Nhloso Land Resources (Pty) Ltd.

Conserving Natural Resources Through Sustainable Land Use

AGRICULTURAL LAND CAPABILITY ASSESSMENT FOR THE PROPOSED WILMAR OIL PIPELINE NEAR RICHARDS BAY, KWAZULU NATAL PROVINCE, SOUTH AFRICA.

Prepared for:

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Report Ref. No.:	**NSW1118**
Date of Issue:	**21 January 2019**
Amendment Date:	**26 April 2019**

EXECUTIVE SUMMARY

Nhloso Land Resources (Pty) Ltd. (NLR) was appointed by Savannah Environmental (Pty) Ltd., to conduct an Agricultural Land Capability assessment for the proposed Wilmar Oil Pipeline near Richards Bay in the KwaZulu Natal (KZN) province, South Africa.

No agricultural land uses were identified during the survey. The majority of the study area comprised of industrial infrastructure including concrete-paved service & maintenance utilities within the TNPA premises, such that the underlying soil could not be accessed for classification. Such areas were classified as the Witbank soil forms by default, collectively constituting approximately 53.1% (25.8 ha) of the study area. The remainder of the study area comprised of Arable (class III and class IV) Fernwood/Longlands soil forms, constituting approximately 12.6% (6.1 ha) and 18.3% (8.9 ha) of the study area, respectively. The Mispah/Glenrosa soil forms were classified as Grazing (class V) land capability, constituting approximately 4.3% (2.1 ha) of the study area. The remaining surface of the study area was covered by water along the TNPA berths, constituting approximately 11.7 % (5.7 ha) of the study area.

The Fernwood/Longlands soil forms were particularly identified along the remaining tracts of undisturbed areas along the peripheries of the TNPA operations and within the RBIDZ property. A distinction was made between the Fernwood/Longlands soil forms identified within the southern portion of the TNPA and those within the RBIDZ property. A significant increase in clay content and depth to water table was observed on the Fernwood/Longlands soil forms identified within the RBIDZ property compared to those identified within the TNPA property. Although the identified Fernwood/Longlands soil forms are classified to be of high potential (arable) agricultural land capability, these soils are best suited for forest plantations or remain under natural vegetation to enable natural nutrient recycling from the biomass and soil organic matter, due to the low nutrient storage capacity and high erosion sensitivity of these soils, attributed to their coarse, poorly developed structure.

Although some of the identified soils were classified as suitable for arable agriculture, agricultural production is not considered practically viable in this case due to currently ongoing industrial activities in the vicinity of the study area, which are envisaged to persist for the foreseeable future since the greater surrounding area has been designated for industrial land use according to the Environmental Authorisation & Record of Decision issued by the KZN Department of Agriculture & Environmental Affairs to enable phase 1A and 1B development for the RBIDZ. Furthermore, the limited extent of arable land (≈15 ha) is not considered viable for commercial crop production as the surrounding areas have been extensively fragmented by historic industrial operations in the vicinity of the study area.

All the identified impacts including soil erosion, soil compaction, and contamination are anticipated to be adequately mitigated to a low level of significance by the recommended integrated mitigation measures. However, in addition to the arable agricultural land capability, the Fernwood/Longlands soil forms are also considered to be characteristic wetland soils, attributed to their seasonal water table fluctuation, as substantiated by the development of a bleached eluvial (*albic*) E-horizon. As such the findings and recommendations of the wetland assessment should be thoroughly considered and implemented in conjunction with this report to ensure compliance with the applicable environmental regulations. Based on the findings of this assessment, the proposed pipeline development is therefore anticipated to have a low agricultural land capability impact, and may be considered favourable provided that the recommendations of this assessment report are implemented to the satisfaction of the regulating authorities.

Declaration

This report has been prepared according to the requirements as set out in Appendix 6 of the Environmental Impact Assessments EIA Regulations, 2014 (No. R. 982). I (the undersigned) declare the findings of this report free from influence or prejudice.

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DOCUMENT GUIDE

NEMA Regulations (2014) - Appendix 6	Relevant section in report
Details of the specialist(s) who prepared the report	Appendix I
The expertise of that person to compile a specialist report including a curriculum vitae	Appendix I
A declaration that the person is independent in a form as may be specified by the competent authority	Appendix I
An indication of the scope of, and the purpose for which, the report was prepared	Section 2.1
The date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 2.4
A description of the methodology adopted in preparing the report or carrying out the specialised process	Section 2
The specific identified sensitivity of the site related to the activity and its associated structures and infrastructure	Section 3
An identification of any areas to be avoided, including buffers	N/A
A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Section 3
A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 2.2
A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment	Section 3 and 4
Any mitigation measures for inclusion in the EMPr	Section 5
Any conditions for inclusion in the environmental authorisation	Section 4 and 5
Any monitoring requirements for inclusion in the EMPr or environmental authorisation	None
A reasoned opinion as to whether the proposed activity or portions thereof should be authorised and	Section 5 and 6
If the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Section 5 and 6
A description of any consultation process that was undertaken during the course of carrying out the study	N/A
A summary and copies if any comments that were received during any consultation process	N/A
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GLOSSARY OF TERMS

Anthrosol: Man-made soil deposit with no recognisable diagnostic soil horizons, including soil materials which have not undergone pedogenesis to an extent that would qualify them for inclusion in another diagnostic horizon.

Contaminant: A substance that has a potential to cause harm to human health and/or the environment.

In-situ: Implies taking place "locally", or "on site", or "on the premises".

Soil Map Unit: A description that defines the soil composition of a land, identified by a symbol and a boundary on a map.

Waste: Any substance that is surplus, unwanted, rejected, discarded, abandoned or disposed of which the generator has no further use of for the purposes of production that must be treated or disposed of.

Alternatively defined as "an inorganic or organic element or compound that, may exercise detrimental acute or chronic impacts on human health and the environment due to its toxicological, physical, chemical or persistency properties”.

ACRONYMS

AGIS	Agricultural Geo-Referenced Information Systems
Bgs	Below ground surface
IUSS	International Union of Soil Sciences
Km	Kilometre
KZN	KwaZulu Natal
m	Metre
NLR	Nhloso Land Resources (Pty) Ltd.
RBIDZ	Richards Bay Industrial Development Zone
SACNASP	South African Council for Natural Scientific Professions
SOTER	Soil and Terrain
TNPA	Transnet National Ports Authority

1. INTRODUCTION

Nhloso Land Resources (Pty) Ltd. (NLR) was appointed by Savannah Environmental (Pty) Ltd., to conduct an Agricultural Land Capability assessment for the proposed Wilmar Oil Pipeline near Richards Bay in the KwaZulu Natal (KZN) province, South Africa. The proposed pipeline route (hereafter referred to as "the study area") traverses through the Transnet National Ports Authority (TNPA) and the Richards Bay Industrial Development Zone (RBIDZ) properties, as depicted on the locality map in **Figure 1** below.

The proposed development will entail installation of four Carbon Steel, DN 200 pipelines of 400 mm diameter to transmit a variety of vegetable oils including Palm, Soybean, and Sunflower oils from the TNPA berths to the Wilmar processing facility located within the RBIDZ property, where the oils will be processed for human consumption as cooking oil and/or margarine etc. The collective throughput capacity of the pipelines is will be up to 250 cubic meters per hour (m^3/hour) when operational, if the pipelines are discharging.

The pipelines will traverse approximately 2.8 km at 1.8 m aboveground. The pipelines will be supported on steel supports, mounted on concrete pad foundations of approximately 1,5 x 1,5 m, extending down to 1,2 m below ground surface (bgs). Underground crossings will be constructed where the proposed pipeline route intersects with the roads and/or railway lines. These underground crossings will include access shafts of approximately 3,225 x 2,060 m, with an underside of 2,800 m below ground on each side. Four 400 mm diameter HDPE pipe sleeves will be installed using a combination of pile caps and piling methods.

