REPORT NO 47579-R01

# LAND CAPABILITY ASSESSMENT FOR MARALLA WEST WIND ENERGY FACILITY

## BIOTHERM SOUTH AFRICA (PTY) LTD

CONFIDENTIAL

SEPTEMBER 2016

WSP | PARSONS BRINCKERHOFF

# LAND CAPABILITY AND WETLAND ASSESSMENT FOR MARALLA WEST WIND FACILITY

## BIOTHERM SOUTH AFRICA (PTY) LTD

**Final**
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# 1 INTRODUCTION

WSP Environmental (Pty) Ltd (WSP) was appointed to undertake a Social and Environmental Impact Assessment (SEIA) by BioTherm Energy (Pty) Ltd (BioTherm) for the proposed development of three renewable energy complexes in the Western and Northern Cape provinces', in order to apply for Environmental Authorisation (EA).

The SEIA is divided into two phases, firstly the Scoping Phase, and secondly and Environmental Impact Assessment (EIA) Phase. This report will form part of the Scoping Phase, acting in the capacity of a Land Capability and Wetland Assessment specialist study for the proposed BioTherm development.

## 1.1 SCOPE AND LIMITATIONS

### AIMS AND OBJECTIVES

The purpose of this report was to provide an initial scoping of the anticipate impacts relating to the land capability and probable wetlands for a proposed wind power development Maralla West site. The finding of this report will be used to identify key sensitive areas within the footprint of the development, and the associated infrastructure which will be addressed in more detail in the EIA phase. This study entailed a desktop review of the area, which was followed up by a site visit to verify the information collected in the desktop phase, and to collect additional relevant information.

The key objectives of this report are:

- Contextualise the natural environment landscape of the proposed development;
- Identify the land capability and presence of wetlands within and around the development footprint, based upon visual inspection;
- Provide an initial screening of the anticipated impacts in on the land capability and wetlands;
- Provide an outline of the methodology that will be followed in the EIA phase; and
- Outline the anticipate impacts on the land capability and wetlands, highlighting any significant potential risks, with the potential to apply effective mitigation measures.

### SOURCES OF INFORMATION

The study made use of the following sources of information:

- Google Earth Pro;
- Agricultural Geo-Referenced Information System (AGIS);
- U.S. Geological Survey (USGS);
- Soil Maps of Africa: European Digital Archive of Soil Maps (EuDASM);
- Mapping and detailed project information provided by BioTherm, and existing reports which were available at the onset of the project;
- Hydrological information provided by The Water Resources 2012 Study (WR2012);
- The Land Capability Classification system described in the South African Chamber of Mines Guidelines;
- Wet-EcoServices Tool, and
- DWAF's Updated Manual for the Identification and Delineation of Wetlands.

## SITE DESCRIPTION

The proposed Maralla West wind facility is located along the provincial boarder between the Western Cape and Northern Cape, approximately 47 km north of the town of Laingsburg, (**Figure 1**). The site covers an area of approximately 47.82 km$^2$ and comprises of four farm properties *viz*. Wolven Hoek 2/182; Wolven Hoek 1/182; Drie Roode Heuvels RE/181; Drie Roode Heuvels RE/180..

The site falls within the Central Karoo District Municipality DC5. The R354 district road serves at the primary access route to the Maralla West site from the N1 at Matjiesfontein. There are several scoping powerline and substation options proposed for the Maralla West site, which will be discussed in more detail in a separate Basic Assessment (BA) study.

The Maralla West site will have an onsite IPP sub-station (two alternatives) and two Eskom Common Sub-stations (**Figure 2**). At the site, medium voltage cables will connect to the Turbines and will transfer electrical energy to a IPP substation. From the IPP substation there will be a 132 kV powerline going to the Common Eskom Sub-station. A single double circuit 132 kV powerline will then go from the Common Eskom Sub-station to the Komsberg Sub-station. The Common Eskom Sub-station and double circuit powerline will be assessed though a separate BA. **Figure 2** and **Figure 3** depict the various sub-station and powerline routing options for the Maralla West Site.

In addition to the proposed BioTherm development, there are several potential wind energy developments earmarked in the surrounding area (**Figure 4**). This area falls within the Komsberg Wind Renewable Energy Development Zone (REDZ). These zones were identified throughout South Africa in a Strategic Environmental Assessment (SEA), as part of the Department of Environmental Affairs Strategic Integrated Project National Infrastructure Plan. In a separate SEA - Electrical Grid Infrastructure (EGI), national power corridors were delineated for the efficient and effective expansion of the transmission infrastructure throughout South Africa. The location of the Maralla West site, as well as the proposed neighbouring renewable energy developments, are strategically placed to overlap with the REDZs and EGI demarked zones (**Figure 4)**. The cumulative impacts assessment for these neighbouring proposed developments will be assessed at a desktop level during this scoping phase.

