AN AGRICULTURAL POTENTIAL AND SOILS IMPACT ASSESSMENT, MITIGATION MEASURES AND RECOMMENDATIONS FOR THE CIVIL WORKS ASSOCIATED WITH THE PROPOSED 450MW EMERGENCY RISK MITIGATION POWER GENERATION INITIATIVE LOCATED IN THE ALTON INDUSTRIAL COMPLEX AND SITUATED ON PORTION 2 OF ERF 1854, REM OF ERF 1795 AND PORTION 1 OF 1795 RICHARDS BAY, IN THE UMHLATUZE LOCAL MUNICIPALITY, KING CETSHWAYO DISTRICT MUNICIPALITY, PROVINCE OF KWAZULU-NATAL, IN EXTENT 7.5 HA. FINAL DRAFT

SAVANNAH REFERENCE NO. SE 2778

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CONTENTS

1. INTRODUCTION AND BACKGROUND

1.1 The Objective

The objective behind this assessment was to determine whether the agronomic or agribusiness potential of this land parcel is a relevant consideration in the development of this land parcel to an electric power production facility. The site is zoned for General industry land use.

1.2 The Locality

The target site lies in the heart of the Richards Bay Alton core industrial area, , which is the second to largest industrial area in KZN outside of the Ethekwini industrial complex.

Richards Bay was brought into being to serve as a dedicated dry and liquid bulk handling harbor for both imports and exports and has developed as such. It has no passenger terminal and has limited general cargo and container handling facilities.

It is the largest and busiest harbor of its type on the African continent. As such it has been the dynamo that has generated an extensive range of related heavy and light manufacturing industries, which in turn have generated a broad spectrum of service industries

Amongst the better known industries are Mondi Paper, Alusaf (which consumes nearly 5% of the RSA power output), Richards Bay Minerals (RBM) and Richards Bay Coal Terminal, the largest bulk coal loading facility in the world and on which the Antwerp bulk facility was modeled.

The Alton Industrial Area in which the target site is situated houses the majority of Richards Bays current industries and support services with the RBIDZ having been established, at various locations in and around Richards Bay, to provide land for future industrial expansion.

Table 1: Properties Adjoining the Target Site

The target site is immediately south of, adjacent to and linked to the property described as Remainder of Erf 1854 Richards Bay which is 45 ha in extent. An additional property, Portion 1 of Remainder of Erf 1854 comprising 4 ha in extent comprises the remainder of the combined land parcel. The table below describes the nature of the adjoining properties

Boundary	Description
Northern	A railway siding serving a number of bulk storage and handling facilities is immediately adjacent to the northern boundary. One of the large enterprises behind the abovementioned is an export grain storage and handling facility with attendant conveyor and silo systems.

Eastern	Immediately east of the target site is a raw timber storage yard, an extensive open air bulk chemical storage yard as well as various service, warehousing and engineering premises. An underground Sasol gas pipeline runs along the length of this boundary
Southern	The southern boundary is occupied mainly by light service industries, which in turn back onto power line servitudes and the John Ross Highway, the busiest arterial highway in KZN outside of the Ethekwini / N3 complex. The underground Sasol gas pipeline also runs along the length of this boundary.
Western	The western boundary is lined by warehousing and transport yards which in turn back onto a mixture of wetlands, power line servitudes and broken ground behind which is the Mondi Paper plant, a major producer of newsprint.

It is evident from the foregoing that the target site lies solidly within a fully transformed industrial township

The locality of the site is further illustrated in Picture Gallery PG 10.1

1.3 The Proposed Change of Land Use

It is proposed that the site be developed to establish a generator that will convert liquid petroleum gas (LPG) fuel into electricity as an emergency risk mitigation unit with a generating capacity of 450 MW. Ultimately the power plant is to be converted to operate on natural gas (NPD) once imported liquified natural gas is made available in Richards Bay in accordance with Transnet's long term planning, An alternative fuel source, Naphta, is also being considered.

The LPG storage facility will consist of 10 tanks of 1 000m3 each, a total of 10 000m3. Naptha will be stored in tanks of up to 90 000m3 in total

This resource will supply power via two 132kV underground cables to connect to a currently unutilized 132kV overhead transmission lines that previously supplied power to the decommissioned Bayside aluminum smelter.

The 450MW Emergency Risk Mitigation Power Plant (RMPP) involves the construction of a gas-fired power station which will provide mid-merit power supply[1] to the electricity grid. The 450MW RMPP is planned to operate on a mid-merit basis at a minimum annual average dispatch rate of ~50% (i.e. operational between 5am and 9:30pm daily and being deployed

[1] Mid-merit electricity generation capacity refers to the generation of electricity which is adjusted according to the fluctuations in demand in the national grid. Baseload electricity generating capacity refers to the generation of electricity continuously for all hours of the day and night in order to satisfy the minimum demand required in the national grid.

on average for 50% over the year during this time period) and a maximum annual average dispatch rate of ~72%. The 450MW RMPP has been designed and developed as a power balance system to manage electricity demand during day time peak periods to provide energy, capacity and ancillary services to promote the stability of the national grid and assist in levelling out the variability in renewables energy electricity supply and meet short term fluctuations in electricity demand. In addition the 450MR RMPP can provide back up support for day time base load generation in the event of unscheduled maintenance on Eskom's base load electricity generation fleet. The power station will have an installed capacity of up to 450MW, to be operated on either LPG or naphtha as the initial fuel source and later to be converted from utilising LPG/naphtha to natural gas. For the initial fuel source, either LPG would be supplied by road from the existing LPG import terminal in Richards Bay or naphtha would be supplied via pipeline from the import berths at Richards Bay. Once LNG import and regassification infrastructure is established in Richards Bay in accordance with the Department of Minerals and Energy, Transnet Limited and the IPP Office's planning, natural gas would be supplied to the 450MW RMPP via a natural gas pipeline from this import terminal. The use of either Naphtha or LPG and the associated infrastructure required in respect of each of these alternative fuel sources, will be investigated further within the EIA phase and the preferred fuel source presented. The LNG terminal and regassification infrastructure and naphtha supply infrastructure at the port of Richards Bay and the relevant pipelines do not form part of the scope of this assessment, whereas LPG infrastructure does form part of this report.

The main infrastructure associated with the facility includes the following:

- Main Power Island consisting of either gas turbines comprising of air intake, air filter structures and exhaust stack for the generation of electricity through the use of natural gas, naphtha or LPG; or Gas engines comprising of reciprocating internal combustion engines and exhaust stack utilising LPG or natural gas.
- Generator and Auxiliary transformers.
- Balance of Plant systems.
- Dry Cooling systems.
- Auxiliaries.
- 132kV interconnecting substation and power lines connecting to the grid transmission infrastructure (The power lines to the grid transmission structure will be applied for under a separate environmental approvals process).

- LPG fuel pipe routing between the LPG storage site and the power plant site **or** Naphtha import pipeline from the port of Richards Bay to the onsite storage of Naphtha (the Naphtha pipeline will be applied for under a separate environmental approval process).
- Stormwater management ponds.
- LPG storage comprising of up to 15 000m^3 of storage in total, comprising of a number of either bullets or spheres storage tanks in design **or**;
- Naphtha storage on the power plant site of up to 90,000m^3 in total, comprising of of a number of tanks,
- Once imported LNG is available in Richards Bay, the 450MP RMPP will be converted from utilising LPG / Naphta to the use of regassified LNG by means of a new dedicated natural gas pipeline which will replace or supplement the LPG / Naphtha supply to the power plant (The approval for the pipeline will be conducted under a separate process);
- 3 effluent reticulation systems - i.e. 1) sanitary wastewater system; 2) oily water collection system and 3) storm water and rainwater collection system.
- Diesel generator to provide start-up power to the first gas engine / turbine.

A graphic presentation of the foregoing appears as Picture Gallery PG 5 and PG 6

1.4 The Regulatory Framework

The most important pieces of legislation effecting land use management are:

Subdivision of Agricultural Land Act 70 of 1970 (SALA)

Conservation of Agricultural Resources Act 43 of 1983 (CARA)

National Environmental Management Act 107 of 1998 (NEMA) **and in particular Government Notice 320 of 20 March 2020**

It is important to note that SALA 70 is in the process of being repealed and being replaced by the Preservation of Agricultural Land Bill since 2016. It should be recognized that delays in the promulgation of this bill might partly be due to recognition of the need to re-examine policy towards the management of nominally agricultural land in peri-urban development areas.

Planning regulations include The National Development Plan (NDP) and the KZN Provincial Spatial Economic Development Strategy (PSEDS) and the RBIDZ development framework.

The assessment and documentation procedure followed in this report is primarily based on the KZN DARD 'Natural Resources and/or Agricultural Survey Specifications, Survey Standards', Version 2, May 2015. These standards reflect the Land Capability Classes (LCCs) detailed in the Survey Specifications, the source document for which is 'KwaZulu-Natal Land Categories' (Collett and Mitchell, 2012).

In order to facilitate flow and avoid unnecessary clutter in the main report, technical data sets are included as technical addenda in the report.

1.5 Local Knowledge

In addition to having lived and worked in the King Cetshwayo District for the last 28 years, John Phipson has undertaken soil capability and agricultural impact assessments at over 100 sites with similar soils, a similar climate and similar vegetation along the whole KZN coastal ecosystem from Port Edward to Kosi Bay, involving the evaluation of thousands of soil profiles. Over 60 of these sites have been in the Richards Bay area alone.