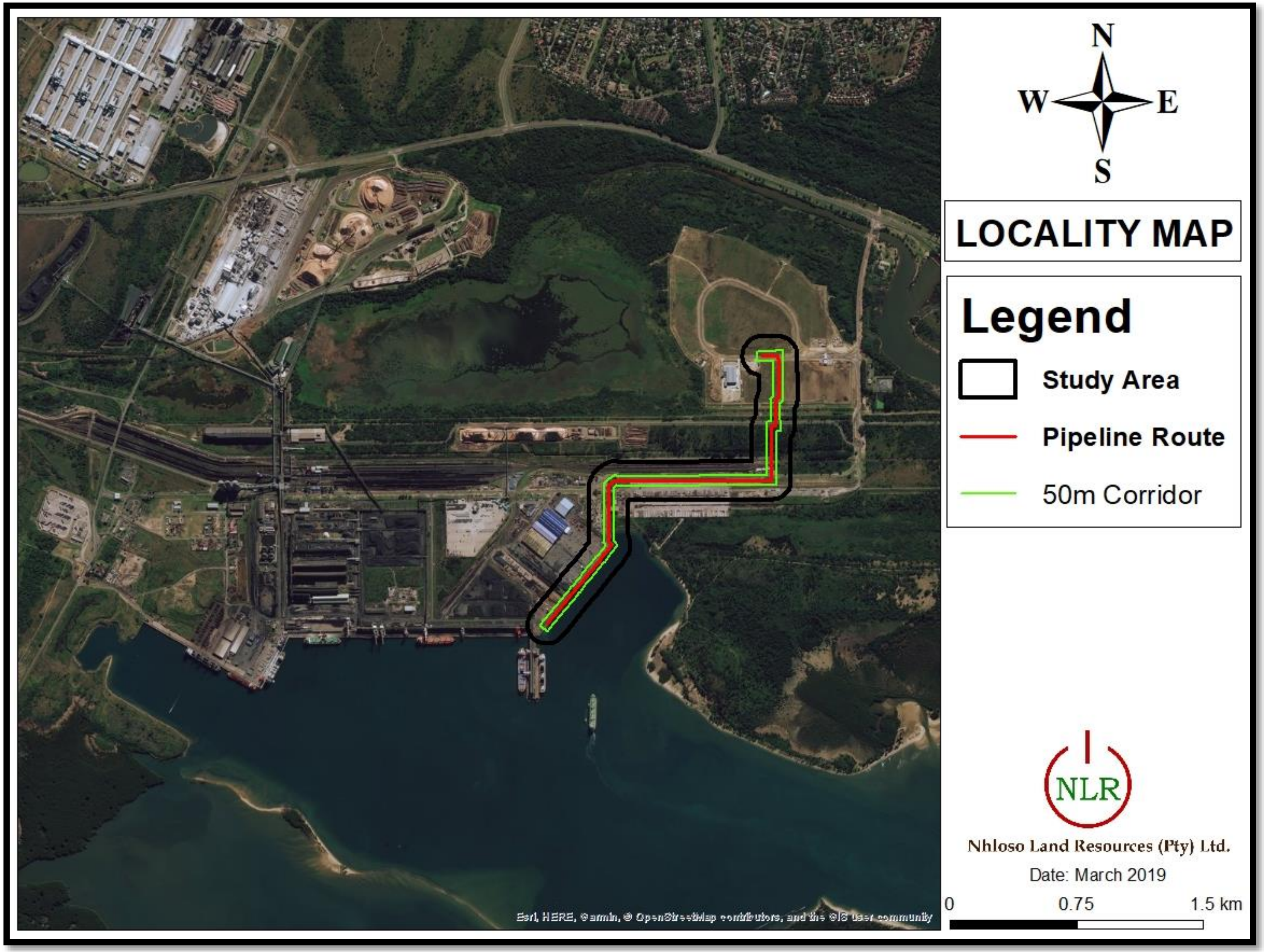


Figure 1: Locality map with satellite imagery depicting the location of the study area and surrounding areas.

2. METHOD OF ASSESSMENT

The scope of this investigation included both a desktop and fieldwork assessment, as briefly described below:

- Desktop screening and field verification assessment of the proposed pipeline route of approximately 3 km;
- Conduct an impact assessment to identify and assess the significance of potential impacts of the proposed pipeline development on the agricultural land capability of the investigated area; and
- Development of an Agricultural Land Capability report, where key mitigation and management measures will be recommended to alleviate the identified impacts.

2.1 TERMS OF REFERENCE

This investigative assessment was guided by the following terms of reference:

Phase I: Site Assessment

- Review historic and current land uses as well as existing land capability impacts in the vicinity of the investigated area(s);
- Subsurface soil observations to classify dominant soil type(s) according to the South African Soil Classification System (Soil Classification Working Group, 1991);
- Record survey points on a Global Positioning System (GPS); and include a description of physical soil properties including the following parameters:
  - Terrain morphological units (landscape position);
  - Diagnostic soil horizons and their respective sequence;
  - Depth of the identified soil horizons;
  - Soil form classification name; and
  - Depth to saturation (water table), where encountered.

Phase II: Reporting (Mapping and Impact Assessment):

- Group uniform soil types into soil map units, according to observed limitations;
- Evaluate the agricultural land capability of the demarcated soil map units;
- Assess the significance of the anticipated impacts of the proposed pipeline(s) and associated infrastructure on the land capability of the identified soils; and
- Present the assessment findings in a form of an electronic report including:
  - A Soil Type Map, indicating the delineated soil types within the study area;

- Photos of current environmental conditions and adjacent land uses in the vicinity of the study area;
- A Land Capability Map, illustrating the agricultural land capability and suitability of the identified soil forms to alternative land uses including arable agriculture, forestry, grazing etc.;
- A discussion of the identified impacts and their respective significance on the identified soils and agricultural land capability; and
- An integrated mitigation approach and management practices to be implemented in order to alleviate the identified impacts.

2.2 ASSUMPTIONS AND LIMITATIONS

As part of this assessment, it is acknowledged that sampling by definition means that not all areas are assessed, and therefore some aspects of soil and land capability may have been overlooked in this assessment. However, it is the opinion of the specialist that this assessment was carried out with adequate sampling and sufficient analytical detail to enable the applicant, the Environmental Assessment Practitioner (EAP), and the regulating authorities to make an informed decision regarding the proposed development.

Soil fertility status was not considered a limitation, since inherent nutrient deficiencies and/or toxicities can be rectified by appropriate liming and/or fertilization prior to cultivation. The agricultural land capability was classified according to current soil physical limitations, with respect to prevailing local climatic conditions. However, it is virtually impossible to achieve 100% purity in soil mapping due to restricted visibility beneath the ground surface. As such, the delineated soil map units could include other soil type(s), and the boundaries between the delineated soils map units are not absolute, but rather form a continuum and gradually change from one type to another. Therefore, soil mapping and the findings of this assessment were extrapolated from individual observation points, and the boundaries are considered the best estimate of the different soil types and land capability classes.

The purpose and scope of this investigation does not include a geotechnical assessment; therefore, the geotechnical stability of the soils will require further assessment and verification by a structural engineer.

2.3 DESKTOP ASSESSMENT

Prior to the commencement of the field assessment, a background analysis, including a literature review, was conducted to collect the existing baseline soil and land capability data in the vicinity of the study area. Various data sources including, but not limited to, the Agricultural Geo-Referenced Information System (AGIS) and other sources as listed under references (section 7) were used for the assessment.

2.4 FIELD INVESTIGATION

A soil survey was conducted on 03 December 2018, where the identified soils within the study area were classified into soil forms according to the Taxonomic Soil Classification System for South Africa (1991). Subsurface soil observations were made using a manual hand auger in order to assess individual soil profiles, and this entailed evaluating physical soil properties and prevailing limitations to various land uses.

2.5 SOIL MAPPING

A 100 m surrounding zone from the centerline of the proposed pipeline route was created to enhance visibility for mapping purposes. Relatively similar soil forms identified within uniform terrain units were grouped into map units, with respect to observed limitations. Soils with relatively equivalent potential (i.e. soils with relatively similar limitations) were then assigned into predetermined land capability classes.

2.6 LAND CAPABILITY CLASSIFICATION

High potential agricultural land is defined as having the soil and terrain quality, growing season and adequate available moisture supply needed to produce sustained economically high crop yields when treated and managed according to best possible farming practices (Scotney et al., 1987). Agricultural land capability is measured on a scale from I to VIII, as presented in **Table 1** below. Classes I to III are classified as prime agricultural land that is well suitable for annual cultivated crops. Class IV soils may be cultivated under certain circumstances and management practices, whereas Classes V to VIII are not typically suitable for cultivation, but may be suitable for grazing and other recreational purposes, and/or ecological conservation (wilderness).

In addition, the climate capability is also measured on a scale from 1 to 8, as illustrated in Table 2 below. Therefore, the land capability rating is adjusted, depending on the prevailing climatic conditions as indicated by the respective climate capability rating.

Table 1: Land Capability Classification (Scotney et al., 1987)

Land Capability Group	Land Capability Class	Increased intensity of use									Limitations
Arable	I	W	F	LG	MG	IG	LC	MC	IC	VIC	No or few limitations. Very high arable potential. Very low erosion hazard
	II	W	F	LG	MG	IG	LC	MC	IC	-	Slight limitations. High arable potential. Low erosion hazard
	III	W	F	LG	MG	IG	LC	MC	-	-	Moderate limitations. Some erosion hazards
	IV	W	F	LG	MG	IG	LC	-	-	-	Severe limitations. Low arable potential. High erosion hazard.
Grazing	V	W	-	LG	MG	-	-	-	-	-	Water course and land with wetness limitations
	VI	W	F	LG	MG	-	-	-	-	-	Limitations preclude cultivation. Suitable for perennial vegetation
	VII	W	F	LG	-	-	-	-	-	-	Very severe limitations. Suitable only for natural vegetation
Wildlife	VIII	W	-	-	-	-	-	-	-	-	Extremely severe limitations. Not suitable for grazing or afforestation.