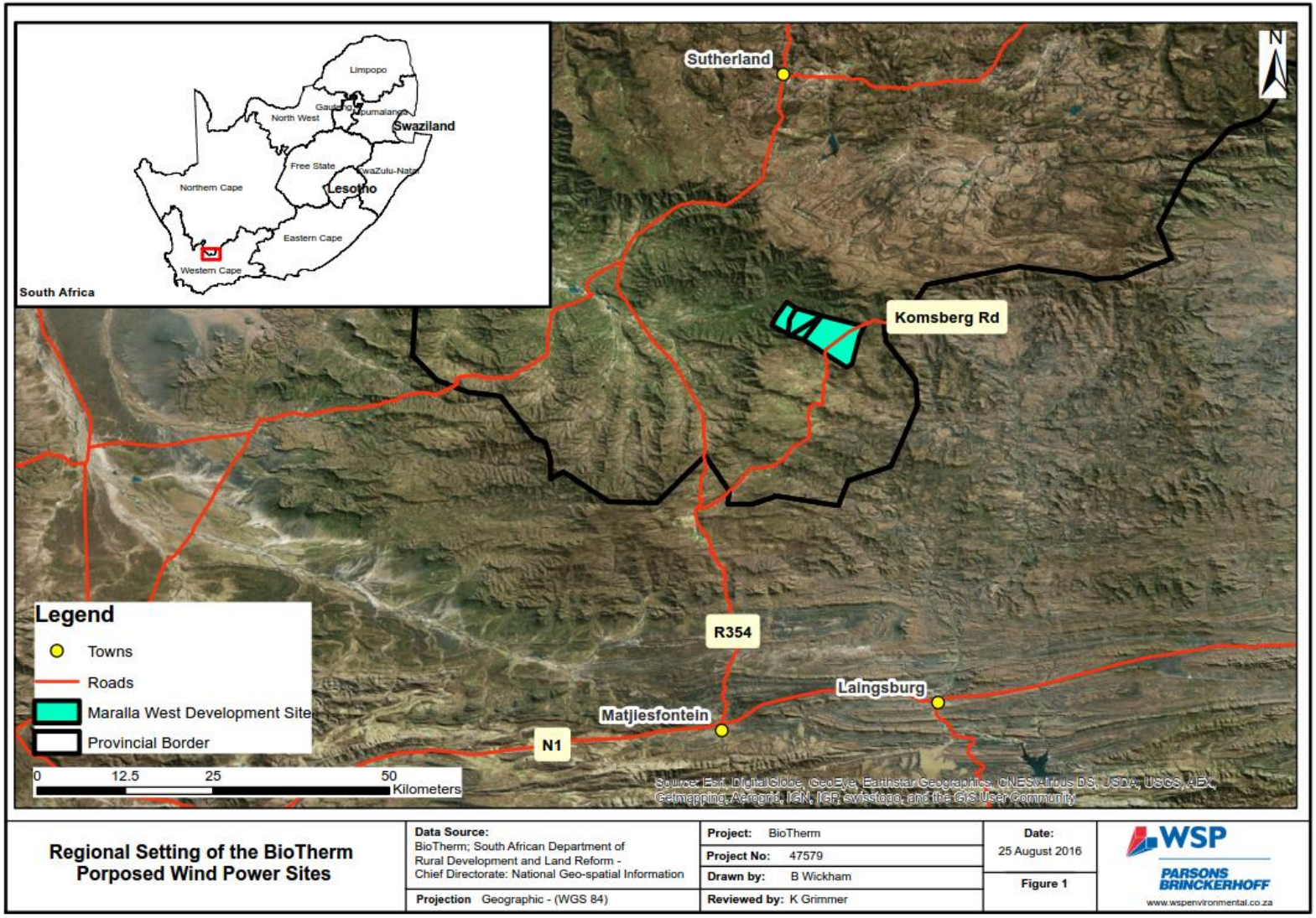


**Figure 1 Regional Setting and Maralla West Site**

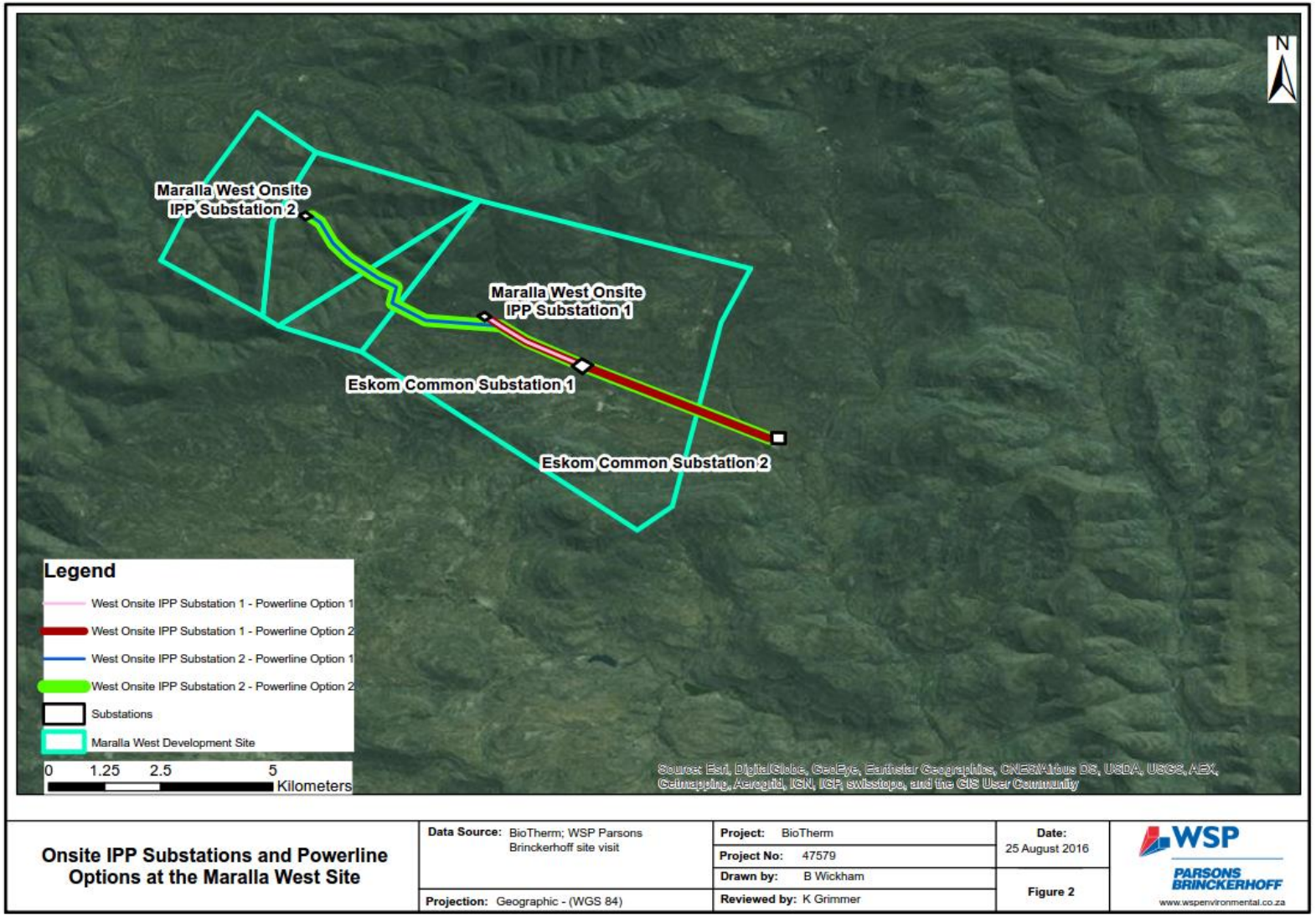


**Figure 2 Eskom and IPP Powerline and Sub-station Options at the Maralla West Site**

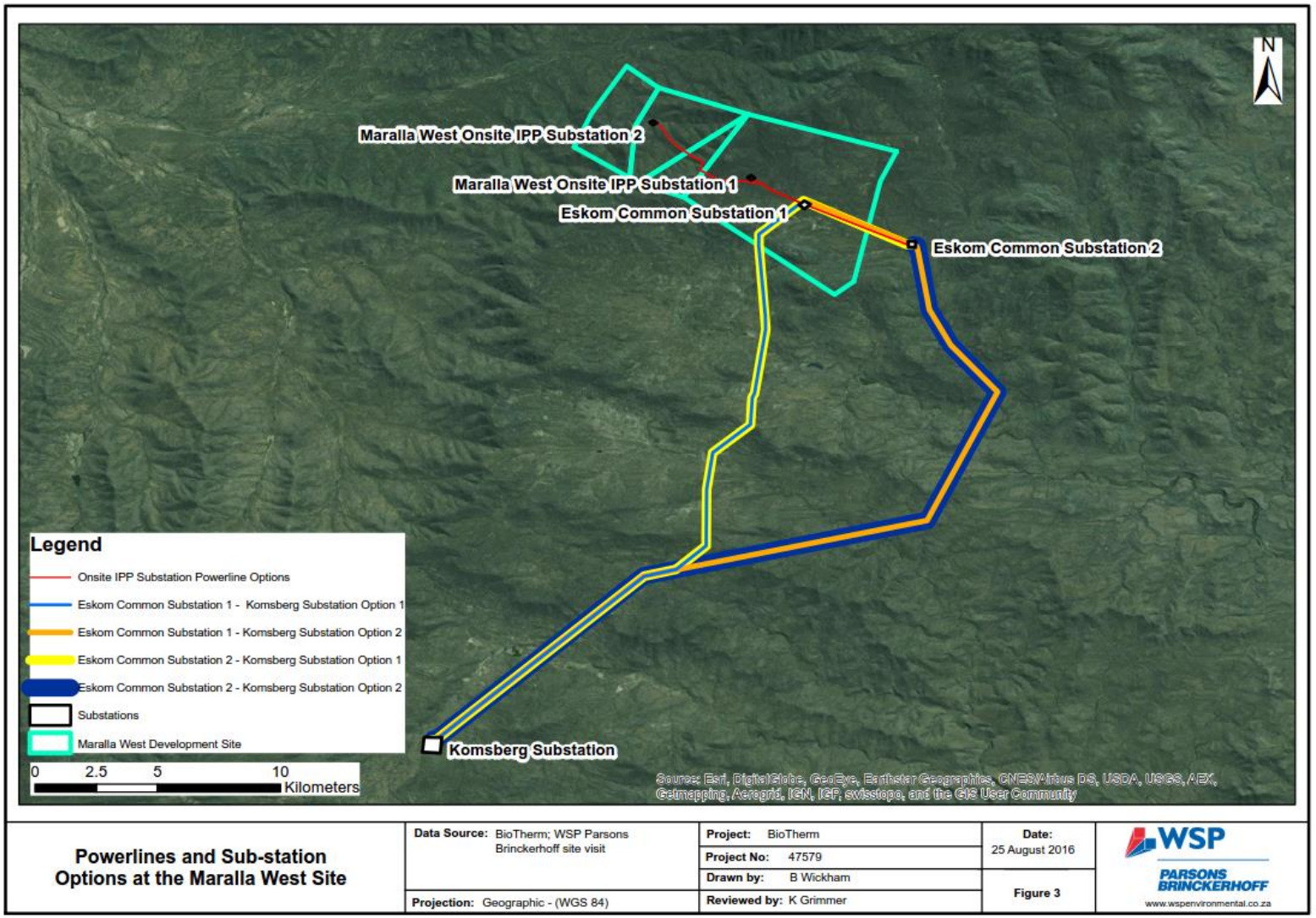


**Figure 3 Komsberg Eskom Powerline and Sub-station Options for Maralla West Site**

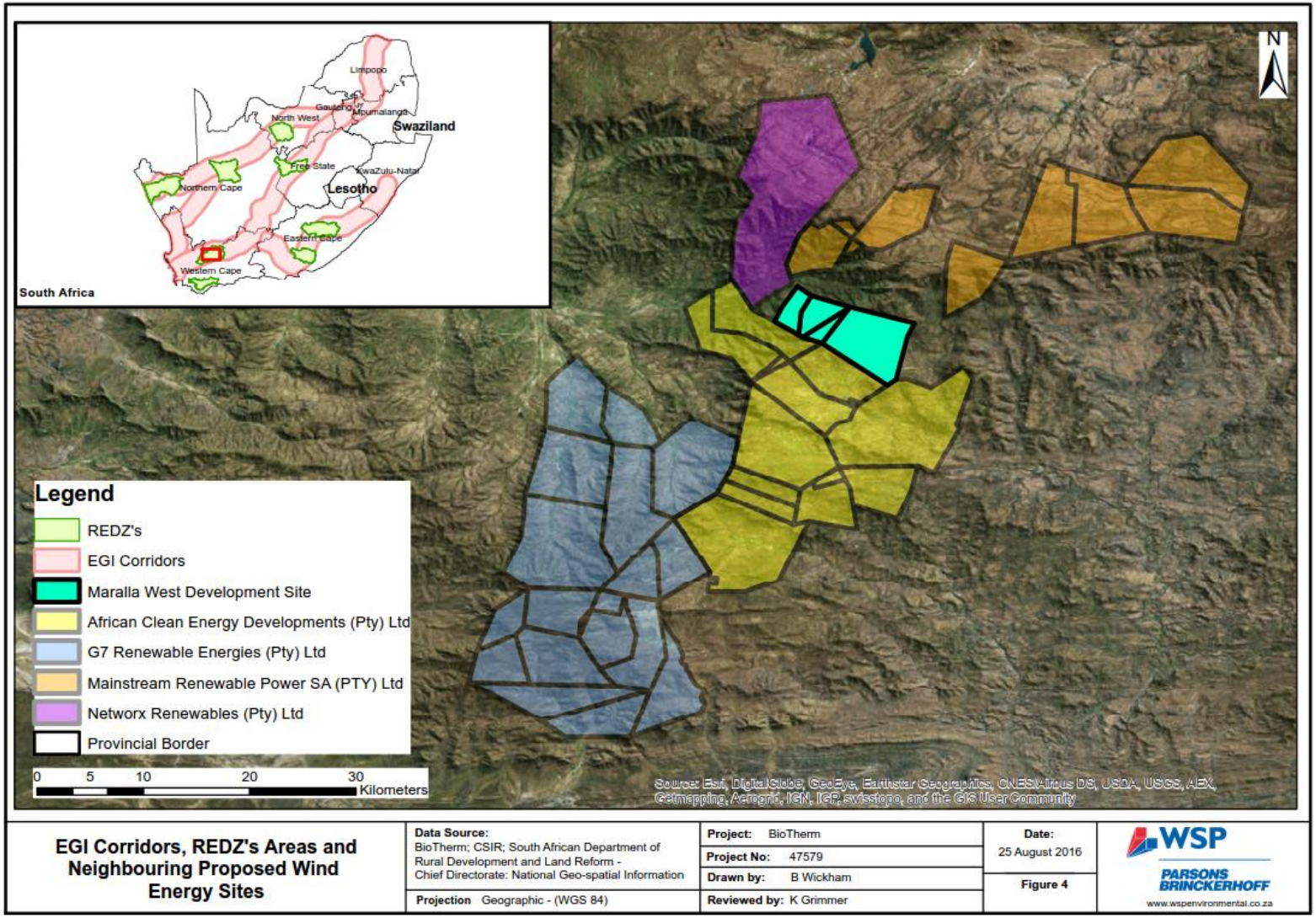


**Figure 4 REDZs and EGI Regions and Proposed Neighbouring Wind Development Sites**

### PROPOSED TECHNOLOGY

For many years people have used windmills and the energy derived from wind to pump water; however, by harnessing the wind through wind turbines, it can now also be used to generate electricity. Each wind turbine harnesses the wind converting the kinetic energy into mechanical power by turning the blades of the turbine, spinning a shaft, which connects to a generator and ultimately produces electrical energy.

The Maralla West site will house up to 125 wind turbines and the energy produced form the facility will be fed directly onto the National Grid. The infrastructure of the site will include the following:

- Up to 125 Wind Turbines, with a maximum 120 m hub height and 150 m rotor diameter;
- Generating capacity between 1.5 to 4 MW;
- Tower footprint of 0.5 ha,
- Operational and Maintenance building occupying an area of 0.038 ha.
- Connection cables;
- Access roads (up to 6 m wide);
- Sub-station (up to 132 kV), occupying an area of 2.25 ha;
- Powerlines (up to 132 kV);
- Servitude (up to 65 m);
- Fences;
- Permanent laydown area for turbine cranes (0.3 ha); and
- Temporary laydown areas, involved during the construction phase (12 ha).

Based on similar wind energy developments in the Western Cape, it is expected that the development for the site will be limited to the area within the designated site boundary. The only noticeable developments outside of the Maralla West site will be the access road and electrical transmission infrastructure.

### ASSUMPTIONS AND LIMITATIONS

The various sources of published data have been assumed to be accurate. The field assessment was limited to a 500 m buffer around the proposed development sites. Wetlands identified for delineation were based on a desktop review and confirmed by a site visit. The boundaries for wetland comprise of gradually changing gradients of wetland indicators, and if a wetland was identified, it should be delineated with some tolerance.

# 2 APPROACH AND METHODOLOGY

The nature of this scoping report is to provide the initial impacts that are anticipated to impact the land capability and wetlands within a 500 m buffer of the proposed development footprint, and the associated infrastructure. In this scoping phase, the land capability and wetlands were identified solely upon the information collected during the desktop study, and upon visual inspection during the site visit. The actual classification of the land capability and wetland assessment will be carried out in more detail, during the EIA phase.

## 2.1 DESKTOP REVIEW

The desktop review made use of several sources of available information (as listed under **Section 1.1** of this report - Sources of information). From these, preliminary maps of the area were created in order to identify areas of focus for the subsequent site investigation. This included the delineation of the following:

- The proposed wind energy facility site;
- Natural vegetation and land use (including neighbouring activities such farming);
- Topographical features;
- Soils (land type) and general geology;
- Watercourses, wetlands and riparian zones;
- Existing infrastructure (roads, houses, powerlines etc.), and
- Neighbouring proposed renewable energy developments.

## 2.2 SITE INVESTIGATION

The site investigation comprised of a three-day site visit from the 1 - 3 March 2016. This entailed a drive throughout a 500m buffer around the proposed sites.

The following tasks were undertaken as part of the site investigation:

- Verification of desktop review information (see listed bullet points above in the desktop review);
- Description of the soil profile characteristics;
