ENERTRAG SOUTH AFRICA (PTY) LTD

DALMANUTHA WIND ENERGY FACILITY

SOIL AND AGRICULTURAL POTENTIAL STUDY SCOPING REPORT

22 JUNE 2022

FINAL

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FINAL

PROJECT NO.: 41103722
DATE: JUNE 2022

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1 INTRODUCTION

WSP in Africa (WSP), a wholly owned affiliate of WSP Global Inc., has been appointed by ENERTRAG South Africa (ENERTRAG) to undertake a Soil and Agricultural Potential Assessment as input into a series of environmental authorisations for the proposed development of the Dalmanutha Wind Energy Facility (WEF) and Dalmanutha West WEF (herein referred to as the Project).

The aim of this scoping assessment was to provide preliminary descriptions of the soils identified and their distribution within the project area, and to establish some typical soil properties and current land use. A high-level screening of potential soil impacts and mitigation was also carried out.

1.1 PROJECT DESCRIPTION

The Project lies approximately 7km southwest of Belfast in Mpumalanga and falls within the Emakhazeni Local Municipality (see **Figures 1-3**). The Project will comprise up to 80 wind turbines, each of which will require a foundation 25m in diameter and 3m deep. Roughly 60km of internal roads of width around 10m will be required and cables will run underground. Other aspects of the Project that will potentially affect the site soils include a substation and battery energy storage system, Operations and Maintenance buildings, a construction camp and a temporary laydown area and cement batching plant (**Figure 4**).

The required authorisations for the Project will include one (1) Scoping and Environmental Impact Assessment (S&EIA) and four (4) Basic Assessments (BAs) made up as follows:

1. Dalmanutha Wind Energy Facility (up to 300MW) – S&EIA;
2. Dalmanutha Wind Energy Facility Grid infrastructure (up to 132kV) - BA;
3. Dalmanutha West Wind Facility (less than 20MW) - BA;
4. Dalmanutha West Grid infrastructure (up to 132kV) - BA; and
5. Common Collection Substation and Powerline (up to 132kV) – BA.

1.2 LEGISLATIVE CONTEXT

The legislation that has direct implications for how soils are managed is the Conservation of Agricultural Resources (Act 43 of 1983) (CARA). Other environmental legislation such as the National Environmental Management Act (Act 107 of 1998) and the National Water Act (Act 36 of 1998) provide guidance on environmental activities and sets out the principles of Duty of Care, Pollution Control and Waste Management. The relevant sections of the CARA are discussed below.

The purpose of the CARA is to provide for the control over the utilization of the natural agricultural resources of the Republic so as to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invader plants. The Act states that control measures may be applied to (amongst others):

- The utilization and protection of land which is cultivated;
- The prevention or control of waterlogging or salination of land;
- The restoration or reclamation of eroded land or land which is otherwise disturbed or denuded.

The Act further states that different control measures may be prescribed in respect of different classes of land users or different areas or in such other respects as the Minister may determine, stipulating that:

- Any land user who refuses or fails to comply with any control measure which is binding on him, shall be guilty of an offence.

The implication of this for the project is that control measures will be required to manage and where possible mitigate the impacts of the Project on soil and land capability.

1.3 STUDY LIMITATIONS

- A significant portion of the site has been disturbed, by existing agricultural activity making classification of the soil forms difficult.
- Site access was difficult owing to the terrain, a lack of access roads and inclement weather.
- The site could not be traversed such that an even grid matrix of classification points could be set up. As a result, some extrapolation of findings will be necessary.
- A third site visit will be required to auger soil classification points in various areas on the remainder of the study site (see **Figure 5**).
- The area demarcated as an Exclusion Area in the underlying images was not included in the study at the landowner's request.