W - Wildlife; F - Forestry; LG - Light grazing
MG – Moderate grazing; IG - Intensive grazing; LC - Light cultivation
MC - Moderate cultivation; IC - Intensive cultivation.; VIC – Very intensive cultivation

Table 2: Climate Capability Classification (Scotney et al., 1987)

Climate Capability Class	Limitation Rating	Description
C1	None to slight	Local climate is favourable for good yield for a wide range of adapted crops throughout the year.
C2	Slight	Local climate is favourable for good yield 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. Good yield potential for a moderate range of adapted crops but planting date options more limited than C3.
C5	Moderate to severe	Moderately restricted growing season due to low temperatures, frost and/or moisture stress. Suitable crops may be grown at risk of some yield loss.
C6	Severe	Moderately restricted growing season due to low temperatures, frost and/or moisture stress. Limited suitable crops for 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 and moisture stress. Suitable crops at high risk of yield loss.

2.7 IMPACT ASSESSMENT METHODOLOGY

The identified impacts were assessed using a common, defensible method of assessing significance that will enable comparisons to be made between risks/impacts and will enable authorities, stakeholders and the client to understand the process and rationale upon which risks/impacts have been assessed. The method to be used for assessing risks/impacts is outlined below.

The first stage of risk/impact assessment is the identification of environmental activities, aspects and impacts. This is supported by the identification of sensitive receptors and resources, which allows for an understanding of the impact pathway and an assessment of the sensitivity to change.

The definitions used in the impact assessment are presented below.

- An **activity** is a distinct process or task undertaken by an organisation for which a responsibility can be assigned. Activities also include facilities or infrastructures that are possessed by an organisation.
- **impact (environmental)** refers to the consequences of the proposed development activities on environmental resources and/or receptors.
- **Receptors** can comprise, but are not limited to, people or human-made systems, such as local residents, communities and social infrastructure, as well as components of the biophysical environment such as soils, wetlands, and water features where applicable.
- **Resources** include components of the biophysical environment.
- **Sensitivity** refers to the susceptibility of the receptor or resource to the anticipated impact caused by the development activities.
- **Intensity** refers to the degree of change to the receptor status in terms of the reversibility of the impact; sensitivity of receptor to stressor; duration of impact (increasing or decreasing with time); controversy potential and precedent setting; threat to environmental and health standards.
- **Extent** refers to the geographical scale of the impact.
- **Duration** refers to the length of time over which the stressor will cause a change in the resource or receptor.

The significance of the impact is then assessed by rating each variable numerically according to the defined criteria, as illustrated under **Table 3** below. The purpose of the rating is to develop a clear understanding of influences and processes associated with each impact. The probability of the impact and the sensitivity of the receptor(s) together comprise the likelihood of the impact occurring and can obtain a maximum value of 10. Whereas, the extent, intensity, and duration of the impact together comprise the consequence of the impact, also adding up to a maximum value of 10. The values for likelihood and consequence of the impact are then read off a significance rating matrix (**Table 4**) to determine the significance of the impact and necessary mitigation requirements. The impact significance is calculated using the following formula:

Significance = (Probability + Resource/ Receptor Sensitivity) X (Extent +Intensity + Duration)

The assessment of significance is undertaken twice. Initial, significance is based on only natural and existing mitigation measures (including built-in engineering designs). The subsequent assessment takes into account the recommended management measures required to mitigate the impacts. Measures such as demolishing infrastructure, and reinstatement and rehabilitation of land, are considered post-mitigation.

The model outcome of the impacts was then assessed in terms of impact certainty and consideration of available information. The Precautionary Principle is applied in line with South Africa's National Environmental Management Act (No. 108 of 1997) in instances of uncertainty or lack of information, by increasing assigned ratings or adjusting final model outcomes. In certain instances where a variable or outcome requires rational adjustment due to model limitations, the model outcomes have been adjusted.

Table 3: Impact assessment criteria and description

	Descriptor	Description	Rating
Probability	Unlikely	Impact is unlikely to occur for the proposed activity	1
	Possible	Impact may occur	2
	Likely	The nature of the activity commonly triggers the impact	3
	Highly likely	The activity will almost certainly trigger the impact	4
	Inevitable	The impact will most definitely occur	5
Resource/ Receptor Sensitivity	Negligible	Receptor(s) not sensitive to the impact	1
	Low	Receptor(s) significantly resistant against impact	2
	Moderate	Receptor(s) moderately sensitive to impact	3
	Moderately High	Receptor(s) vulnerable to impact	4
	Very High	Receptor(s) highly susceptible to impact	5
Extent	Local/Site	Impact limited within the vicinity of the development area (≤ 5km from site)	1
	Regional	Includes the surrounding area, within 100km and/or ≤ 250 ha	2
	National	Extends >100km and/or ≥250 ha	3
Intensity	Low	Natural processes or functions are not affected.	1
	Moderate	Affected environment is altered but function and process continue in a modified manner	2
	High	Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases	3
Duration	Temporary (short term)	Dissipation of impact through active or natural mitigation in a time span shorter than 5 years	1
	Medium term	Will most likely last for 5–10 years, and can be effectively mitigated thereafter.	2
	Long term	The impact will last for the entire operational life of the operation, but will be mitigated thereafter	3
	Permanent	Non-transitory.	4

Table 4: Significance Rating Matrix

	CONSEQUENCE (Extent + Intensity + Duration)									
LIKELIHOOD (Likelihood + Sensitivity)	1	2	3	4	5	6	7	8	9	10
	2	4	6	8	10	12	14	16	18	20
	3	6	9	12	15	18	21	24	27	30
	4	8	12	16	20	24	28	32	36	40
	5	10	15	20	25	30	35	40	45	50
	6	12	18	24	30	36	42	48	**54**	**60**
	7	14	21	28	35	42	49	**56**	**63**	**70**
	8	16	24	32	40	48	**56**	**64**	**72**	**80**
	9	18	27	36	45	**54**	**63**	**72**	**81**	**90**
	10	20	30	40	50	**60**	**70**	**80**	**90**	**100**

Table 5: Criteria for assessing the significance of impacts

Significance	Low	Site specific, low intensity	< 30
	Medium	Site specific, moderate intensity	30 - 60
	High	Regional, high intensity	60 - 100

Table 6: Mitigation Requirements.

Significance Level	Significance Rating	Negative Impact Management Recommendation
High	60 - 100	Critically consider the viability of proposed projects Seek strategic measures to minimise impacts and improve current management effective immediately
Medium	30 - 60	Maintain current project layout and methodology, with recommended management practices to alleviate the identified impacts
Low	< 30	Maintain current project layout and methodology, with recommended management practices to alleviate the impacts

3. ASSESSMENT RESULTS

3.1 DESKTOP ANALYSIS

The desktop assessment results were obtained from various data sources including, but not limited to, the Agricultural Geo-referenced Information System (AGIS) and other sources as listed under references. The available Soil Terrain (SOTER) and geological data indicate that the study area comprises of soil with very little to no profile differentiation, classified as Albic Arenosols (ARa), primarily derived from alluvial sand. These soils are typically light-coloured (bleached) sand, expressed by high Munsell value and low chroma (IUSS, 2014).

3.2 HISTORIC AND CURRENT LAND USE

No agricultural land uses were identified within the study area during the soil survey. The majority of the study area comprised of industrial infrastructure including concrete-paved service & maintenance utilities on the southern portion, falling within the Transnet National Ports Authority (TNPA) premises, as depicted in **Figure 2** below. The remainder of the study area comprised of remnants of a natural thicket along the peripheries of the TNPA operations (**Figure 3**), and an ephemeral grassland within the RBIDZ property (**Figure 4**).

Figure 2: View of the industrial land use features within the southern portion (TNPA property) of the study area.

Figure 3: View of the remaining thicket identified along the peripheries of the TNPA operations.

Figure 4: View of the ephemeral grassland within the northern portion (RBIDZ property) of the study area.

3.3 DOMINANT SOIL TYPES

The majority of the study area comprised of concreted surfaces such that the underlying soil could not be accessed for classification, which were then classified as Witbank soil forms by default. The Witbank soil form is characteristic of the soils that have been extensively modified or buried by historic anthropogenic activities, hence appropriate in this scenario. This group of soils collectively constituted approximately 53.1% (25.8 ha) of the study area, as illustrated on the soil map in **Figure 5** below.

The remainder of the study area comprised of the Fernwood/Longlands and Mispah/Glenrosa soil forms, constituting approximately 30.9% (15 ha) and 4.3% (2.1 ha) of the study area, respectively. The Fernwood/Longlands soil forms were particularly identified along the remaining tracts of undisturbed areas. A distinction was made between the Fernwood/Longlands soil forms identified within the southern portion of the TNPA and those within the RBIDZ property. A significant increase in clay content and depth to water table was observed on the Fernwood/Longlands soil forms identified within the RBIDZ property compared to those identified within the TNPA property.

