

**FINAL BASIC ASSESSMENT  
REPORT AND WATER USE  
LICENCE APPLICATION PROCESS  
FOR THE PROPOSED  
DEVELOPMENT OF SU CASA  
PRIVATE BURIAL ESTATE AND  
ASSOCIATED ACTIVITIES ON  
PORTION 10 OF FARM  
DOORNRUG 302 IN EMALAHLENI  
LOCAL MUNICIPALITY,  
MPUMALANGA PROVINCE**

**APRIL 2023**

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**Note:**

The proposed project will be undertaken on Portion 10 (a Portion of Portion 9) of Farm Doornrug 302 in Emalahleni Local Municipality, Mpumalanga Province. It should be noted that this farm is also referred to as Portion 22 of Farm Doornrug 302. However, the owner's Title Deed refers to the property as Portion 10 (A Portion of Portion 9) of Farm Doornrug 302

**DOCUMENT CONTROL**

**FINAL BASIC ASSESSMENT REPORT:  
 THE PROPOSED DEVELOPMENT OF SU CASA PRIVATE BURIAL  
 ESTATE AND ASSOCIATED ACTIVITIES ON PORTION 10 OF FARM  
 DOORNRUG 302 IN EMALAHLENI LOCAL MUNICIPALITY,  
 MPUMALANGA PROVINCE**

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**ABBREVIATIONS**

- BAR:** Basic Assessment Report
- EA:** Environmental Authorisation
- EIA:** Environmental Impact Assessment
- EMPR:** Environmental Management Programme
- NEMA:** National Environmental Management Act, 107 of 1998
- NEMBA:** National Environmental Management: Biodiversity Act 10 of 2004
- NWA:** National Water Act N. 36 of 1998
- WUL:** Water Use Licence Application
- WULA:** Water Use Licence Application

## 1. INTRODUCTION

Some of the cemeteries in Emalahleni Local Municipality have reached capacity while others will reach capacity in future. In order to increase future capacity for cemeteries, Su Casa Burial Estate (Pty) Ltd. (hereafter referred to as Su Casa) proposes to construct a private cemetery on the Remaining Extent of Portion 10 (a portion of Portion 9) of the Farm Doornrug 302 JS. The total size of the proposed project site is ~26ha. The proposed burial estate is located ~18km west of Emalahleni and ~2km south of the N4.

The proposed project triggers activities listed under the Environmental Impact Assessment (EIA) Regulations of 2014 as amended, promulgated under the National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA), as such requires an Environmental Authorisation (EA) before construction commences. Further, the proposed project triggers activities listed under Section 21 of the National Water Act, 1998 (Act 36 of 1998) and requires a Water Use Licence (WUL) before construction activities commence. In addition, the proposed project requires a permit to establish a cemetery.

The application for the EA will be lodged with the Mpumalanga Department of Agriculture, Rural Development, Land and Environmental Affairs (DARDLEA) whereas the Water Use Licence Application (WULA) will be lodged with the Department of Water and Sanitation (DWS). The permit to establish the cemetery will be obtained from the Emalahleni Local Municipality.

Eaglesage (Pty) Ltd. (hereafter referred to as Eaglesage) has been appointed by Su Casa to undertake the Basic Assessment (BA) and WULA processes for the proposed project.

## 2. DETAILS OF THE PROJECT PROPONENT AND ENVIRONMENTAL ASSESSMENT PRACTITIONER

### 2.1. Details of the Project Proponent

Table 1 below includes the details of the project proponent.

Table 2-1: : Details of the project proponent

Aspect	Details
Applicant:	Su Casa Burial Estate (Pty) Ltd.
Trading name:	Su Casa Burial Estate (Pty) Ltd.
Contact person:	Tshepo Mavundla
Physical address:	Plot 126, West Street, Clewer, Witbank, 1036
Postal address:	Plot 126, West Street, Clewer, Witbank, 1036
Telephone:	013 007 1382
E-mail:	<a href="mailto:tshepo@zitholama.co.za">tshepo@zitholama.co.za</a>

## 2.2. Details of the Environmental Assessment Practitioner

Table 2 below includes the details of the Environmental Assessment Practitioner (EAP)

**Table 2-2:** Details of the EAP

Aspect	Details
Company name of EAP:	Eaglesage (Pty) Ltd.
EAP's name and surname:	J.M. Mahumela
Postal address:	P.O. BOX 5264, The Reeds, 0158
Fax:	086 667 2088
E-mail:	<a href="mailto:masala.mahumela@eaglesage.co.za">masala.mahumela@eaglesage.co.za</a> / <a href="mailto:info@eaglesage.co.za">info@eaglesage.co.za</a>
Qualifications and relevant experience	B.Sc. Honours Environmental Management. Fiveteen years in the environmental consulting field. Refer to Appendix A for CV and Qualifications
Professional affiliations	<ul style="list-style-type: none"> <li>• South African Council for Natural Scientific Professions (SACNASP). Registration Number 400536/14.</li> <li>• Environmental Assessment Practitioners of South Africa (EAPASA). Registration Number 2019/1296.</li> </ul>

## 3. PROJECT LOCATION

The Proposed Su Casa Burial Estate and associated infrastructure will be located on Farm Doornrug 302 JS, Remaining Extent of Portion 10 (a Portion of Portion 9), in Emalahleni Local Municipality in the Mpumalanga Province. The 21 digit Surveyor General code for the property is T0JS0000000030200010. The site is located south of the N4 and R104 between Balmoral and Witbank. The property is zoned for agricultural purposes and maize has been cultivated over the years, but the Developer is applying for Special Consent so that the site can be used as a cemetery. The area surrounding the project site consists predominantly of agricultural fields and mining operations to the east of the project area.

It is important to note that the proposed project site has been purchased and belongs to the project proponent. Figures 1, 2 and 3 below illustrate the proposed project locality and an indication of the transformation that has taken place on the proposed site.

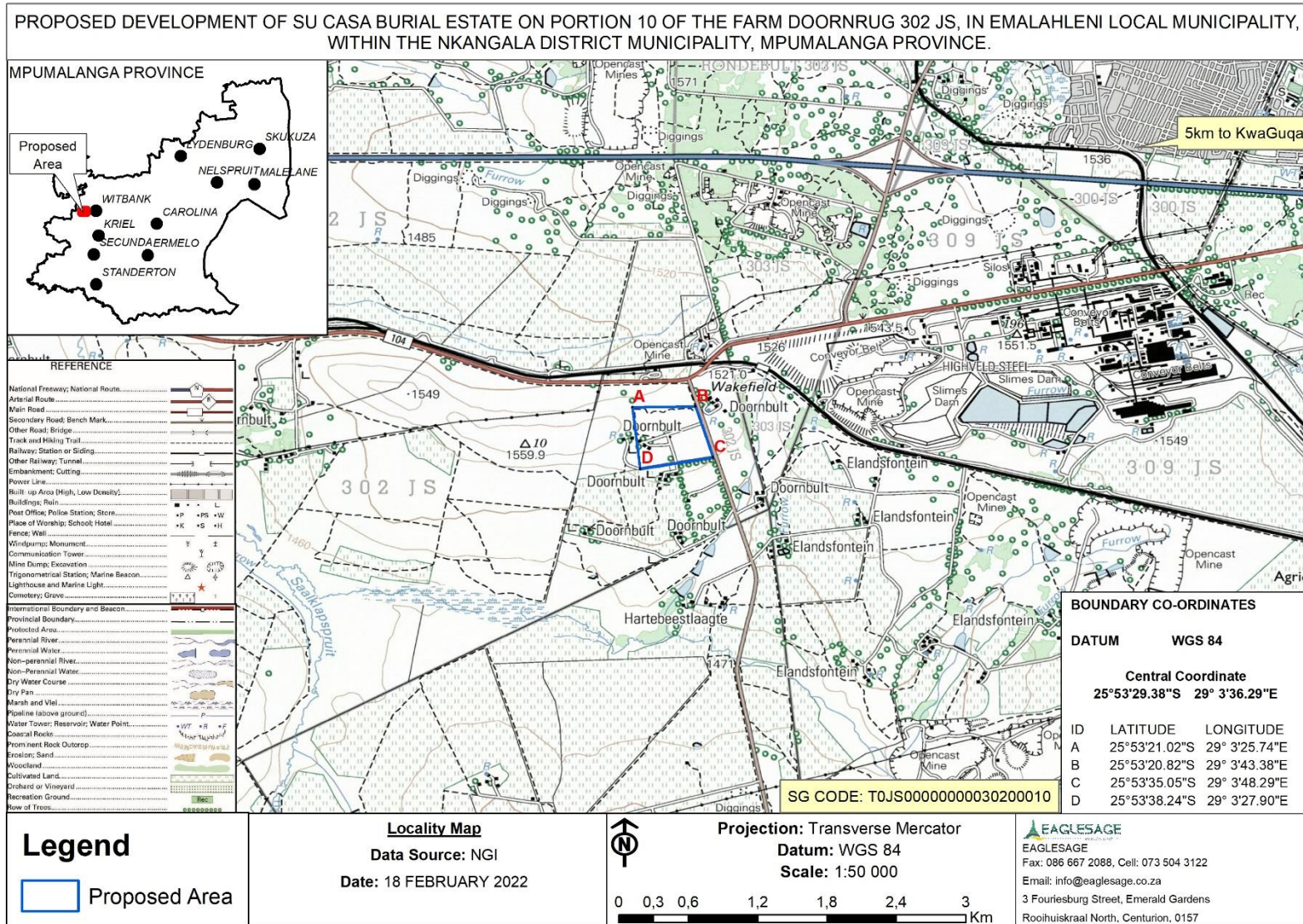
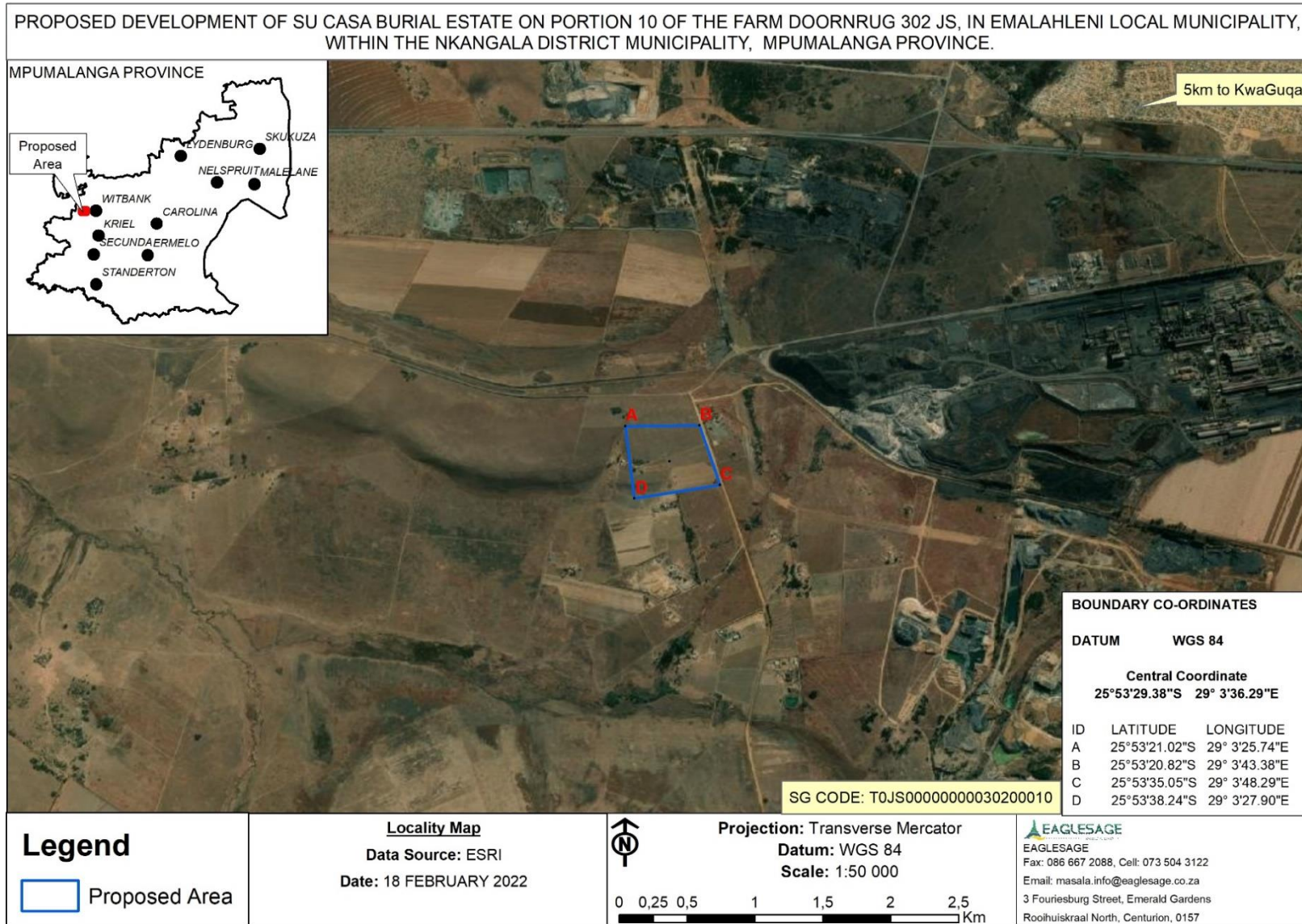