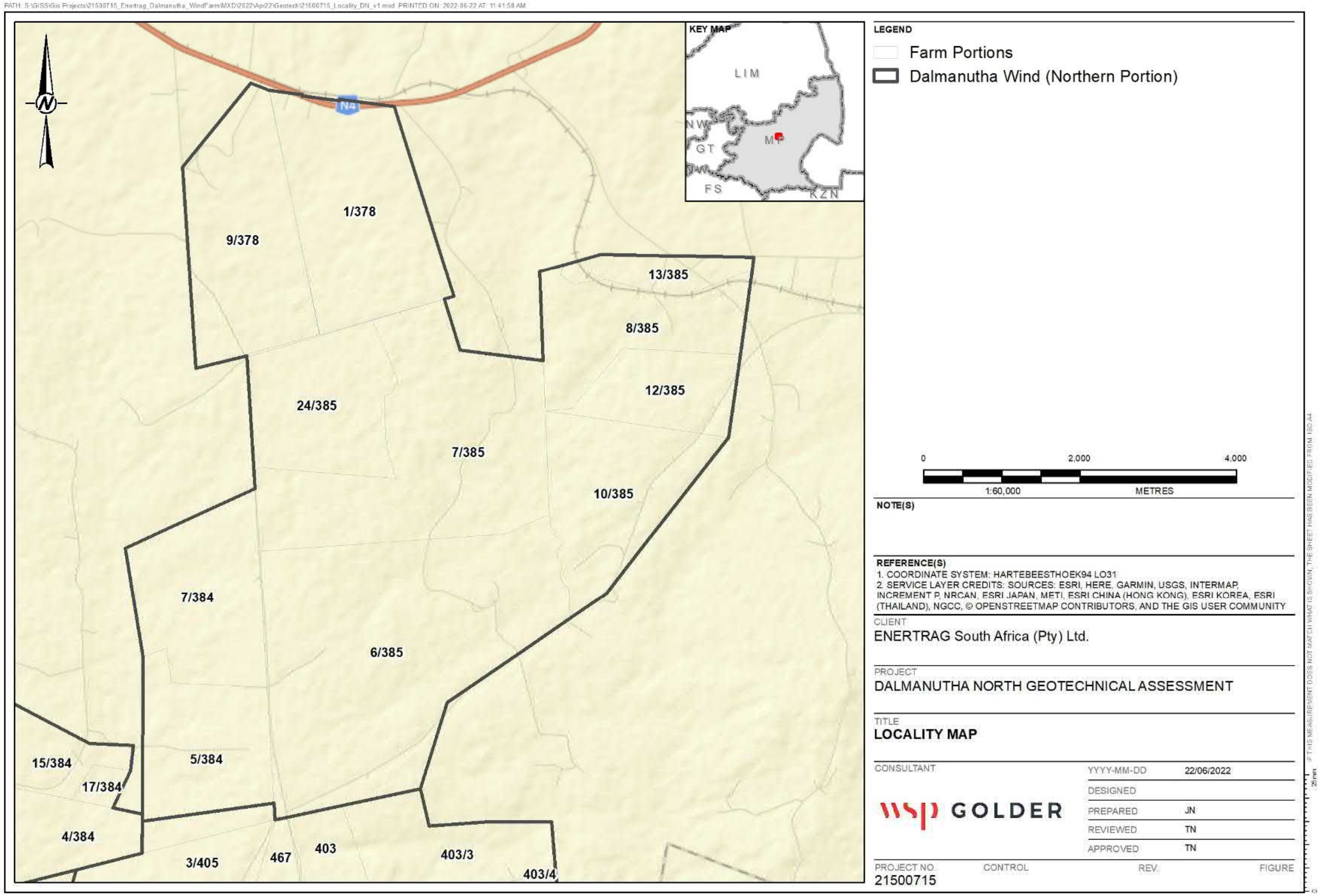

Figure 1: Dalmanutha Wind Site Setting – Northern Portion

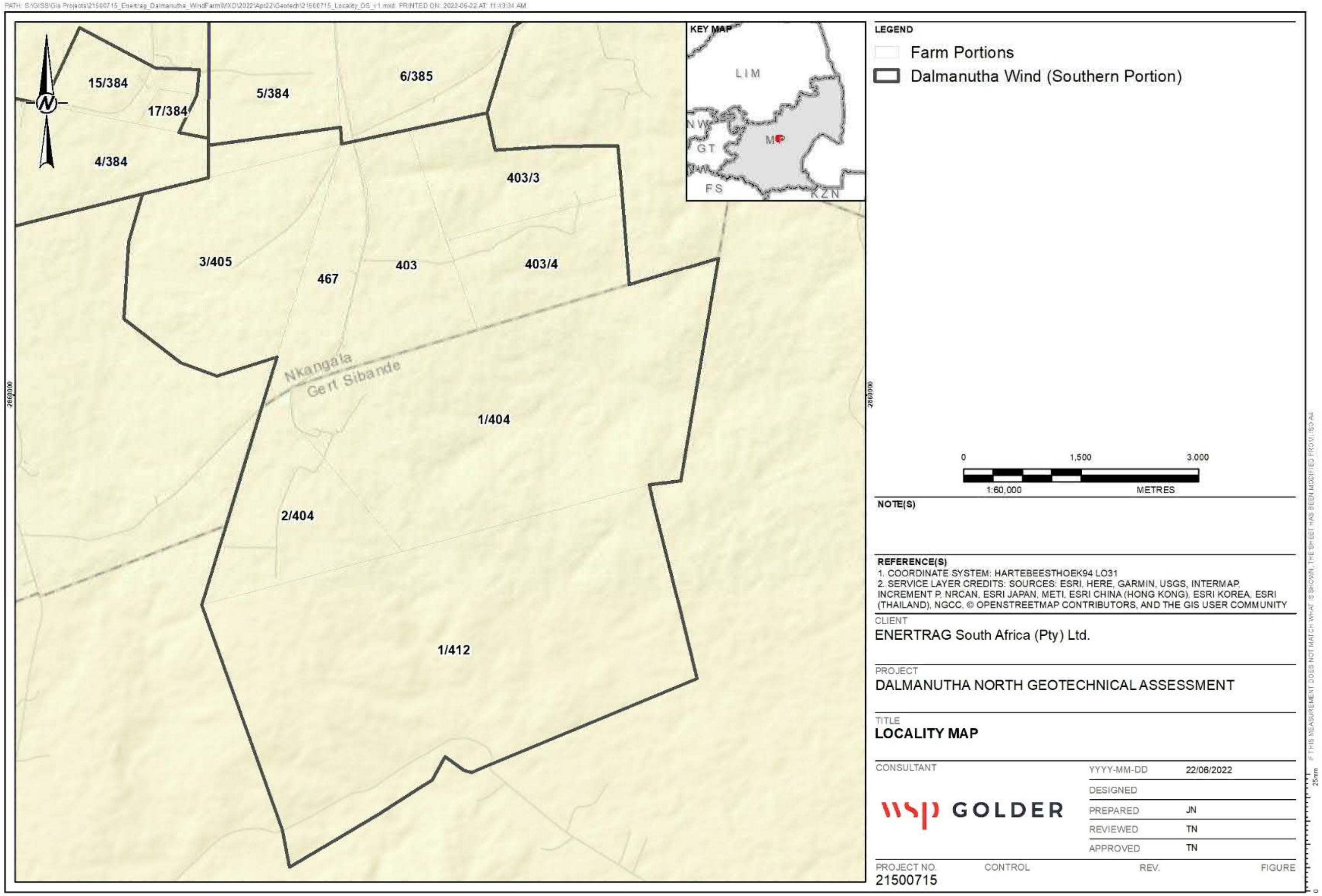

Figure 2: Dalmanutha Wind Site Setting – Southern Portion

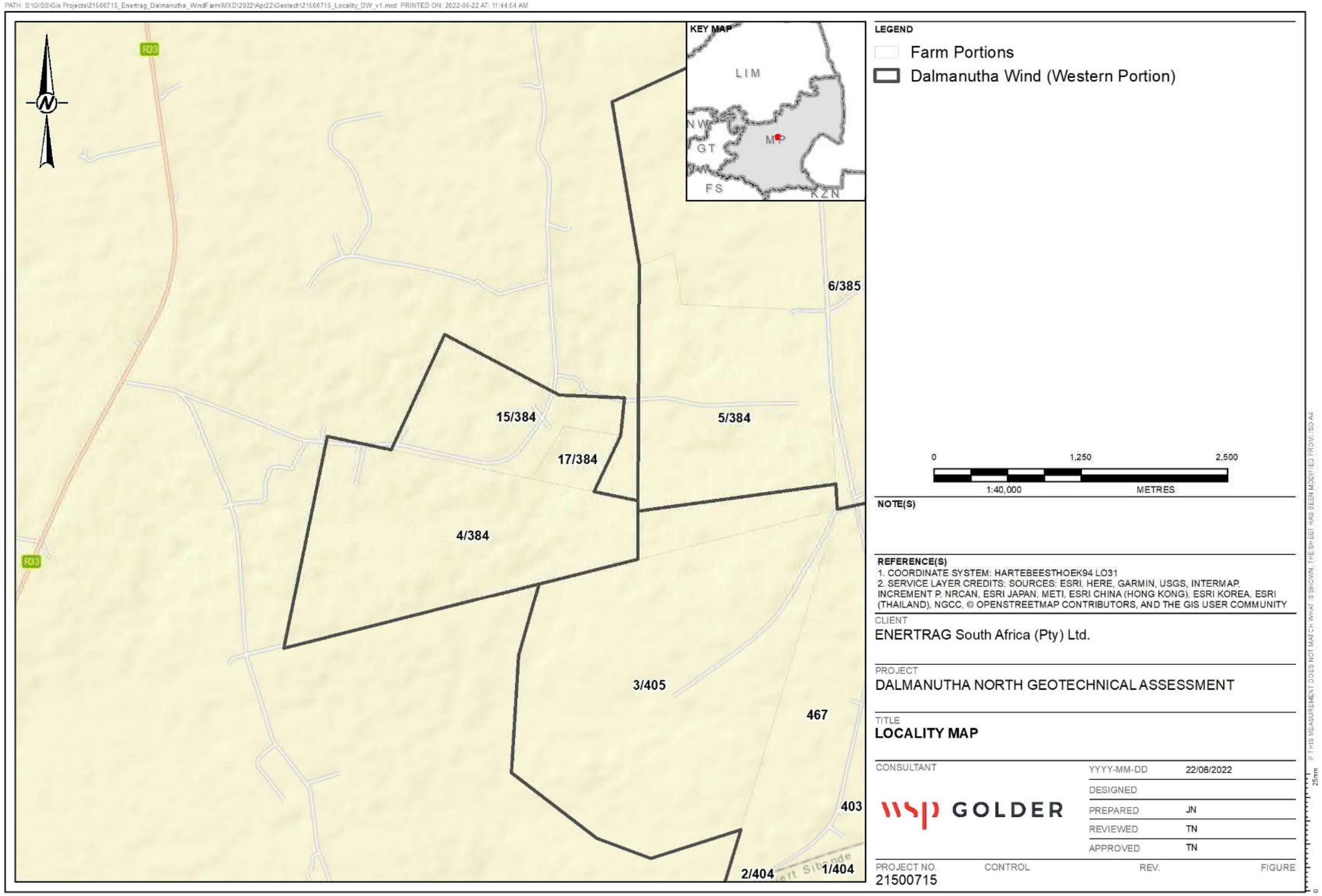

Figure 3: Dalmanutha Wind Site Setting – Western Portion

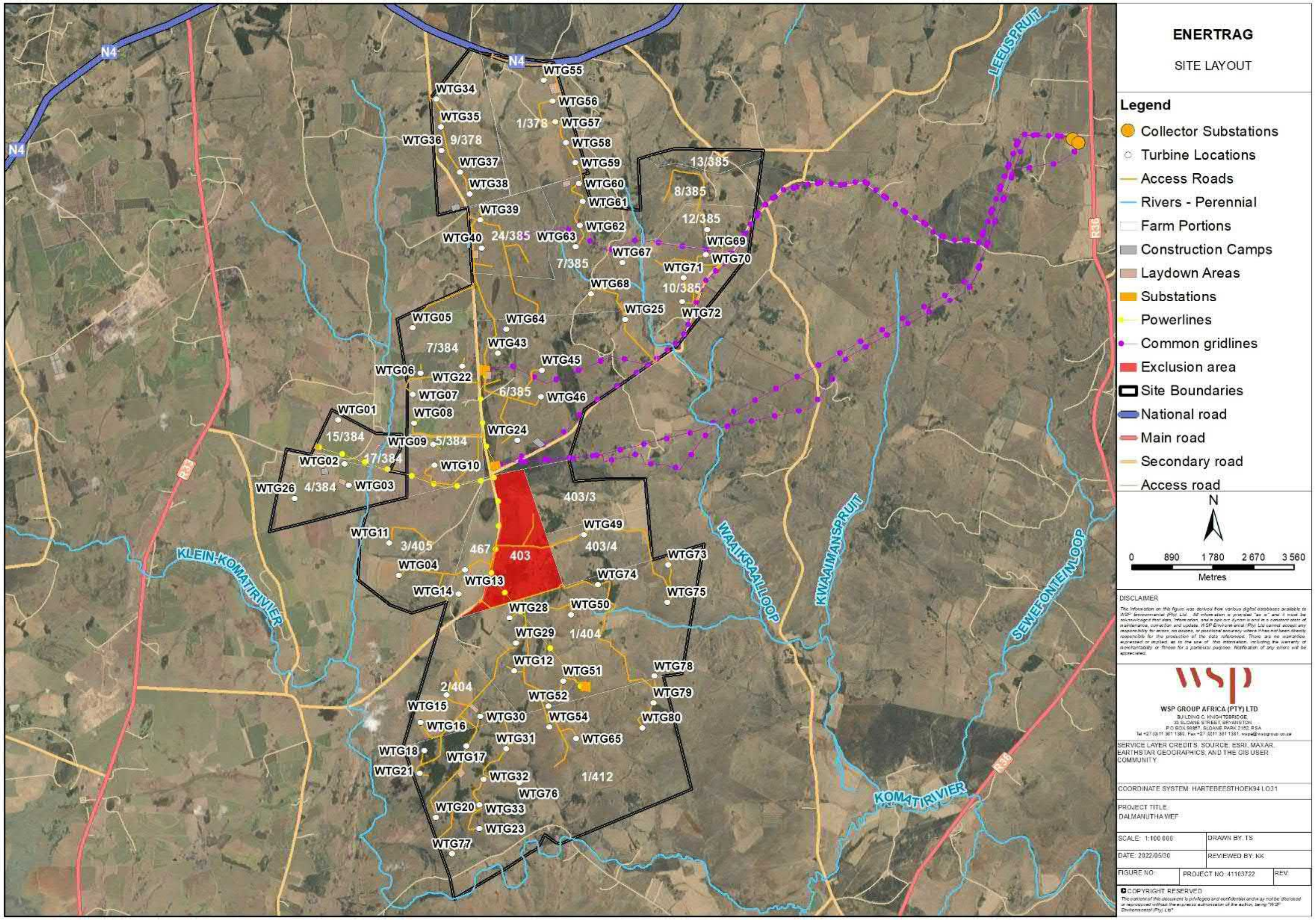

Figure 4: Dalmanutha Site Layout

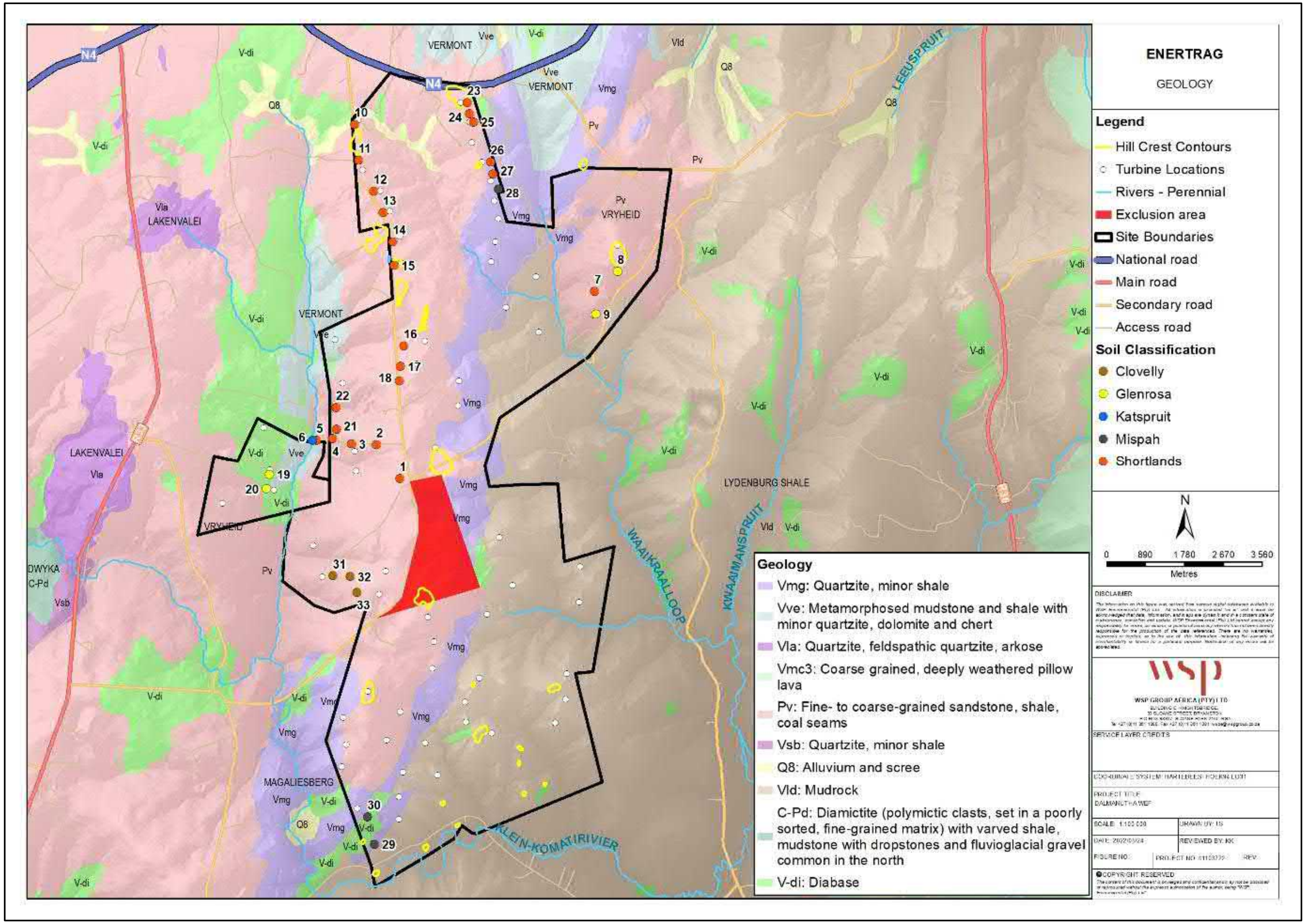

Figure 5: **Dalmanutha Site Geology and Classification Points**

2 BASELINE ENVIRONMENT

2.1 CLIMATE

The climate of the Dalmanutha region can be described as a subtropical highland climate or a temperate oceanic climate with dry winters and falls