  - Soil depth and profile description (i.e. subjective moisture estimation, effective rooting depth, presence of mottling, gleying, pedocretes and soil structure);
  - Classification of soil form and family based on the Taxonomic Soil Classification System for South Africa (Macvicar, 1991); and
  - Permeability based on in-situ estimation and texture properties;
- Description of Underlying lithology; and
- Collection of representative soil samples, sent in for laboratory analyses for pH, electrical conductivity, exchangeable sodium and soil texture.

A handheld Global Positioning System (GPS) and camera were used in conjunction with the maps created in the desktop review, to conduct the ground truthing exercise. The GPS was used to delineate areas as well as verify and mark all relevant points of interest with exact co-ordinates to subsequently create more detailed maps. Representative soil samples were collected using a hand-operated auger, where the holes were drilled until the parent material/refusal was reached.

A more detailed description of the steps followed for the defining the Land Capability and Wetland Assessment, will be described in the EIA phase.

## 2.3 IMPACT SCREENING TOOL

The scoping phase includes an impact screening process developed by the environmental assessment practitioner (WSP) to assess the significance of identified impacts. The screening tool will allow any impacts of very low significance to be excluded from the detailed study in the Environmental Impact Assessment phase (i.e. the EIA). The screening tool is based on two criteria, namely probability and severity, as described in **Table 1**, **Table 2** and **Table 3**.

**Table 1 Screening Assessment Matrix**

| Probability Scale | Severity / Beneficial Scale | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| 1 | Very Low | Very Low | Low | Medium |
| 2 | Very Low | Low | Medium | Medium |
| 3 | Low | Medium | Medium | High |
| 4 | Medium | Medium | High | High |

**Table 2 Probability Scale**

| | |
|---|---|
| **4** | Definite<br>Where the impact will occur regardless of any prevention measures |
| **3** | Highly Probable<br>Where it is most likely that the impact will occur |
| **2** | Probable<br>Where there is a good possibility that the impact will occur |
| **1** | Improbable<br>Where the possibility of the impact occurring is very low |

**Table 3 Severity / Beneficial Scale**

| | | |
|---|---|---|
| **4** | Very severe<br>An irreversible and permanent change to the affected system(s) or party (ies) which cannot be mitigated. | Very beneficial<br>A permanent and very substantial benefit to the affected system(s) or party(ies), with no real alternative to achieving this benefit. |
| **3** | Severe<br>A long term impacts on the affected system(s) or party(ies) that could be mitigated. However, this mitigation would be difficult, expensive or time consuming or some combination of these. | Beneficial<br>A long term impact and substantial benefit to the affected system(s) or party(ies). Alternative ways of achieving this benefit would be difficult, expensive or time consuming, or some combination of these. |
| **2** | Moderately severe<br>A medium to long term impacts on the affected system(s) or party (ies) that could be mitigated. | Moderately beneficial<br>A medium to long term impact of real benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are equally difficult, expensive and time consuming (or some combination of these), as achieving them in this way. |
| **1** | Negligible<br>A short to medium term impacts on the affected system(s) or party(ies). Mitigation is very easy, cheap, less time consuming or not necessary. | Negligible<br>A short to medium term impact and negligible benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are easier, cheaper and quicker, or some combination of these. |

# 3 REGIONAL OVERVIEW

## 3.1 HYDROLOGY

The Water Resources 2012 (WR2012) Study (WRC/DWA, 2012) was used to obtain hydrological data for the area. This study modelled South Africa (including Lesotho and Swaziland) on a quaternary basis.