Figure 3-1: Locality map of the proposed site





Figure

3-2: Google Earth image indicating the site locality

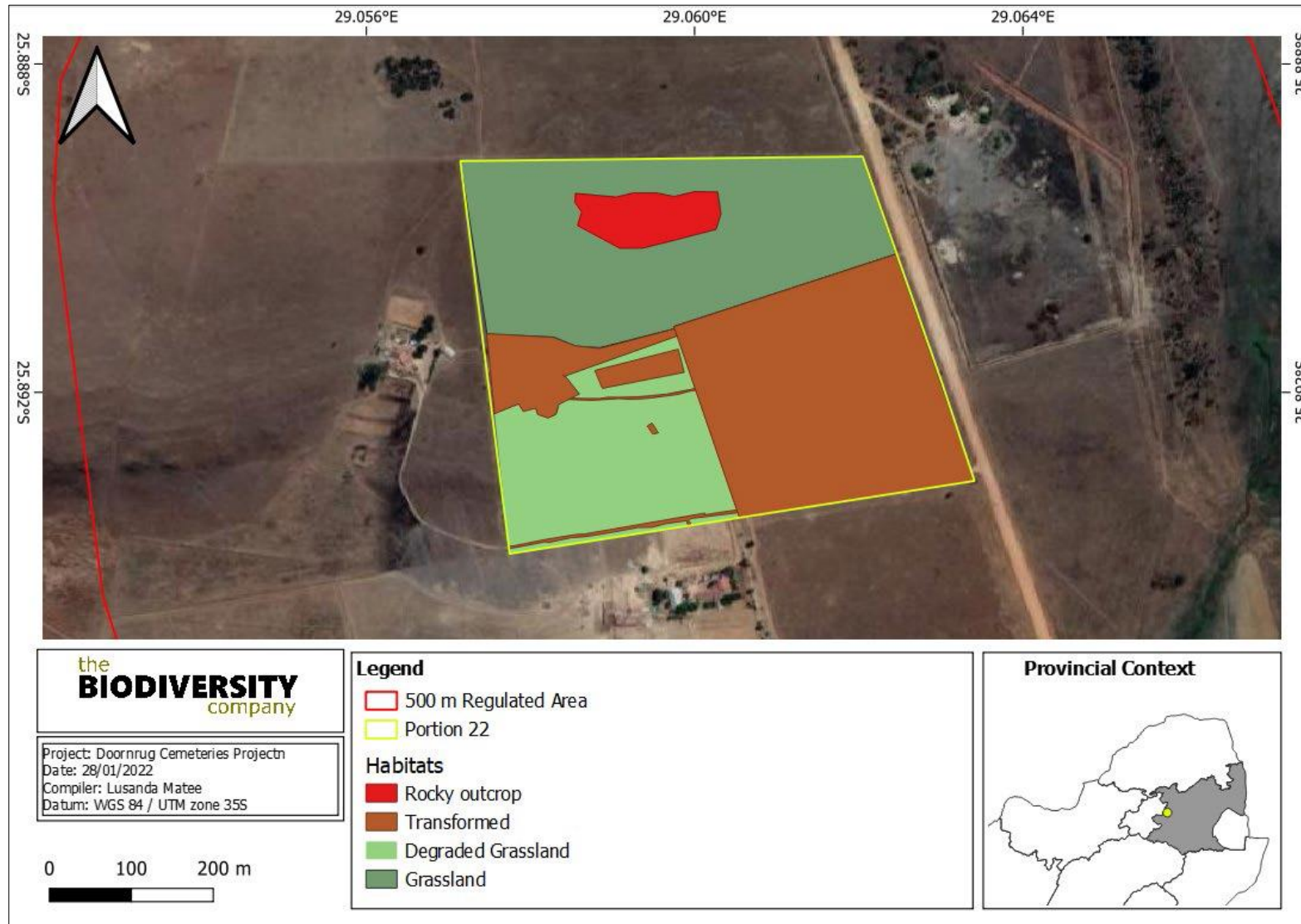


Figure 3-3: Degraded area and the habitat units identified in the project area

#### 4. DESCRIPTION OF THE SCOPE OF THE PROPOSED ACTIVITY INCLUDING LISTED ACTIVITIES

The Scope of the proposed project

The proposed project will entail development of a private cemetery and associated infrastructure which include but is not limited to the following:

- 4.1. Chapel,
- 4.2. Dining hall,
- 4.3. Ablution facilities.
  - 4 x 2500L septic tanks will be installed on site.
  - Where necessary, toilets will also be provided at the entrance/gate(s).
  - To save water, 3L toilets will be used instead of 11L toilets and urinals with automatic tipping system when they are off will be used.
- 4.4. Admin offices,
- 4.5. Parking areas,
- 4.6. Internal roads,
- 4.7. Walkways,
- 4.8. Security houses,
- 4.9. Landscaping,
- 4.10. Ash scattering garden,
- 4.11. Upgrade of the existing boreholes for provision of domestic water during construction and operational phases.
- 4.12. Establishment of a new borehole for provision of domestic water during construction and operational phases,
- 4.13. Establishment of two ponds that will have  $\pm 25\text{m}$  radius and  $\pm 1.4\text{m}$  deep, each.
  - Stormwater will be used to fill the ponds, however, in the event that there will be no storm water to fill the ponds, water to fill the ponds will be sourced from the municipality.
  - Water tanks will be brought for irrigation of the vegetation throughout the operational phase. This water will be sourced from the municipality.
  - Drinking water will be sourced from the municipality and or bought commercially.
- 4.14. Wall of remembrance,
- 4.15. Electrification of the facilities,
- 4.16. The house in the farm will be kept for site staff and the garage will be kept and used as a workshop. The other remaining buildings will be demolished,
- 4.17. Palisade fence with a height of 1.8m will be constructed.
- 4.18. The excavations of graves will be to a depth of approximately 2 m and will be dug as and when required.

- 4.19. There will be sections that will have head stones and sections that will have head stones and caps. There will also be family estates with plots.

Refer to Figure 4-1 below for the proposed site layout and Appendix C for the site layout printed in A3 size.



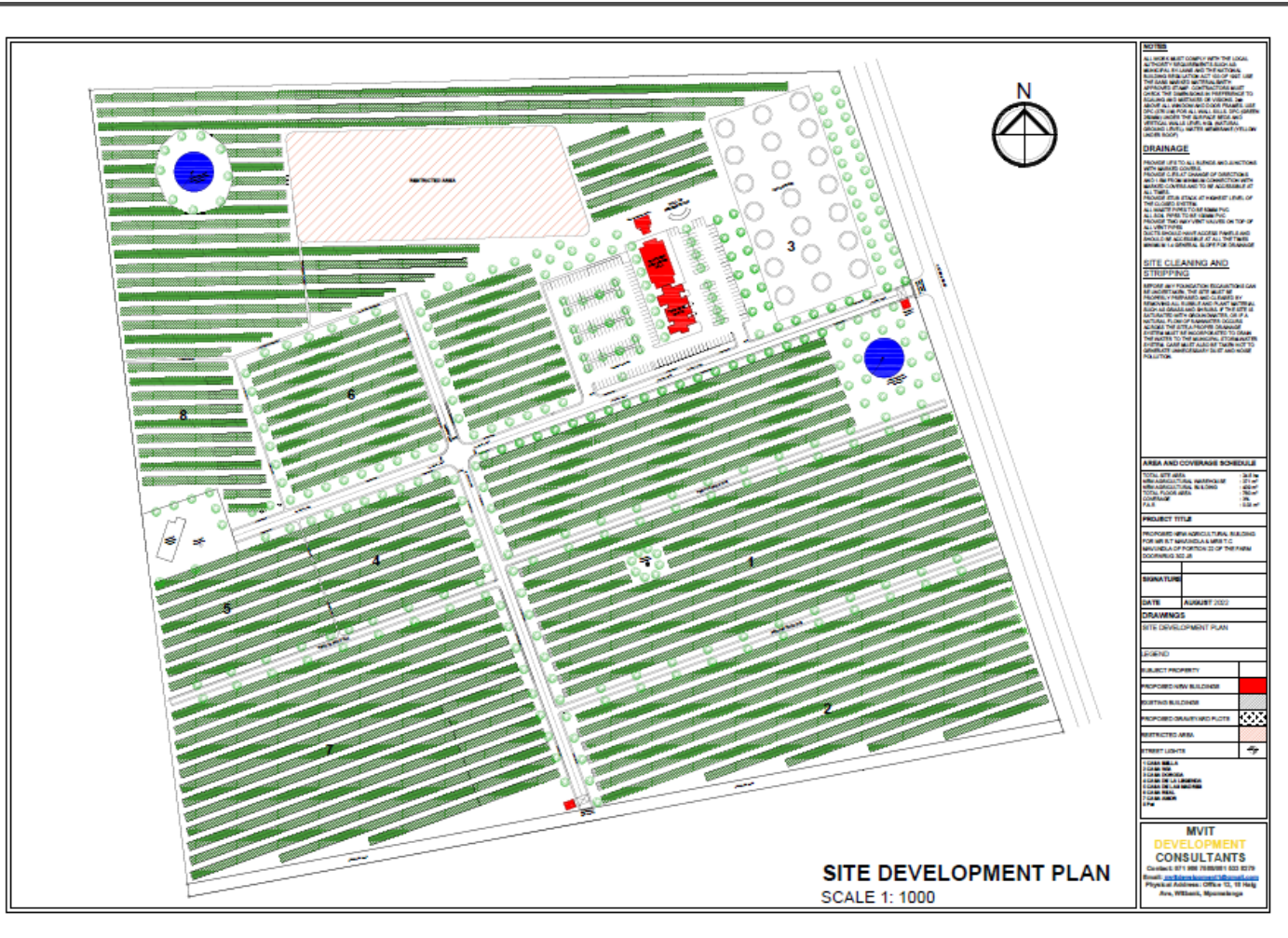


Figure 4-1: Site Plan

#### 4.20. Listed Activities Triggered by the Proposed Project

The proposed activity will trigger a number of listed activities and the following table contains all those activities being applied for:

Table 4-1: Table Listed activities

Activities Listed under the NEMA EIA Regulations		
Listing Notice 1 (GNR 983) under EIA Regulations of 2014 as amended		
Activity Number	Description of the relevant Basic Assessment Activity as per Listing Notice 1	Applicability of the Listed Activity to the proposed project
9	<p><i>The development of infrastructure exceeding 1 000 metres in length for the bulk transportation of water or storm water—</i></p> <p><i>(i) with an internal diameter of 0,36 metres or more; or</i></p> <p><i>(ii) with a peak throughput of 120 litres per second or more;</i></p>	The proposed project may entail development of an approximately 1km pipeline for transportation of storm water.
12	<p><i>The development of—</i></p> <p><i>(i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or</i></p> <p><i>(ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs—</i></p> <p><i>(a) within a watercourse;</i></p> <p><i>(b) in front of a development setback; or</i></p> <p><i>(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; —</i></p> <p><i>excluding—</i></p>	This was a recommendation from the Biodiversity Specialist.

	<p><i>(aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour;</i></p> <p><i>(bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies;</i></p> <p><i>(cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies;</i></p> <p><i>(dd) where such development occurs within an urban area;</i></p> <p><i>(ee) where such development occurs within existing roads, road reserves or railway line reserves; or</i></p> <p><i>(ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared.</i></p>	
23	<i>The development of cemeteries of 2 500 square metres or more in size.</i>	The proposed project entails development of a private cemetery which will be more than 2500 square meters in size.
27	<i>The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation.</i>	The proposed site constitute approximately 26 ha in size and was used for maize farming. Approximately 10 ha of the 26 ha is transformed due to farming or other activities. Indigenous vegetation exists on site, however, it covers less than 20 ha. Refer to Figure 3 above.
28	<i>Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development:</i>	The proposed site was used for agricultural purposes after 1998 and the Developer proposes to develop a private

	<p><i>(i) will occur inside an urban area, where the total land to be developed is bigger than 5 hectares; or</i></p> <p><i>(ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;</i></p> <p><i>Excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.</i></p>	<p>cemetery and the total property size is approximately 26 ha.</p>
<b>Listing Notice 3 (GNR 985) under EIA Regulations of 2014 as amended</b>		
Activity Number	Description of the relevant Basic Assessment Activity as per Listing Notice 3	Applicability of the Listed Activity to the proposed project
2	<p><i>The development of reservoirs, excluding dams, with a capacity of more than 250 cubic metres.</i></p> <p><i>f. Mpumalanga</i></p> <p><i>i. In a protected area identified in terms of NEMPAA, excluding conservancies;</i></p> <p><i>ii. Outside urban areas:</i></p> <p><i>(aa) National Protected Area Expansion Strategy Focus areas;</i></p> <p><i>(bb) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;</i></p> <p><i>(cc) Sites or areas identified in terms of an international convention;</i></p> <p><i>(dd) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;</i></p> <p><i>(ee) Core areas in biosphere reserves; or</i></p> <p><i>(ff) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve, where such areas comprise indigenous vegetation; or</i></p>	<p>Two man-made water features (artificial ponds) will be constructed and trees will be planted around them for families who wish to have a quiet time and place at the cemetery when they miss their loved ones. The ponds will have diameters of approximately 25m.</p>

	<p><i>iii. Inside urban areas:</i></p> <p><i>(aa) Areas zoned for use as public open space; or</i></p> <p><i>(bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority, or zoned for a conservation purpose.</i></p>	
4	<p><i>The development of a road wider than 4 metres with a reserve less than 13,3 metres.</i></p> <p><i>f. Mpumalanga</i></p> <p><i>i. Outside urban areas:</i></p> <p><i>(aa) A protected area identified in terms of NEMPAA, excluding disturbed areas;</i></p> <p><i>(bb) National Protected Area Expansion Strategy Focus areas;</i></p> <p><i>(cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;</i></p> <p><i>(dd) Sites or areas identified in terms of an international convention;</i></p> <p><i>(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;</i></p> <p><i>(ff) Core areas in biosphere reserves; or</i></p> <p><i>(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas, where such areas comprise indigenous vegetation; or</i></p>	<p>A small portion of a CBA has been identified towards the northern boundary of the site. The CBA may be affected by the internal roads.</p>
12	<p><i>The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.</i></p>	<p>A Critical Biodiversity Area towards the northern boundary of the proposed site. Clearance of more than 300 square</p>

	<p><i>f. Mpumalanga</i></p> <p><i>i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;</i></p> <p><i>ii. Within critical biodiversity areas identified in bioregional plans.</i></p>	<p>metres of indigenous vegetation may take place within the Critical Biodiversity Area.</p>
<p>14</p>	<p><i>The development of—</i></p> <p><i>(i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or</i></p> <p><i>(ii) infrastructure or structures with a physical footprint of 10 square metres or more;</i></p> <p><i>where such development occurs—</i></p> <p><i>(a) within a watercourse;</i></p> <p><i>(b) in front of a development setback; or</i></p> <p><i>(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour.</i></p> <p><i>f. Mpumalanga</i></p> <p><i>i. Outside urban areas:</i></p> <p><i>(aa) A protected area identified in terms of NEMPAA, excluding conservancies;</i></p>	<p>Two artificial ponds with a diameter of approximately 25m will be developed.</p>

	<p>(bb) National Protected Area Expansion Strategy Focus areas;</p> <p>(cc) World Heritage Sites;</p> <p>(dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;</p> <p>(ee) Sites or areas identified in terms of an international convention;</p> <p>(ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;</p> <p>(gg) Core areas in biosphere reserves; or</p> <p>(hh) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve, where such areas comprise indigenous vegetation.</p>	
<b>Activities Listed under the National Water Act, 1998 (Act 36 of 1998)</b>		
Activity 21 a	<p><i>Taking water from a water resource</i></p>	<p>A new borehole will be established and two existing boreholes may be upgraded. Water for domestic use (ablution facilities, dining hall, etc.) may be sourced from these boreholes.</p>
Activity 21 c	<p><i>Impeding or diverting the flow of water in a watercourse.</i></p>	<p>The proposed private cemetery will be developed within 500m of a wetland(s).</p>
Activity 21 g	<p><i>Disposing of waste in a manner which may detrimentally impact on a water resource;</i></p>	<p>Septic tank(s) will be used to temporarily store sewer generated on site and sewer will be collected by a registered service provider.</p>

Activity 21 i	<i>Altering the bed, banks, course or characteristics of a watercourse.</i>	The proposed private cemetery will be developed within 500m of wetland(s).
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## 5. KEY LEGISLATIVE REQUIREMENTS

The legislation, policies and guidelines listed below are applicable to the proposed project.

