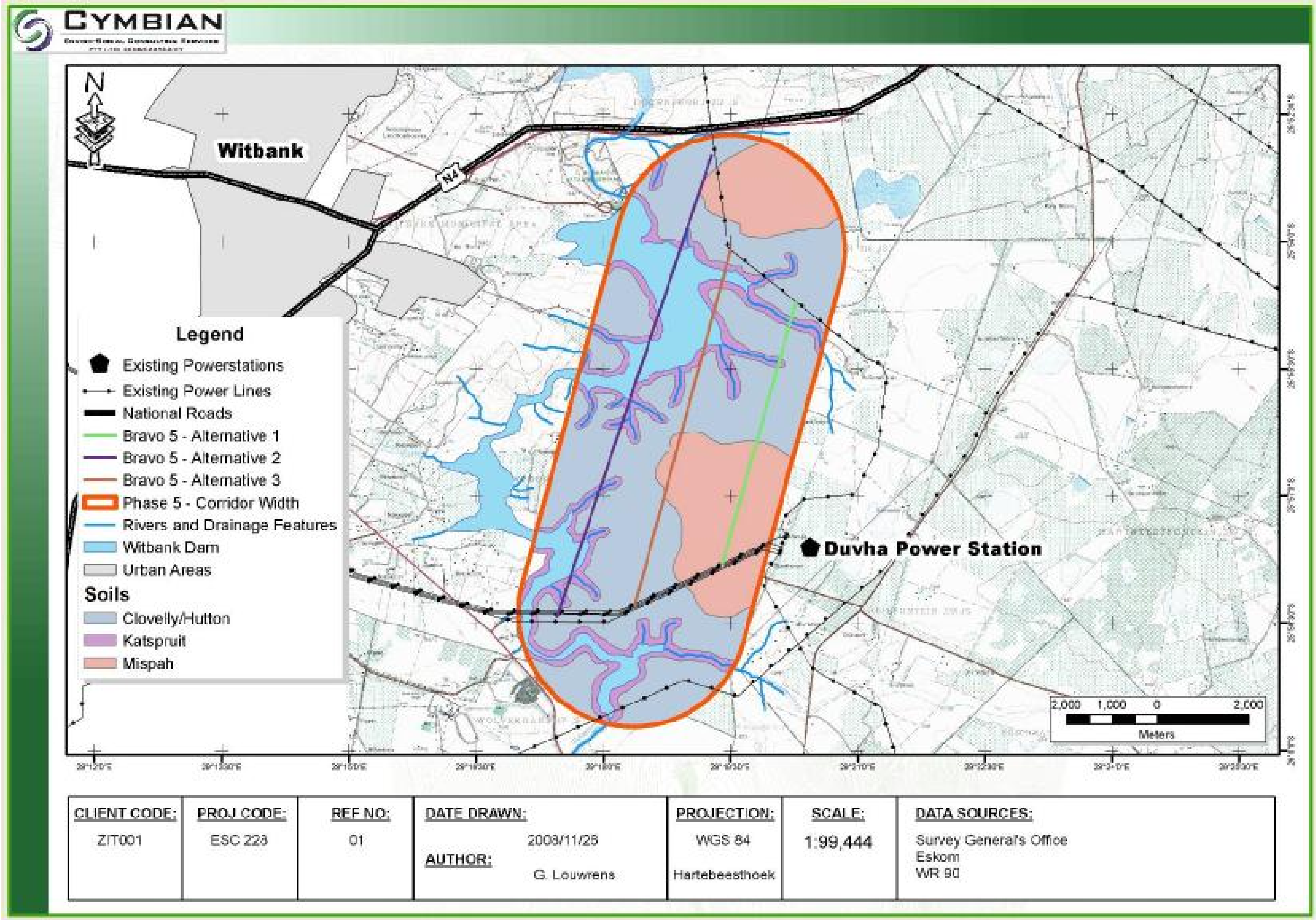

Figure 7: Soil Type Map

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 8 for an illustration of a typical Mispah soil form.