1.6 Terms of Reference

Site layout maps and similar data sets have been provided by the client.

1.7 Use and Ownership of Land

The target site is owned by a fellow group company of the project sponsor, Phinda Power Producers (Pty) Ltd, 39 Florida Road, Morningside, Durban 4 000. Tel 031 313 8500.

1.8 Historical Background

As the result of a major deglaciation further north approximately 10 000 years ago (The Great Flood) the eastern coast of sub-Saharan Africa was inundated, leaving a deposit of fine grey sand in a narrow coastal strip starting near the KZN / Eastern Cape border and steadily widening as one moves northwards, reaching a width of several km in the Richards Bay area and then rapidly widening to over 30 km as it reaches the Maputaland flatlands and onward through Mozambique and Tanzania where it is nearly 100 km wide.

This Soil Family came to be known as the Fernwood Soil Family, named after the farm “Fernwood” between Mtubatuba and Hluhluwe where it was first scientifically described.

As the sea receded these recent sands acquired a small layer of organic matter which became host to what was commonly known as Lala Palm Savannah and is now technically referred to as BioResource Group 1 (BRG 1)- Moist Coast Forest, Thorn and Palm Veld.

This ecosystem has largely been destroyed by the indiscriminate planting of two commercially introduced monocultures in the form of sugarcane and eucalyptus species, accelerated by urban sprawl.

During the post World War Two decade there was a massive drive to make South Africa self sufficient in building timber and paper products. This led to the establishment of extensive eucalyptus plantations along the Zululand coast where deep soils, a 1 000 mm rainfall and hot, humid summers were ideal for the production of eucalyptus trees for pulping.

Fortunately most of the wetlands and short coastal streams were left untouched.

In 1963 access to Richards Bay, which then consisted of half a dozen fishing shacks, was along sand tracks beginning west of what is now Enseleni through endless eucalyptus plantations, a five hour trip from Durban.

The decision to create a major bulk handling harbor at Richards Bay permanently and irrevocably transformed the whole area within the period of a few years.

1.9 Approach of the Study

In order to facilitate flow and avoid unnecessary clutter in the main report, technical data sets are included as technical addenda to the report.

The desktop assessment has relied mainly on data furnished by KZNDARD Directorate for Macro-planning, various organs of the Agricultural Research Council, the Council for Geo Science as well as well as own experience of the area. Sundry other sources are mentioned as they occur, elsewhere in this study

This desk top study has been followed by a site verification process along the lines stipulated by the KZN Department of Agriculture (KZNDARD) Directorate of Natural Resources. The May 2015 Standards for Agricultural Land Assessment, published by KZNDARD, are unmatched by any other province, nor at national level.

1.10 Summary of Findings

The Agricultural Theme Sensitivity ascribed to the target site in terms GN 320 and the Land Category provided by the KZNDARD Natural Resources Directorate are both out of date and erroneous.

The empirical evidence taken at site clearly and unequivocally demonstrates that the target site comprises of non-arable land within a fully transformed industrial development zone.

In terms of notice 320, being non-arable land, it is a low sensitivity area with a Land Capability Value of 1-5 on a scale of 1-15.

The agricultural impact assessment that arrived at this conclusion has been carried out at two levels. Viz:

The desktop assessment has relied partly on data furnished by the KZN DARD Directorate of Natural Resources and specifically the data for BioResource Unit Za10, Nhlabane and partly on data gathered from an assessment of over 60 sites within the same ecosystem within a 20 km radius of the target site.

This was followed by a site verification process along the lines stipulated by the KZN DARD Directorate of Natural Resources and DEA notice No. 320 of 20 March 2020. Both

assessments were carried out against the background of the author's extensive and intensive knowledge of the KZN Coastal Sands and Coastal Lowlands Soil Systems.

1.11.1 Open Rangeland

The site consists of vacant and unutilized open rangeland

1.11.2 Savannah

The target site complies with the definition "Moist Coast Forest, Thorn and Palm Veld", commonly referred to as Lala Palm Savannah

1.11.3 Food Crops

No food crops are grown on the site

1.11.4 Industrial Crops

In terms of KZNDARD regulations, the soils fall into LCC VI, suitable only for long term crops such as plantations, orchards and pastures.

In view of the site locality the KZNDARD Land Category description should be change from Secondary Agricultural Land to Permanently Transformed Land.

Although the climate has a good rating, the Fernwood Soils that cover the site will only support eucalyptus species and *casuarina equisetifolia.* The first is an industrial crop used for building timber and paper making, the second has a limited industrial use as firewood and for making charcoal, its main use being for stabilising mined sand dunes and windblown sand near recreational beach areas.

There are visible remnants of previous eucalyptus plantations. Self established eucalyptus trees grow randomly on parts of the site

In terms of economic sustainability of industrial crops, it should be noted that Mondi Forests Limited has sold off all its land parcels of less than 40 000 ha on the grounds that plantations of less than 40 000 ha are not economically viable management units. The target site is 45 ha.

1.11.5 Livestock

No wild or domestic livestock was seen.

1.11.6 Water

A perennial stream and accompanying wetland occupy a strip along but outside of the eastern boundary of the property. This aspect will be addressed in detail by others.

1.11.7 Samples and Photographs

As the soils encountered at the site are common to the area and well known no soil samples were kept. Photographs relevant to the site are contained in the Picture Gallery PG 10 at the end of this report.

1.12 Report Format

For ease of readability and internal flow this report has been designed to be presented in ten chapters:

An Introduction and Background

A Desktop Study

The Site Verification Process

Access, Infrastructure and Services

Ecosystem Services

An Impact Assessment and Mitigation Measures

Conclusions and Recommendations

Useful References

Appendices Containing Technical Data

A Gallery of Annotated Illustrative Photographs

1.13 Site Agricultural Context

It should be noted that the target site for this report is not a standalone entity but is an integral part of a soils and ecological entity that extends from immediately behind the coastal sand dunes in the east to within a few hundred meters of the N2 National Highway in the west and from the R 34 in the south to the Nseleni River / Nhlabane in the north, an area of approximately 15 000 ha.

With the exception of watercourses and wetlands, together with a few pockets of Hutton Soil Form, Clansthal Series soils adjacent to the N2 National Highway, the entire area is either permanently transformed or in the form of Mhlatuze City (Richards Bay) or covered by the Fernwood Soil Form, an non-arable soil under any circumstances.

The Fernwood Soil Form sits squarely and firmly within the DEA Agricultural Sensitivity Theme 1 to 5, yet the data base that appears to have been used by DEA describes these soils as being of High and Very High Sensitivity, an obvious erroneous finding.

2. METHODOLOGY: DESKTOP STUDY

2.1 Soils Data

Soil parent materials have been identified by reference to the Council for GeoScience geological survey map no. 2732, St Lucia. Although these maps are on a scale of 1: 250 000

they do provide useful indicators of the quality of soils that are likely to be encountered within the study site. The soil parent material is described as "Yellowish redistributed sand"

code Qs (Appendix 9.1). **This feature on its own indicated that the target site would consist of non-arable land**

This finding was supported by the Soil Systems map published by the SA Sugar Research Institute (SASRI) that appears as Appendix 9.2 hereto.

The following standard soil classification texts were used in order to determine site specific Soil Forms and thus obtain data on the physical properties of the Soil Forms encountered and the management thereof:

Soil Classification: A Taxonomic System for South Africa: McVicar et al, ISCW (Blue book)

Identification and Management of the Soils of the South African Sugar Industry;

SA Sugar Research Institute. (Sugar book)

Soils of South Africa: Martin Fey

The additional source of data has been own records and own past experience arising from previous agricultural assessments made in the area over the past 25 years.

Land Capability Class (LCC) was determined and tabled on a scale of I to VIII and the DEA Agricultural Sensitivity Theme on a scale of 1 to 15.

2.2 Bio Resource Group (BRG) and Bio Resource Unit Data (BRU) Data

Those who work with agricultural soils in KZN have the unique good fortune of having a data base of over 600 BRUs from which to draw background information regarding any study site.

This data base has been painstakingly compiled over an extended period of time, largely by a generation of now retired scientists.

Much of this data is still valid, but some of the data has been modified by significant changes in demographic and socio-economic circumstances.

The primary source of desktop data has been provided by the Natural Resources Directorate, KZN Department of Agriculture and Rural Development (KZN DARD) for the

BioResource Unit (BRU) Za10-Inhlabane, which in itself falls within BRG 1- Moist Coast Forest, Thorn and Palm Veld.

Mucina and Rutherford describe it as a transitional area between CB1 Maputaland Coastal Belt and CB3 KwaZulu-Natal Coastal Belt of the Indian Ocean Coastal Belt Biome (Appendix 9.3)

A caveat with regard to BRU data is that the source information on soils has been obtained from the Soil and Irrigation Research Institute (SIRI, now the Institute for Soil, Climate and Water (ISCW), a division of the Agricultural Research Council (ARC) Landtype Data Base. The ISCW Land Type Survey: Broad Soil Patterns describes these soils as type H: Grey regic sands type Ha, predominantly deep grey sands near the coast. As these were national studies, it is inevitable that the data contained therein is on a macro-scale.