The areas where the Mispah/Glenrosa soil forms were identified appeared to be significantly transformed due to historic and/or current industrial activities, with most areas seemingly infilled with pebbles at relatively shallow depth and/or on the surface in some instances. These soils have undergone severe compaction over time such that refusal was encountered at relatively shallow depth, and these soils were therefore classified as equivalent to the Mispah/Glenrosa soil forms due to limited soil material available. The remaining surface of the study area was covered by water along the TNPA berths, constituting approximately 11.7 % (5.7 ha) of the study area, as depicted in **Figure 5** below.

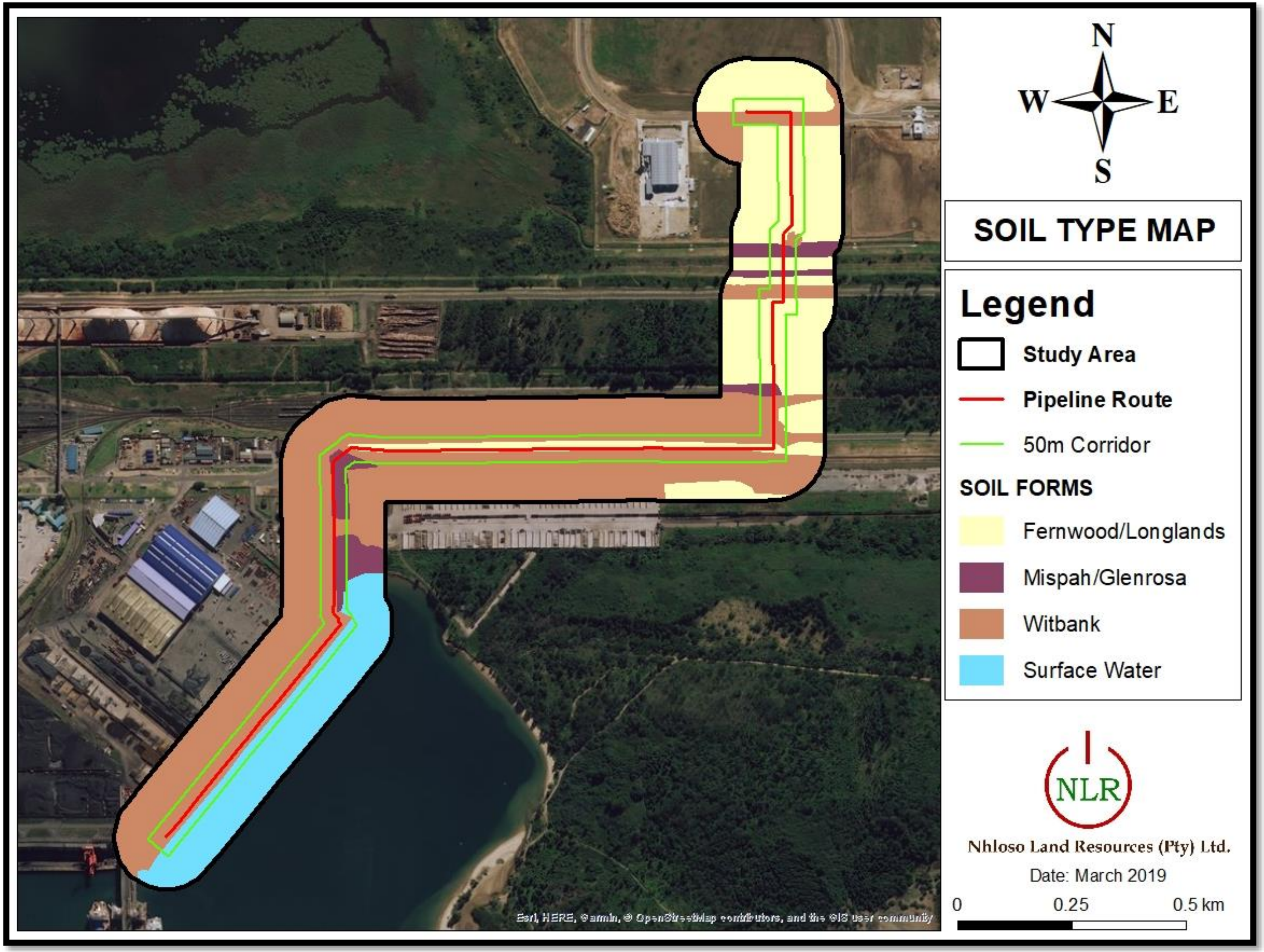


Figure 5: Soil map depicting the spatial distribution of the identified soil forms within the study area.

3.4 LAND CAPABILITY CLASSIFICATION

In South Africa, agricultural land capability is generally restricted by climatic conditions, particularly water availability. However, even within similar climatic zones, different soil types typically have different land use capabilities attributed to their inherent characteristics.

For the purposes of this assessment, land capability was inferred from physical soil properties and prevailing local climatic conditions. The surveyed area is considered to fall within Climate Capability Class 2, with a good yield potential for a wide range of adapted crops. The identified soils were classified into four land capability classes as presented in **Figure 6** below, and the identified land capability limitations for the identified soils are discussed in a comprehensive summary presented in **Tables 7 - 9** below, with representative photos and spatial extents of each soil form.

The Fernwood/Longlands soil forms typically have a coarse texture and high porosity, accounting for their generally high permeability and low water and nutrient storage capacity. On the other hand, these soils offer ease of cultivation, rooting and harvesting of root and tuber crops; however, cultivation can easily destabilise these soils, typically resulting in shifting dunes to poor cohesion. The low coherence, low water & nutrient storage capacity attributes, in conjunction with high sensitivity to erosion are main limitations, such that these soils are best suited for forest plantations or remain under natural vegetation, to enable natural nutrient recycling from the biomass and the soil organic matter.

However, in reality, these soils are commonly used for a variety of crops under injudicious and/or desperate circumstances. Cautious management practices, including minimum tillage, monitored dosage of irrigation and fertigation, and fallow period(s) are highly recommended under such circumstances where these soils are cultivated.

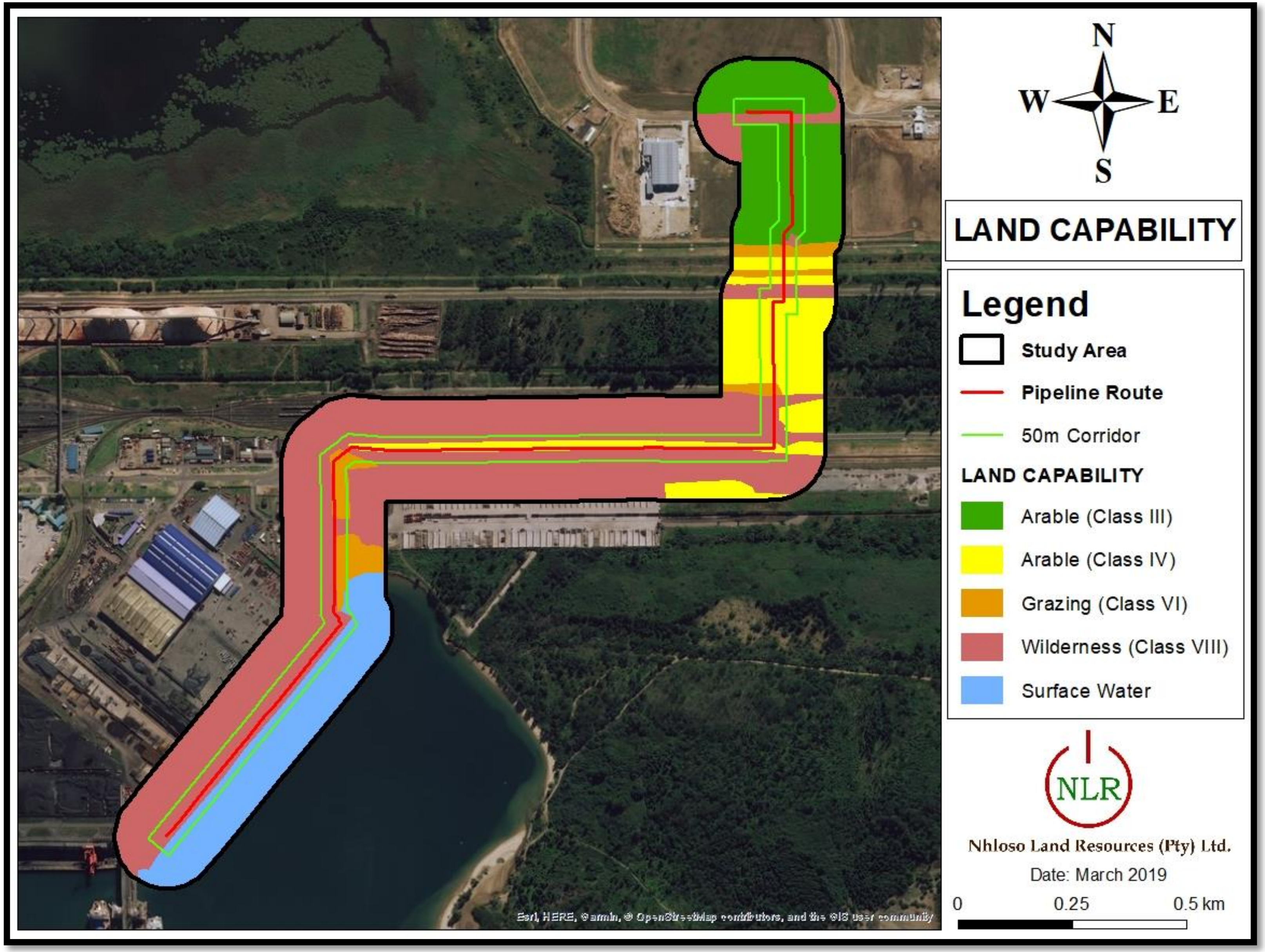


Figure 6: Land capability map depicting land capability classification of the identified soils in the study area.