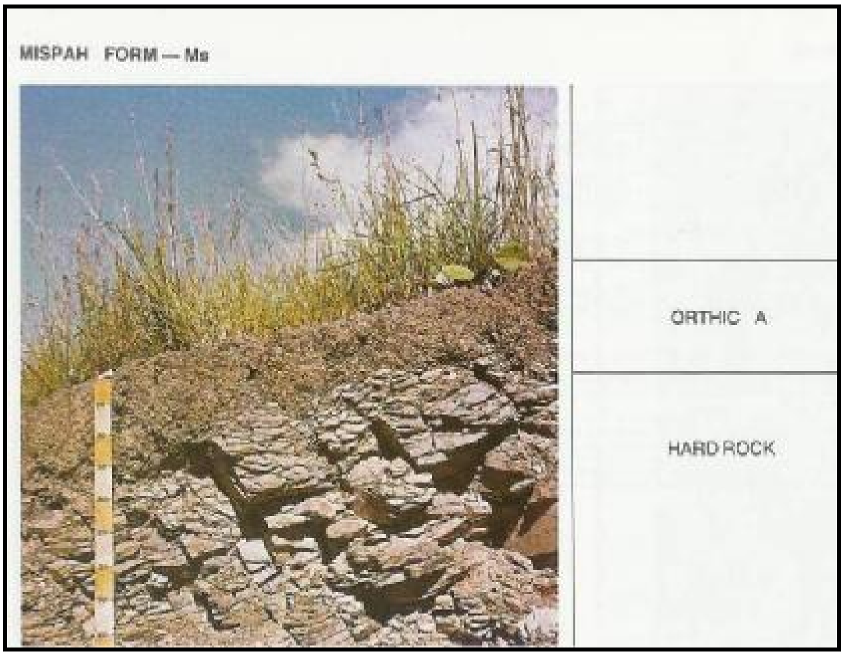

Figure 8: Mispah soil form (Memoirs on the Natural Resources of South Africa, no. 15, 1991).

Clovelly Soil Form

Clovelly soils can be identified as an apedal "yellow" B-horizon as indicated in Figure 9 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.

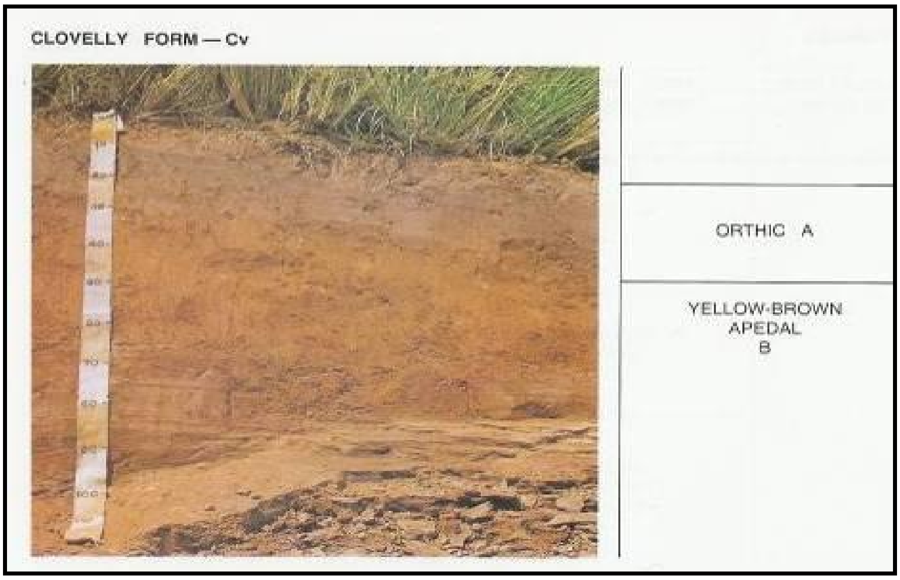

Figure 9: Clovelly soil form (Soil Classification, 1991)

Hutton Soil Form

Hutton's are identified on the basis of the presence of an apedal (structureless) "red" B-horizon as indicated in Figure 10 below. These soils are the main agricultural soil found in South Africa, due to the deep, well-drained nature of these soils. The Hutton soils found on the site are restricted to the midslopes of the site. .

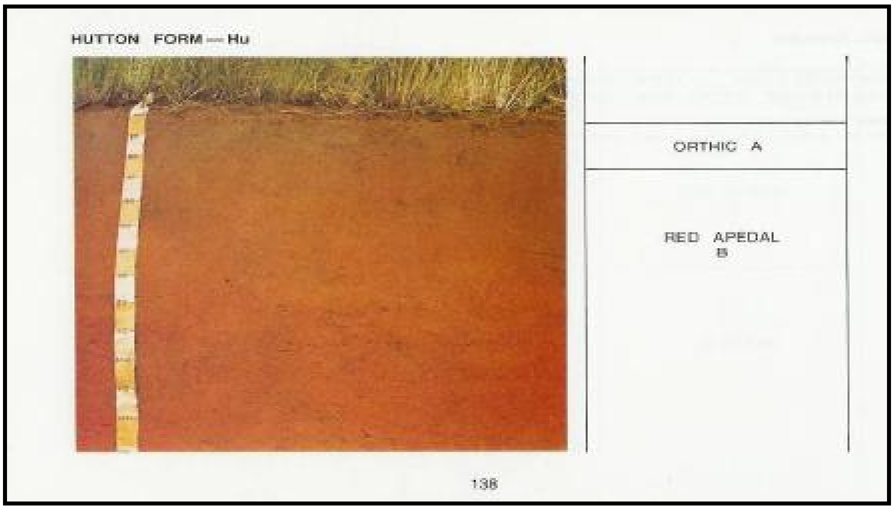

Figure 10: Hutton Soil Form (Soil Classification, 1991)