Table 5-1: Legislation, Policies and Guidelines applicable to the proposed project

Legislation/Policy/Guideline	Applicability
The Constitution of South Africa, 1996 (Act 108 of 1996)	<p>The constitution states that</p> <p><i>Everyone has the right—</i></p> <ul style="list-style-type: none"> <li><i>(a) to an environment that is not harmful to their health or wellbeing; and</i></li> <li><i>(b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that—</i> <ul style="list-style-type: none"> <li><i>(i) prevent pollution and ecological degradation;</i></li> <li><i>(ii) promote conservation; and</i></li> <li><i>(iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.</i></li> </ul> </li> </ul> <p>The proposed project affects the environment and the rights of the people should be considered when undertaking the project.</p>
National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA) and its Environmental Impact Assessment (EIA) Regulations of 2014 as amended.	The proposed project triggers Listed Activities under the EIA Regulations under the NEMA. An Environmental Authorisation should be obtained before commencement of the proposed project.
National Water Act, 1998 (Act 36 of 1998) (NWA)	The proposed project triggers activities listed under Section 21a, c, l and g of the NWA, and require a Water Use Licence.
National Environmental Management: Waste Act, 2008 (Act 59 of 2008) (NEMWA).	Waste will be generated during construction and operational phase and the management of the waste will have to be in line with the requirement of the Act.

Legislation/Policy/Guideline	Applicability
	The Environmental Management Programme attached to this report outlines how the waste will be managed.
National Environmental Management: Air Quality Act 2004 (Act 39 of 2004)	During the construction activities of the proposed project, dust generation is expected. The project will have to comply with the requirements of the Act.
National Heritage Resources Act, 1999 (Act 25 of 1999)	<ul style="list-style-type: none"> <li>• The proposed development exceeds 5000m<sup>2</sup> in size and will change the character of the site.</li> <li>• Internal roads longer than 300m will be constructed.</li> <li>• Fence/wall longer than 300m will be constructed.</li> <li>• The Developer is applying for Special Consent so that the site can be used as a private cemetery.</li> </ul>
National Health Act, 2003 (Act 61 Of 2003)	The proposed project will have to comply with the Act with regards to the management of dead bodies.
National Veld and Forest Act, 1998 (Act 101 of 1998)	The proposed project will have to comply with Act and ensure that unnecessary fires are prevented.
Emalahleni Local Municipality By-Laws relating to cemeteries, Funeral Parlours and Crematoria	The proposed project will have to obtain all the permits from the Elamahleni Local Municipality before establishing the cemetery.
Emalahleni Local Municipality Integrated Development Plan 2022 – 2027.	The Municipality through the Department of Parks, Cemeteries and Public Open Spaces is responsible for providing cemetery services in terms of burial space, cemetery management and maintenance; the development and maintenance of parks and open spaces; landscaping and beautification of municipal entrances, tree planting and greening programmes and management of heritage sites.

**6. A MOTIVATION FOR THE NEED AND DESIRABILITY FOR THE PROPOSED DEVELOPMENT INCLUDING THE NEED AND DESIRABILITY OF THE ACTIVITY IN THE CONTEXT OF THE PREFERRED LOCATION**

The Emalahleni Local Municipality’s Cemeteries, Parks and Open Space Management Department operates and manages 7 non- active cemeteries with a total size of 36.7 ha and 6 active cemeteries with a total size of 81.1ha.

There is one new cemetery under development and a crematorium that is externally operated. Further, there is a competing demand for space in terms of new developments and space for cemeteries. The need to explore alternative burial methods become imperative and crucial in the municipal planning space. Vandalism and lack of security at cemeteries also becomes an increasing concern, with some of the damage occurring from roaming game. Source <https://www.emalahleni.gov.za/v2/environmental-and-waste-management/cemeteries-parks-and-open-space> (07 October 2022).

Since the existing cemeteries will reach capacity in future, Su Casa has proposed to construct a private cemetery. The proposed private cemetery will provide capacity for the Emalahleni Local Municipality.

The proposed site was purchased by the Developer for the sole purpose of developing a cemetery. Therefore, there is no other alternative location that is preferred. The proposed site has been assessed by various specialists and none have found it to be a fatal flaw for the proposed project. In addition, mitigation measures for the identified impacts have been included in the Environmental Management Programme (EMPr).

## **7. A MOTIVATION FOR THE PREFERRED SITE, ACTIVITY AND TECHNOLOGY ALTERNATIVE**

The proposed project is located on the property that is owned by the Developer. It will not be easy to consider taking the proposed project to another site as that option would require buying a new property.

Various specialist studies have been undertaken and based on the findings of the specialists, the proposed project can be undertaken provided the mitigation measures are in place

## **8. BIOPHYSICAL DESCRIPTION OF THE SITE**

### **8.1. Climate**

The information below has been sourced from the Wetland Assessment Report prepared by The Biodiversity Company and dated February 2022.

The climate for the Rand Highveld Grassland is characterised by a summer rainfall with a mean annual precipitation of 654 mm which is slightly lower in the western parts of this vegetation type (see Figure 5). These areas are known to have warm-temperate conditions with dry winters. The likelihood of frost however is greater in the western parts with the incidence of frost ranging from 30 to 40 days compared to the east which has a frost incidence of 10 to 35 days (Mucina & Rutherford, 2006). This vegetation type is also classified as endangered even though very little conservation has been done for this vegetation type.

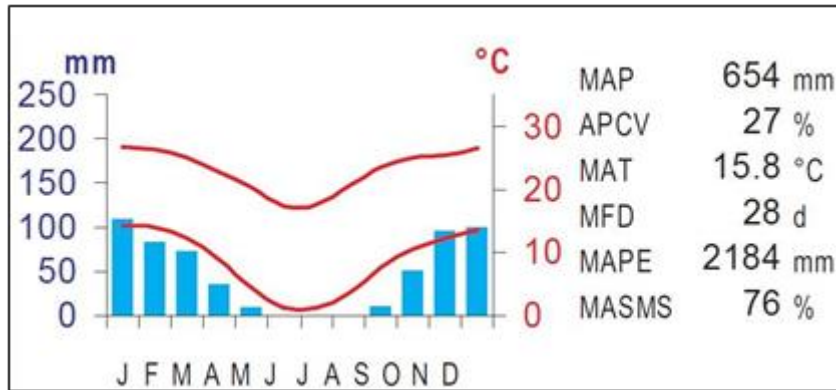


Figure 8-1: Climate for the Rand Highveld Grassland.

### 8.2. Soils

The information below has been sourced from the Wetland Assessment Report prepared by The Biodiversity Company in February 2022.

According to the land type database (Land Type Survey Staff, 1972 - 2006), the project area is characterised by the Bb 16 land type. The Bb land type consists of plinthic catena. Upland duplex and marginalitic soils are rare and dystrophic and/or mesotrophic red soils are not wide spread. Figure 6 illustrates the respective terrain units relevant to the Bb 16 land type.

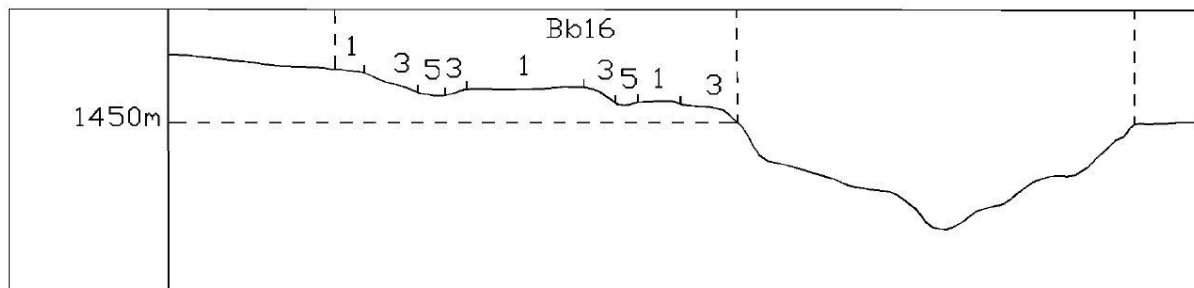


Figure 8-2: Illustration of land type Bb 16 terrain units (Land Type Survey Staff, 1972 - 2006)

### 8.3. Topographical Inland Water and River Line Data

One perennial stream has been identified within the proposed project area by means of the “2529” quarter degree square topographical river line data set. A single inland water area has also been identified within the 500 m regulated area (see Figure 7).

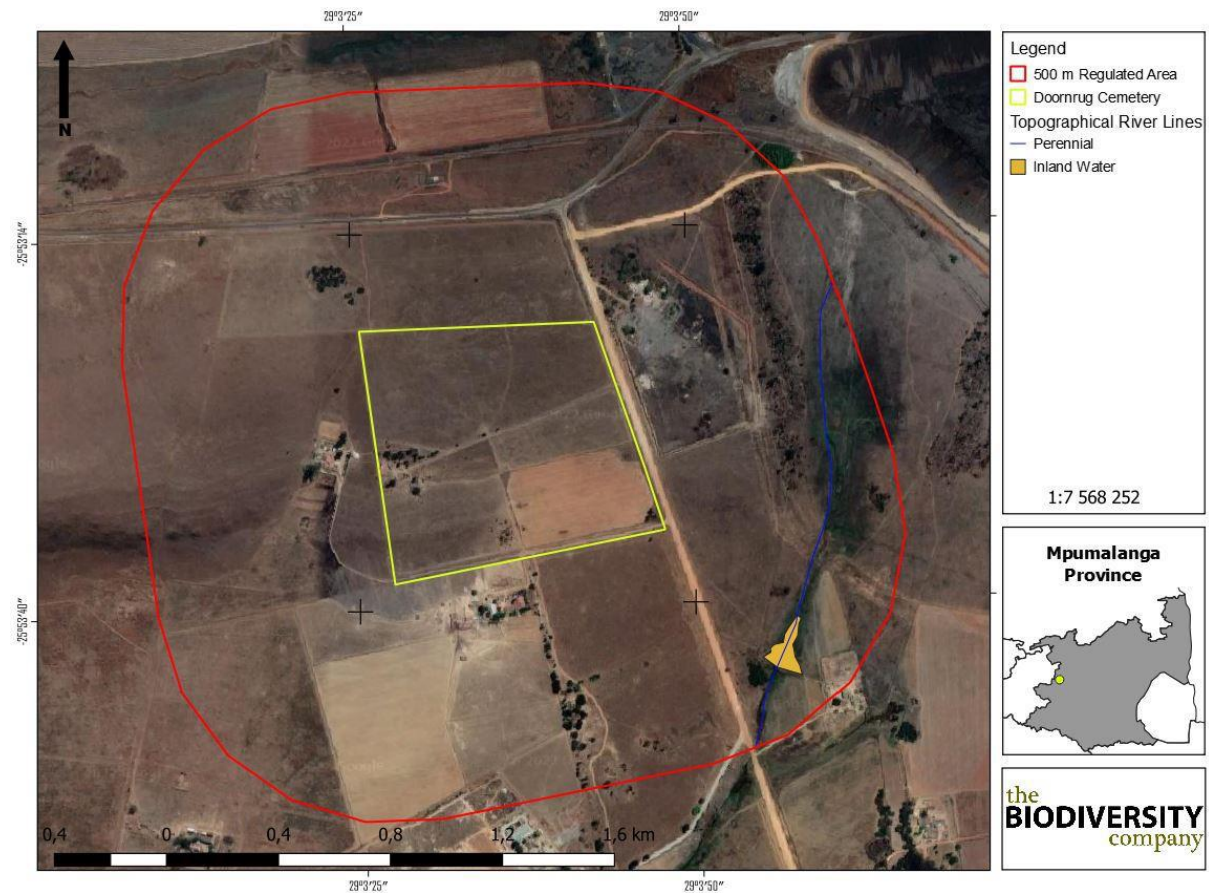


Figure 8-3 : Illustration of topographical river lines and the inland water area located within the 500 m regulated area

#### 8.4. Mpumalanga Highveld Grassland Wetlands

The Wetland information was sourced from the Wetland Assessment Report that was prepared by The Biodiversity Company in 2022. The Wetland Assessment Report is attached as Appendix D3.

The Mpumalanga Highveld Grassland Wetland Layer indicates additional wetlands within the 500 m regulated area, namely a channelled valley bottom, a floodplain wetland as well as a seep wetland (see Figure 8).



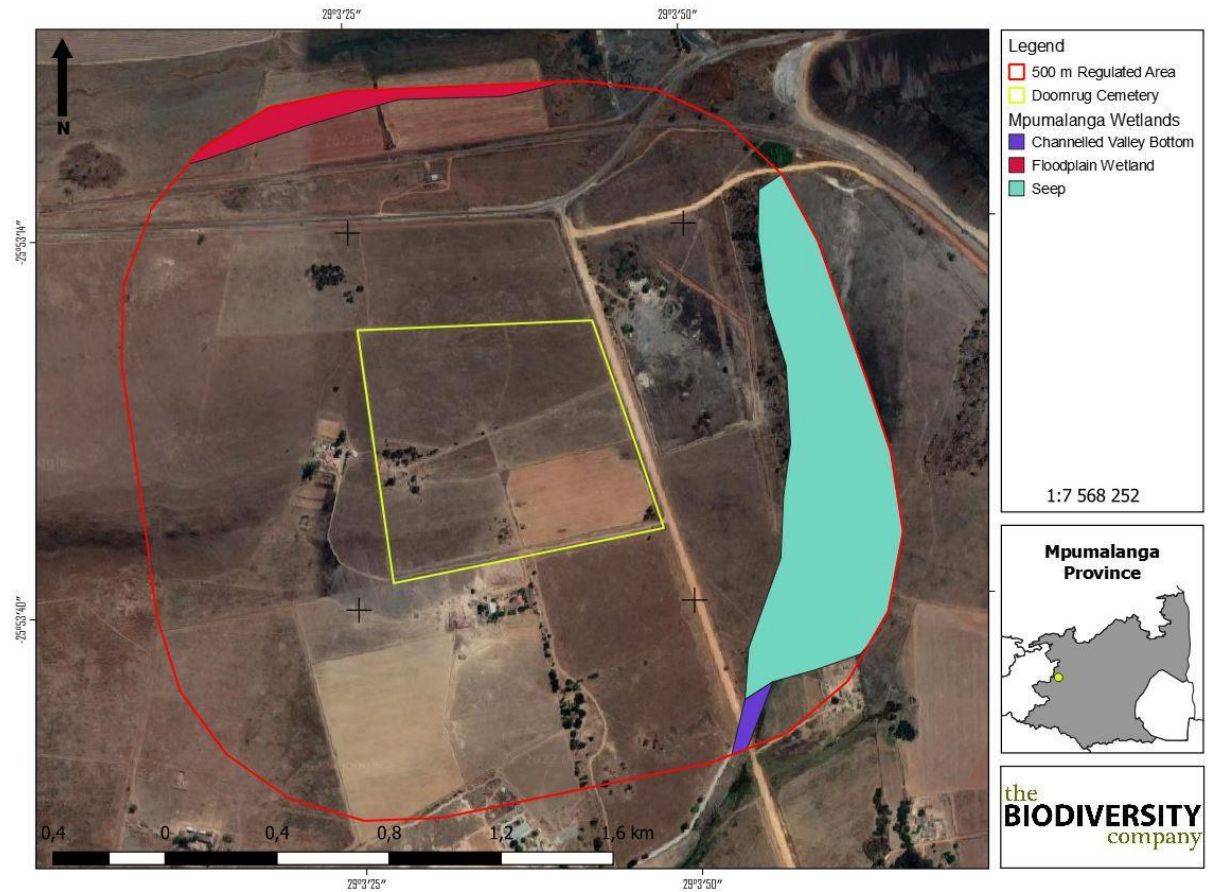


Figure 8-4 : Wetlands located inside the 500 m regulated area according to the Mpumalanga wetland dataset

#### 8.4.1. NFEPA Wetlands

Two types of NFEPA wetlands were identified within the MRA, namely channelled valley bottom wetlands as well as seeps. The channelled valley bottom and seep wetlands are classified as natural.