Table 7: Summary discussion of the identified Fernwood/Longlands soil forms and their inherent agricultural land capability

Soil Form(s)	Fernwood/Longlands
Terrain Morphological Unit (TMU)	Relatively flat landscape of < 0.5 % slope gradient
Areal Extent	Approximately 15 ha; which constitutes ≈ 31% of the study area
Diagnostic Horizon Sequence	0 - 3 cm: Orthic A 3 - 72 cm: E-horizon ≥ 72 cm: *Seasonal* water table
Physical Limitations	These soils have sufficient depth for most cultivated crops and rapid drainage characteristics. However, the excessively drained nature of these soils as evidenced by the bleached E-horizon is often problematic for cultivated crops where irrigation is not viable. This further indicates high leaching rates and poor nutrients retention to sustain arable crops.
Land Capability	The identified Fernwood/Longlands soil forms are considered to be of moderate (class III to IV) land capability, potentially suitable to arable agricultural land use. However, these soils are considered best suited for grazing and/or forestry land use due to the excessively drained nature of these soils, which is likely to pose poor water & nutrients retention due to high porosity, which may be problematic for arable crops where irrigation is not viable.
Impact Significance:	Although the agricultural land capability impact is anticipated to be relatively low, the ecological impact is anticipated to be considerably higher due to the wetland attributes of these soils. Soil erosion and potential contamination risks are anticipated to be high, largely attributed to the coarse texture and apedal (weakly developed) structure of these soils; whereas, the soil compaction impact is anticipated to be of medium risk.

View of the characteristic features of the identified Fernwood/Longlands soil form.

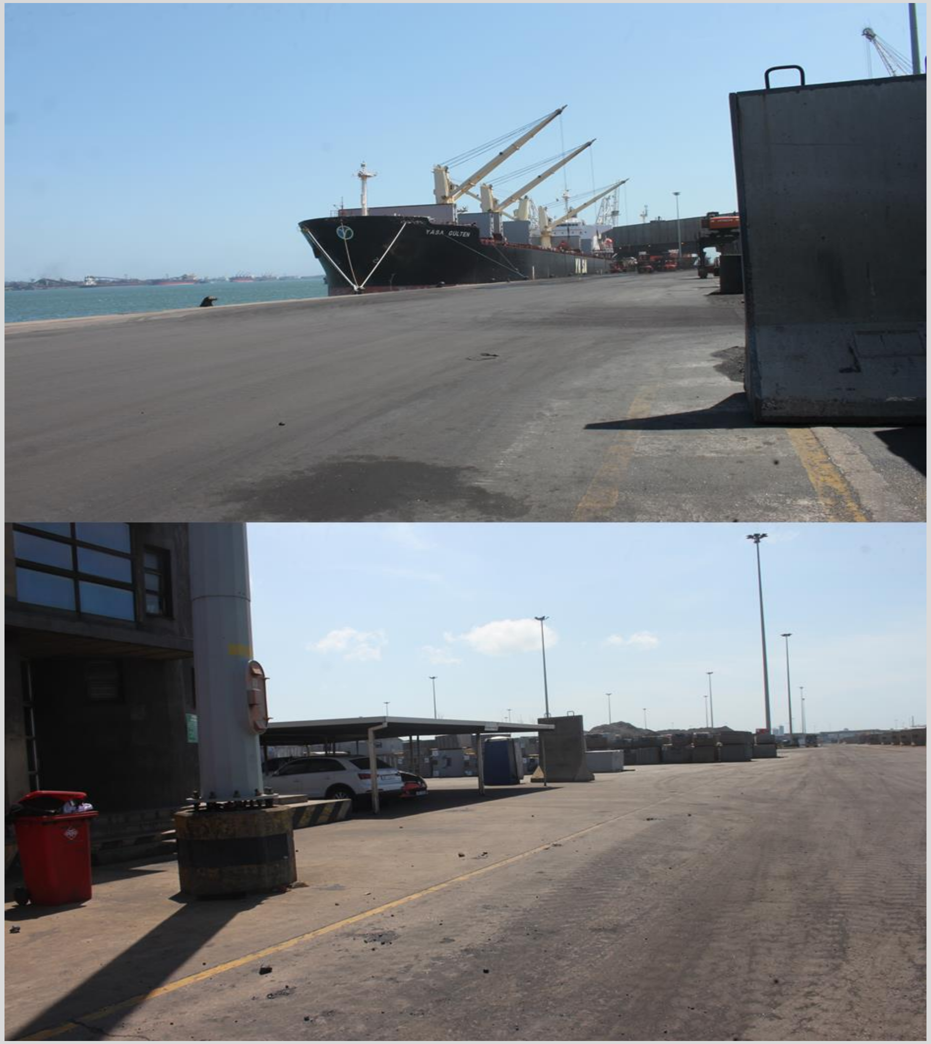
Table 8: Summary discussion of the Mispah/Glenrosa soil forms and their inherent agricultural land capability

Soil Form(s)	Mispah/Glenrosa
Terrain Morphological Unit (TMU)	Relatively flat landscape of < 0.5 % slope gradient
Areal Extent	Approximately 2.1 ha; which constitutes ≈ 4.3% of the study area
Diagnostic Horizon Sequence	0-12 cm: Orthic A 12-28 cm: imported (anthropogenic) material
Physical Limitations	Shallow effective rooting depth is the primary limitation of the land capability of these soil forms, attributed to the observed infilling with pebbles and resultant compaction at relatively shallow depth.
Land Capability	These soil forms are considered to be of poor (class VI) land capability and are not suitable for arable agricultural land use under current conditions. These soils may be cultivated for grazing pastures with shallow rooting depth.
Impact Significance:	The agricultural land capability impact is anticipated to be low for these soil forms, attributed to the pre-existing anthropogenic (infilling & compaction) impacts observed under current conditions. The erosion, potential contamination and subsequent compaction impacts are anticipated to be medium for these soils under current conditions

View of the identified in-filled areas, classified as equivalent to the Mispah/Glenrosa soil forms.

Table 9: Summary discussion of the Witbank soil form and their inherent agricultural land capability

Soil Form(s)	Witbank (*Anthrosols*)
Terrain Morphological Unit (TMU)	Relatively flat landscape of < 0.5 % slope gradient
Areal Extent	Approximately 25.8 ha; which constitutes ≈ 53% of the study area
Diagnostic Horizon Sequence	Unspecified – diagnostic (classifiable) soil material could not be assessed as the *in-situ* soil is buried and/or extensively modified at the time of assessment.
Physical Limitations	Comprises of extensively disturbed areas due to historic anthropogenic activities, to an extent that no recognisable diagnostic soil horizon properties could be identified. These soils primarily included operational buildings, concrete paving on road surfaces, railway infrastructure identified within the study area.
Land Capability	These soils were classified as Wilderness (Class VIII) and are not considered to make a significant contribution to agricultural productivity under current conditions.
Impact Significance:	These soils are considered to be resistant to erosion and soil compaction impacts due artificial surface hardening material(s) used on the existing infrastructure e.g. paved roads, buildings, concrete parking areas etc. Furthermore, these soils have a relatively low potential for contamination, due to their relatively impermeable surface that can effectively hinder contaminant percolation into the underlying soil.



View of the observed permanent structures classified as the Witbank soil forms

4. IMPACT ASSESSMENT RESULTS

4.1 PROPOSED ACTIVITY

The significance of the anticipated impacts was evaluated based on the description of associated activities for the proposed pipeline development, which indicates that four 400 mm diameter HDPE pipe sleeves will be installed using a combination of pile caps and piling methods as described below. However, percussion driven piles are likely to be the preferred piling option due to the relatively soft sands in the upper strata and the relatively shallow water table, as this method of piling doesn’t require auger boring or any other form of excavation.

4.1.1 Pile Caps

It is assumed that the pile caps that will support the structural steel bridge will be as per the indicative drawings, including:

- Main supports: (No 2 at the ends of the 12 m high bridge, plus 1 No at the end of the 5,5 m high bridge)
  - 3m wide;
  - 1,7 m long;
  - 0,7m below ground surface; and
  - 0,5 m above ground surface.