The arability data in the BRU report refers only to soils and slope. It does not take into account climatic and other factors that make up the whole agricultural potential package. It is for these reasons that a site specific soils assessment is required

2.4 Climatic Desktop Data; BRU Za10-Nhlabane

The table below provides a useful description of the 8 Climate Capability Categories

Table 2: Description of Climate Capability Classes

Climate Capability Class	Limitation Rating	Description: Scotney et Al. UKZN 1987
C1	None to slight	Local climate is favourable for good yields for a wide range of adapted crops throughout the year.
C2	Slight	Local climate is favourable for a wide range of adapted crops and a year round growing season. Moisture stress and lower temperatures increase risk and decrease yields relative to C1.
C3	Slight to Moderate	Slightly restricted growing season due to the occurrence of low temperatures and frost. Good yield potential for a moderate range of adapted crops.
C4	Moderate	Moderately restricted growing season due to low temperatures and severe frost.
C5	Moderate to Severe	Moderately restricted growing season due to low temperatures, frost and/or moisture stress. Suitable crops at risk of some yield loss.

C6	Severe	Moderately restricted growing season due to low temperatures, frost and/or moisture stress. Limited suitable crops which frequently experience yield loss.
C7	Severe to Very Severe	Severely restricted choice of crops due to heat, cold and/or moisture stress
C8	Very Severe	Very severely restricted choice of crops due to heat, cold and/or moisture stress. Suitable crops at high risk of yield losses.

Table 3 Climatic Data for the Study Area: Richards Bay / Nhlabane

	Climatic Data BRU Za10 Nhlabane												
	Annual	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean Rainfall (mm)	973	126	127	114	70	55	33	26	42	68	91	111	110
Average Temp (° C)	20.5	23.9	24.2	23.3	21.2	18.8	16.5	16.3	17.4	19.1	20.1	21.6	23.0
Min Temp (° C)	15.4	19.8	20.0	18.9	16.2	12.9	9.9	9.8	11.4	14.1	15.6	17.3	18.8
Max Temp (° C)	25.5	28.0	28.4	27.7	26.2	24.7	23.1	22.9	23.4	24.2	24.7	25.9	27.3
% Mean Daily Relative Humidity	71	77	76	74	71	68	63	65	66	69	72	73	76
Heat Units Base 10		431	398	412	336	273	195	195	229	273	313	348	403
Evaporation A	1690	183	160	160	126	108	90	100	120	132	161	165	185

Pan(mm)													

The BRU is frost free. It has a Climate Capability rating of C1

2.5 Terms of Reference

Terms of reference, proposed future use of land, land portion details, land ownership details, site relevant site maps and similar data was provided by the client.

2.6 Soil Systems

The site lies within the Coastal Sands and the Coastal Lowlands Soil System as illustrated in Appendix 9.2 hereto.

3. SITE VERIFICATION

IT SHOULD BE NOTED AT THE VERY OUTSET THAT REMAINDER OF ERF 1795 AND PORTION 1 OF 1795 IN FACT CONSTITUTES THE RICHARDS BAY BUSINESS PARK , A SITE THAT HAS BEEN FULLY DEVELOPED AND TRANSFORMED FOR MANY YEARS. A PHOTOGRAPHOF THE SITE APPEARS IN PICTURE GALLERY PG10.4 HEREOF. THERE IS THEREFORE NO NEED TO MAKE ANY FURTHER REFERENCE TO THIS SITE ELSEWHERE IN THIS REPORT

3.1 Methodology

The site verification exercise was carried out on the 16th July 2020. The weather was cool and clear. Except for soil profiles amongst the eucalyptus trees, the soil profiles were damp throughout the profile

For an observation area of 1 ha to 5 ha, the Survey Standards, Version 2, May 2015 require a survey intensity of 4 profiles.

In this instance a total of 6 profiles were examined, plus, for interests sake, one profile in an adjoining wetland.

The tool for profile observations was a Dutch Auger. As the site is uniformly level there was no need to measure slope using an Abne Level.

Soil texture was estimated using the ball and sausage method.

During the initial reconnaissance drive through there was evidence of rubble and other disturbances

The presence of a water courses and wetland will be addressed by others.

No domestic livestock was seen.

Indigenous trees were few and scattered except along the water course, which item will be addressed by others.

The site is relatively free of any alien invader species.

3.2 Soils Data

Table 4 overleaf provides a descriptive summary of the main features of the Soil Forms encountered at the site in layman's language. Corresponding technical details constitute Appendix 9.7 hereto

Table 4: Description of Site Soil Families

Soil Family	Features
Fernwood	Fernwood is named after the farm Fernwood between Mtubatuba and Hluhluwe. It is fine unstructured sand that was deposited along our coastline as sediment from the Great Flood which took place some 10,000 years ago. It is first found a narrow strip in the southern KZN and then gradually widens as it moves northwards, reaching a width of 30-40 km on the Maputaland coast. This soil does little more than hold the plant upright.
Witbank	The Witbank Soil Form comprises of topsoil over landfills, mine dumps, road embankments, builders' rubble, leveled sports fields etc. The topsoil stratum is seldom over 200mm in depth. Physical and chemical properties vary widely according to the source of the topsoil cover

The physical properties of these soil families were summarized from "Identification and Management of the Soils of the South African Sugar Industry" published by the SA Sugar Research Institute. (Sugar book)

This is an extremely useful publication as it details physical and chemical characteristics as well as soil management guidelines for all 48 of the Soil Forms that occur within the RSA Sugar Industry. This data is further refined at the Soil Series level for some 400 Soil Series that occur within the 48 Soil Forms.

3.3 Land Capability Class Determination

Once the relevant soil profile and topographic data had been recorded, the next step was to compile and record the Land Capability Class for each soil profile assessed.

This is the fundamental step in assessing all the individual components that determine the physical capability and crop yield potential of a particular soil at a particular site.

Examination and assessment of the individual components of the determination can also give valuable insights into the management practices that will be required during the construction and rehabilitation phases of a proposed development process.

The following determinants are then applied to a Land Capability Class determination flowsheet:

Soil texture (clay content)

Slope % of surrounding area

Effective rooting depth

Moisture intake rate

Soil permeability

Soil wetness

Aspect

Terrain unit

Rockiness and crusting potential are sometimes a consideration.

Table 5 below defines the qualities of each of the eight nationally recognised Land Capability Classes.

The values attached to each determinant of an LCC also provide useful management guide e.g. Texture, rooting depth, permeability etc.

Only soils complying with Land Capability Classes I to III (LCCI to LCCIII) are readily acceptable for arable crop cultivation. These equate to scores of 6 to 15 in terms of the GN 320 theme sensitivities. LCC IV soils may be cultivated under certain stringent and well managed conditions.

LCC V usually refers to wetlands and LCC VI to non arable land that can be used only for long term crops due to steepness, soil depth and so forth;

LCC VII and VIII soils are limited to domestic livestock and wild game.
Most of the profiles studied fell into LCC IV and LCC VI.

Soils from LCCV to LCCVIII are non arable soils and fall within GN 320 theme sensitivity scores of 1 to 5.

Table 5: Description of Land Capability Classes

Class	Concepts
I	Land in Class I has few limitations that restrict its use; it may be used safely and profitably for cultivated crops; the soils are nearly level and deep; they hold water well and are generally well drained; they are easily worked, and are either fairly well supplied with plant nutrients or are highly responsive to inputs of fertilizer; when used for crops, the soils need ordinary management practices to maintain productivity; the climate is favourable for growing many of the common field crops.
II	Land in Class II has some limitations that reduce the choice of plants or require moderate conservation practices; it may be used for cultivated crops, but with less latitude in the choice of crops or management practices than Class I; the limitations are few and the practices are easy to apply.
III	Land in Class III has severe limitations that reduce the choice of plants or require special conservation practices, or both; it may be used for cultivated crops, but has more restrictions than Class II; when used for cultivated crops, the conservation practices are usually more difficult to apply and to maintain; the number of practical alternatives for average farmers is less than that for soils in Class II.
IV	Land in Class IV has very severe limitations that restrict the choice of plants, require very careful management, or both; it may be used for cultivated crops, but more careful management is required than for Class III and conservation practices are more difficult to apply and maintain; restrictions to land use are greater than those in Class III and the choice of plants is more limited.
V	Land in Class V has little or no erosion hazard but has other limitations which are impractical to remove that limit its use largely to pasture, range, woodland or wildlife food and cover. These limitations restrict the kind of plants that can be grown and prevent normal tillage of cultivated crops; it is nearly level; some occurrences are wet or frequently flooded; others are stony, have climatic limitations, or have some combination of these limitations.
VI	Land in Class VI has severe limitations that make it generally unsuited to cultivation and limit its use largely to pasture and range, woodland or wildlife food and cover; continuing limitations that cannot be corrected include steep slope, severe erosion hazard, effects of past erosion, stoniness, shallow rooting zone, excessive wetness or flooding, low water-holding capacity; salinity or sodicity and severe climate.
VII	Land in Class VII has very severe limitations that make it unsuited to cultivation and that restrict its use largely to grazing, woodland or wildlife; restrictions are more severe than those for Class VI because of one or more continuing limitations that cannot be corrected, such as very steep slopes, erosion, shallow soil, stones, wet soil, salts or sodicity and unfavourable climate.
VIII	Land in Class VIII has limitations that preclude its use for commercial plant production and restrict its use to recreation, wildlife, water supply or aesthetic purposes; limitations that cannot be corrected may result from the effects of one or more of erosion or erosion hazard, severe climate, wet soil, stones, low water-holding capacity, salinity or sodicity.

In order to facilitate flow and avoid clutter, the flowsheets reflecting the key components of LCC determinations are relegated to Appendix 9.4 hereto.