into Köppen climate type: Cwb. The average temperature for the year in nearby Belfast is 14.4°C and the warmest month on average is January with an average temperature of 18.2°C. The coolest month on average is June with an average temperature of 8.8°C. The mean annual precipitation for Belfast is 838.2mm. The month with the most precipitation on average is January with 162.6mm and the month with the least precipitation on average is July with an average of 5.1mm. These climatic conditions give rise to chemically weathered red and yellow soils that are typical of subtropical upland areas, as was widely seen on site (see **Figures 5, 6, 7** and Appendix A).

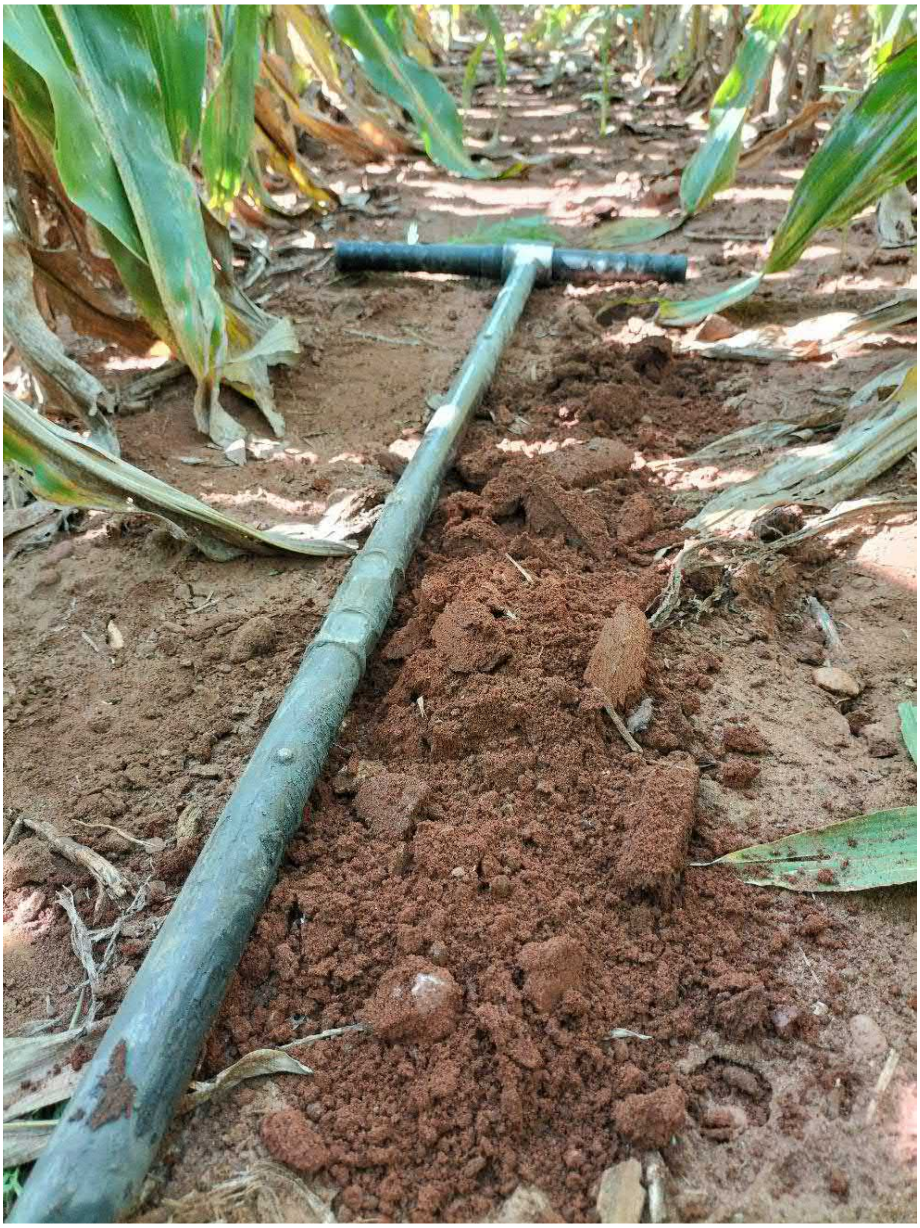

Figure 6: Typical Subtropical Weathered Soil of the Shortlands Form

2.2 GEOLOGY

The site geology is dominated by fine- to course-grained sandstone and shale across the west, mudrock across the east and quartzite and shale along the middle section (see **Figure 5**). The sandstone has given rise to soils that contain kaolinitic clays in the site areas already visited, as expected (see **Figure 6**). Where the site areas underlain by quartzite have been visited, rocky areas with very thin soils and minimal vegetation were encountered (see **Figure 5**), also as expected. It is expected that the areas underlain by mudrock will give rise to clay-rich, silty soils.

2.3 TOPOGRAPHY

The topography of the area is varied and comprises largely rocky hillslopes interspersed by gullies. The site slopes upward from south to north, flattening in the middle section. As expected in the areas already visited, thin, rocky soils exist on the hilltops, while deep, red, well-drained soils occur in the uplands and wet, gleyed soils can be found in the gullies. There was very little evidence of 'intermediate', poorly drained soils showing mottles or other signs of wetness, however. **Figure 7** shows red soils (Shortlands form) next to the riverbed in which gleyed soils (Katspruit form) were identified.