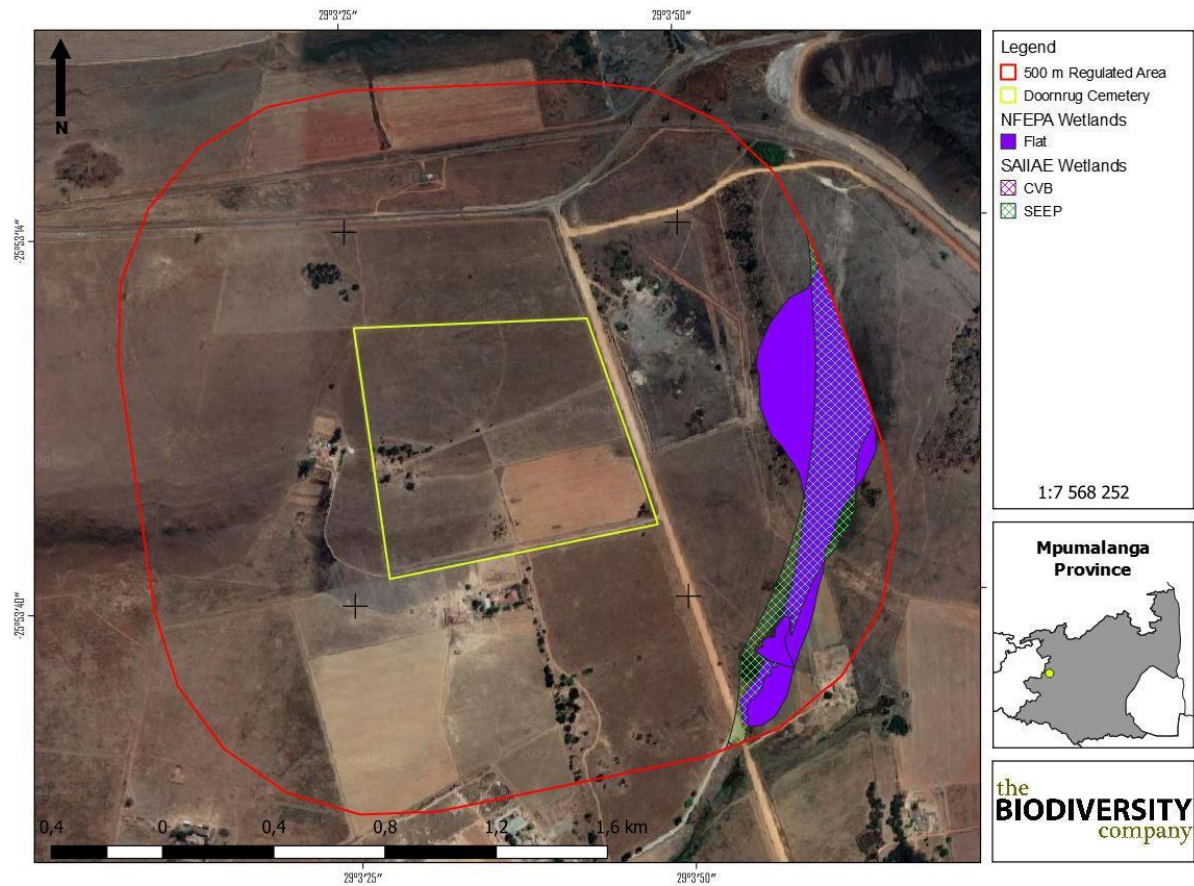


Figure 8-5 : NFEPA and SAIIE wetlands within the project area and its surroundings

#### 8.4.2. Wetland Delineation and Description

Two HGM units both unchannelled valley bottom has been identified within the 500 m regulated area (see Figure 10 and Figure 11). In addition, multiple drainage features were identified within the 500 m regulated area. These drainage feature although not classified as wetland areas still require conservation while the proposed activity takes place. These drainage systems have been excluded from the functional assessment. Some recommendations have been made to conserve the integrity of the drainage features.

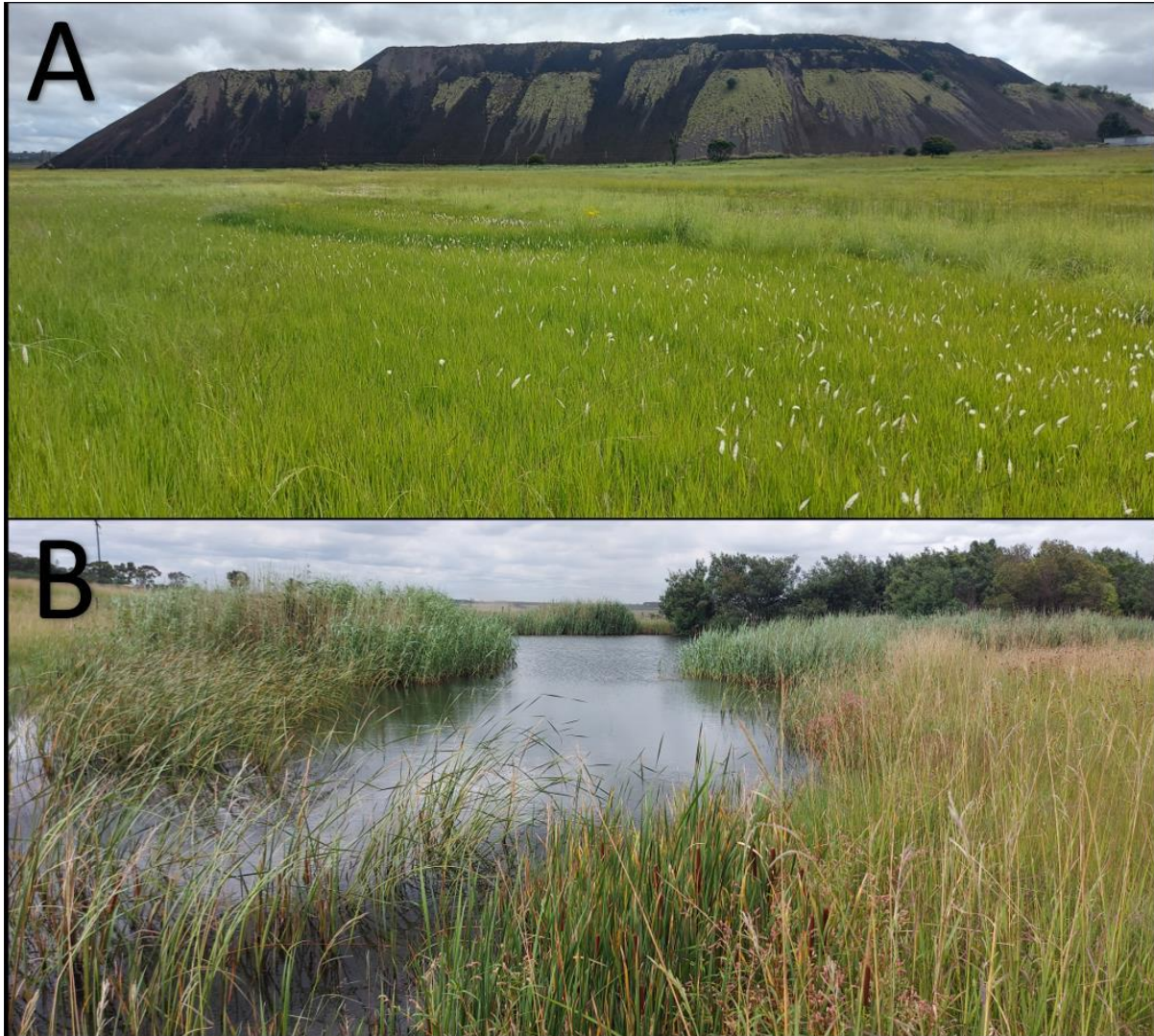


Figure 8-6 : Examples of the different HGM units delineated within the project area. A) Unchanneled valley bottom at HGM 1, B) Dam located within the Unchannelled valley bottom at HGM 1.



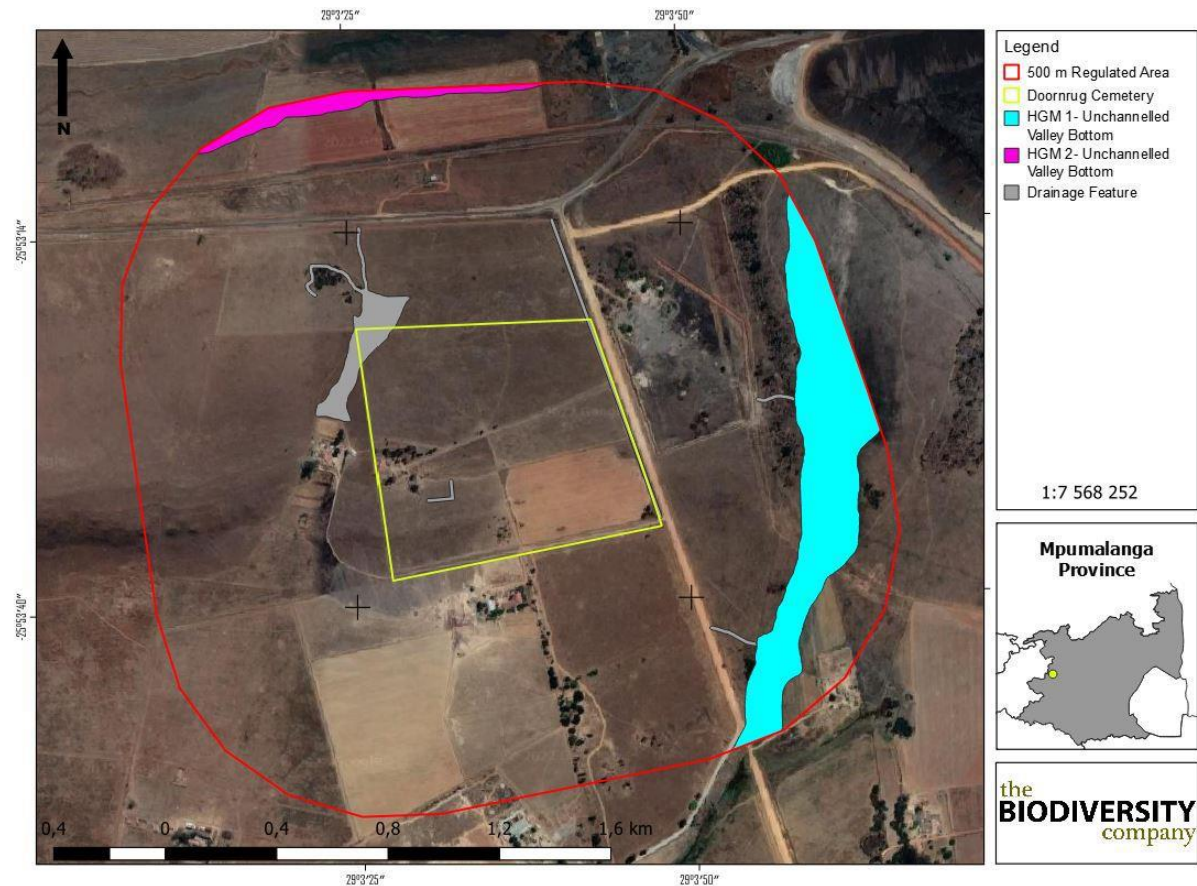


Figure 8-7 : Delineation of wetlands within project area

The wetland classification as per SANBI guidelines (Ollis *et al.*, 2013) is presented in Table 5. One wetland type was identified within the project area, namely an unchannelled valley bottom (HGM 1 and 2).

Table 8-1 : Wetland classification as per SANBI guideline (Ollis *et al.* 2013)

Wetland System	Level 1		Level 2	Level 3	Level 4		
	System	DWS Ecoregion/s	NFEPA Wet Veg Group/s	Landscape Unit	4A (HGM)	4B	4C
HGM 1 and 2	Inland	Highveld	Mesic Highveld Grassland Group 4	Valley Floor	Unchanneled Valley Bottom	N/A	N/A

### 8.5. Ecosystem Threat Status

The Ecosystem Threat Status is an indicator of an ecosystem’s wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition. According to the spatial dataset, the proposed development overlaps with a VU ecosystem (Figure 12).



Figure 8-8 : Map illustrating the ecosystem threat status associated with the proposed project area

### 8.6. Ecosystem Protection Level

Indicator of the extent to which ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP), based on the proportion of the biodiversity target for each ecosystem type that is included within one or more protected areas. Not Protected, Poorly Protected or Moderately Protected ecosystem types are collectively referred to as under-protected ecosystems. The proposed development overlaps with a PP ecosystem (Figure 13).