3.4 Soil Properties

For the technically minded, physical and chemical properties of the soils encountered at the site are detailed in Appendix 9.7 hereto.

3.5 Use and Ownership of Land

The site is currently vacant rangeland / savannah. The land is owned by a fellow group company of Phinda Power Producers (Pty) Ltd, the project sponsor.

4. ACCESS, INFRASTRUCTURE AND SERVICES

Access is from the John Ross Parkway (R 34) from the N2 National Highway. It is the second exit left (28˚46'19.0"S and 32˚00'53.7"E) when driving from the Empangeni into the

industrial suburb of Alton. First left into Kraft Link (28˚46'05.4"S and 32˚00'53.9"E). The target site is at the vacant land on the right. The site is serviced by municipal electricity and water.

5. ECOSYSTEM SERVICES

By far the most important ecosystem service is the high annual rainfall, typically 1 000 mm per annum, which together with warm winters and hot, humid summers permits the planting of extensive eucalyptus plantations for pulping on soils that would otherwise be vacant land or poor quality grazing.

A stream and wetland that run parallel to, but immediately outside of the target site, provide a useful outlet for any storm water drainage and subsequent seepage. The stream might also play a part in determining the level of the water table across the site

6. IMPACT ASSESSMENT AND MITIGATION MEASURES

It is inevitable that the proposed commissioning of the 450 MW emergency plant will severely impact on the site during the anticipated 20 years plus life of the installation. The actual footprint of the operation will be 3.9 ha with a further 0.5 ha being taken up by the associated 132 kV substation on a 49 ha site.

Any open areas that are left uncovered or unhardened on the footprint should be protected against wind erosion by the panting of locally adapted runner grasses or similar ground cover. Due to the extremely light texture of the soil resulting in excessive permeability together with level terrain, soil erosion arising from storm water runoff should not occur, provided that storm water falling on hard surfaces should be trapped and recycled or otherwise diverted into the adjoining stream

The socio-economic offset in this instance is not only the creation of employment at the site for approximately 40 people during operation, thus providing food security to 40 families in the form of permanent employment, but also downstream employment to service providers such as caterers, security and cleaning services. It also contributes a material contribution to GDP in place of its limitation to GDP being only municipal rates from land that previously contributed nothing.

It is also critical for the urgent provision of electricity which is essential for the economy of the country.

Table 6.1: Impact Assessment: Newlyn Emergency Power Plant

The Nature of the Impact

Impact on the 450MW Emergency Risk Mitigation Power plant site will be long term, severe, but ultimately reversible should the site be decommissioned and not used for any other commercial or industrial purpose and hardened surfaces removed

The entire operation takes place within the context of presently vacant, unutilized land within an existing industrial area that employs nobody. The long term economic and social benefits are positive in that the development of the site will provide long term employment for members of approximately 40 families, the most important form of food security, and provide much needed electricity.

Defining the Impact	**Without Mitigation**	**With Mitigation**
Extent	1	1
Duration	5	5
Magnitude	10	10
Probability	5	5
Significance	90(very high)	90 (very high)
Status	Positive	Positive
Reversibility	Only if the site is ever de-commissioned as a working site and allowed to return to virgin veld, a highly unlikely scenario	Only if the site is ever de-commissioned as a working site and allowed to return to virgin veld, a highly unlikely scenario
Irreplaceable Loss of Resources?	In realistic terms, Yes	In realistic terms, Yes
Can Impacts be Mitigated?	Yes, marginally so, by controlling nuisance dust during construction and by covering unhardened areas with locally adapted runner grasses or similar ground cover	Yes, marginally so, by controlling nuisance dust during construction and by covering unhardened areas with locally adapted runner grasses or similar ground cover

Mitigation: The only mitigation that is practical during construction is the the control of nuisance dust, which is controlled by keeping unhardened surface working areas

damp. This should be followed by planting and maintaining lawns or similar groundcover as rapidly as possible during the final phase of construction
Residual Impacts: The residual impact will be permanent

Table 6.2: Cumulative Impact Assessment: Newlyn Emergency Standby Unit

The Nature of the Cumulative Impact From an agricultural and agribusiness perspective there is no cumulative impact apart from the marginal items mentioned above		
Defining the Impact	**Overall Impact of the Proposed Project Considered in Isolation**	**Cumulative Impact of the Project and Other Projects in the Area**
Extent	1	1
Duration	5	1
Magnitude	10	0
Probability	5	1
Significance	90 (very high)	1 (very low)
Status	Positive	Neutral
Reversibility	Highly unlikely	N/A. Other projects in the area are already established, several of which accommodate open or unprotected handling and storage of bulk chemicals and minerals
Irreplaceable Loss of Resources?	Yes	N/A
Can Impacts be Mitigated?	No	N/A
Mitigation: As there are no impacts on the surrounding area, there is nothing to mitigate		
Residual Impacts: There are no residual impacts on the surrounding area		

7. CONCLUSIONS AND RECOMMENDATION

7.1 Conclusion

Of the 6 soil profiles that were examined, all consisted of non-arable land (LCCVI and LCCVIII) / DEA Agricultural Sensitivity Theme 1 to 5, probably 1 to 2.

7.2 Recommendation

In view of the land parcel being made up of vacant, unused non-arable land in the heart of a fully transformed major industrial hub, the specialist has no option other than to recommend that the application for the proposed land use be approved.

8. USEFUL REFERENCE PUBLICATIONS

The following reference material was utilized during the assessment and verification process:

Development and Application of a Land Capability Classification System for South Africa: J L Schoeman et al, ARC-ISCW, 2002

Identification and Management of the Soils of the South African Sugar Industry: SA Sugar Research Institute. (Sugar book)

KwaZulu-Natal Agricultural Land Categories: Collett A (DAFF) and Mitchell FJ (KZN DARD), Version 1, 2012 and its Appendix:

KZN Natural Resources Soil Profile Data Sheets

Land Assessment in KwaZulu-Natal: Botha et al, Natural Resources Directorate, KZN DARD; Cedara

Natural Resources and/or Agricultural Survey Specifications, Version 2 May 2015: KZN DARD Natural Resources Directorate, Cedara

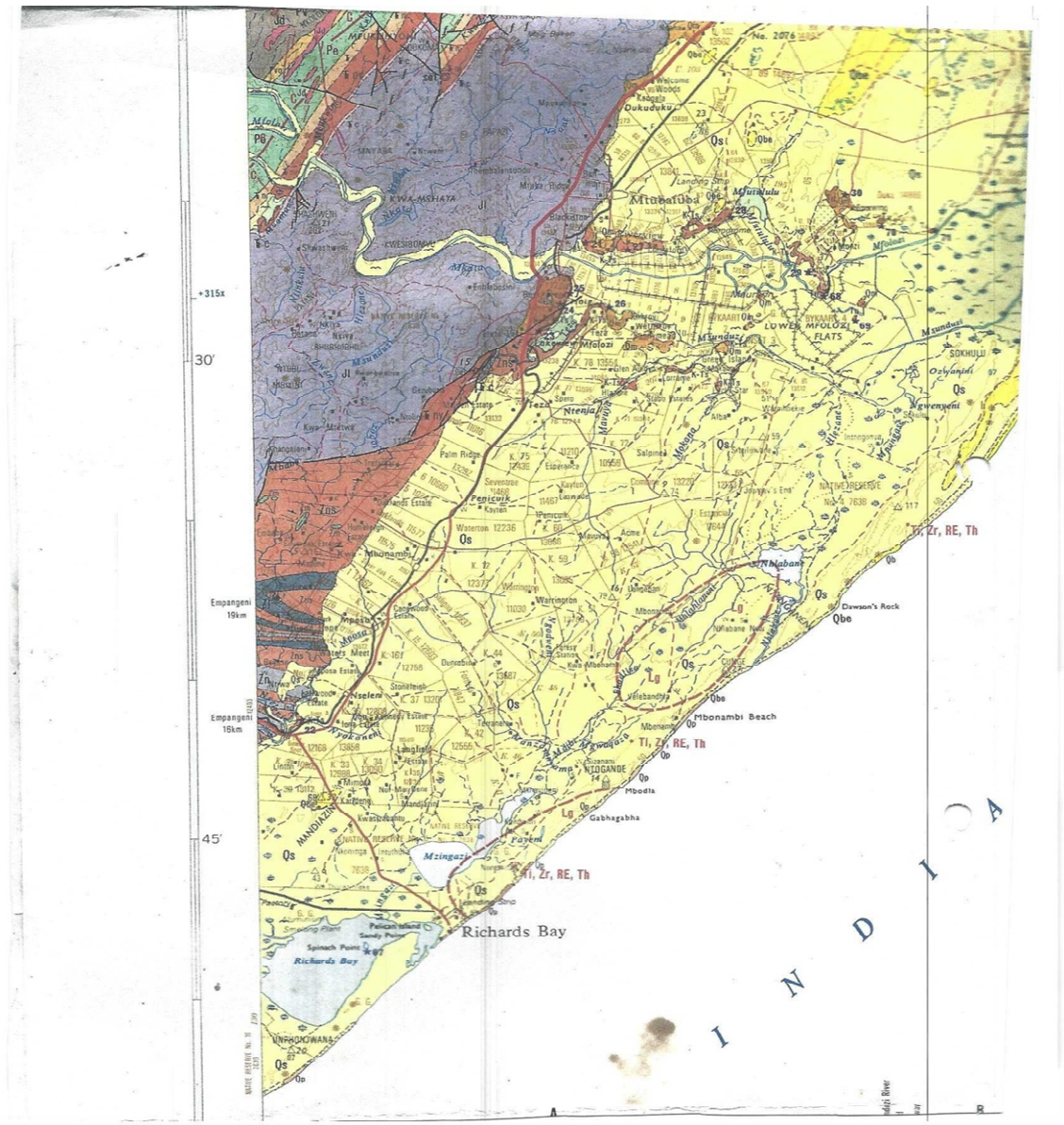
Soil Classification: A Taxonomic System for South Africa: CN MacVicar et Al, SIRI 1991 (Blue Book). This publication was produced by a working group of 30 scientists, written primarily for scientists