- Intermediate supports: (2 No for the 12 m high bridge, 6 No for the 5,5 m high bridge)
  - 3m wide;
  - 1,0 m long;
  - 0,7m below ground surface; and
  - 0,5 m above ground surface

4.1.2 Piling

Piling will be used for the above-ground portion of the pipeline that will extend over the Transnet Railyard North section of the route. Percussion driven piles will be driven into the ground by ramming precast concrete piles with a large dropweight that is hoisted on a rig and then allowed to “hammer” the pile into the ground until it reaches a predetermined resistance such that it will support the imposed loads from the structure (dead weight plus imposed loads).

The pipelines will traverse approximately 2.8 km at 1.8 m aboveground, and will be supported on steel supports, mounted on concrete pad foundations of approximately 1,5 x 1,5 m, extending down to 1,2 m below ground surface (bgs).

Underground crossings will be constructed where the proposed pipeline route intersects with the roads and/or railway lines. These underground crossings will include access shafts of approximately 3,225 x 2,060 m, with an underside of 2,800 m below ground on each side.

4.2 AGRICULTURAL LAND CAPABILITY IMPACTS

The proposed development will not directly impact on the agricultural crop production of the proposed development area, as no agricultural land uses were observed during the soil survey. The proposed development has a potential to hinder agricultural land use as a physical barrier and inaccessibility of the land for agricultural use. However, the overall impact is anticipated to be relatively low due to the linear alignment of the proposed pipeline infrastructure, and limited overall surface area that will be effectively utilised.

Apart from inaccessibility of the land for agricultural use, the soils will further be exposed to erosion, compaction, and potentially soil contamination, where intrusive surface disturbances will occur, particularly during the construction & installation phase of the development. The significance of the aforementioned impacts on the identified soil types is summarised in **Tables 10 to 13** below. Theses impacts are however anticipated to cease during the operational phase if managed properly.

4.2.1 Inaccessibility of Potentially Arable and Grazing Land

Although some of the identified soils are suitable for arable agriculture, agricultural production is not considered practically viable in this case due to currently ongoing industrial activities in the vicinity of the study area, which are envisaged to persist for the foreseeable future since the greater surrounding area has been designated for industrial land use according to the Environmental Authorisation & Record of Decision issued by the KZN Department of Agriculture & Environmental Affairs to enable phase 1A and 1B development for the RBIDZ.

The overall land capability impacts will be particularly significant for the potentially arable Fernwood/Longlands (Class III & IV) soil forms, attributed to their inherently arable land capability and vulnerability to erosion. In addition to their arable agricultural potential, the Fernwood/Longlands soil forms are also considered to be characteristic wetland soils, attributed to their seasonal water table fluctuation, as substantiated by the development of a bleached eluvial (*albic*) E-horizon, as depicted on the sample photos in **Table 7** above. In light of the above, the agricultural land capability impact is anticipated to be relatively low for the identified Fernwood/Longlands soil forms (**Table 10**), in context of the pre-existing land use impacts in the vicinity of the study area. However, the impact on these soils is anticipated to be considerably higher for their wetland attributes and ecological function.

The impact is also anticipated to be low for the Mispah/Glenrosa soil forms, and negligible for the Witbank soil forms, due to their inherently poor land capability of these soils under current conditions, as presented in **Tables 10** below.

Table 10: Loss of agricultural land capability impact assessment for the identified soils

Impact Descriptors	Fernwood/Longlands (Class III & IV)		Mispah/Glenrosa (Class V)		Witbank (Class VIII)	
	Pre-mitigation	Post-mitigation	Pre-mitigation	Post-mitigation	Pre-mitigation	Post-mitigation
Probability	Unlikely (1)	Unlikely (1)	Unlikely (1)	Unlikely (1)	Unlikely (1)	Unlikely (1)
Sensitivity	Moderate (3)	Moderate (3)	Low (2)	Low (2)	Negligible (1)	Negligible (1)
Extent	Local/Site (1)	Local/Site (1)	Local/Site (1)	Local/Site (1)	Local/Site (1)	Local/Site (1)
Intensity	Moderate (2)	Low (1)	Moderate (2)	Low (1)	Low (1)	Low (1)
Duration	Life of operation (3)	Life of operation (3)	Life of operation (3)	Life of operation (3)	Life of operation (3)	Life of operation (3)
Significance	**Low (24)**	**Low (16)**	**Low (18)**	**Low (15)**	**Low (10)**	**Low (10)**

4.2.2 Soil Erosion

The anticipated soil erosion impacts are fundamentally based on field observations including the terrain morphology (landscape) and the observed 'soil profile characteristics'. In general, soils with a high clay content have a high water holding capacity and are less prone to erosion in comparison to sandy textured soils, which are more susceptible to erosion. The proposed development area comprises of relatively flat terrain, which restricts the erosion hazard, and therefore, physical soil properties took precedence over slope gradient as a determining criterion for erosion risk for this assessment.

Although the identified soils seemingly display moderate susceptibility to erosion under current conditions, their susceptibility to erosion will be largely increased once the vegetation is cleared and the soils become exposed to wind and stormwater. As such, the soil erosion impact is considered to be of medium risk for the Fernwood/Longlands soil forms, attributed to their coarse texture and apedal (weakly developed) structure, as illustrated on the sensitivity map in **Figure 7** below. The erosion risk is also anticipated to be medium for the infilled Mispah/Glenrosa soil forms, although significantly compacted under current conditions due to historic anthropogenic impacts, as illustrated in **Table 11** below.

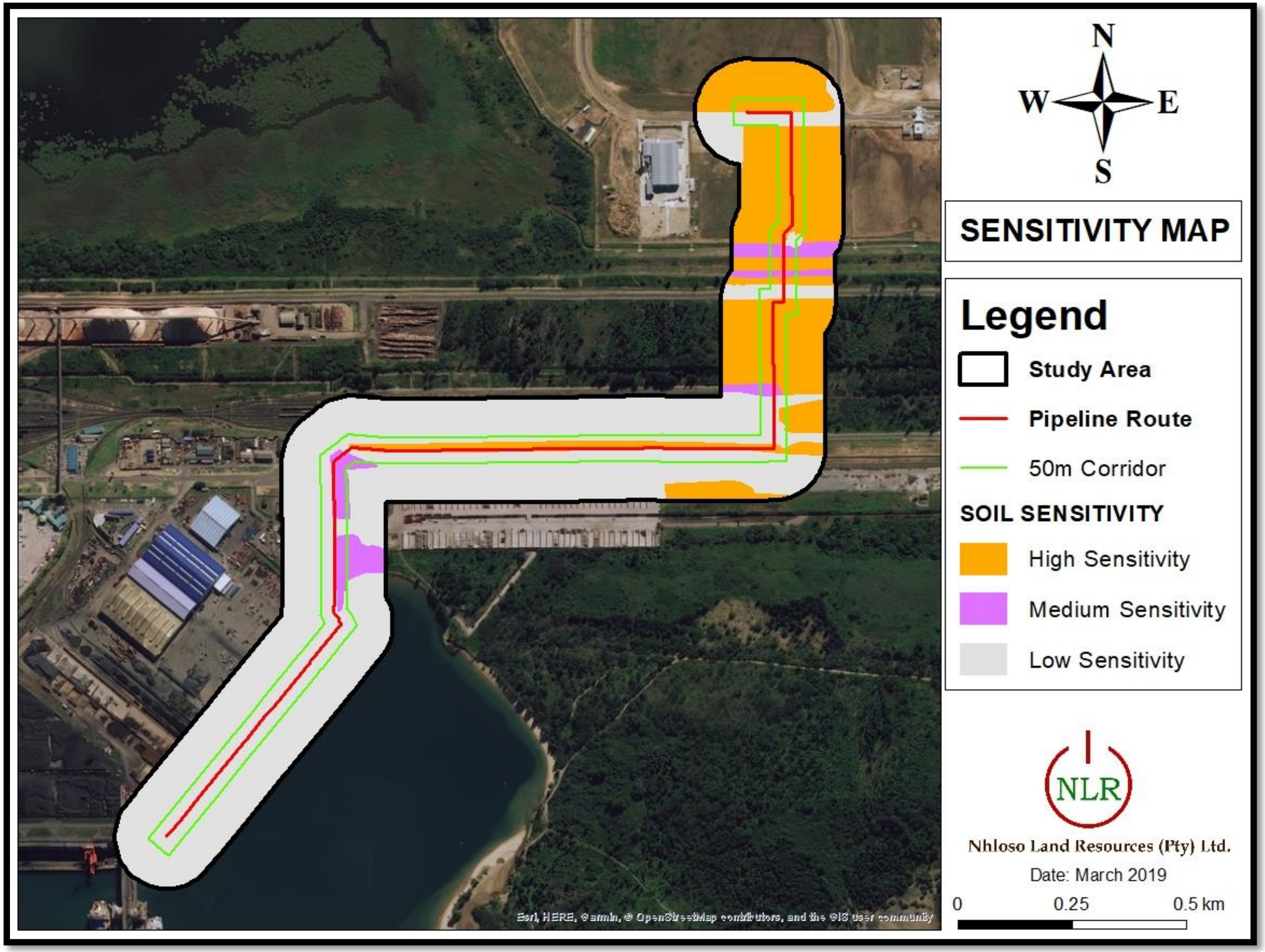


Figure 7: Sensitivity map depicting the sensitivity of the identified soils to the proposed development activities.