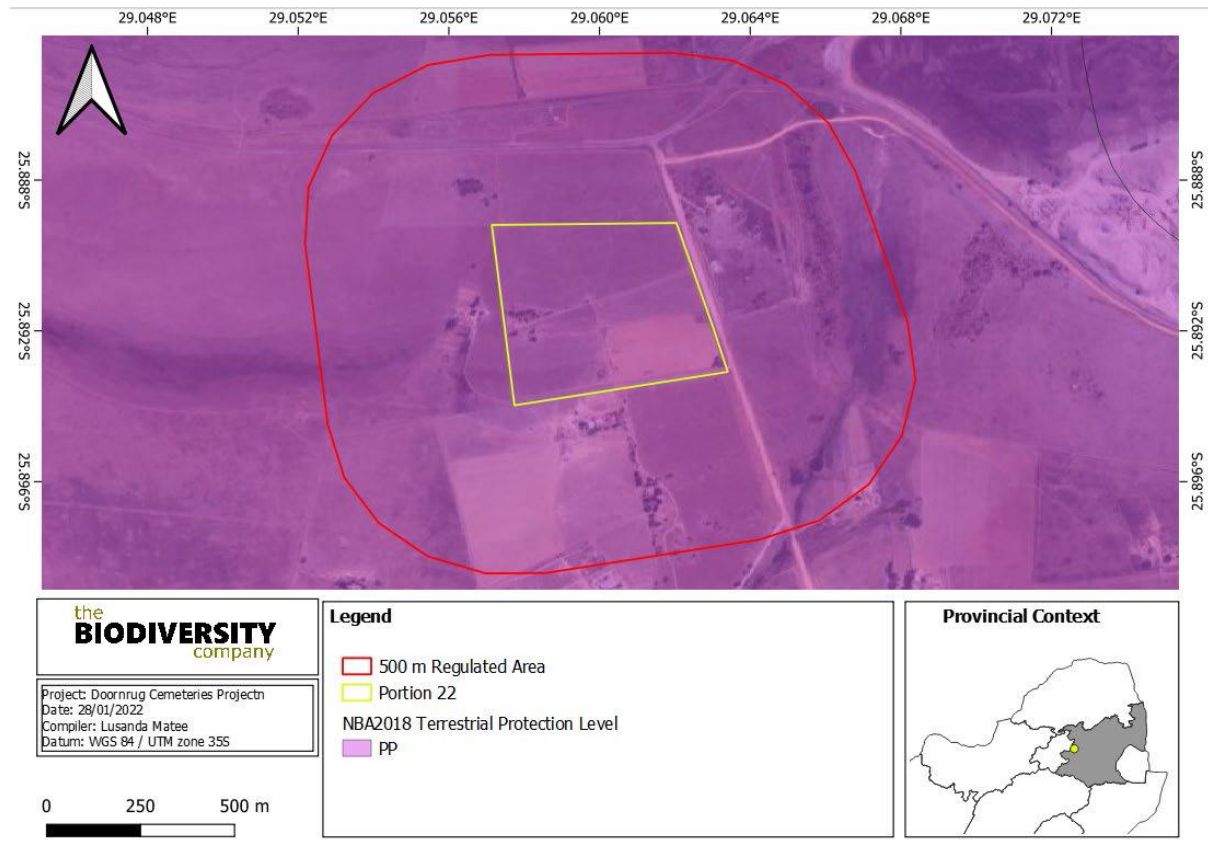


Figure 8-9 : Map illustrating the ecosystem protection level associated with the proposed project area

### 8.7. Protected Areas

According to the protected area spatial dataset from SAPAD (2021), SACAD (2021) and SAMPAZ (2021), the proposed development does not occur within any protected area and there is no protected area in close proximity to the project area. The De Hoop Private Nature Reserve is situated more than 20 km away from the project area.

### 8.8. Terrestrial Critical Biodiversity Areas (CBAs)

Figure 14 shows the project area superimposed on the Mpumalanga Biodiversity Sector Plan (MBSP) Terrestrial CBA map. Based on this, the proposed development areas will potentially overlap with:

- Critical Biodiversity Area (CBA): Irreplaceable;
- Critical Biodiversity Area (CBA): Optimal;
- Moderately modified- old lands;
- Heavily Modified Areas (HMA); and
- Other Natural Areas.



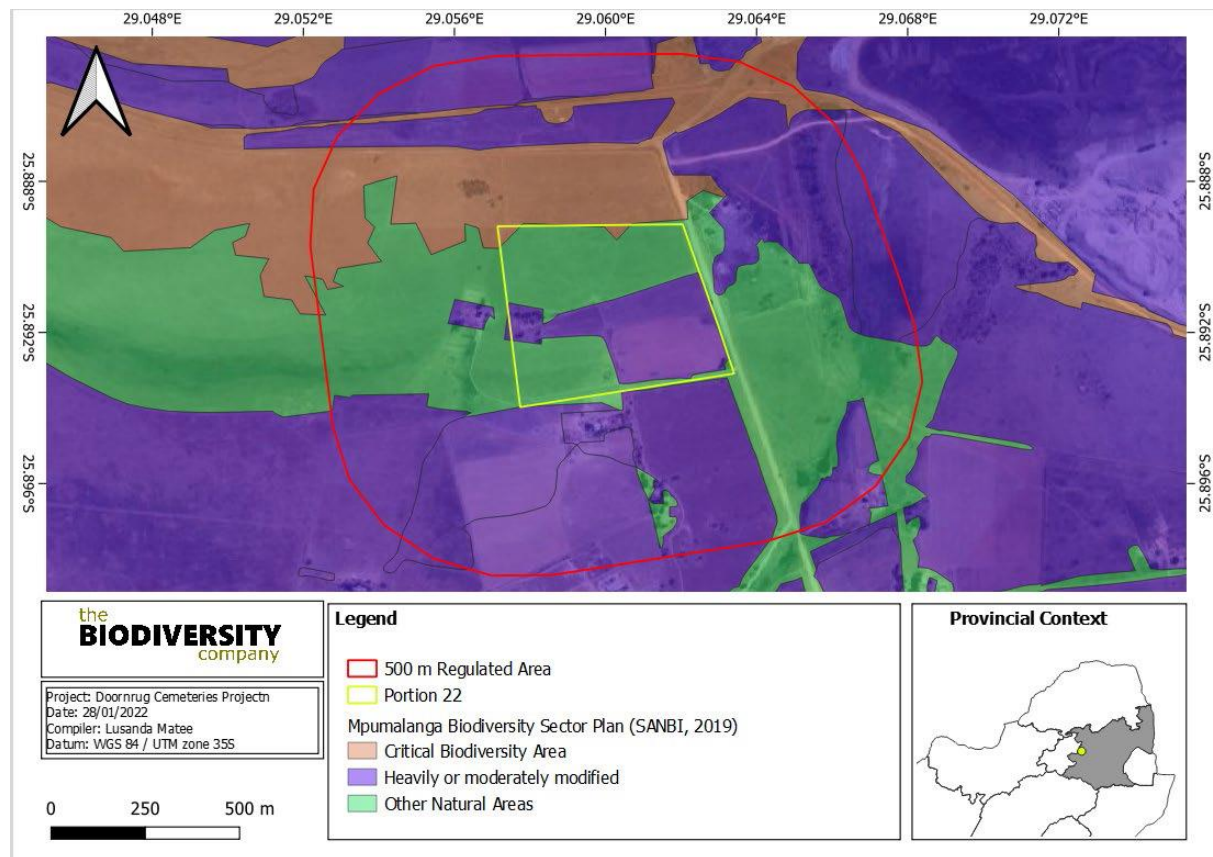


Figure 8-10 : The project areas superimposed on the MBSP (MTPA, 2015)

### 8.9. The National List of Threatened Terrestrial Ecosystems

The Su Casa Burial Estate project and associated infrastructure traverse Rand Highveld Grassland which is listed as Vulnerable under criterion A1 due to irreversible loss of natural habitat (Figure 15). Loss of natural habitat includes outright loss, for example, the removal of natural habitat for cultivation, building of infrastructure, mining etc., as well as severe degradation. An ecosystem is categorised as vulnerable if the extent of the remaining natural habitat in the ecosystem is less than or equal to 60% of the original extent of the ecosystem. For this purpose, habitat is considered severely degraded if it would be unable to recover to a natural or near-natural state following the removal of the cause of the degradation (e.g., invasive aliens, over-grazing), even after very long periods. For EIAs, the 2011 National list of Threatened Ecosystems remains the trigger for a Basic Assessment in terms of Listing Notice 3 of the EIA Regulations published under the NEMA.



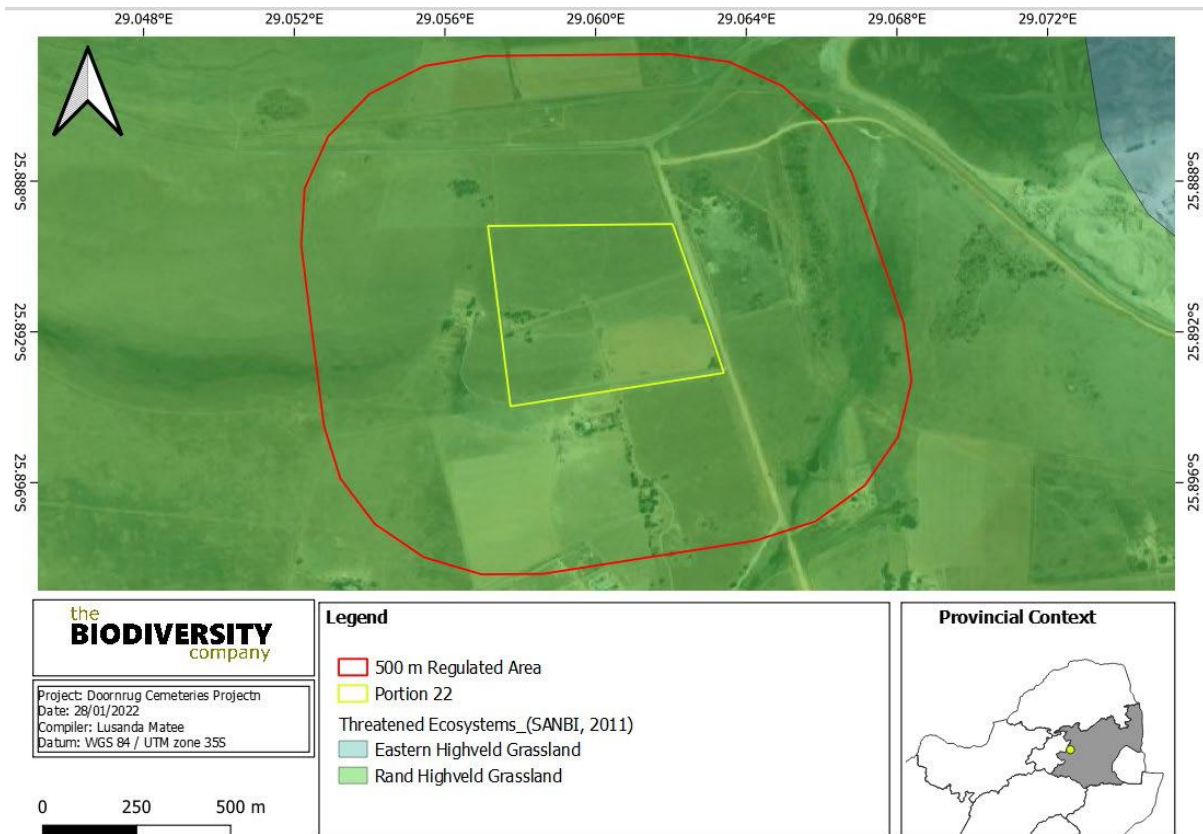


Figure 8-11 : The Doornrug Cemeteries Project in relation to National Threatened or Protected Ecosystems

### 8.10. Important Bird & Biodiversity Areas

The Doornrug Cemeteries Project area is not located within an Important Bird and Biodiversity Areas (IBA) nor is there one within the immediate landscape.

### 8.11. Hydrological Setting

The project area does not overlap or traverse any Ecological Support Area (NBA) River or NBA wetlands, it is however close to Critically Endangered (CR) Rivers and Critically Endangered (CR) wetlands (Figure 16).

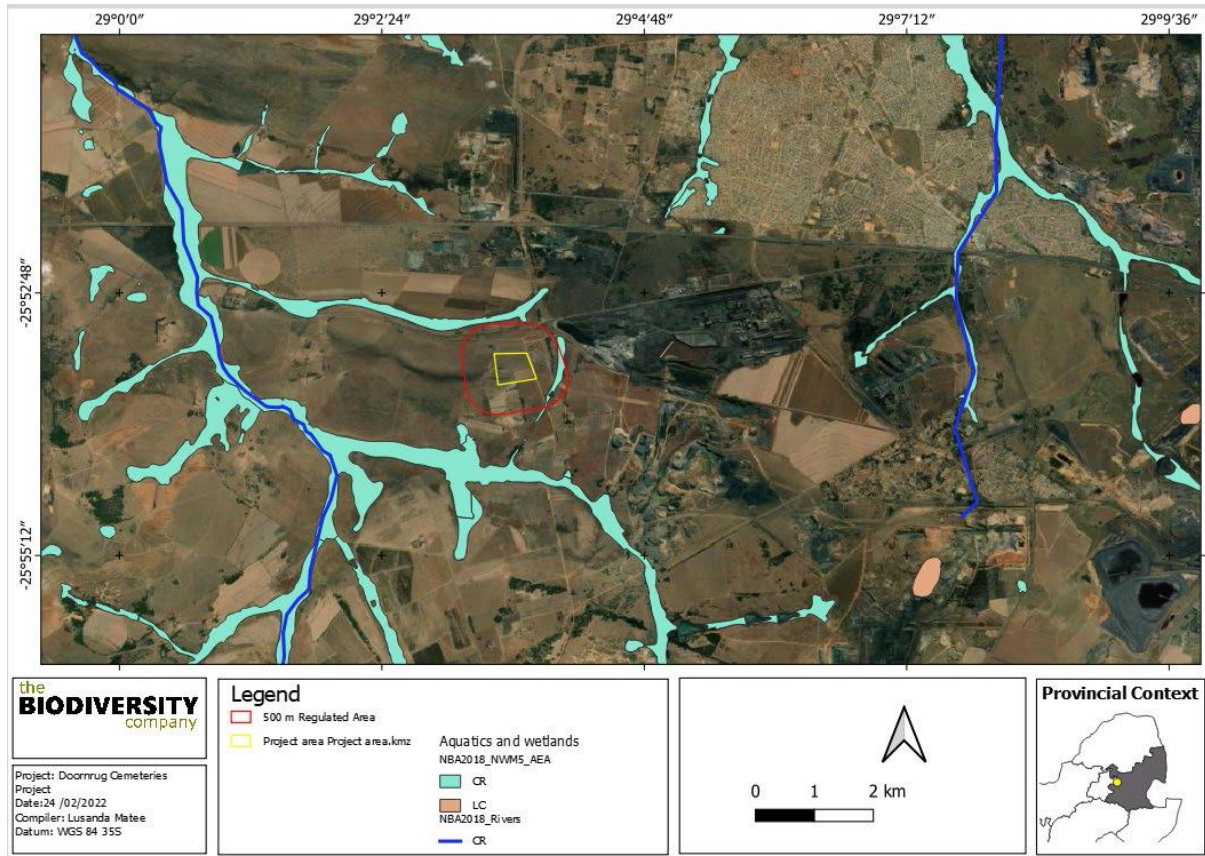


Figure 8-12: Map illustrating ecosystem threat status of river and wetland ecosystems in the project area.

### 8.12. National Freshwater Ecosystem Priority Area Status

The National Freshwater Ecosystem Priority Areas (NFEPA) spatial data indicates that no Freshwater Ecosystem Priority Areas (FEPA) rivers were identified within the project area however the closest FEPA wetland (Unclassified) is less than a km from the project area (Figure 17).