The Maralla West site fall within the Gouritz Water Management Area 16 (WMA 16) and the Olifants-Doring Water Management Area 17 (WMA 17). The Maralla West site is located within the quaternary catchments J11A and E23A.

The climate in the area is generally dry throughout the year, where the daily mean temperatures range between 30°C to below 0°C (Schulze, 2006). The mean annual precipitation (MAP) of the region is very low, with extremely high mean annual evaporation (MAE). The area is a winter rainfall region, where the peak rainfall occurs between May and September. **Table 4** shows the hydrological characteristics of the applicable quaternary catchments.

There are numerous dry natural channels which drain the sites of water from a westerly to easterly direction. The water courses are generally ephemeral in nature which seldom shows evidence of surface water runoff due to the arid conditions of the area (**Plate 1**). The main water course running through the Maralla West site *viz*. Kamberg River drain's the quaternary catchments J11A and E23A.

**Table 4 Tertiary J11 & E23: Quaternary Information (site within J11Aand E23A)**

| QUATERNARY | WMA | MAP (MM/A) | MAE (MM/A) | MAR (MILLION |
|---|---|---|---|---|
| MARALLA WEST SITE | | | | |
| J11A | Gouritz (WMA16) | 295 | 1965 | 5.86 |
| E23A | Olifants-Doring (WMA 17) | 254 | 1895 | 3.25 |

*Source: WR2012, WRC/DWS, 2012*

## 3.2 VEGETATION AND LAND USE

### NATURAL VEGETATION

According to Mucina and Rutherford (2006) the natural vegetation within the site mostly comprises of Central Mountain Shale Renosterveld, with minor contribution of Koedoesberge-Moordenaars Karoo, Tanqua Escarpment Shrubland, and Roggeveld Shale Renosterveld (**Figure 5**).

### NATIONAL LAND COVER AND LAND USE

The department of Agriculture, Forestry and Fisheries (DAFF) define the land cover within the Maralla West site, predominantly as Shrubland and Low Fynbos, with minor pockets of Wetlands and Thicket, Bushlands, Bush Clumps, and High Fynbos (DAFF, 2012). The DAFF Land Cover is shown in shown in **Figure 6.** For the site, there are three wetlands marked within the 500 m buffer around the site (**Figure 6**). However, upon the site visit, all these wetlands were actually confirmed to be cultivated areas and small earth-walled farm dams.

During the site visit, the majority of the vegetation cover comprised of shrub-like vegetation and Fynbos (**Plate 3**), with minor areas of cultivated land (**Plate 4**) and wetlands (i.e. “Wetland Flat” type) (**Plate 2**). The land use throughout the sites is dominated by sheep grazing (**Plate 3**). In addition, antelope were seen grazing on the farm, which may offer potential hunting activities. In general, the land use for the site, comprised of the following surface features:

- Three telecommunication masts installed on hilltops (**Plate 5**);
- District farm roads;
- Powerlines;
- Earth-wall dams (**Plate 6** and **Plate 7**);
- Windmill-driven boreholes (**Plate 8**); and
- Reservoirs located on the farm property (**Plate 8**).