Soils of South Africa: Martin Fey, Cambridge University Press

9. APPENDICES

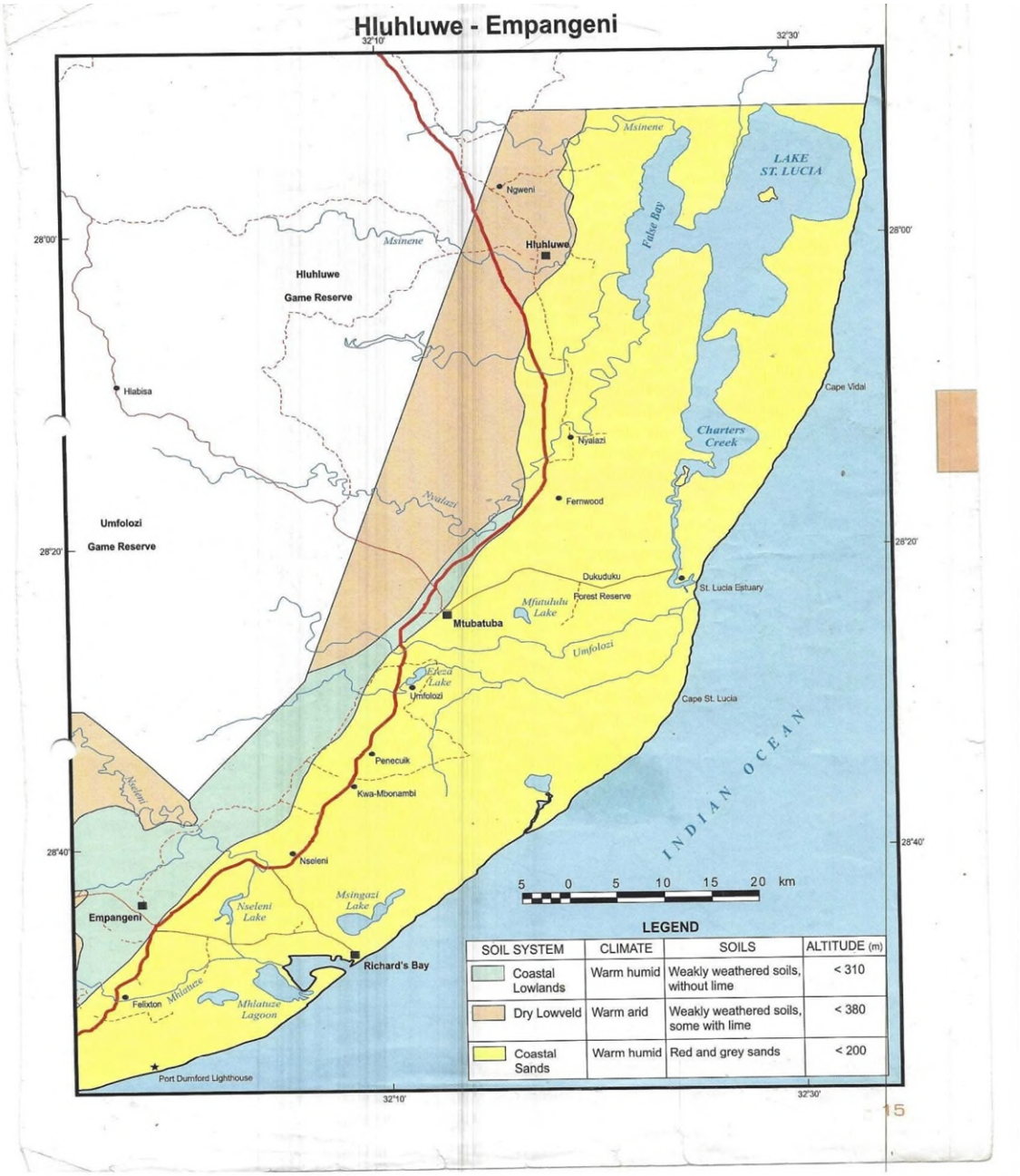
Appendix 9.1 Soil Parental Map: Council for GeoScience Map Number 2927 St Lucia

It is patently clear from the map below that the parent material for this site is recent sands. Up to within a few hundred meters of the N2 National Highway the parent material is grey recent sands, less than 10 000 years old. To the best knowledge of the specialist there is nowhere along the entire KZN coastal region has this parent spawned arable soils. A few pockets of protruding red recent sands, some 600 000 years old, have weathered down to the Hutton Soil Form, Clansthal Series which may not be cultivated if the slope is greater than 3% as the clay content of this Series is less than 16% .



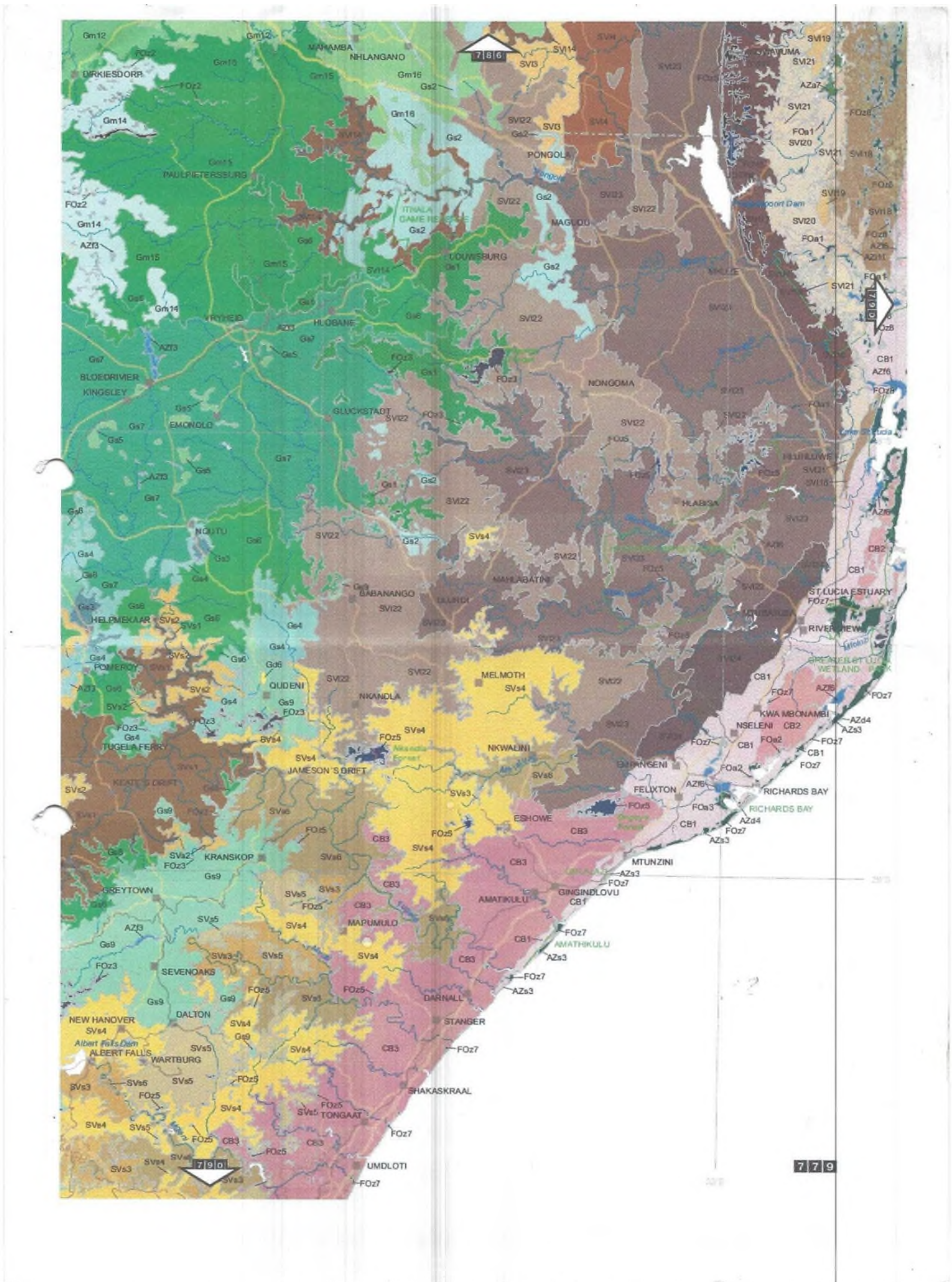
Appendix 9.2: Soil Systems Hluhluwe to Empangeni (SASA Experiment Station)

This map, prepared by scientists fully familiar with the ecology of the KZN coastal areas, confirms and endorses the findings in Appendix 9.1 above.