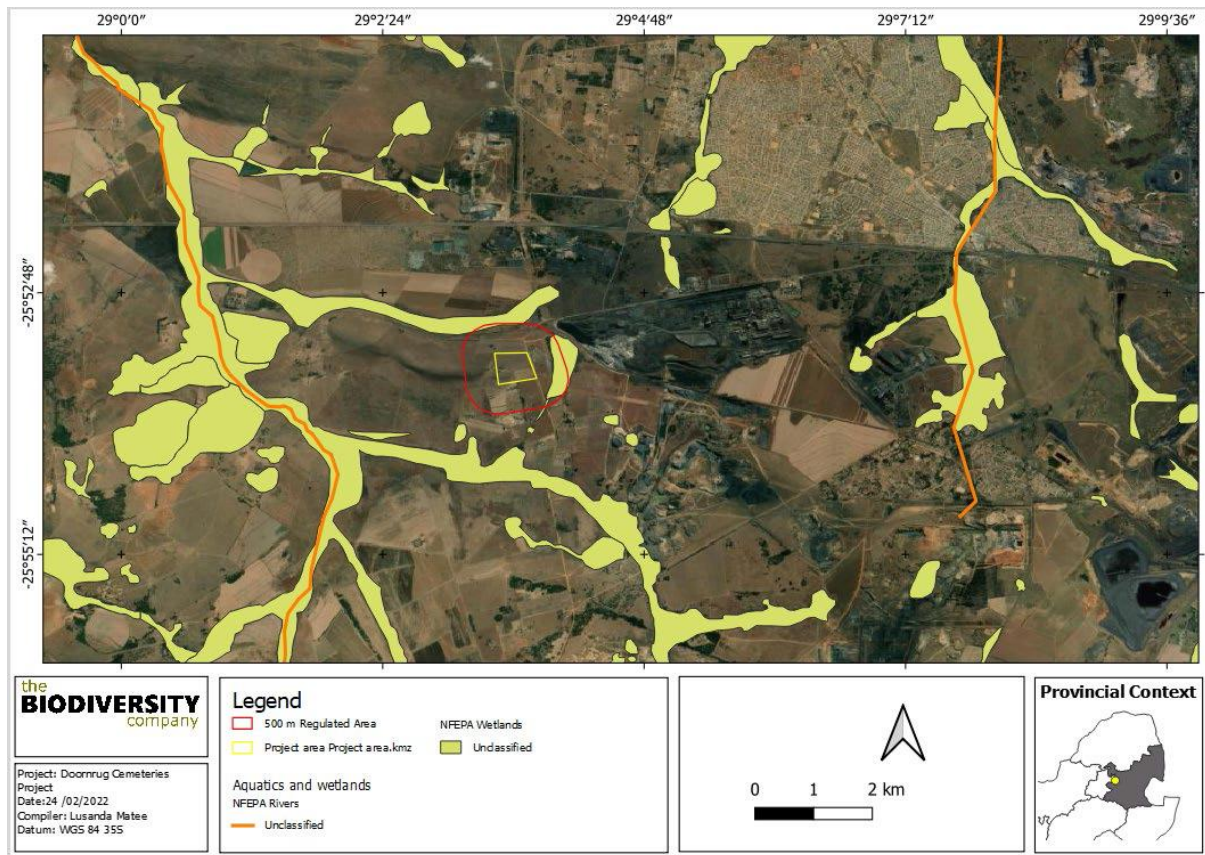


Figure 8-13 : The project area in relation to the National Freshwater Ecosystem Priority Areas

### 8.13. Flora

According to Mucina & Rutherford, the vegetation type that is predominate within the project area is the Rand Highveld Grassland (Figure 18), which is in the Mesic Highveld Grassland Bioregion of the Grassland Biome (Mucina & Rutherford 2006; SANBI,2018). The Rand Highveld Grassland Type is virtually confined to Mpumalanga Province, although both also extend marginally into eastern Gauteng.



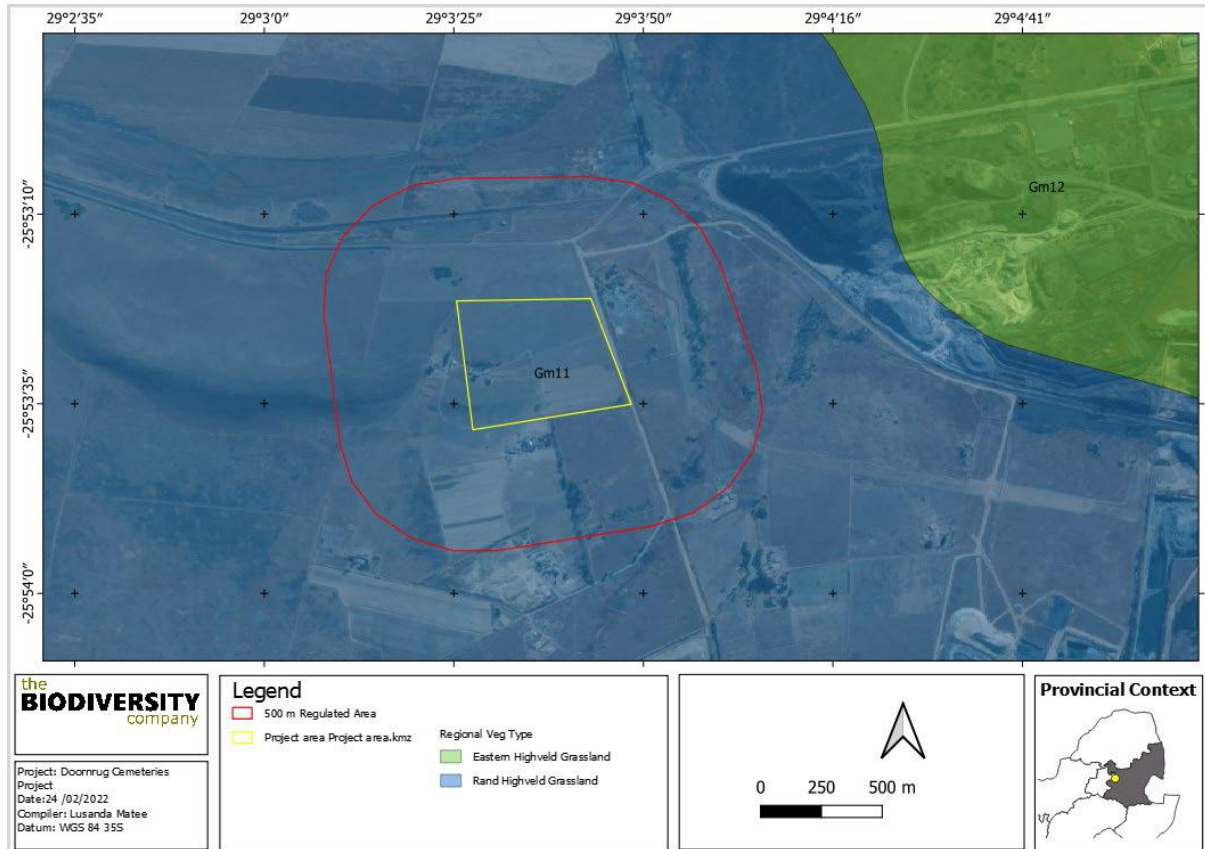


Figure 8-14 : Map illustrating the vegetation type associated with the project area

### 8.14. Expected Flora Species

According to the new Plants of Southern Africa (POSA) database underpinned by the Botanical Database of Southern Africa (BODATSA), a total of 485 species of indigenous plants are expected to occur within the assessment area and immediate landscape. Appendix C of the Terrestrial Compliance Statement provides the list of species and their respective conservation status and endemism. A total of 8 Red List/ SCC according to the IUCN Red List status could be expected to occur within the assessment area and are provided in Table 6 below (according to the relevant POSA Grid Squares)(Figure 19).

Table 8-2 : Threatened flora species that may occur within the assessment area associated with the proposed project area. VU= Vulnerable, DD=Data Deficient

Family	Species	IUCN	IUCN
Iridaceae	<i>Gladiolus paludosus</i>	VU	Indigenous; Endemic
Asphodelaceae	<i>Aloe bergeriana</i>	DD	Indigenous; Endemic
Apocynaceae	<i>Aspidoglossum validum</i>	DD	Indigenous; Endemic

A total of 54 woody, graminoid, shrub and herbaceous plant species belonging to were recorded in the project area during the field assessment. This includes two species that have been assigned alien invader plant

categories under the National Environmental Management: Biodiversity Act (NEMBA). Some of the plant species recorded can be seen in Figure 19.

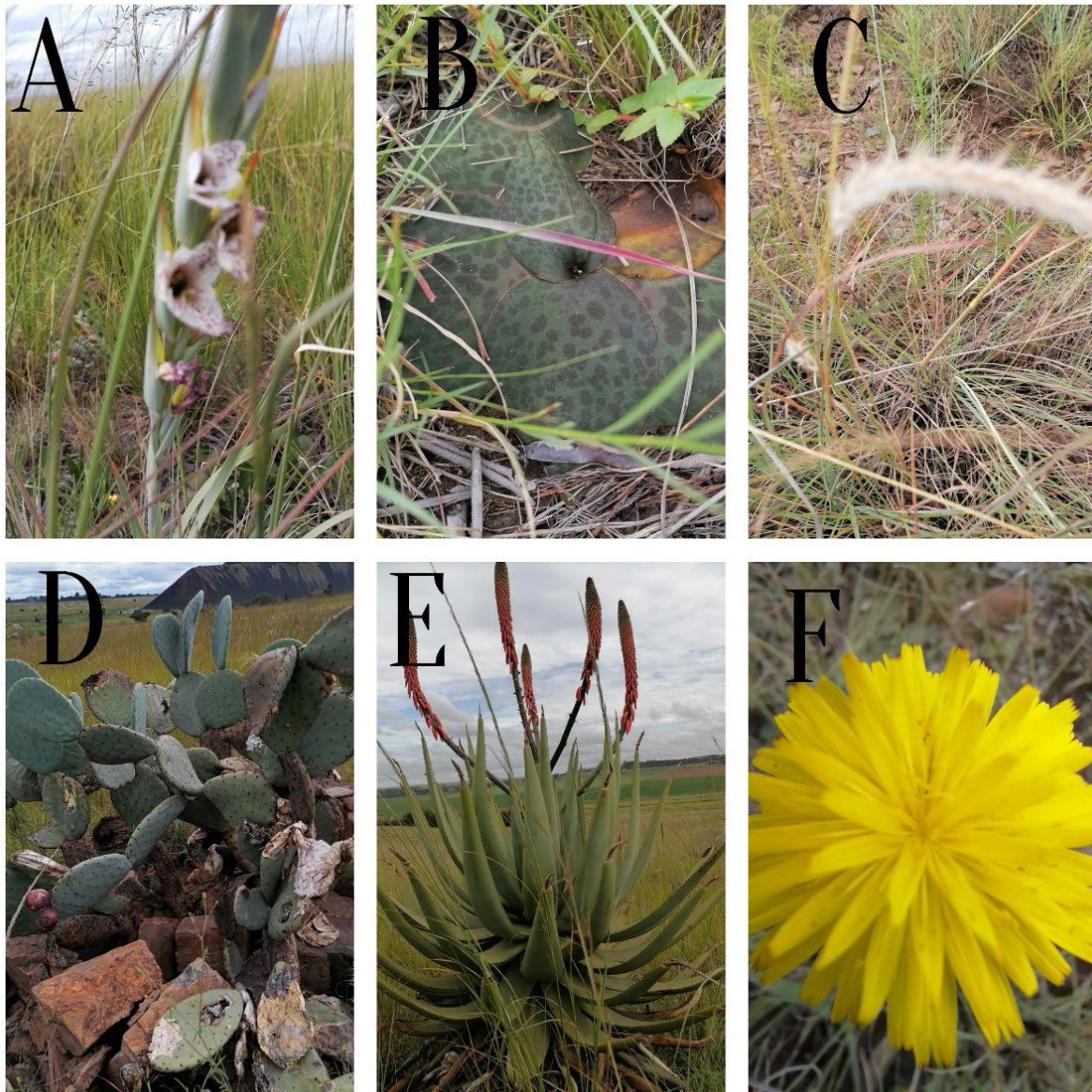


Figure 8-15 : Photographs illustrating some of the flora recorded within the assessment area. A) *Gladiolus ecklonii* (Sheath Glad), B) *Ledebouria ovatifolia* (Flat-leaved African Hyacinth). C) *Elionurus muticus* (Wire Grass)., D) *Opuntia ficus-indica* (Sweet prickly pear).,E) *Aloe castanea* (Cat's Tail Aloe) and F) *Hypochaeris radicata* (Cat's ear)



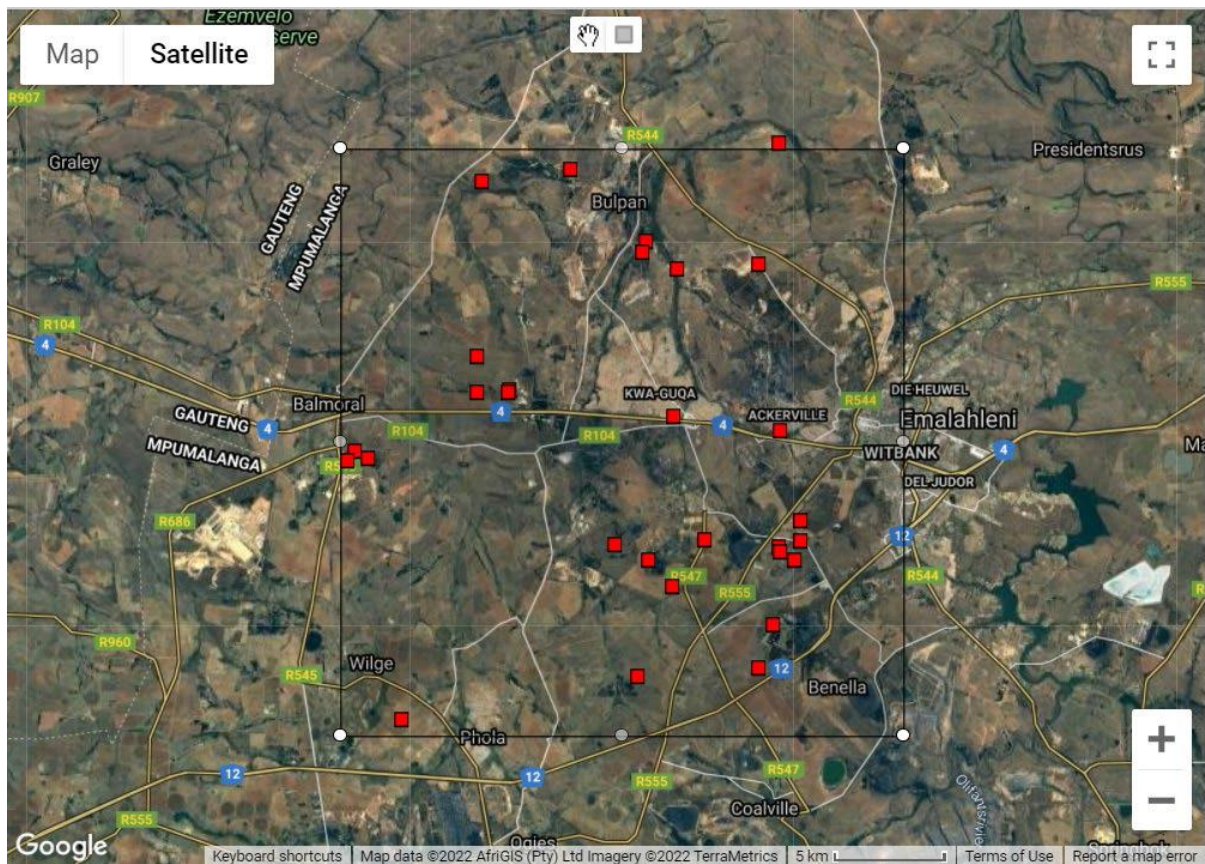


Figure 8-16 : Map showing the grid drawn to compile an expected species list (BODATSA-POSA, 2016)

### 8.15. Invasive Alien Plants

Ten (10) Invasive Alien Plant (IAP) species listed under the Alien and Invasive Species List 2016, Government Gazette No. 40166 as Category 1b were recorded for the area. These IAP species must be controlled by implementing an Invasive Alien Plant Management Programme in compliance of section 75 of the Act. Plants listed as Category 1 alien or invasive species under the National Environmental Management: Biodiversity Act (NEMBA) appear in the green text, whilst category 2 appear in blue (Table 8-3).