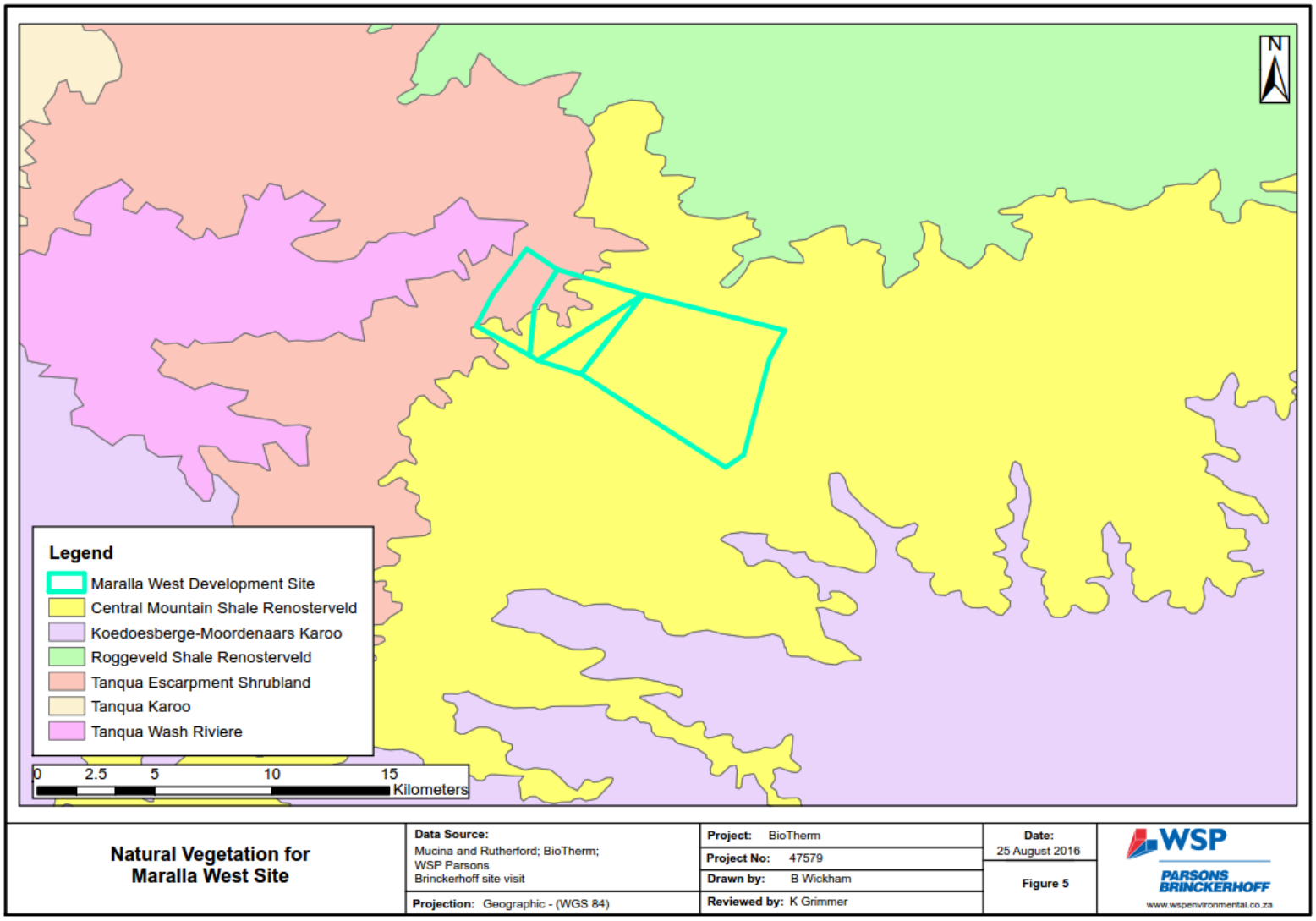


Figure 5 Natural Vegetation for Maralla West Site

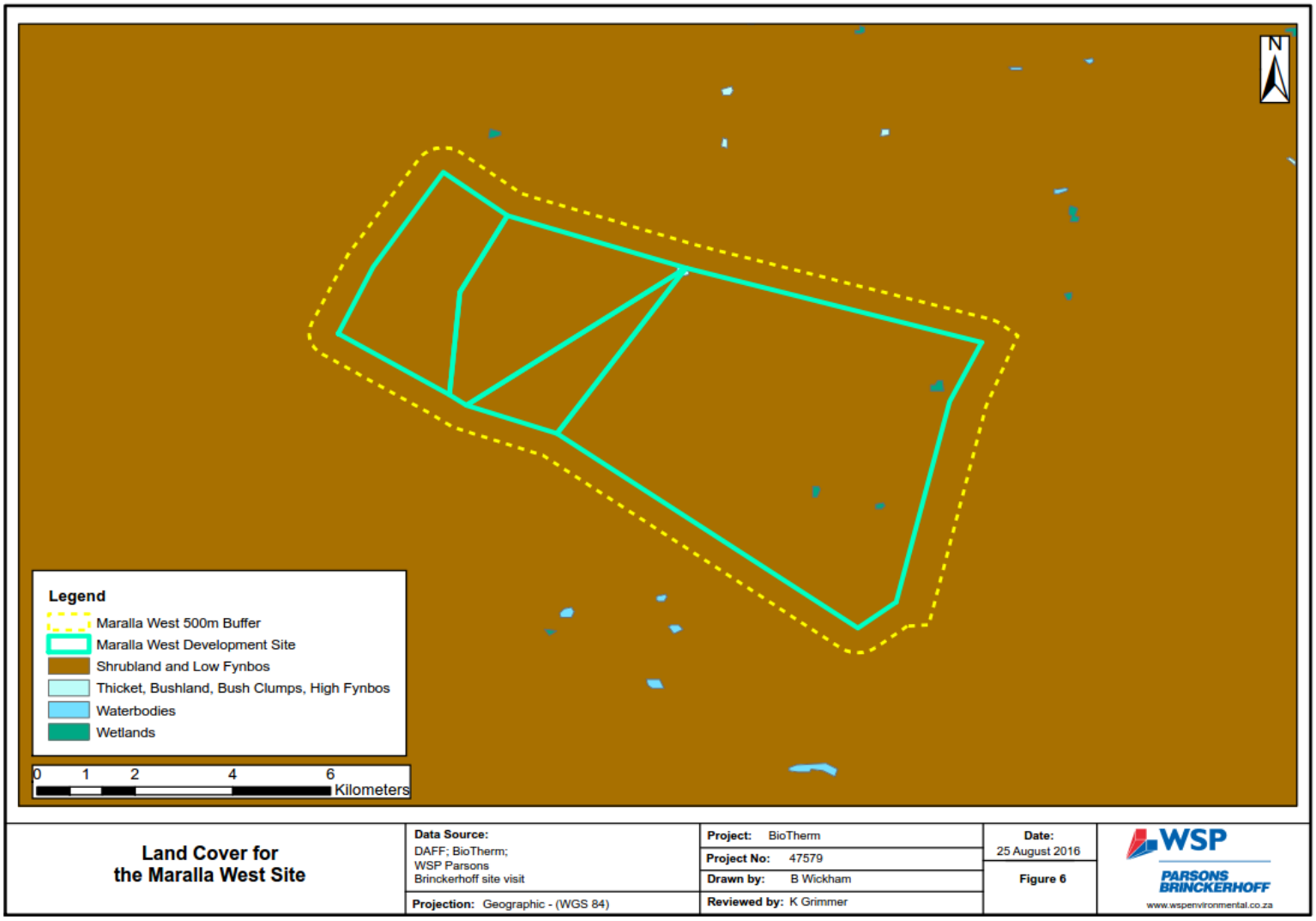


Figure 6 National Land Cover for Maralla West Site

## 3.3 SOIL AND GEOLOGY

### SOIL

Based on the land type maps of South Africa (AGIS, 2007) the soils in the area are identified primarily as miscellaneous land classes, rocky areas with miscellaneous soils and Glenrosa and/or Mispha soil forms (other soils may occur). Lime is generally present in the landscape. Soil land types for the Maralla West site is shown in **Figure 7**.

Upon the site visit, a total of eight samples were taken at various locations throughout the Maralla West site (**Figure 8**). At each sampling location the soil profile depth and characteristics were identified and a sample was collected for chemical and physical analyses. The location of the soil samples was determined by the land type maps as well as on-site observation for changes in the topography and land features (i.e. riparian area or wetland) which could induce a change in the soil type. For practical reasons, soil samples that were collected in a similar setting and had the same soil family were mixed to provide representative samples for the area (**Table 5**). The representative soil samples were sent to the SGS South Africa (Pty) Ltd laboratory for analysis; characteristics analysed included pH, electrical conductivity, exchangeable sodium and texture were undertaken.

**Table 5 Representative soil samples sent to laboratory for analyses**

| REPRESENTATIVE SOIL SAMPLE | SOIL SAMPLES COLLECTED FROM SITES |
|---|---|
| Maralla - SS1 | SS6 |
| Maralla - SS2 | SS3 + SS5 + SS7 + SS8 |
| Maralla - SS3 | SS1 + SS2 + SS4 |

The majority of the soil samples were identified as Mispha soil form (**Plate 9**). The soil samples collected in a dry river bed were classified as fine-grained alluvial soils (**Plate 10**), while those from wetland flats were identified as Prieska form (**Plate 11**). The full in-depth analyses of the soil for the Maralla West site, will be evaluated in the EIA.