Katspruit Soil Form

The Katspruit soil form is most commonly found in areas of semi-permanent wetness. The soil is made up of an Orthic A-horizon over a diagnostic G-horizon and is indicated in Figure 11 below. The G-horizon has several unique diagnostic criteria as a horizon, namely:

- It is saturated with water for long periods unless drained;
- Is dominated by grey, low chroma matrix colours, often with blue or green tints, with or without mottling;
- Has not undergone marked removal of colloid matter, usually accumulation of colloid matter has taken place in the horizon;
- Has a consistency at least one grade firmer than that of the overlying horizon;
- Lacks saprolitic character; and
- Lacks plinthic character.

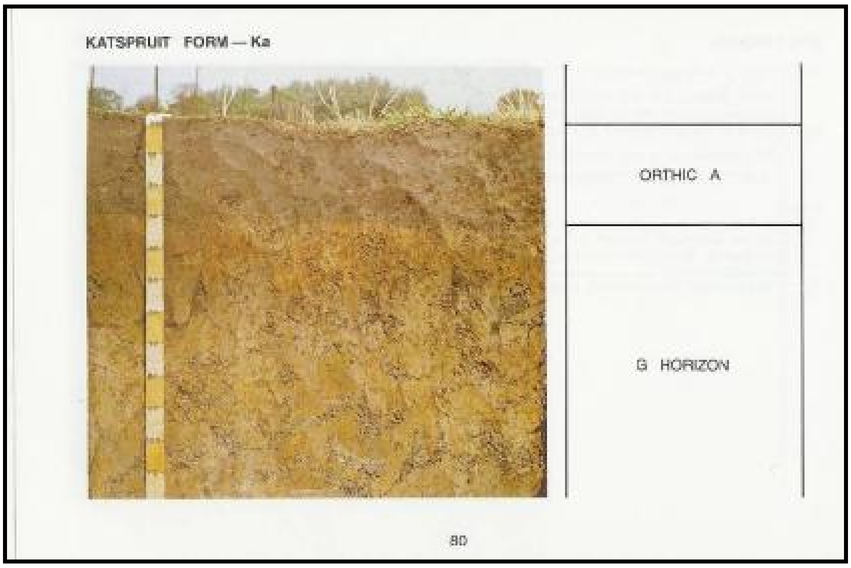

Figure 11: Katspruit Soil form (Soil Classification, 1991)

3.6 Land Capability

3.6.1 Data Collection

A literature review was conducted in order to obtain any relevant information concerning the area, including information from the Environmental Potential Atlas (ENPAT), Weather Bureau and Department of Agriculture. Results from the soil study were taken into account when determining the land capability of the site.

The land capability assessment methodology as outlined by the National Department of Agriculture was used to assess the soil's capability on site.

3.6.2 Regional Description

The regional land capability is mostly class VI soils with many limitations. There are large patches of arable land and this is evidenced from the large number of cultivated lands found in the region. In the areas where the soil is too shallow or too wet to cultivate, livestock are grazed.

3.6.3 Site Description

The soils identified on site were classified according to the methodology proposed by the Agricultural Research Council – Institute for Soil, Climate and Water (2002). Factors evaluated are tabled below.

The site is made up of two main land capability classes, namely class VI-VII – light grazing and class V – grazing. The class VI and VII soils are not suitable for cultivation mainly due to shallow nature of the soils of this class. The class VI and VII soils have continuing limitations that cannot be corrected; in this case rock complexes, flood hazard, stoniness, and a shallow rooting zone constitute these limitations. The class V soils found on site are limited to the areas surrounding drainage lines or streams and the Witbank Dam and are limited by the frequent flooding risk, shallow depth and poor drainage. Figure 12 illustrates the various land capability units on site.