Table 8-3 : IAPs recorded in the project area

Scientific Name	Common Name	Threat Status (SANBI, 2017)	SA Endemic	Alien Category
<i>Cereus jamacaru</i>	Queen-of-the-Night	NE	Not Indigenous; Naturalized exotic weed	NEMBA Category 1b.
<i>Cirsium vulgare</i>	Spear Thistle, Scotch Thistle	NE	Not Indigenous; Naturalized exotic weed	NEMBA Category 1b.

Scientific Name	Common Name	Threat Status (SANBI, 2017)	SA Endemic	Alien Category
<i>Datura ferox</i>	Large Thorn Apple	NE	Not Indigenous; Naturalized exotic weed	NEMBA Category 1b.
<i>Eucalyptus camaldulensis</i>	Red River Gum	NE	Not Indigenous; Naturalized exotic weed	NEMBA Category 1b.
<i>Gleditsia triacanthos</i>	Honey Locust	NE	Not Indigenous; Naturalized exotic weed	NEMBA Category 1b.
<i>Opuntia ficus-indica</i>	Sweet prickly pear	NE	Not Indigenous; Naturalized exotic weed	NEMBA Category 1b.
<i>Pinus patula</i>	Jejecote Pine	NE	Not Indigenous; Naturalized exotic weed	NEMBA Category 2
<i>Schinus molle</i>	Peruvian Pepper Tree	NE	Not Indigenous; Naturalized exotic weed	NEMBA Category 1b.
<i>Senna occidentalis</i>	Coffee Senna	NE	Not Indigenous; Naturalized exotic weed	NEMBA Category 1b.
<i>Verbena bonariensis</i>	Purpletop Vervain	NE	Not Indigenous; Naturalized exotic weed	NEMBA Category 1b.

#### 8.16. Species of conservation concern (SCC)

##### 8.16.1. Avifauna

A total of thirty-three (33) bird species were recorded in the project area during the survey based on either direct observation or the presence of visual tracks & signs. Avian diversity within this habitat was relatively poor due to the project area's surrounding land-use. In addition to this, the areas of the Grassland Biome, which therefore suggests that the sensitivity of the site, from an avian perspective, will not be of any great significance. One species of Conservation Concern (SCC) was however recorded, namely *Falco biarmicus* (Lanner Falcon)

### 8.16.2. Amphibians

No reptile or amphibian species were recorded in the project area during the survey, this can be attributed to the lack of suitable habitat, the past human settlements and adjacent mining areas. No indigenous tree species occur on the site; hence the lack of arboreal reptiles.

### 8.16.3. Mammals

A total of three mammal species were recorded in the project area. The presence of humans, overgrazing by livestock as well as the frequent burning of the grassland vegetation reduces available refuge habitat and expose remaining smaller terrestrial mammals to increased predation levels, this may have also contributed to the low diversity observed in the project area. The Species recorded are listed in Table 8-4.

Table 8-4 : Mammal species recorded in the project area

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
<i>Herpestes sanguineus</i>	Slender Mongoose	LC	LC
<i>Hystrix africaeaustralis</i>	Cape Porcupine	LC	LC
<i>Lepus saxatilis</i>	Scrub Hare	LC	LC

### 8.17. Species of conservation concern (SCC)

Four habitats were recorded in the project area (Figure 21) and are discussed below:

#### 8.17.1. Transformed

These include areas classified that have been transformed and are considered to no longer represent functioning ecosystems with intact or near-intact ecological and evolutionary processes. These areas are not in climax condition due to factors other than physical disturbance. This habitat unit represents the area that has been cleared of all vegetation or transformed to cropland and the high disturbance levels in such habitats have provided the necessary conditions for alien and invasive plant (AIP) species to proliferate and dominate the landscape. This habitat is regarded as transformed due to the nature of the modification of the area to an extent where it would not be able to return to its previous state.

#### 8.17.2. Degraded Grassland

This habitat unit includes grassland communities that have not been historically transformed but the various sections have received different historical and current impacts. This habitat unit is degraded to some degree and some areas are within a recovering state and mainly consist of pioneer species and IAPs.

### **8.17.3. Grassland**

The grassland habitat type identified in the project area was the remaining natural grassland after the majority of the project area was utilized for agricultural activities, predominantly maize farming and pasture fields. From a grass succession perspective, climax and sub climax grass species were more prominent than pioneer species, indicating an established grass sward moving towards a climax state, from a successional aspect. Although not completely degraded or transformed, this habitat unit did display some forms of disturbance.

### **8.17.4. Rocky Outcrop Habitat Unit**

Occasional ridges or rocky outcrops interrupt the grassland cover. The Rocky Outcrop Habitat Unit comprises scattered rocky outcrops within the proposed Su Casa Burial Estate project area. The vegetation occurring within these areas is almost similar to that of the grassland habitat unit. This habitat unit has several small rocky outcrops, with largely intact vegetation composition and structure, a high diversity of floral species and increased diversity and abundance of floral species. There is a similarity between the two vegetation units, with a few species occurring within this habitat unit which are typical of the rocky outcrops of the area.

### **8.18. Areas of Concern**

The following concerns are associated with the two feasibility areas:

- According to the spatial dataset, the proposed development overlaps with a VU ecosystems; and
- Traverses a protected area expansion area

### **8.19. Site Ecological Importance**

The vegetation structure and species composition of the two habitats have been completely altered as such, has a very low conservation value and ecological sensitivity from a floral perspective.



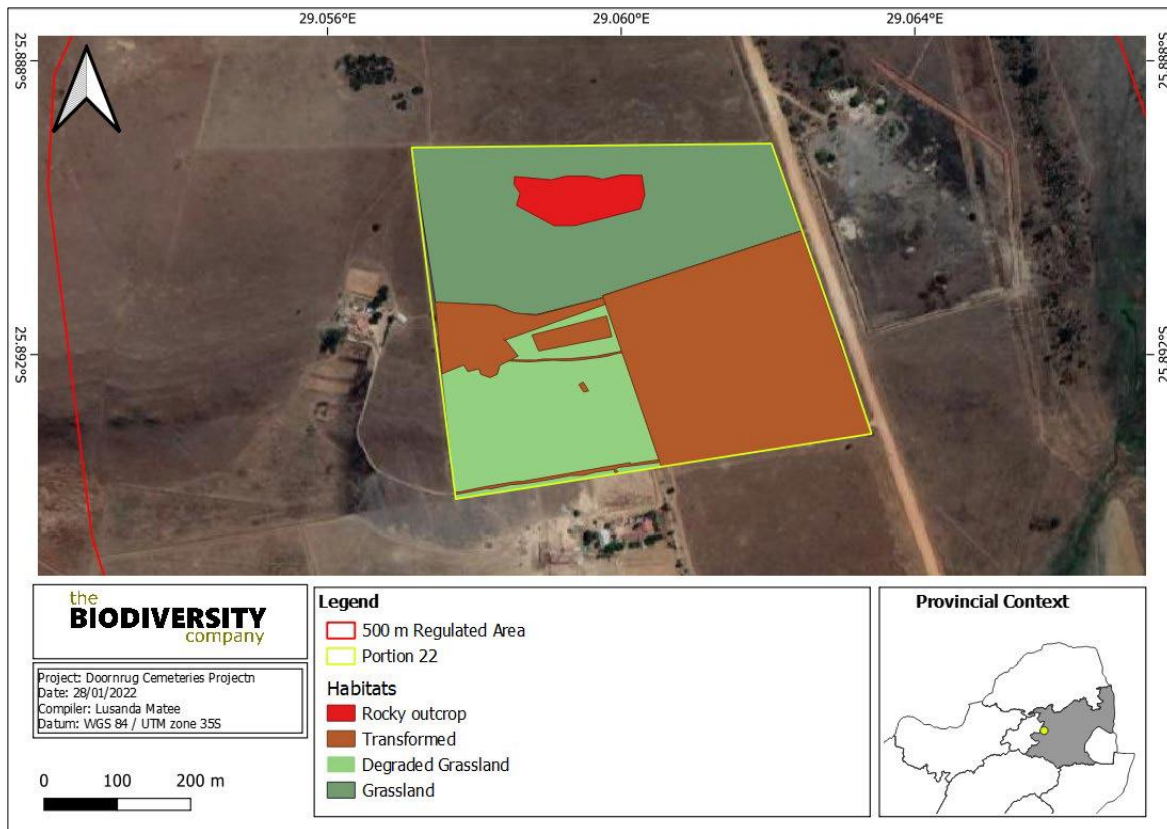


Figure 8-17 : The habitat units identified in the project area

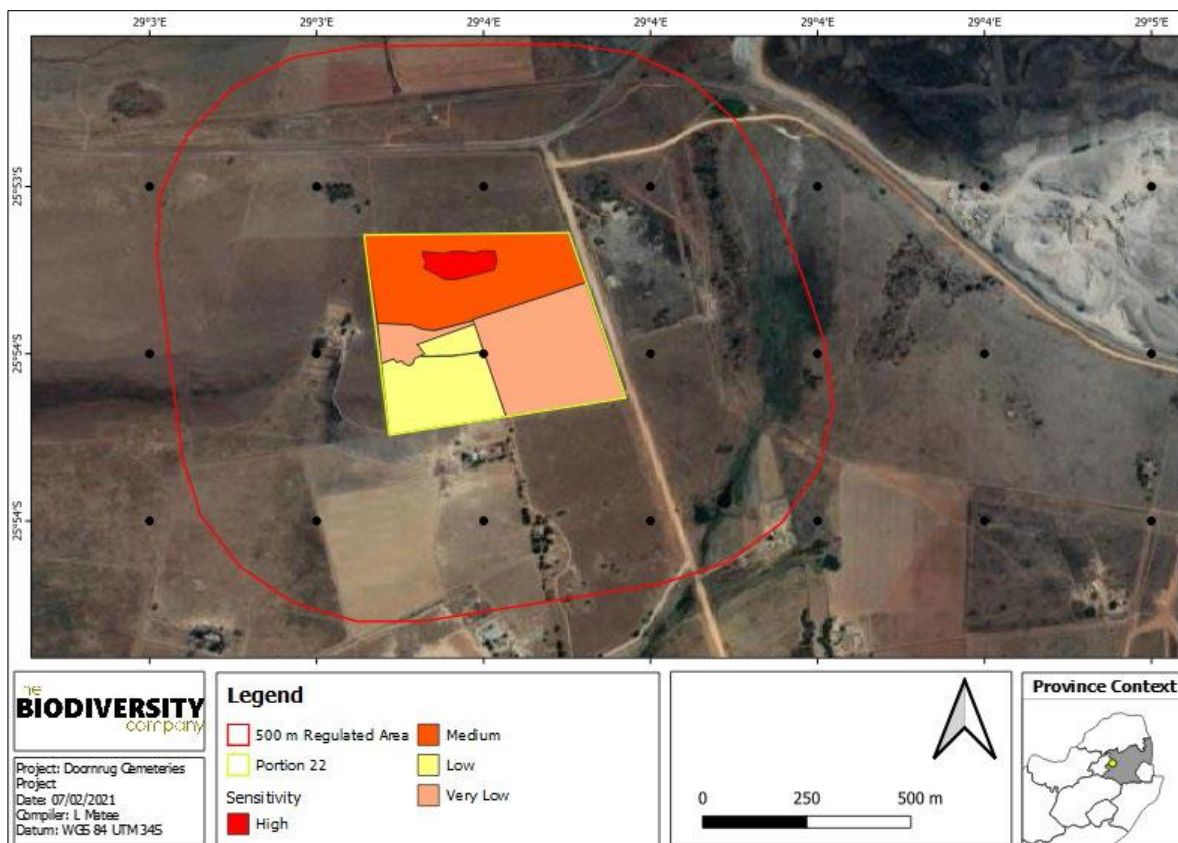


Figure 8-18 : The sensitivity of the project area



### 8.20. Land Capability

The following information was sourced from the Agricultural Compliance Statement Report prepared by The Biodiversity Company on February 2022.

According to the land type database (Land Type Survey Staff, 1972 - 2006), the project area is characterised by the Ba5 land type as well as the Bb16 land type which is illustrated in Figure 23. The Ba and Bb land types consists of duplex and marginalitic soils which tend to be dystrophic or mesotrophic. The subsoils consists of widespread red soils and according to Mucina & Rutherford (2006), Glenrosa as well as Mispah soil forms tend to dominate these areas. These soil forms are predominantly formed on rocky ridges.

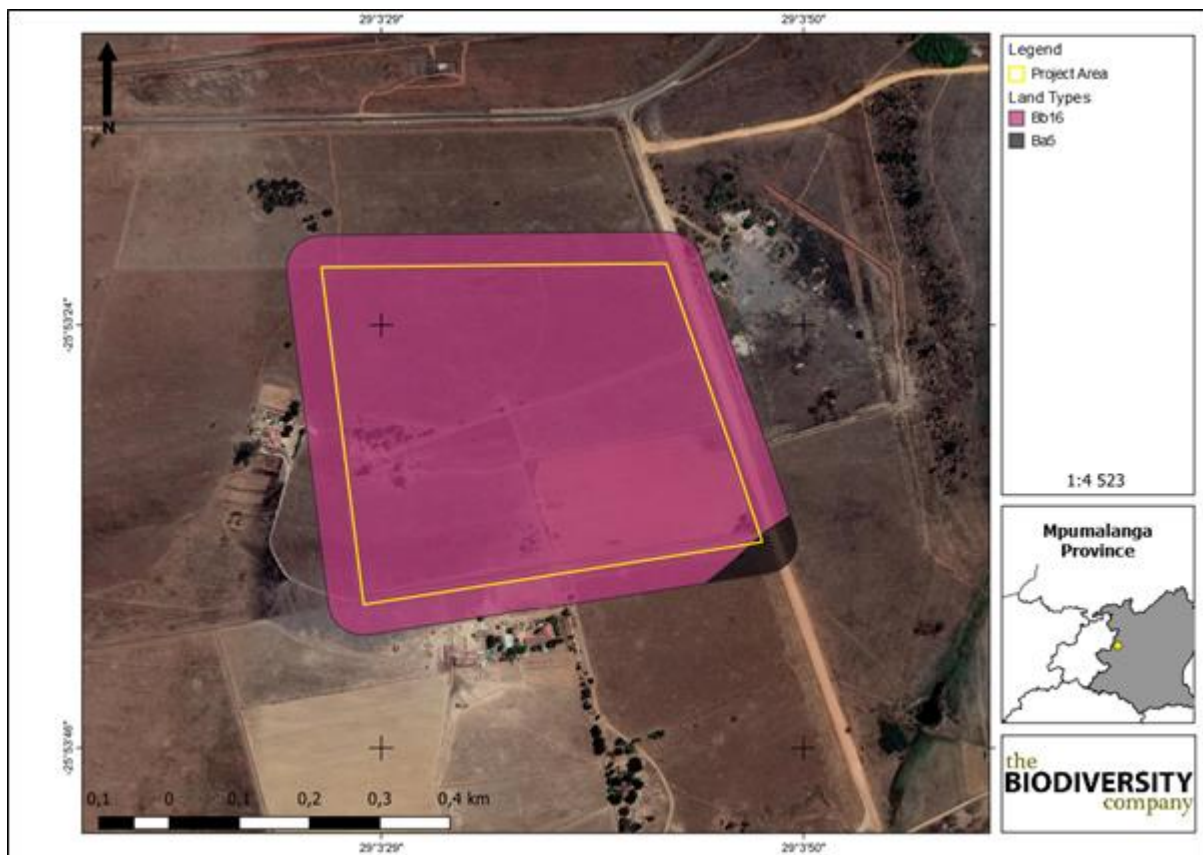


Figure 8-19 : The land types associated with the project area

The Ba5 land type terrain unit is illustrated in Figure 8-20. The various soil forms that are expected throughout these land types terrain units are shown in Table 8-5. The Bb16 land type terrain unit is illustrated in Figure 8-21. The various soil forms that are expected throughout the Bb16 land types terrain units are shown in Table 8-6.