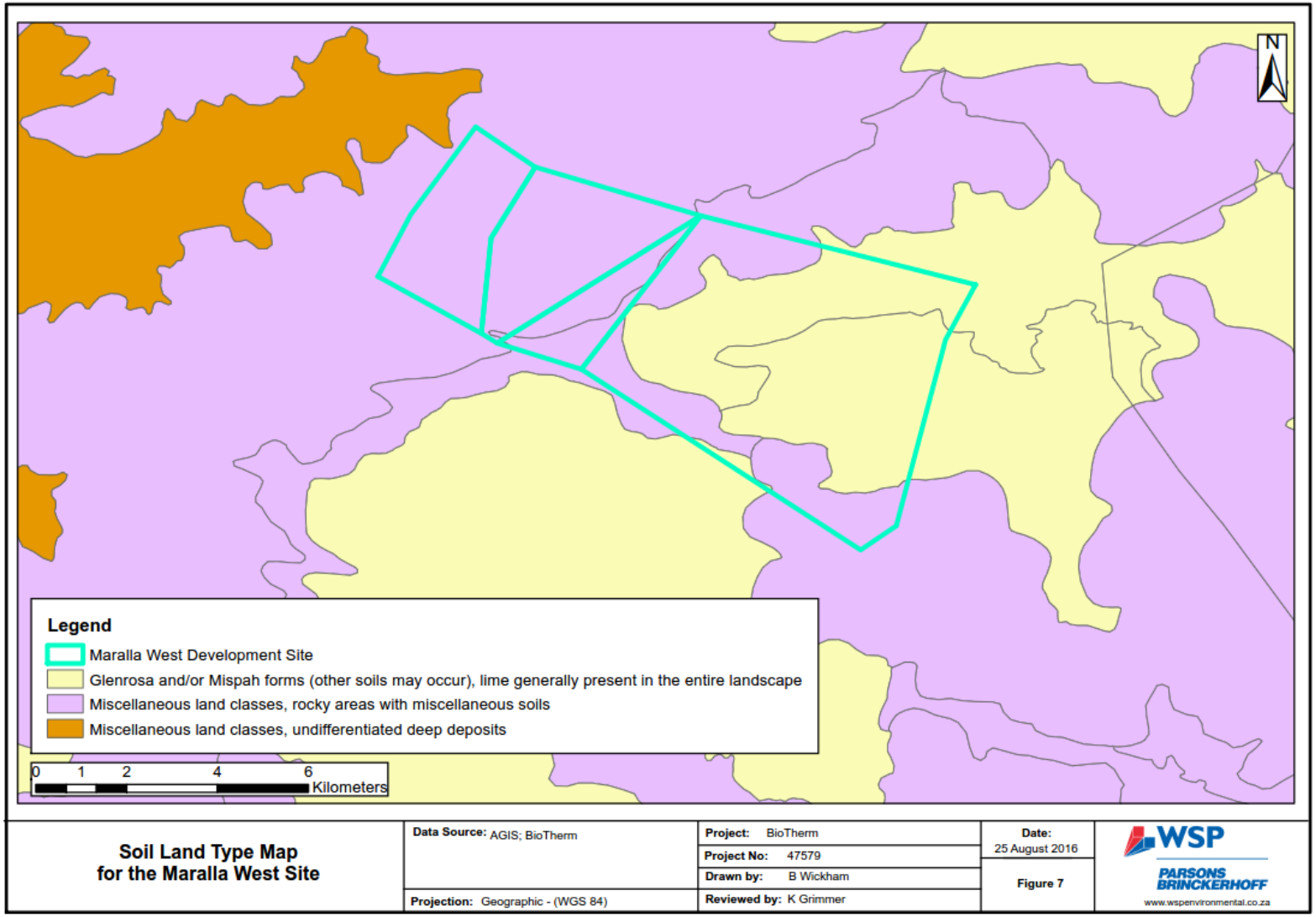


Figure 7 Soil land Types for Maralla West Site

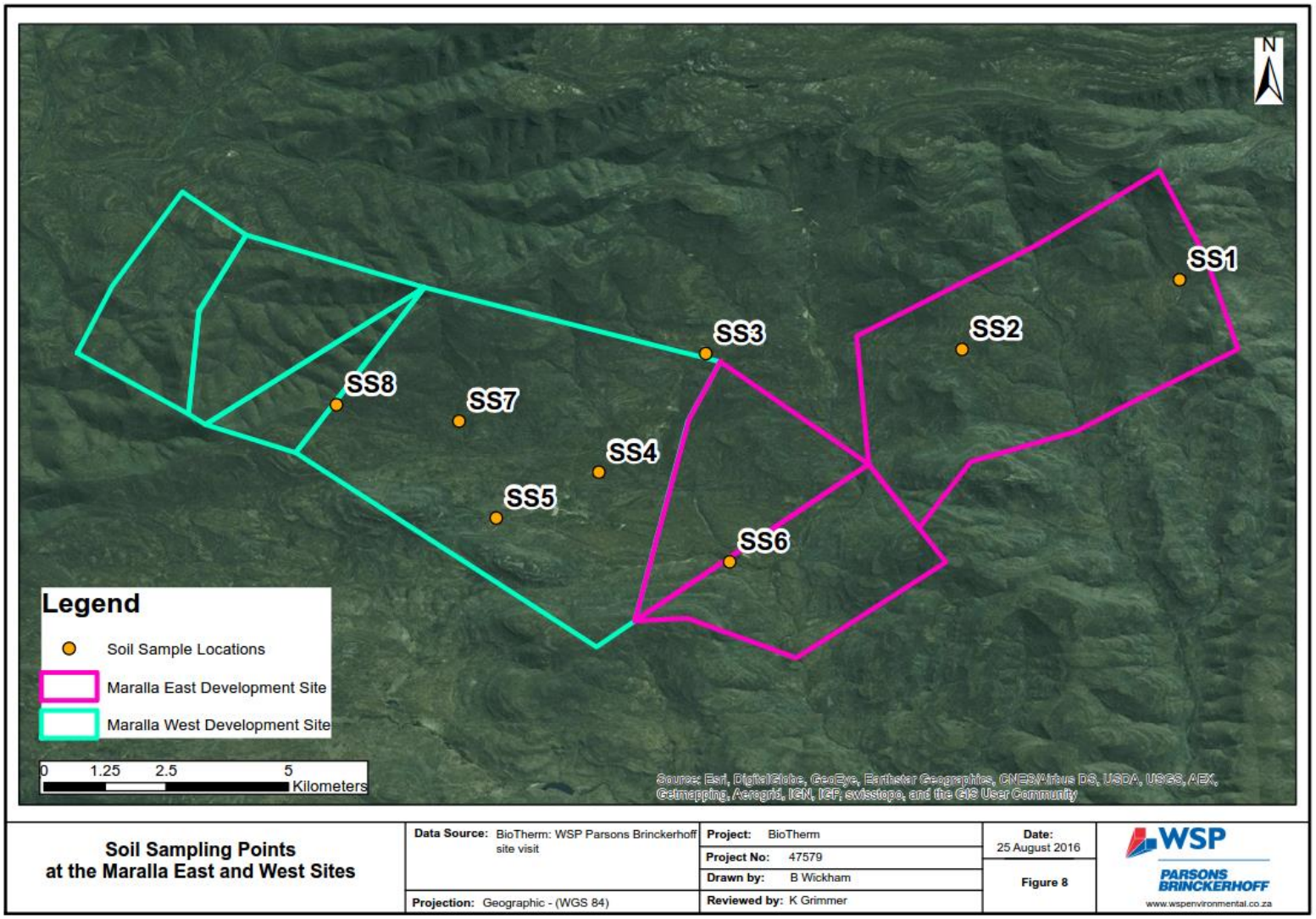


Figure 8 Soil sampling points at the Maralla East and West Sites

## GEOLOGY

The topography of the Maralla West site comprises of relatively flat open areas and mountainous slopes. In the mountainous area, the slope values average around 34.4 %, and 1.1 % on the floodplains of the main watercourses. The elevation of the site ranges from 984 m to 1379 m (**Figure 9**). There are several natural gullies and watercourses, which drain the site in the direction of the slope (**Figure 9**), however these are ephemeral in nature, and seldom have water present in the channels.

The Maralla West site is nested in the Roggeveld Mountains range, in the Larger Cape Fold belt system. The site is located on the Beaufort Series which forms part of the Karoo system (**Figure 10).** The rock type for the series comprises of shale, mudstone, sandstone and limestone (Schifano *et al*., 1970). Upon the site visit, shale and mudstone were the dominant rock type for the area.