The Witbank soils are considered to be resistant to erosion impact due artificial surface hardening material used on the existing infrastructure e.g. paved roads, buildings, concrete parking areas etc.

Table 11: Soil erosion impact assessment for the identified soils

Impact Descriptors	Fernwood/Longlands (Class III & IV)		Mispah/Glenrosa (Class V)		Witbank (Class VIII)	
	Pre-mitigation	Post-mitigation	Pre-mitigation	Post-mitigation	Pre-mitigation	Post-mitigation
Probability	Highly Likely (4)	Likely (3)	Likely (3)	Possible (2)	Unlikely (1)	Unlikely (1)
Sensitivity	Very High (5)	Very High (5)	Moderately High (4)	Moderately High (4)	Negligible (1)	Negligible (1)
Extent	Local (1)	Local (1)	Local (1)	Local (1)	Local (1)	Local (1)
Intensity	Moderate (2)	Low (1)	Moderate (2)	Low (1)	Low (1)	Low (1)
Duration	Life of operation (3)	Temporary (1)	Life of operation (3)	Temporary (1)	Life of operation (3)	Temporary (1)
Significance	**Medium (54)**	**Low (24)**	**Medium (42)**	**Low (18)**	**Low (10)**	**Low (06)**

4.2.3 Soil Compaction

Heavy equipment and vehicular traffic during construction activities is anticipated to cause significant soil compaction on the identified soils. The significance of this impact is anticipated to be medium for the Fernwood/Longlands and Mispah/Glenrosa soil forms, and significantly low for the Witbank soil forms, as presented in **Table 12** below.

Table 12: Soil compaction impact assessment for the identified soils

Impact Descriptors	Fernwood/Longlands (Class III & IV)		Mispah/Glenrosa (Class V)		Witbank (Class VIII)	
	Pre-mitigation	Post-mitigation	Pre-mitigation	Post-mitigation	Pre-mitigation	Post-mitigation
Probability	Inevitable (5)	Highly Likely (4)	Inevitable (5)	Highly Likely (4)	Unlikely (1)	Unlikely (1)
Sensitivity	Moderate (3)	Moderate (3)	Low (2)	Low (2)	Negligible (1)	Negligible (1)
Extent	Local (1)	Local (1)	Local (1)	Local (1)	Local (1)	Local (1)
Intensity	Moderate (2)	Low (1)	Moderate (2)	Low (1)	Low (1)	Low (1)
Duration	Life of operation (3)	Temporary (1)	Life of operation (3)	Temporary (1)	Life of operation (3)	Temporary (1)
Significance	**Medium (48)**	**Low (21)**	**Medium (42)**	**Low (18)**	**Low (12)**	**Low (06)**

4.2.4 Soil Contamination

All the identified soils are considered to be equally predisposed to contamination, as contamination sources are generally unpredictable and typically occur as incidental spills or leaks during construction projects. The soil contamination impact is therefore largely dependent on the nature, volume and/or concentration of the contaminant of concern. The significance of this impact is anticipated to be high (as a worst-case scenario) for the Fernwood/Longlands, attributed to their well-drained upper solumn, though which contaminants can percolate into the groundwater, as presented in **Table 13** below.

Table 13: Soil contamination impact assessment for the identified soils

Impact Descriptors	**Fernwood/Longlands (Class III & IV)**		**Mispah/Glenrosa (Class V)**		**Witbank (Class VIII)**	
	Pre-mitigation	Post-mitigation	Pre-mitigation	Post-mitigation	Pre-mitigation	Post-mitigation
Probability	Likely (3)	Possible (2)	Likely (3)	Possible (2)	Possible (2)	Unlikely (1)
Sensitivity	Very High (5)	Moderate (3)	Moderately High (4)	Moderate (3)	Low (2)	Negligible (1)
Extent	Local (1)	Local (1)	Local (1)	Local (1)	Local (1)	Local (1)
Intensity	High (3)	Low (1)	High (3)	Low (1)	Moderate (2)	Low (1)
Duration	Permanent (4)	Temporary (1)	Permanent (4)	Temporary (1)	Permanent (4)	Temporary (1)
Significance	**High (64)**	**Low (15)**	**Medium (56)**	**Low (15)**	**Low (28)**	**Low (06)**

The Mispah/Glenrosa and Witbank soil forms on the other hand are anticipated to have a medium and low significance, due to their relatively compacted condition and impermeable surface that can effectively hinder contaminant percolation into the underlying soil and groundwater, respectively.

4.3 CUMULATIVE IMPACT

The proposed development is anticipated have cumulative impacts on soil compaction and potential contamination, particularly attributed to construction activities. However, the significance of cumulative impacts associated with this development are anticipated to be relatively low, due to its linear nature and limited extent. In addition, the respective location of the proposed infrastructure development within the remaining tracts of land between the TNPA and RBIDZ properties (which have been significantly transformed by historic and/or ongoing industrial development activities) further lowers the significance of cumulative impacts on a local scale, hence designated for industrial purposes according to the existing Environmental Authorisation & Record of Decision issued by the KZN Department of Agriculture & Environmental Affairs.

5. MITIGATION STRATEGY

The Mining and Biodiversity Guideline document (DEA et al., 2013) provides a range of "best practice" guidelines and mitigation hierarchy, which were adapted for this assessment. The following mitigation measures were compiled in line with the aforementioned mitigation hierarchy, which constitutes avoidance of adverse impacts on environmental resources as a first option (the "no-go alternative") prior to any other development alternative; and in circumstances where avoidance is not feasible, the potential impacts should be mitigated accordingly following the mitigation hierarchy.

5.1 THE NO-GO ALTERNATIVE

The "no-go" alternative implies that the proposed development is not implemented within the study area as an avoidance of the identified impacts, and maintain the status quo. However, maintaining the status quo is not likely to improve the agricultural potential of the study area since no agricultural activities are actively in place, and the area within which the study area is located has been specifically designated for industrial development. It is therefore recommended that the proposed development can be implemented, provided that the following mitigation measures are effectively implemented throughout the project, since no severe and/or irreversible impacts are anticipated as far as the agricultural land capability aspect is concerned.

5.2 INTEGRATED MITIGATION MEASURES

The following integrated mitigation measures are recommended should any intrusive construction activities be carried out within the study area, as detailed in **Table 14** below.

Table 14: Proposed mitigation measures to alleviate the identified impacts during various phases of the proposed development

INTEGRATED MITIGATION MEASURES: CONSTRUCTION – DECOMMISSIONG PHASE	
POTENTIAL IMPACTS	**PROPOSED AVOIDANCE AND MITIGATION MEASURES**
Land withdrawal from cultivation Land withdrawal from grazing Destruction of seasonal wetland habitat(s) Soil compaction	▪ Schedule construction works such that there are no unprecedented delays, such that the soil exposure duration is reduced to absolute minimum. ▪ Vegetation clearance and earthworks should be preferably scheduled during the dry (low rainfall) season when chances of runoff and water erosion are minimal, and soil moisture content is also minimal, in order to avoid excessive soil erosion through stormwater runoff. ▪ Avoid clearing the vegetation cover all at once; the study area can be divided into subsections that will be progressively cleared only when required according to the construction schedule. ▪ Strictly limit vegetation clearance and earthworks to the pre-determined areas where intrusive subsurface excavation will be required for the installation of the pipeline supporting structures. ▪ Vegetation clearance and construction activities should preferably commence on the up-gradient section and gradually progress down-gradient, such that the undeveloped portion can continuously serve as a natural erosion control, sediment retention, and stormwater attenuation mechanism. ▪ Avoid stockpiling where possible, and all excavated soil can be re-used on adjacent areas to minimise soil exposure to erosion and dust emission, following the excavation works. ▪ Re-vegetate or mulch the cleared areas after the construction works to limit soil erosion and dust emission. ▪ Vehicular movement should be strictly restricted within the existing roads minimise compaction footprint. ▪ Bare (un-vegetated) soils can be regularly dampened with water to supress dust during the construction phase, especially when strong winds prevail. ▪ A regulated speed limit of ≤ 40 km per hour can be maintained on unpaved road to minimise dust emission during construction works. ▪ A strict waste management plan should be developed to guide the construction crew and must be adhered to throughout the project. ▪ Contamination prevention measures should be addressed in the EMP for the proposed development, and this should be implemented and made available and accessible to all contractors and construction crew.