2.4 SENSITIVITY

Based on the site work undertaken to date, the areas that must be avoided are the exclusion area and the areas around the watercourses (see **Figure 8**). A 50m buffer – as opposed to a more typical 100m buffer – has been used as the terrestrial (dry) soils appear to start close to the edges of the watercourses in the area.

Figure 7: Red Soils Near Riverbed

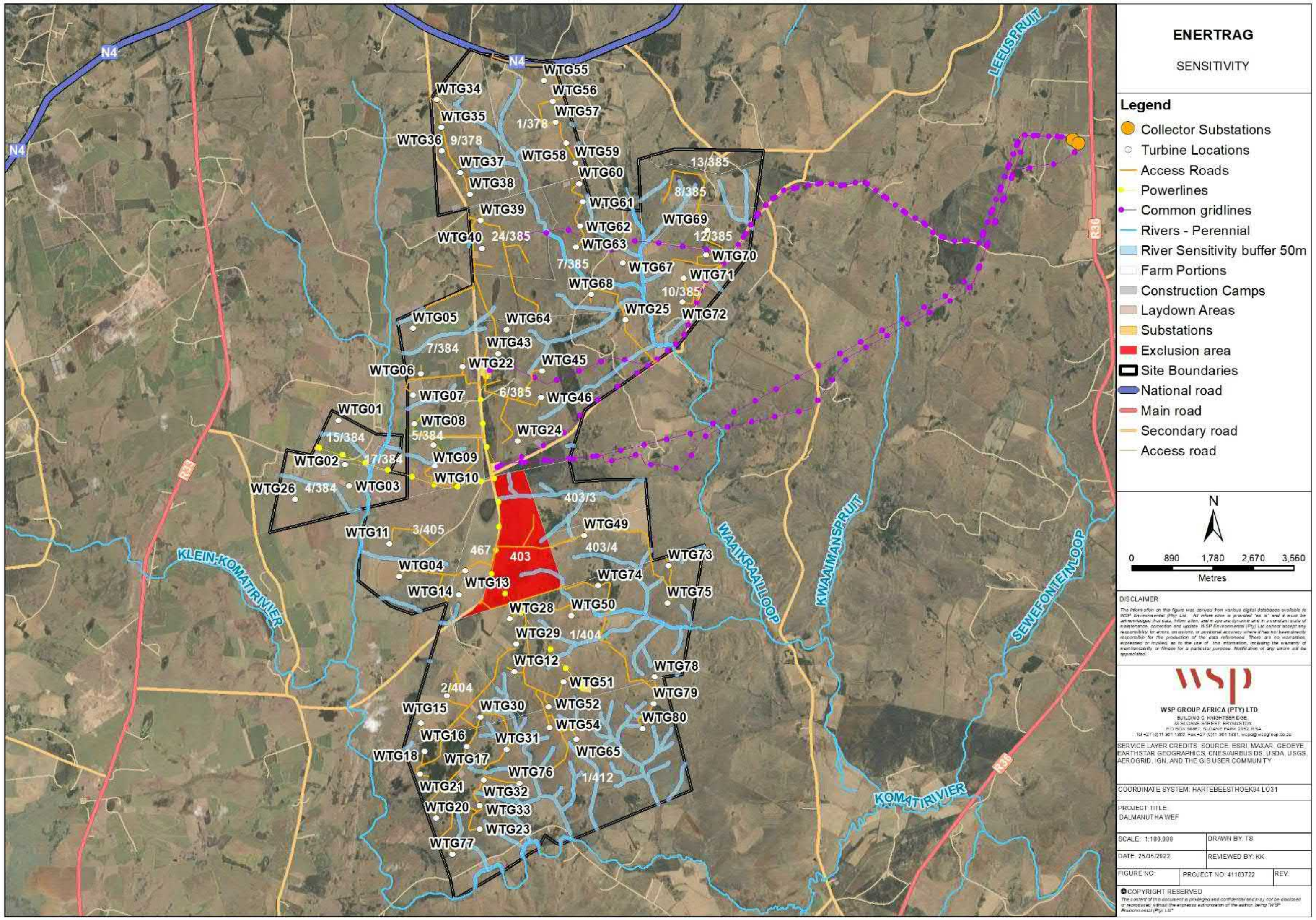

Figure 8: Dalmanutha Preliminary Site Sensitivities

3 IMPACTS SCREENING

3.1 METHODOLOGY

The screening tool used to undertake the high-level impacts and mitigation assessment within this document is based on two criteria; probability and consequence (**Table 1**), where the latter is based on the intensity, extent, and duration of the impact. The scales and descriptors used for scoring probability and consequence are detailed in **Table 2** and **Table 3**, respectively.

Table 1: Significance Screening Tool

		CONSEQUENCE SCALE			
		1	**2**	**3**	**4**
PROBABILITY SCALE	**1**	**Very Low**	**Very Low**	**Low**	**Medium**
	2	**Very Low**	**Low**	**Medium**	**Medium**
	3	**Low**	**Medium**	**Medium**	**High**
	4	**Medium**	**Medium**	**High**	**High**

Table 2: Probability Scores and Descriptors

SCORE	DESCRIPTOR
4	**Definite**: The impact will occur regardless of any prevention measures
3	**Highly Probable**: It is most likely that the impact will occur
2	**Probable**: There is a good possibility that the impact will occur
1	**Improbable:** The possibility of the impact occurring is very low

Table 3: Consequence Scores Descriptions

SCORE	NEGATIVE	POSITIVE
4	Very severe: An irreversible and permanent change to the affected system(s) or party(ies) which cannot be mitigated.	Very beneficial: A permanent and very substantial benefit to the affected system(s) or party(ies), with no real alternative to achieving this benefit.
3	Severe: A long term impact on the affected system(s) or party(ies) that could be mitigated. However, this mitigation would be difficult, expensive or time consuming or some combination of these.	Beneficial: A long term impact and substantial benefit to the affected system(s) or party(ies). Alternative ways of achieving this benefit would be difficult, expensive or time consuming, or some combination of these.