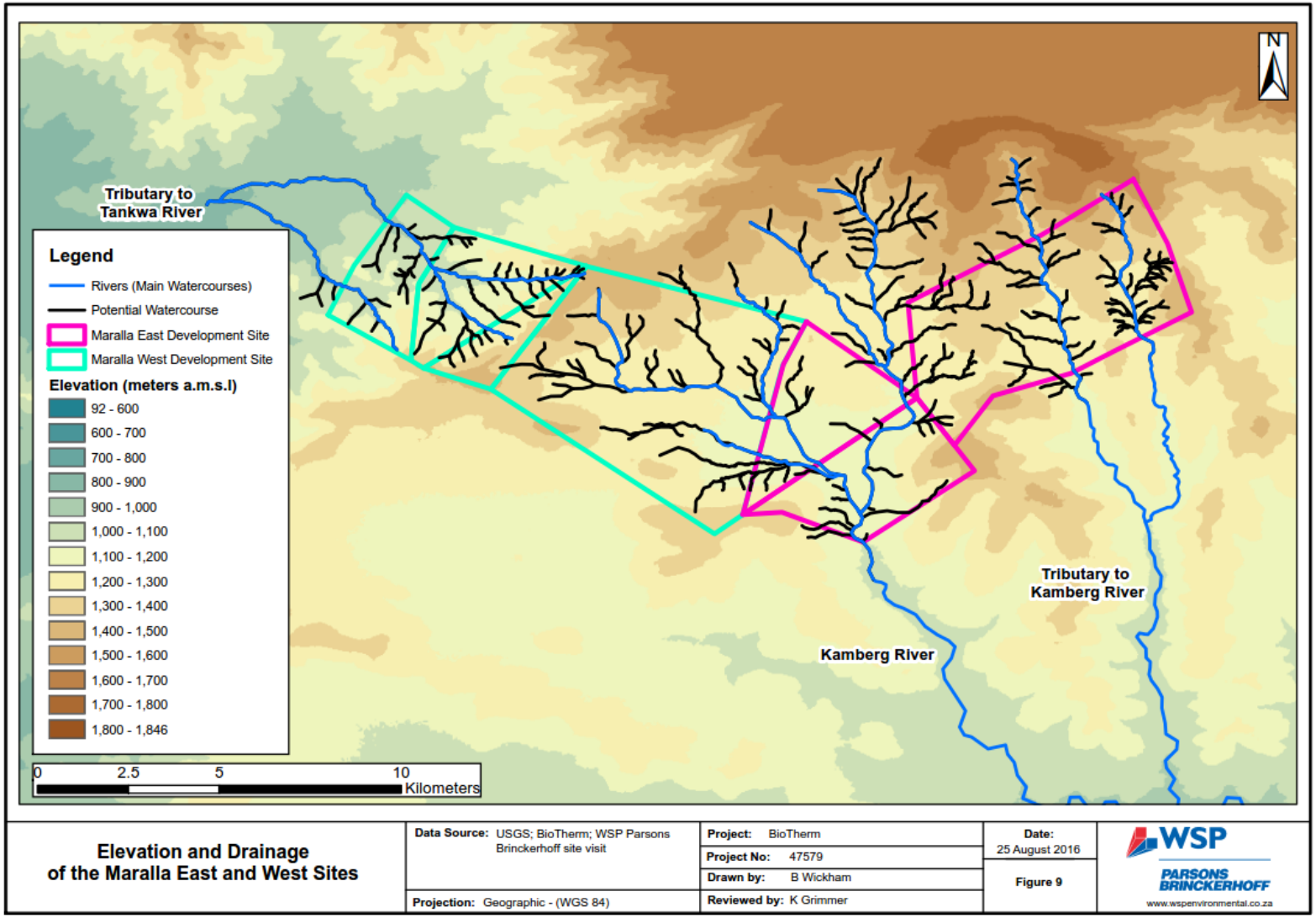


Figure 9 Elevation and Drainage for the Maralla East and West Site

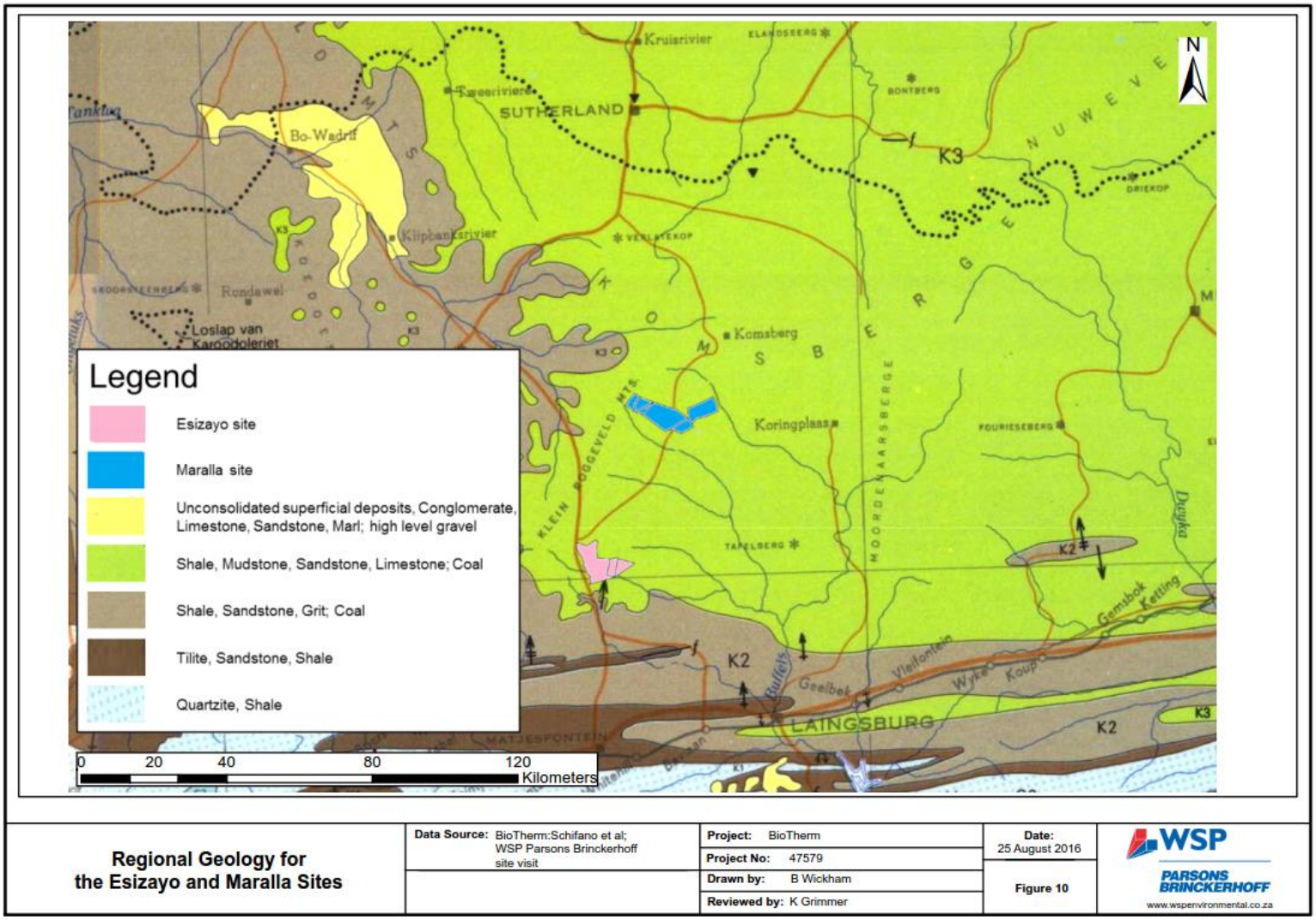


Figure 10 Regional Geology for Esizayo and Maralla (East and West) Sites

# 4 IMPACTS AND ISSUES IDENTIFICATION

The nature of the local and regional landscape is a sparsely populated with little infrastructure. For the most part, the natural landscape is generally homogeneous (i.e. undulating areas and mountainous rocky slopes, Mountain Shale Renosterveld, with pale yellow-brown “Mispha” soils). The land use is dominated by sheep grazing, with smaller portions of land under cultivation (irrigated and dryland) with farm dams. Furthermore, there were several small wetland flats located on the site.

## 4.1 BROAD BASED IMPACTS

The anticipated impact on the land capability and wetlands for the proposed BioTherm development, during the construction, operational and decommissioning phases, is as follows.

### CONSTRUCTION PHASE

- Reduction in land available for grazing animals, due to the occupation of wind power infrastructure within the footprint of the development;
- Potential increase in soil erosion, due to vegetation clearance, soil disturbance and increased vehicle traffic within the footprint of the development;
- Potential increase in wetland sedimentation as a result of potential increased soil erosion;
- Potential land contamination from spillage of hazardous substances (i.e. concrete, oils, fuels, grease and sewage waste); and
- Loss of aesthetical value due to the disturbance of the natural landscape.

### OPERATIONAL PHASE

- Reduction in land available for grazing animals, within the footprint of the development;
- Potential land contamination from spillage of hazardous substances (i.e. oils, fuels, grease and sewage waste); and
- Loss of aesthetical value due to the disturbance of the natural landscape.

### DECOMMISSIONING PHASE

- Potential increase in soil erosion, due to the removal of infrastructure resulting in a disturbed exposed soil surface, and the increased vehicle traffic within the footprint of the development; and
- Potential increase in wetland sedimentation as a result of potential increased soil erosion.

### ALTERNATIVES ASSESSMENTS

The anticipated impacts for the power transmission infrastructure (i.e. powerlines and substations) are considered to be the same as those listed above, during the construction, operational and decommissioning phases. A more in-depth study will need to be carried out to determine the suitable powerline routing option.

### CUMULATIVE IMPACTS

The cumulative impacts are related to the proposed renewable energy generation projects located around proposed BioTherm development. A 50 km radius around the development is considered an acceptable area for cumulative impacts, given that the proposed neighbouring wind energy developments fall within a 50 km radius from the site. Furthermore, the area around these sites is sparsely populated and the natural land cover is mostly homogenous, thus a 50 km radius was considered an acceptable distance for the cumulative impacts. There are four renewable energy developers that have propose several wind energy project in the area surrounding the BioTherm sites (**Figure 4**). They are as follows:

- Mainstream Renewable Power SA (Pty) Ltd;
- Networx Renewables (Pty) Ltd;
- African Clean Energy Developments (Pty) Ltd; and
- G7 Renewable Energies (Pty) Ltd.

As mentioned under the site description, the Maralla West site and the proposed neighbouring wind energy facilities, falls within the Komsberg Wind Renewable Energy Development Zone, which is ideally suited for wind energy developments (CSIR, 2015). In addition, these developments are strategically situated within the Central Corridor of the EGI (CSIR, 2014). The setting of the Maralla West site and the additional proposed neighbouring wind energy developers relative to the REDZ's and EGI areas is depicted in **Figure 4**.

Given the homogeneity of the landscape and similar land use in the region, the anticipated impacts from the additional proposed neighbouring wind energy facilities will be similar to those identified for the Maralla West development. Based off an initial desktop review, these proposed neighbouring sites will occupy large tracts of land where wetlands have been identified, based off the National Freshwater Ecosystem Priority Areas (NFEPA) land cover wetlands GIS database (**Figure 11**). However, these will need to be verified in a separate ground truthing exercise and distinguished between actual wetlands and cultivated areas and farm dams, as was the case for the Maralla West site. Furthermore, there are numerous watercourses identified throughout the proposed neighbouring wind energy sites, which should be avoided by the associated wind power generation infrastructure. While it is likely that the majority of these watercourses are ephemeral in nature, this will need to be confirmed in a detailed ground truthing exercise during the wet season of the area. The identification and delineation of wetlands in the area should also be conducted during the wet season. Lastly, the fact that these proposed neighbouring sites, including the BioTherm sites, are situated alongside each other leaves little undisturbed areas of land in between, and the net cumulative impacts will be greater had they been dispersed developments in the first place.

The screen assessment of the cumulative impacts for these proposed neighbouring wind energy facilities (based off a simplified desktop analysis), has been summarised in **Table 6** below. It is recommended that an initial scoping phase, followed up by an EIA, for each of these potential developments should be carried out to identify the potential impacts.