INTEGRATED MITIGATION MEASURES: CONSTRUCTION – DECOMMISSIONG PHASE	
POTENTIAL IMPACTS	**PROPOSED AVOIDANCE AND MITIGATION MEASURES**
Soil erosion and sediment losses	▪ A spill prevention and emergency spill response plan, as well as dust suppression, and fire prevention plans should also be compiled and incorporated to the safety protocols to guide the construction works. ▪ The spill prevention plan should adequately address clean-up measures, to mitigate ingress of contaminants into the soils and potential leaching of contaminants into groundwater in the event of a spill and/or a leak of potentially hazardous substances during the construction phase and throughout the lifespan of the proposed development. ▪ Burying of waste, including rubble, domestic waste, or empty containers should be strictly prohibited. ▪ Inert uncontaminated building rubble should be removed to an authorised disposal site, or alternatively reused within the study area e.g. on road surfaces where permitted by the landowner(s).
Soil contamination	▪ Efforts should be made to reclaim all the associated facilities and infrastructure as soon as they are no longer in use, to prevent complex accumulated impacts. ▪ Burying of waste should be strictly prohibited, and all waste should be managed in accordance with the relevant legislative requirements. ▪ Inert (uncontaminated) rubble waste may be re-used in the vicinity of the study area where needed e.g. on road surface. ▪ Completely decommission and reclaim all the constructed infrastructure materials as soon as they are no longer in use, and re-vegetate any exposed soils with a suitable indigenous pioneer grass species, where needed. ▪ Soil compaction (where encountered) can be alleviated by lightly ripping the soils to at least 45 cm below ground surface to physically loosen the soil during decommissioning, prior to re-vegetating the soil.

6. CONCLUSIONS & RECOMMENDATIONS

No agricultural land uses were identified during the survey. The majority of the study area comprised of industrial infrastructure including concrete-paved service & maintenance utilities within the TNPA premises, such that the underlying soil could not be accessed for classification. Such areas were classified as the Witbank soil forms by default, collectively constituting approximately 53.1% (25.8 ha) of the study area. The remainder of the study area comprised of Arable (class III and class IV) Fernwood/Longlands soil forms, constituting approximately 12.6% (6.1 ha) and 18.3% (8.9 ha) of the study area, respectively. The Mispah/Glenrosa soil forms were classified as Grazing (class V) land capability, constituting approximately 4.3% (2.1 ha) of the study area. The remaining surface was covered by water along the TNPA berths, constituting approximately 11.7 % (5.7 ha) of the study area.

The Fernwood/Longlands soil forms were particularly identified along the remaining tracts of undisturbed areas along the peripheries of the TNPA operations and within the RBIDZ property. A distinction was made between the Fernwood/Longlands soil forms identified within the southern portion of the TNPA and those within the RBIDZ property. A significant increase in clay content and depth to water table was observed on the Fernwood/Longlands soil forms identified within the RBIDZ property compared to those identified within the TNPA property. Although the identified Fernwood/Longlands soil forms are classified to be of high potential (arable) agricultural land capability, these soils are best suited for forest plantations or remain under natural vegetation to enable natural nutrient recycling from the biomass and soil organic matter, due to the low nutrient storage capacity and high erosion sensitivity of these soils, attributed to their coarse, poorly developed structure.

All the identified impacts including soil erosion, soil compaction, and contamination are anticipated to be adequately mitigated to a low level of significance by the recommended integrated mitigation measures. However, in addition to the arable agricultural land capability, the Fernwood/Longlands soil forms are also considered to be characteristic wetland soils, attributed to their seasonal water table fluctuation, as substantiated by the development of a bleached eluvial (albic) E-horizon. As such the findings and recommendations of the wetland assessment should be thoroughly considered and implemented in conjunction with this report to ensure compliance with the applicable environmental regulations. Based on the findings of this assessment, the proposed pipeline development is therefore anticipated to have a low agricultural land capability impact, and may be considered favourable provided that the recommendations of this assessment report are implemented to the satisfaction of the regulating authorities.

7. REFERENCES

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APPENDICES

APPENDIX A:

DETAILS, EXPERTISE AND CURRICULUM VITAE OF THE SPECIALIST

1.(a)(i) Details of the specialist who prepared the report

Ms. Sinethemba E. Mchunu
SACNASP: 100171/13
M.Sc. Soil Science (US)
BSc. Hons (Soil Science) (US)

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Signature

1.(a).(ii) The expertise of the specialist who compile a specialist report including a curriculum vitae

Company of Specialist:	Nhloso Land Resources (Pty) Ltd.
Name / Contact person:	Sinethemba Mchunu
Physical address:	ED Village 9 West Central Arterial Richards Bay 3900
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Qualifications	MSc. Soil Science (University of Stellenbosch) BSc Hons. Soil Science (University of Stellenbosch) BSc. Agric. Viticulture & Soil Science (University of Stellenbosch)
Registration / Associations	South African Council for Natural Scientific Professions (SACNASP) Member of the Land Rehabilitation Society of Southern Africa (LaRSSA) Member of the Soil Science Society of South Africa (SSSSA Member of the South African Soil Surveyors Association (SASSO) Member of the Gauteng Wetland Forum (GWF)

SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF SINETHEMBA E. MCHUNU

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ACADEMIC QUALIFICATIONS

- 2012: MSc. Soil Science, University of Stellenbosch
- 2010: BSc. Hons. Soil Science, University of Stellenbosch
- 2009: BSc. Agric. Viticulture and Soil science, University of Stellenbosch
  Postgraduate Biometry (Statistics) course

PROFESSIONAL AFFILIATIONS

- South African Council for Natural Scientific Professions (SACNASP): Reg. No.: 100171/13
- Land Rehabilitation Society of Southern Africa (LaRSSA)
- Soil Science Society of South Africa (SSSSA)
- South African Soil Surveyors Organization (SASSO)

WORK EXPERIENCE

- Founder of Nhloso Land Resources (Pty) Ltd. (Current)
- Senior Environmental Consultant (Project Manager) at Scientific Aquatic Services
- Contaminated Site Consultant (Project Manager) at Environmental Resources Management (ERM) South Africa
- Soil Specialist at Strategic Environmental Focus (Pty) Ltd. (2012 – 2013)
- Soil Analytical Researcher at Stellenbosch University (2009 –2010)

SELECTED PROJECT EXAMPLES:

Soil Agricultural Land Capability Impact Assessments

- Soil and Land Capability Assessment for the expansion of the Royal Bafokeng Styldrift Mine near Brits, North West province, South Africa;
- Soil and Land Capability Impact Assessment for the proposed Xstrata Paardekop & Amersfoort Coal Mines in, Mpumalanga Province, South Africa;
- Soil and Land Capability Impact Assessment for the proposed Xstrata Coal Mine in, Mpumalanga Province, South Africa;

- Agricultural Impact Assessment for a proposed 30 megaWatts (MW) Photo Voltaic (PV) Solar Facility in Mareetsane, North West Province, South Africa;
- Soil and Land Capability Impact Assessment for the proposed BioGas Plant facility in Malmesbury, Western Cape Province, South Africa; and
- Soil and Agricultural Potential Assessment for the proposed Hulett Milling Plant at the Owen Sithole College of Agriculture (OSCA) in Empangeni, KwaZulu Natal Province, South Africa.

Contaminated Site Investigations

- Soil and Groundwater contamination assessments prior to installation and decommissioning of underground fuel storage tanks at multiple petroleum filling stations within the Gauteng, Limpopo, Free State, Northern Cape, and North West Provinces;
- Soil contamination assessment at ELCA Engineering Turbo Manufacturing and Fabrication to inform the due diligence process;
- Bi-annual soil contamination assessment at BHP Billiton Klipspruit Coal Mine for Water Use Licence compliance;
- Soil Contamination and Waste Classification Assessment at Petra Diamonds Mine in Lime Acres, Kimberly, Northern Cape Province, South Africa;
- Soil and Groundwater contamination assessments at multiple Mining and Distribution operations with private fuel storage facilities; and
- Sediment and water quality assessment for the Bokoni Platinum Mine.

Environmental Risk Assessments

- Environmental Risk and Liability Assessment prior to decommissioning and mine closure for the BECSA TNC Colliery in the Mpumalanga Province, South Africa;
- Environmental Risk Assessment for the abandonment of the former Rand Uranium Gold Mine, prior to land use change to a mixed residential and commercial development at Bhongweni and Toekomsrus in Randfontein, Gauteng Province, South Africa;

Wetland Delineations and Impact Assessments

- Characterisation of the wetland recharge mechanism(s) through the vadose zone, as part of the impact assessment of the proposed coal mining activities within the catchment in Kwagga North, Mpumalanga Province, South Africa;
- Investigating wetland offset alternatives and appropriate rehabilitation measures for the proposed coal mining activities at Phalanndwa Colliery in Delmas, Mpumalanga Province, South Africa;
- Wetland Rehabilitation Plan and ecological assessment of an artificial watercourse “abandoned quarry” in Olifantsfontein, Gauteng Province, South Africa;

1.(b) A declaration that the specialist is independent in a form as may be specified by the competent authority

I, Sinethemba Mchunu, declare that -

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct

____

Signature of the Specialist