2	Moderately severe: A medium to long term impact on the affected system(s) or party(ies) that could be mitigated.	Moderately beneficial: A medium to long term impact of real benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are equally difficult, expensive and time consuming (or some combination of these), as achieving them in this way.
1	Negligible: A short to medium term impact on the affected system(s) or party(ies). Mitigation is very easy, cheap, less time consuming or not necessary.	Negligible: A short to medium term impact and negligible benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are easier, cheaper and quicker, or some combination of these.

The nature of the impact must be characterised as to whether the impact is deemed to be positive (+ve) (i.e. beneficial) or negative (-ve) (i.e. harmful) to the receiving environment/receptor. For ease of reference, a colour reference system (Error! Reference source not found.) has been applied according to the nature and significance of the identified impacts.

Table 4: Impact Significance Colour Reference System to Indicate the Nature of the Impact

Negative Impacts (-ve)	Positive Impacts (+ve)
Negligible	**Negligible**
Very Low	**Very Low**
Low	**Low**
Medium	**Medium**
High	**High**

3.2 HIGH LEVEL IMPACTS AND MITIGATION

At this stage in the assessment the potential impacts of soil erosion, compaction and contamination have been assessed.

SOIL EROSION

Some erosion will occur wherever soils are disturbed, especially if mitigation measures are not correctly put in place. The thin, hilltop soils and the less structured soils will be more vulnerable to erosion than the more clay-rich soils. Soil erosion can lead to sedimentation of the watercourses that cross the site, and to the loss of arable soil, especially topsoil, for rehabilitation purposes.

Soil erosion mitigation measures that should be considered include phase-appropriate stormwater management plans and correct soil stripping, stockpiling and monitoring, with emphasis on quick revegetation of bare soils. Further to this, existing roads should be used and regraded.

Soil erosion probability is thus definite and potential consequences severe, making the significance High.

SOIL COMPACTION

The more clay-rich soils identified on site will be more vulnerable to compaction than the sandier soils will. Soil compaction reduces the pore space available for air and water within soil, reducing soil arability and increasing the risk of soil erosion.

Soil compaction cannot be fully mitigated against as compacted soil cannot regain its original structure. Soils can be ripped to make them more suitable for cultivation. Soil compaction mitigation measures that should be considered include limiting vehicle routes on site by demarcating traffic areas and limiting vehicle access, and by stripping soils when they are dry. Reuse of existing roads will prevent additional areas from becoming compacted.

Soil compaction probability is thus Definite and potential consequence Moderately Severe, making the significance Medium.

SOIL CONTAMINATION

The more clay-rich soils identified on site will be more vulnerable to contamination than the sandier soils will as the more clay-rich soils are more chemically active and will interact with the contaminants. All soils will be at risk of contamination, especially from hydrocarbons, as a result of the Project, especially during the construction phase.

Contamination mitigation measures that should be considered will include proper handling and storage of hazardous materials, frequent vehicle maintenance, equipping onsite vehicles with drip trays, strict control of the potential contaminants entering the site and adequate waste disposal facilities on site.

Soil contamination probability is Highly Probable and potential consequence Severe, making the significance Medium.

At this stage no soils-related fatal flaws are evident for the proposed project. The areas on site that need to be buffered are the watercourses and the area that needs to be avoided is the exclusion area, which was not included in the study at the landowner's request.

4 PLAN OF STUDY FOR EIA

4.1 SITE ASSESSMENT

Site visits were conducted during the summer season between the 22nd and 24th March, and during the autumn season between the 17th and 20th May 2022. A final site visit will be undertaken during the winter season in order to classify the soils on the remainder of the study area which has not yet been visited. A free format soils classification survey of the study area will be undertaken on foot, using a spade, a hand-held bucket auger and a hand-held Dutch auger to identify soil forms present on site. Current activities at the site and specific areas of land use will be noted. The soil types encountered will be reported upon and mapped.

4.2 SOIL CAPABILITY ASSESSMENT

The soils still to be identified in the field will be classified by form in accordance with the South African soil taxonomic system (Soil Classification Working Group, 1991) and the area's land capability will be assessed and mapped based on the results of the classification study. The South African land capability classification system by Scotney *et al.* (1987) will be used to classify and map land capability (see **Table 5**). This system is useful in that it is able to quickly provide an overview of the agricultural capability and limitations of the soils in question and is useful for land capability comparisons. This system, however, is agriculturally focussed, offering little information about the soil potential for alternative uses. For this reason, a soil suitability assessment tool for alternative uses developed in-house by WSP and informed by the IEMA Land and Soils in EIA Guide (IEMA, 2021) will also be applied to the site (see **Table 6**). A key aspect of this method is that input is gathered in an interdisciplinary manner. As the proposed use of the land for this study is WEF turbines and associated infrastructure, the geotechnical expert working on the project will be consulted.

Table 5: Land Capability Classification System (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 6: Alternative Land Capability Classification System

<table>
<tr><th colspan="2">PROPOSED USE</th><th>(ENTER USE HERE)</th><th>COMMENTS</th></tr>
<tr><td colspan="2">Limitations</td><td>(enter use-specific limitations here)</td><td rowspan="8">(explain capability class decision here)</td></tr>
<tr><td colspan="3"></td></tr>
<tr><td colspan="2">Capability Class</td><td>Limitations To Proposed Use</td></tr>
<tr><td>1</td><td>Very good</td><td>None or Marginal</td></tr>
<tr><td>2</td><td>Good</td><td>Slight</td></tr>
<tr><td>3</td><td>Fair</td><td>Moderate</td></tr>
<tr><td>4</td><td>Poor</td><td>Considerable, Long-Term</td></tr>
<tr><td>5</td><td>Very Poor</td><td>Severe, Long-term, Irreversible</td></tr>
</table>

4.3 SOIL IMPACT ASSESSMENT

The impact assessment undertaken in Section 3 of this document will be expanded upon based on the outcomes of the final site visit and further soil assessment.