Table 2: Land Capability of the soils on site for agricultural use

Soil	Clovelly & Hutton	Mispah	Katspruit
Area (ha)	263.0	101.0	63.0
% of site	61.6	23.7	14.7
Rock Complex	Yes – hard rock	Yes – hard rock	
Flooding Risk	F1 – None	F1 - None	F4 - Common
Erosion Risk	E4 – Moderate to High	E4 – Moderate to High	E3 - Moderate
Slope %	10.0	10.4	7.0
Texture	T1 – 15 – 45% Clay	T1 – 15 – 45% Clay	T1 – 15 – 45% Clay
Depth	D4 – 10 – 30 cm	D4 – 10 – 30 cm	D3 – 40 – 60 cm
Drainage	W2 – Well drained	W2 – Well drained	W5 – Poorly drained
Mech Limitations	MB2 – Large Stones and Boulders, Unploughable	MB3 – Shallow soils on rock	MB0 - None
pH	pH > 5	pH > 5	pH > 5
Soil Capability	VI	VII	V
Climate Class	C2	C2	C1
Land Capability	VI – Light Grazing	VII – Light Grazing	V - Grazing

No limitation	Low to Moderate	Moderate	High	Very Limiting

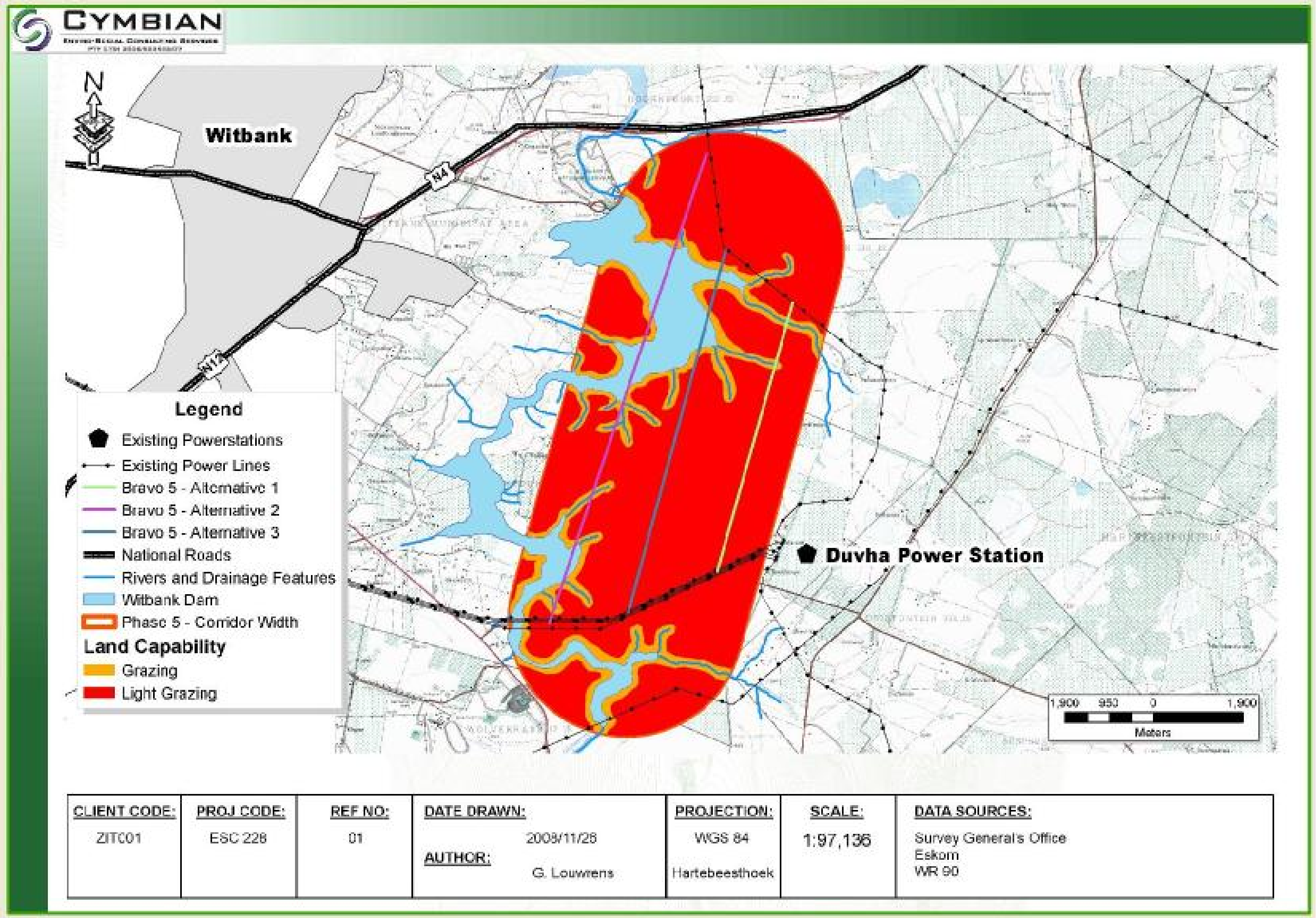

Figure 12: Land Capability Map

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