Hluhluwe - Empangeni
32°10'
32°30'
28°00'
28°20'
28°40'
Msinene
LAKE ST. LUCIA
Ngweni
Hluhluwe
False Bay
Hluhluwe Game Reserve
Hlabisa
Cape Vidal
Charters Creek
Nyalazi
Fernwood
Umfolozi Game Reserve
Dukuduku Forest Reserve
St. Lucia Estuary
Mfutululu Lake
Mtubatuba
Umfolozi
Ekeza Lake
Cape St. Lucia
INDIAN OCEAN
Penecuik
Kwa-Mbonambi
Nseleni
Nseleni Lake
Msingazi Lake
Empangeni
Richard's Bay
Felixton
Mhlatuze
Mhlatuze Lagoon
Port Dumford Lighthouse
5 0 5 10 15 20 km
LEGEND
SOIL SYSTEM | CLIMATE | SOILS | ALTITUDE (m)
Coastal Lowlands | Warm humid | Weakly weathered soils, without lime | < 310
Dry Lowveld | Warm arid | Weakly weathered soils, some with lime | < 380
Coastal Sands | Warm humid | Red and grey sands | < 200

Appendix 9.3 Mucina and Rutherford Map 779

Although this map is on an extremely coarse scale it does illustrate that the Richards Bay area is in a transitional zone between the KwaZulu-Natal Coastal Belt and the Maputland Wooded Grasslands. Both systems have recent sands as their soils base.



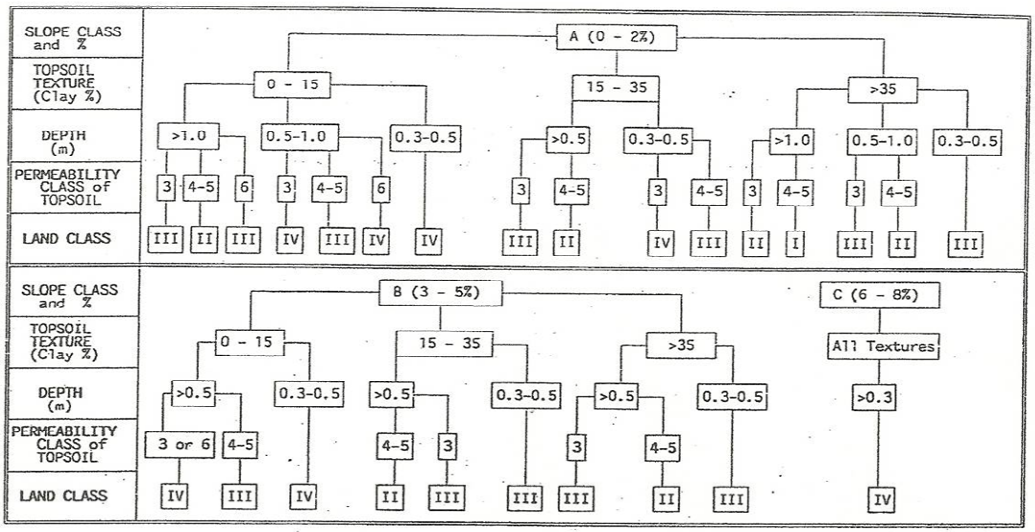
Appendix 9.4: Definition and Determination of Land Capability ClasseS

The flowsheets below and overleaf detail the procedures used to determine Land Class Capability. This capability is closely allied to soil yield potential.

33

CAPABILITY CLASS DETERMINATION GUIDELINE for BRGs:
Dry Zululand Thornveld (20), Valley Bushveld (21), Lowveld (22), Sandy Bushveld (23) (Average annual rainfall 587-830 mm)

Use the following flow chart to determine the land capability classes for land to be cropped in the above Bioresource Groups.



PERMEABILITY CLASS DESCRIPTION*			
Class	Rate (seconds)	Description	Texture
7	<1	Extremely rapid	Gravel and Coarse Sand. 0 to 10 % clay.
6	1-3	Rapid	5% to 10% clay.
5	4-8	Good	> 10% clay.
4	9-20	Slightly restricted	
3	21-40	Restricted	Strong structure, grey colours, mottles. > 35% clay.
2	41-60	Severely restricted	Strong structure, weathered rock. > 35% clay.
1	>60	Impermeable	Rock and very strong structure. > 35% clay.

* If roots can penetrate the subsoil, test permeability of upper subsoil.
If roots cannot penetrate the subsoil, test the permeability of the mid-topsoil.
Dark structured clay topsoil (vertic & melanic) with a Class 2 permeability should be assessed in the chart as if it has a Class 3 permeability. If permeability is Class 7, downgrade to Land Class IV.

Now refer to the opposite page to make adjustments for wetness, rockiness, crusting or permeability.

USE THE FOLLOWING LAND CHARACTERISTICS TO MODIFY THE LAND CLASS OBTAINED OPPOSITE, IF NECESSARY: The land capability class determined using the "flow chart" cannot be upgraded through consideration of wetness, rockiness, surface crusting or permeability classes given below, but it may be downgraded as indicated.

WETNESS		
Class	Definition	Land Class
W0	Well drained - no grey colour with mottling within 1.5 m of the surface. Grey colour without mottling is acceptable.	No change
W1	There is no evidence of wetness within the top 0.5 m. Occasionally wet - grey colours and mottling begin between 0.5 m and 1.5 m from the surface.	Downgrade Class I to Class II, otherwise no change
W2	Temporarily wet during the wet season. No mottling in the top 0.2 m but grey colours and mottling occur between 0.2 m and 0.5 m from the surface. Included are: soils with G horizons (highly gleyed and often clayey) at depths deeper than 0.5 m; soils with an E horizon overlying a B horizon with a strong structure; soils with an E horizon over G horizons where the depth to the G horizon is more than 0.5 m.	Downgrade to Class IV
W3	Periodically wet. Mottling occurs in the top 0.2 m, and includes soils with a heavily gleyed or G horizon at a depth of less than 0.5 m. Found in bottomlands.	Downgrade to Class Va
W4	Semi-permanently / permanently wet at or above soil surface throughout the wet season. Usually an organic topsoil or an undrained vlei. Found in bottomlands.	Downgrade to Class Vb

PERMEABILITY	
Permeability Class	Adjustment to be made
1 - 2	If in sub-soil, rooting is likely to be limited: Use the permeability of the topsoil in the flow chart. If this is the permeability of the topsoil, then the topsoil is probably a dark structured clay, in which case a permeability Class 3 can be used in the flow chart.
3 - 5	Classify as indicated in the flow chart.
6	Topsoil should have < 15% clay - use the flow chart.
7	Downgrade Land Classes I to III to Land Class IV.

ROCKINESS		
Class	Definition	Land Class
R0	No rockiness	No change
R1	2 - 10% rockiness	Downgrade Classes I to II, otherwise no change
R2	10 - 20% rockiness	Downgrade Classes I to II, otherwise no change
R3	20 - 30% rockiness	Downgrade to Class IV
R4	> 30% rockiness	Downgrade Classes I, II, III & IV to Class VI

SOIL SURFACE CRUSTING		
Class	Definition	Land Class
t0	No surface crusting when dry	No change
t1	Slight surface crusting when dry	Downgrade Class I to Class II, otherwise no change
t2	Unfavourable surface crusting when dry	Downgrade Classes I & II to Class III, otherwise no change

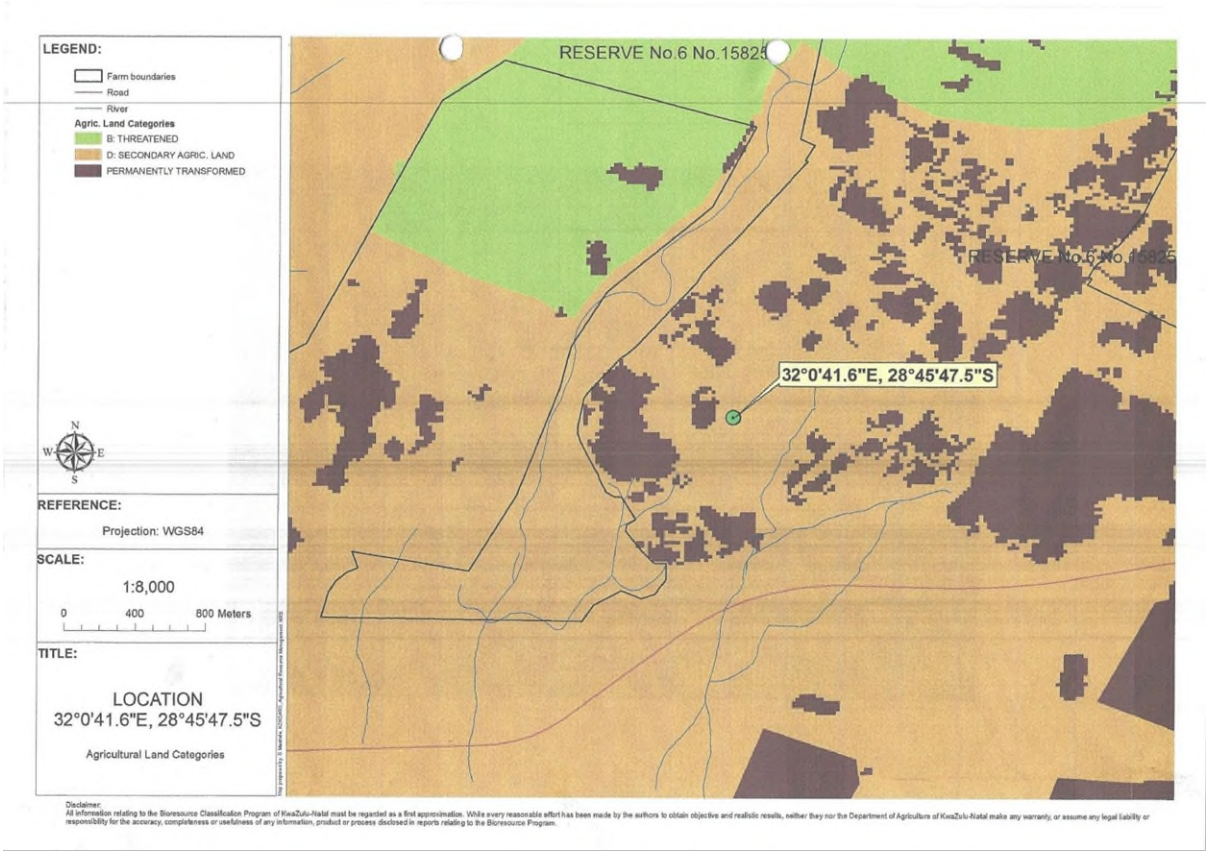
NB **Any land not meeting the minimum requirements shown is considered non-arable (Class V, VI, VII or VIII).**
Non-arable land in BRGs 2, 4, 6, 9, 12, 14, 15, 16, 17, 18 & 19 includes:

* all land with W3, W4 or R4,
* all land with slope exceeding 20%,
* land with slope 13-20%, if clay < 15% or depth < 0.4m,
* land with slope 8-12% and clay > 15%, if depth < 0.25m,
* land with slope 8-12% and clay < 15%, if depth < 0.5m, and
* land with slope 0-7%, if depth < 0.25m.

20 March 1996

Appendix 9.5 KZNDARD Land Categories

Although this map does reflect some of the land in the area as being permanently transformed, it is probably thirty years out of date. From the Mondi Papers to the sea, the whole area is either permanently transformed, wetland, power transmission servitudes and other nonagricultural services.



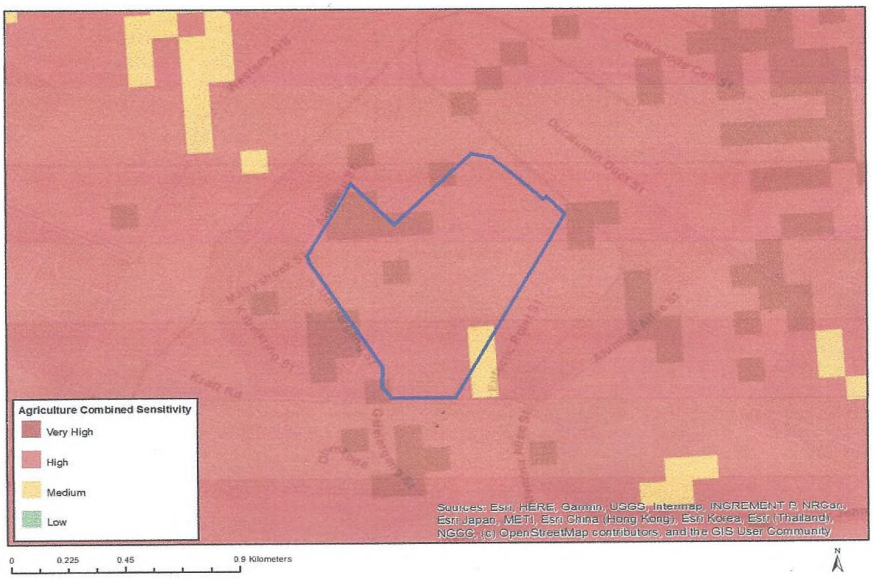
Appendix 9.6: DEA Site Agricultural Sensitivity Theme

The DEA site agricultural sensitivity theme map has no correlation whatsoever with the empirical findings at the target site. Appendices 9.1, 9.2, 9.7 and 9.8 clearly indicate that te entire site is non-arable land, LCCVI and LCCVII (Agricultural Theme Sensitivity 1 to 5).

Results of the environmental sensitivity of the proposed area.

The following section represents the results of the screening for environmental sensitivity of the proposed site for relevant environmental themes associated with the project classification. It is the duty of the EAP to ensure that the environmental themes provided by the screening tool are comprehensive and complete for the project. Refer to the disclaimer.

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
High	Land capability;09. Moderate-High/10. Moderate-High
Medium	Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate
Very High	Land capability;11. High/12. High-Very high/13. High-Very high/14. Very high/15. Very high

It is recommended that DEA review and adjust its data base and the agricultural sensitivity theme attributed to the site

Appendix 9.7 Spatial Representation of Land Capability Classes at the Newlyn 450 MW Plant

The yellow placemarks reflect non-arable land LCCVI (DEA Agricultural Sensitivity Theme 2 to 3?) and the purple placemark reflects non-arable land LCCVIII (DEA Agricultural Sensitivity Theme 1).

The area shaded in pink is the Richards Bay Business Park, a site that is surrounded by concrete palisade walls and is covered from wall to wall with cement paving bricks, and has been for the last twenty or so years. The DEA Agricultural Sensitivity Theme map reflects this entire area as high sensitivity agricultural land

Appendix 9.8 Land Capability Classes: Soil Profiles at the Newlyn 450 MW Emergency Plant

Ref	Co-ordinates	Soil Form	Slope %	Clay %	Depth (mm)	Permea-bility	Wet-ness	LCC	Aspect/ Terrain unit
NL 1	28˚46'01.8"S 32˚00'37.4	Witbank	0-2	0-5	150	7	W0	VIII	Plain
NL 2	28˚46'02.0"S 32˚00'39.9"E	Fernwood	0-2	0-5	>900	7	W0	VI	Plain
NL 3	28˚46'00.8"S 32˚00'41.0"E	Fernwood	0-2	0-5	>900	7	W0	VI	Plain
NL 4	28˚46'01.0"S 32˚00'43.9	Fernwood	0-2	0-5	>900	7	W0	VI	Plain
NL 5	28˚46'01.1"S 32˚00'44.4"E	Fernwood	0-2	0-5	>900	7	W0	VI	Plain
NL 8	28˚45'58.7"S 32˚00'42.9"E	Fernwood	0-2	0-5	>900	7	W0	VI	Plain

Colour Coding

Colour	Comment
	LCC Column : LCCVI: Non-arable land (DEA Agricultural Sensitivity Theme 2 to 3?)
	LCC Column : LCCVIII: Non-arable land (DEA Agricultural Sensitivity Theme 1)

Appendix 9.9: Physical and Chemical Properties of 450 MW Emergency Plant Site Soils

9.9.1 Physical Properties

Soil Form / Family	Clay % of Topsoil	Water Holding Capacity (mm/m)	Water Intake Rate	Drainage Capacity	Erosion Hazard	Tillage Constraints
Fernwood	0 to 6	Less than 80	Good	Excessive	Very High	Cr, co, mw
Witbank	5 to 50	80 to 140	Moderate to Poor	Low to High		Cl, cr, clo, mw, sh

9.9.2 Chemical Properties

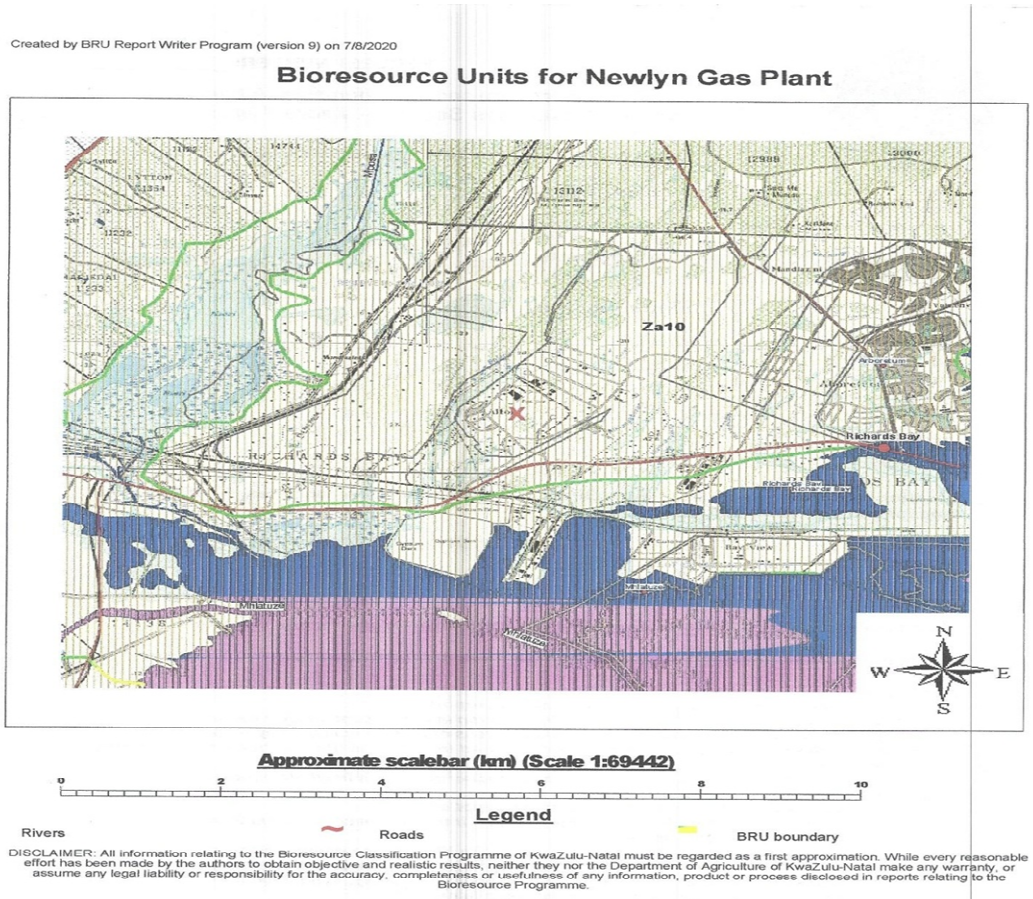
Soil Form / Family	Base Status	Organic matter Content	N&S Mineralisation Capacity	K Reserves	Zn Reserves	Salinity/ Sodicity Hazard
Fernwood	Low to Very Low	Very Low	Low	Low	Low	Nematode Hazard
Witbank	Low to Moderate	Low	Low	Low	Low	Low

The physical and chemical properties of the Witbank Soil Form Vary widely and unpredictably according to the quality of the soil material that has covered the underlying rubble.