5 REFERENCES

- ARC – Institute for Soil, Climate and Water. 2006. *Land Types of South Africa*. Pretoria.
- Fey, M. 2012. *Soils of South Africa*. Cambridge University Press, Granger Bay, Cape Town, South Africa.
- IEMA. 2021. Land and Soils in EIA Guide. IEMA, London, UK.
- Soil Classification Working Group. 1991. *Soil Classification – Taxonomic System for South Africa*. Memoirs on the Agricultural Natural Resources of South Africa No. 15. Department of Agricultural Development, Pretoria.
- Scotney, D.M, F Ellis, R. W. Nott, T.P. Taylor, B.J., Van Niekerk, E. Vester and P.C. Wood. 1987. A system of soil and land capability classification for agriculture in the SATBVC states. Dept. Agric. Pretoria.

APPENDIX

APPENDIX

A FIELD NOTES

APPENDIX

APPENDIX: SOIL

Classification Point: 1

Coordinates: 25°48’55.59S 30°06’03.70’’E

Soil Form: Shortlands

Photograph(s):

Classification Point: 2

Coordinates: 25°48'29.66"S 30° 5'43.91"E

Soil Form: Shortlands

Photograph(s):

Classification Point: 3

Coordinates: 25°48'28.94"S 30° 5'23.51"E

Soil Form: Shortlands

Photograph(s):

Classification Point: 4

Coordinates: 25°48'24.96"S 30° 5'7.88"E

Soil Form: Shortlands

Photograph(s):

Classification Point: 5

Coordinates: 25°48'26.17"S 30° 4'54.86"E

Soil Form: Shortlands

Photograph(s):

Classification Point: 6

Coordinates: 25°48'26.17"S 25°48'26.17"S

Soil Form: Katspruit

Photograph(s):

Classification Point: 7

Coordinates: 25°46'36.55"S 30° 8'44.18"E

Soil Form: Shortlands

Photograph(s):

Classification Point: 8

Coordinates: 25°46'21.71"S 30° 9'3.20"E

Soil Form: Glenrosa

Photograph(s):

Classification Point: 9

Coordinates: 25°46'53.50"S 30° 8'45.24"E

Soil Form: Glenrosa

Photograph(s):

Classification Point: 10

Coordinates: 25°44'30.88"S 30° 5'28.11"E

Soil Form: Shortlands

Photograph(s):

Classification Point: 11

Coordinates: 25°44'57.61"S 30° 5'31.15"E

Soil Form: Shortlands

Photograph(s):

Classification Point: 12

Coordinates: 25°45'20.91"S 30° 5'43.32"E

Soil Form: Shortlands

Photograph(s):

Classification Point: 13

Coordinates: 25°45'36.68"S 30° 5'50.93"E

Soil Form: Shortlands

Photograph(s):

Classification Point: 14

Coordinates: 25°45'58.61"S 30° 5'58.54"E

Soil Form: Shortlands

Photograph(s):

Classification Point: 15

Coordinates: 25°46'16.09"S 30° 5'59.68"E

Soil Form: Shortlands

Photograph(s):

Classification Point: 16

Coordinates: 25°47'16.15"S 30° 6'7.07"E

Soil Form: Shortlands

Photograph(s):

Classification Point: 17

Coordinates: 25°47'31.54"S 30° 6'4.15"E

Soil Form: Shortlands

Photograph(s):

Classification Point: 18

Coordinates: 25°47'42.34"S 30° 6'3.28"E

Soil Form: Shortlands

Photograph(s):

Classification Point: 19

Coordinates: 25°48'51.42"S 30° 4'15.80"E

Soil Form: Glenrosa

Photograph(s):

Classification Point: 20

Coordinates: 25°49'2.15"S 30° 4'13.42"E

Soil Form: Glenrosa

Photograph(s):

Classification Point: 21

Coordinates: 25°48'17.96"S 30° 5'11.27"E

Soil Form: Shortlands

Photograph(s):

Classification Point: 22

Coordinates: 25°48'1.61"S   30° 5'11.17"E

Soil Form: Shortlands

Photograph(s):

Classification Point: 23

Coordinates: 25°44'15.27"S 30° 7'0.62"E

Soil Form: Shortlands

Photograph(s):

Classification Point: 24

Coordinates: 25°44'23.46"S 30° 7'2.46"E

Soil Form: Shortlands

Photograph(s):

Classification Point: 25

Coordinates: 25°44'29.72"S 30° 7'5.72"E

Soil Form: Shortlands

Photograph(s):

Classification Point: 26

Coordinates: 25°44'59.56"S 30° 7'19.63"E

Soil Form: Shortlands

Photograph(s):

Classification Point: 27

Coordinates: 25°45'8.56"S 30° 7'21.47"E

Soil Form: Shortlands

Photograph(s):

Classification Point: 28

Coordinates: 25°45'19.79"S 30° 7'25.63"E

Soil Form: Mispah

Photograph(s):

Classification Point: 29

Coordinates: 25°53'27.36"S 30° 5'40.42"E

Soil Form: Mispah

Photograph(s):

Classification Point: 30

Coordinates: 25°53'7.00"S 30° 5'34.62"E

Soil Form: Mispah

Photograph(s):