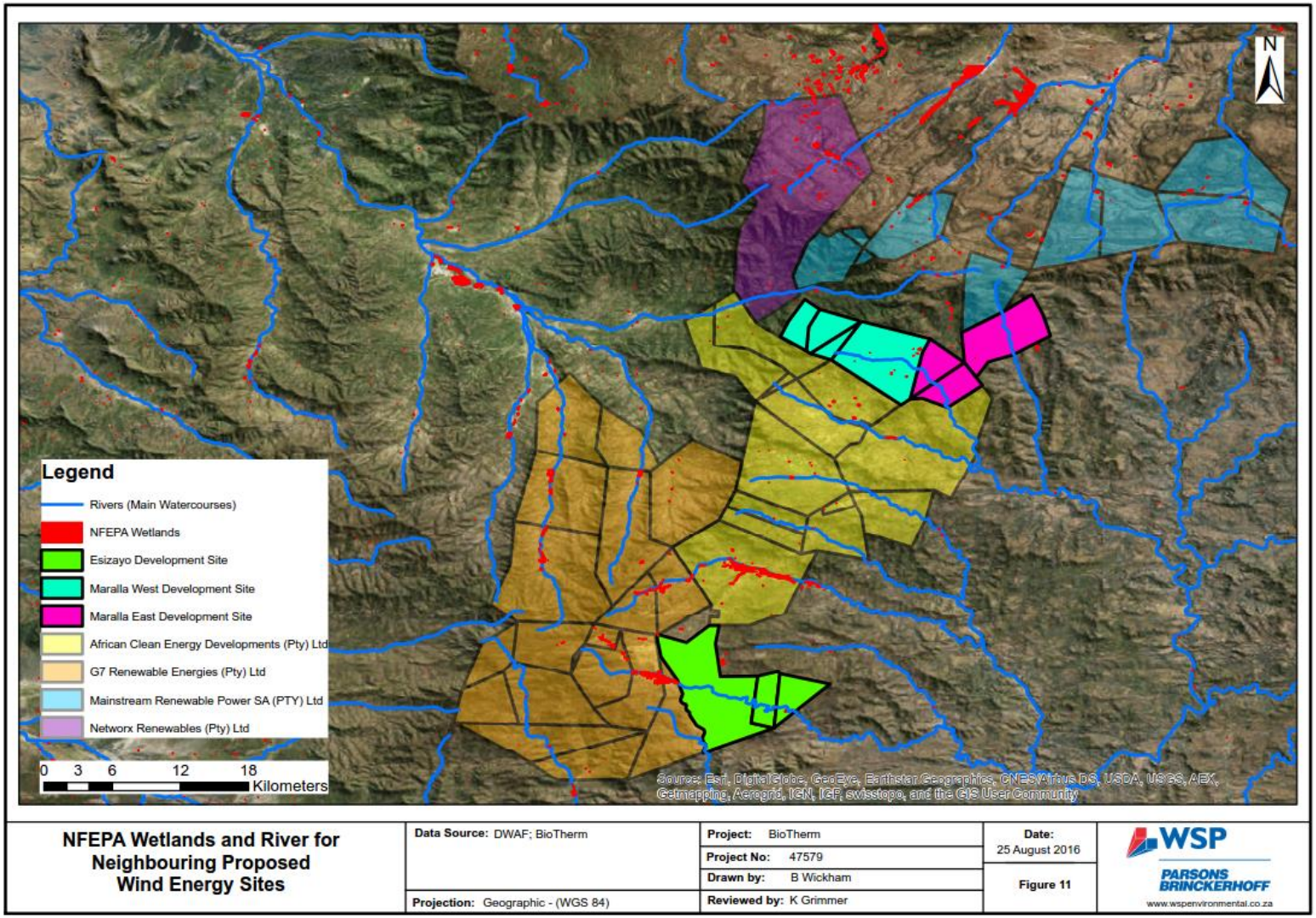


Figure 11 NFEPA Wetlands and Main Rivers in and around the Neighbouring Proposed Wind Energy Developments

SCREENING Assessment

The screening phase of the potential impacts on the land capability and wetlands is required for the EIA phase. To this end, the screening tool (as described in **Section 2.3**) has been used to undertake a preliminary assessment of the identified potential impacts.

The rating and overall preliminary assessment of significance for the broad impacts is provided in **Table 6**.

**Table 6 Screening assessment of broad land capability impacts**

| PHASE | ANTICIPATED IMPACT | NATURE | PROBABILITY | SEVERITY/ BENEFIT | SIGNIFICANCE |
|---|---|---|---|---|---|
| **Construction** | Reduction in grazing land | Negative | 4 | 2 | Medium |
| | Potential increase in soil erosion | Negative | 1 | 1 | Very low |
| | Potential increase in wetland sedimentation | Negative | 1 | 1 | Very low |
| | Potential land contamination from spillage of hazardous substances | Negative | 1 | 1 | Very low |
| | Loss of aesthetical value | Negative | 2 | 2 | Low |
| **Operational** | Reduction in grazing land | Negative | 4 | 1 | Medium |
| | Potential land contamination from spillage of hazardous substances | Negative | 1 | 1 | Very low |
| | Loss of aesthetical value | Negative | 2 | 2 | Low |
| **Decommissioning** | Potential Increase in soil erosion | Negative | 1 | 1 | Very low |
| | Potential increase in wetland sedimentation | Negative | 1 | 1 | Very low |
| **Cumulative Impacts** | Reduction in grazing land | Negative | 4 | 1 | Medium |
| | Loss of aesthetical value | Negative | 2 | 2 | Low |
| | Potential increase in wetland sedimentation | Negative | 1 | 1 | Very low |

# 5 TERMS OF REFERENCE FOR THE IMPACT ASSESSMENT PHASE

There is only one concern for the land capability identified during the scoping phase *viz.* the loss of grazing land available within the Maralla West site. However, while this may be high during the construction phase of the project, it will be medium to low impact on the land capability during the operational life span of the wind energy facility.

There is enough information present in this report to proceed with an in-depth EIA study of the proposed BioTherm development. The hacking method will be followed for the assessment of the impact significance during the EIA phase. This methodology is outlined below.

## 5.1 REPORTING

A draft Land Capability and Wetland Assessment report will be compiled during the EIA phase, defining in more detail the land capability and wetland assessment within the proposed development area. This will include the associated potential impacts and corresponding mitigation measures. Following

comments from the relevant stakeholders, the final Land Capability and Wetland Assessment report will be updated and submitted with the final EIA report.

# 6 CONCLUSIONS AND RECOMMENDATIONS

The nature of the local and regional landscape in which the proposed BioTherm site is located is a sparsely populated and semi-arid environment. The area comprises of undulating areas and mountainous slopes, with Central Mountain Shale Renosterveld and shrub-like vegetation which support the current land use of grazing animals (predominately sheep). There are numerous gullies and watercourses (which are ephemeral in nature) located throughout the region, which only convey water after periods of high rainfall events. In general, the landscape and land use is relatively homogenous in nature, and the potential impacts on the land capability and wetlands have been identified at a broad scale, rather than an individual assessment for the site.

The scoping assessment has not identified any fatal flaws in terms of the land capability and wetlands for the proposed BioTherm development. The only impact of concern is the loss of grazing land, which is unavoidable. The anticipated impacts listed in **Table 6** should be considered and carried through to the EIA phase. Lastly, the anticipate impacts from the proposed neighbouring renewable energy developments are expected to be similar to the proposed BioTherm development, and will have a cumulative effect on the area, which should be taken into account during their respective scoping and EIA phases.

In the EIA phase, recommendation and mitigations measures will be provided to minimise the potential negative impacts on the land capability and wetlands within the proposed BioTherm development. This will require an improved understanding of the anticipated impacts and objectives of the proposed project, with the aim of contributing to the sustainability of the development in context of the land capability and wetlands.

# 7 PLATES

Plate 1: Dry watercourse

Plate 2 : Wetland Flat

Plate 3 : Natural vegetation with grazing sheep (Land use)

Plate 4: Irrigated cultivated grazing land

Plate 5: Communication masts

Plate 6: Earth-wall dam with water

Plate 7: Broken Earth-wall dam

Plate 8: Windmill and reservoirs

Plate 9 : Rocky/shale" Mispha soil form

Plate 10 : Singular fine-grained fluvial soil

Plate 11 : Prieska soil form

Plate 12 : Clump of planted trees

Plate 13 : Surface shrink-swell cracks in wetland flat

Plate 14 : surface multi directional surfaceflow features on the edge of the wetland flat

Plate 15 : Ephemeral main watercourse (Riparian vegetation)

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# 9 APPENDICES

Appendix A - SGS Soil results