Appendix 9.10: BioResource Unit BRU Za10 Nhlabane, Newlyn 450 MW Emergency Plant

It is from the BRU report for this area that rainfall, temperature and other climatic data is extracted.

This BRU extends along the coastal strip from the Umhlatuze River (which flows into the Richards Bay harbour), northwards until a few km short of the Umfolozi River mouth and the St Lucia Estuary. Its western boundary is roughly the N2 National Highway. Each of the 600 BRU reports for KZN reflect an individual local ecosystem.



10. PICTURE GALLERY

PG10.1 Site Locality

It is clear from the image below that the target site is situated in the heart of the largest concentration of heavy industries in KZN outside of the Ethekwini industrial areas.

The road running hp horizontally across the screen is the John Ross Parkway (R34), the busiest road in KZN outside of eThekwini and the N3 National Highway.

Immediately south of this industrial complex is the Richards Bay harbour, by far the largest bulk handling harbour on the African Continent.

PG10.2 Fernwood Soil Form

This photograph, taken approximately ten km from the target site, is typical of the Fernwood Soil Form that stretches along the whole of the KZN coastline, immediately behind the sand dunes.

A thin layer of dark organic matter that has accumulated on the surface over the last ten thousand years supports coarse grasses as well as a range of trees and shrubs that can send their roots deep through a stratum of leached sand to find moisture, nutrients and oxygen that are deep down.

PG10.3: Typical Waste Dump

Over the last 50 years there has been widespread dumping of building rubble, road building detritus on the site. The manner in which these mounds of detritus have been covered by windblown sand on which grass and plant seeds have established themselves is a tribute to the manner in which nature can heal itself, even under hostile conditions.

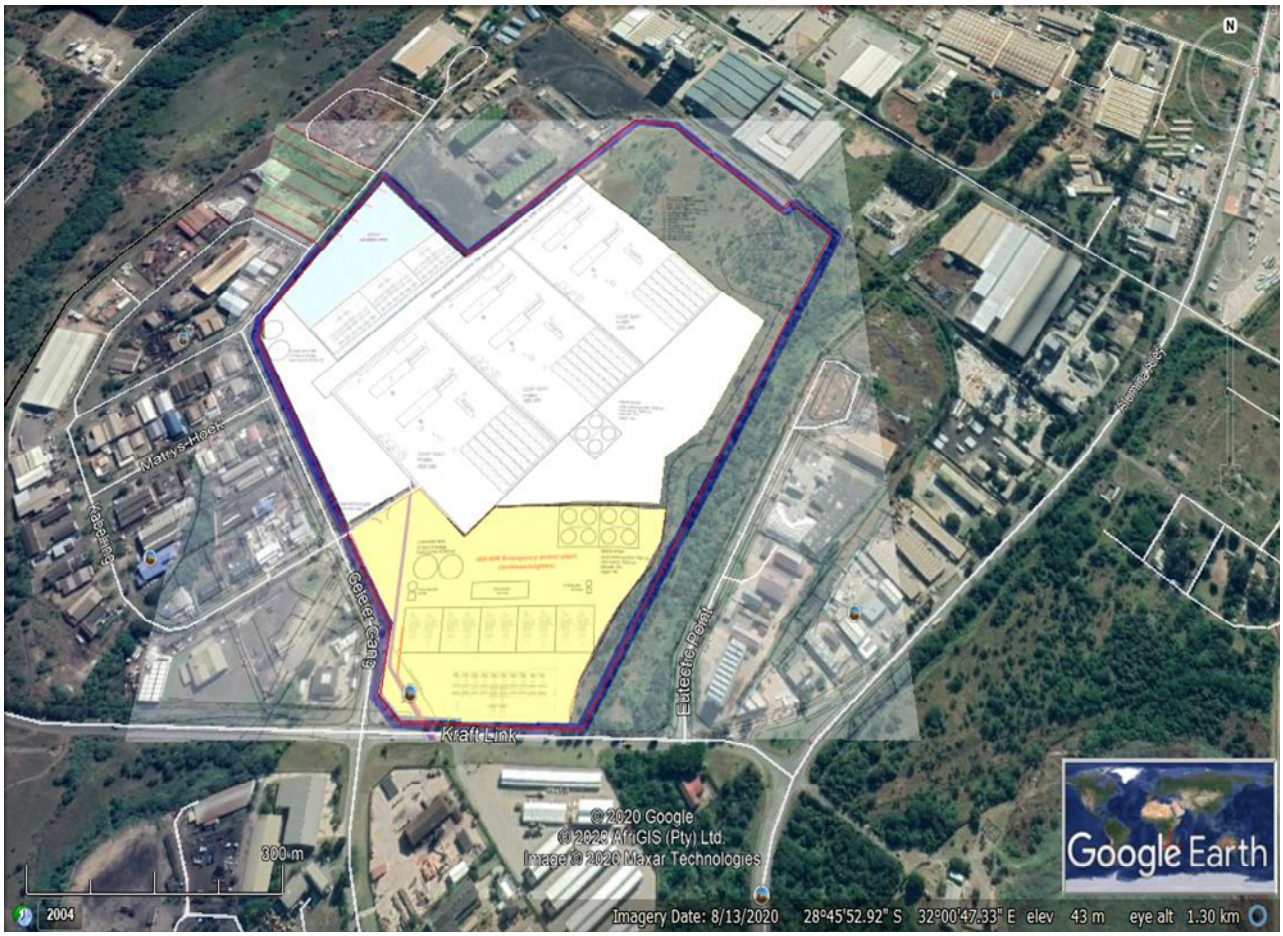
Where similar detritus has been buried and then covered, the outcome is the Witbank Soil Form, a blanket name for manmade soil profiles.

PG 10.4 Fully Transformed Industrial Site

The photograph below clearly illustrates that the land parcel that is made up of Remainder of Erf 1795 and Portion 1 of Erf 1795, Richards Bay has been fully developed and transfornmed. It cannot in any manner be described as agricultural land

Picture Gallery 10.5: Site Components

As indicated in Chapter 1.3, the target site addressed in this report is part of an integrated power generation facility that will embrace an entire land parcel of some 49 ha



The portion highlighted in pale yellow represents this portion of the project plus NPG and naptha storage tanks. The filled in white portion represents the 4 000 MW gas to electricity that is being addressed in a separate but parallel report.

The pale blue area represents the internal substation from which power will be distributed into the national network via a 4 x 400 Kv transmission grid

Picture Gallery PG 10.6: Industrial Context

This drawing reflects the target area within the context of adjacent, fully developed, long established industrial, service and commercial properties

Table 7: Synopsis

Synopsis of the impact on ecosystem services of the proposed development at the target site and the agricultural implications thereof

Issue	Nature of Impact	Extent of Impact (local / 500m radius)	No-go areas
Soils	The soils are in their geological infancy and thus have no structure. Apart from a thin stratum of organic matter at the surface they are inert sand. The proposed development will have no effect on the physical or chemical properties of the soils. The soils at the site have a relative agricultural theme sensitivity of 1 to 3.	Limited to the target site only.	Nil
Climate	The climate is semi-tropical, the implication being that most arable crops can only be grown during the winter months. The proposed development will not impact on climate related agricultural effects.	Limited to the target site only	Nil
Water Table	One of the features of very sandy soils is that when they are dry, water poured over them runs through the profile without wetting it until the water reaches a water table or an impervious stratum. The profile then fills from the bottom upwards towards the surface. In this instance it will appear that the water table at the site is at the same level as the adjoining wetland as soil profiles started to show signs of leaching and regic sand from depths of 700mm upwards.	This aspect will be addressed further by the wetland and geohydrology specialists.	The wetland is a no – go area for development.

Crops	The only crops that will grow on these soils are grasses that have a very shallow root concentration and woody vegetation that has strong rooting systems that will go deep and look for water. It is for this reason that eucalyptus trees can be grown commercially provided there are sufficient heat units and a rainfall close to 1 000mm pa.	Limited to the target site only	Nil

Description of expected significance of impact

Although the proposed development will permanently transform the site, the significance is minimal as it is currently vacant and unused land with a severely limited crop potential.

Gaps in knowledge & recommendations for further study

The gap in knowledge regarding the soils on this site is the level of the water table. The only indigenous vegetation was a few scattered Lala Palms (*Hyphaene coriacea*), Umdoni (*Syzygium cordatum*), Monkey Orange (*Strychnos madagascariensis*) and *Acacia karroo ssp kosiensis* trees. This aspect will be addressed by a biodiversity specialist

There are no further recommendations.