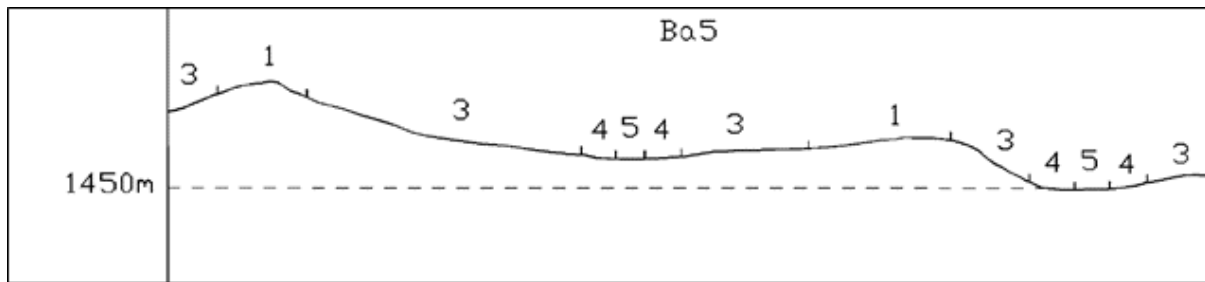


Figure 8-20 : Illustration of the Ba5 land type terrain units (Land Type Survey Staff, 1972 - 2006)

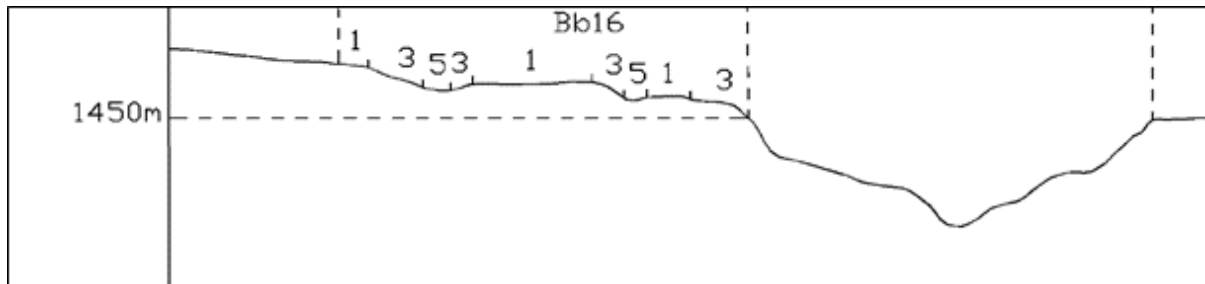


Figure 8-21 : Illustration of the Bb16 land type terrain units (Land Type Survey Staff, 1972 - 2006)

Table 8-5 : Soils expected at the respective terrain units within the Ba5 land type (Land Type Survey Staff, 1972 - 2006)

Terrain Units							
1 (20%)		3 (60%)		4 (15%)		5 (5%)	
<b>Hutton</b>	50%	Hutton	40%	Hutton	25%	Willowbrook	50%
<b>Glenrosa</b>	20%	Avalon	15%	Avalon	15%	Katspruit	30%
<b>Clovelly</b>	10%	Glenrosa	10%	Longlands	15%	Longlands	20%
<b>Bare rock</b>	10%	Glencoe	10%	Kroonstad	10%		
		Clovelly	5%	Bonheim	10%		
		Longlands	5%	Clovelly	10%		
		Sawrtland	5%	Swartland	5%		
		Wasbank	5%	Glencoe	5%		
		Mispah	5%	Wasbank	5%		

Table 8-6 : Soils expected at the respective terrain units within the Bb16 land type (Land Type Survey Staff, 1972 - 2006)

Terrain Units					
1 (50%)		3 (45%)		5 (5%)	
<b>Clovelly</b>	35%	Clovelly	35%	Stream beds	30%
<b>Mispah</b>	15%	Bare Rock	10%	Katspruit	30%
<b>Hutton</b>	15%	Mispah	15%	Longlands	15%

<b>Avalon</b>	15%	Cartref	15%	Wasbank	15%
<b>Cartref</b>	5%	Hutton	10%	Swartland	10%
<b>Glenrosa</b>	5%	Avalon	10%		
<b>Glencoe</b>	5%	Longlands	5%		
<b>Bare Rock</b>	5%				

The geology of this region is included within the Witwatersrand Supergroup and the Pretoria Group. According to Mucina & Rutherford (2006), the Selons River formation, which forms part of the Rooiberg Group, can also be expected in this area with many Quartzite ridges visible from the surface.

**8.20.1. Terrain**

The slope percentage of the project area has been calculated and is illustrated in Figure 8-11. The majority of the regulated area is characterised by a slope percentage between 0% and 5%. A smaller part of the regulated area is characterised by a slope percentage between 5% and 10%, with some smaller patches within the project area characterised by a slope percentage up to 15. This illustration indicates a non-uniform topography with gentle to steep slopes being present. The Digital Elevation Model (DEM) of the project area (Figure 8-23) indicates an elevation of 1 514 to 1 539 Metres Above Sea Level (MASL).

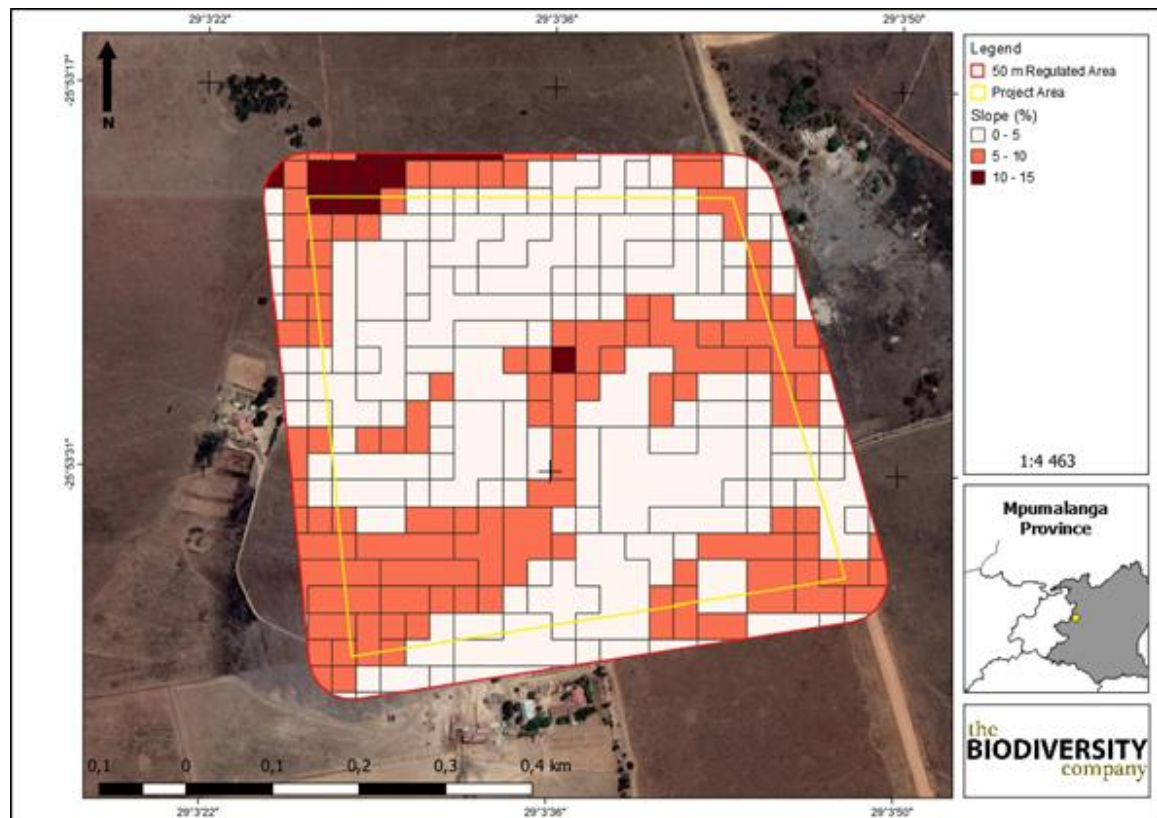


Figure 8-22: Slope percentage map for the regulated area



Figure 8-23 : Digital Elevation Model of the regulated area (metres above sea level)

### 8.20.2. Soil forms

Three soil forms were identified within the 50 m regulated area namely Mispah, Glenrosa and Clovelly. Of these soil forms, the Clovelly soil form is most sensitive.



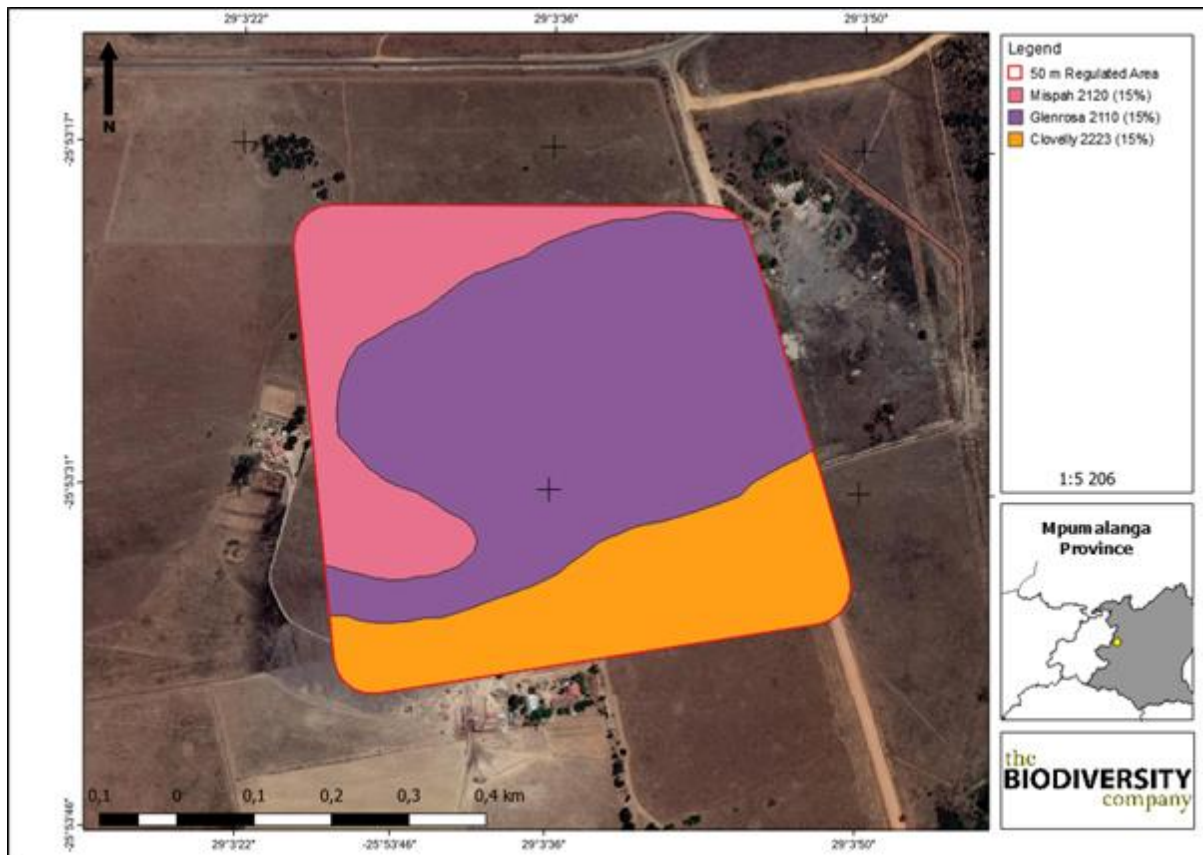


Figure 8-24 : Soil forms delineated within the 50 m regulated area

The land capability of the Mispah, Glenrosa and Clovelly soils have been determined to be class “VI”, class “VI” and a class “IV” respectively with a climate capability level 8 given the low Mean Annual Precipitation and the high evaporation rates. The combination between the determined land capabilities and climate capabilities results in a land potential “L7” and “L6” respectively.

The “L6” land potential is regarded to have very restricted potential. It has regular and/or severe limitations due to soil, slope, temperatures or rainfall and is non-arable. The “L7” land potential is regarded to have low potential. It has severe limitations due to soil, slope, temperatures or rainfall and is non-arable.

### Sensitivity Verification

The following land potential level has been determined;

- Land potential level 6 (this land potential level is characterised by very restricted potential. Regular and/or severe limitations due to soil, slope, temperatures or rainfall. Non-arable); and
- Land potential 7 (this land potential level is characterised by low potential. Severe limitations due to soil, slope, temperatures or rainfall. Non-arable).

Fifteen land capabilities have been digitised by (DAFF, 2017) across South Africa, of which eight potential land capability classes are located within the proposed footprint area’s assessment corridor, namely land capability 1 to 8 (ranging from very low to moderate) (see Figure 29). The baseline findings and the sensitivities as per the



Department of Agriculture, Forestry and Fisheries (DAFF, 2017) national raster doesn't concur with one another in the sense that no "Moderate" sensitivity land potential areas were identified during the site visit.

It is worth noting that this nation-wide data set has some constraints of its own. According to DAFF (2017), inaccuracies and the level of detail of these data sets are of concern. Additionally, the scale used to model these data sets are large (1:50 000 to 1:100 000) and is not suitable for farm level planning. Furthermore, it is mentioned by DAFF (2017) that these data sets should not replace any site-based assessments given the accuracies perceived.

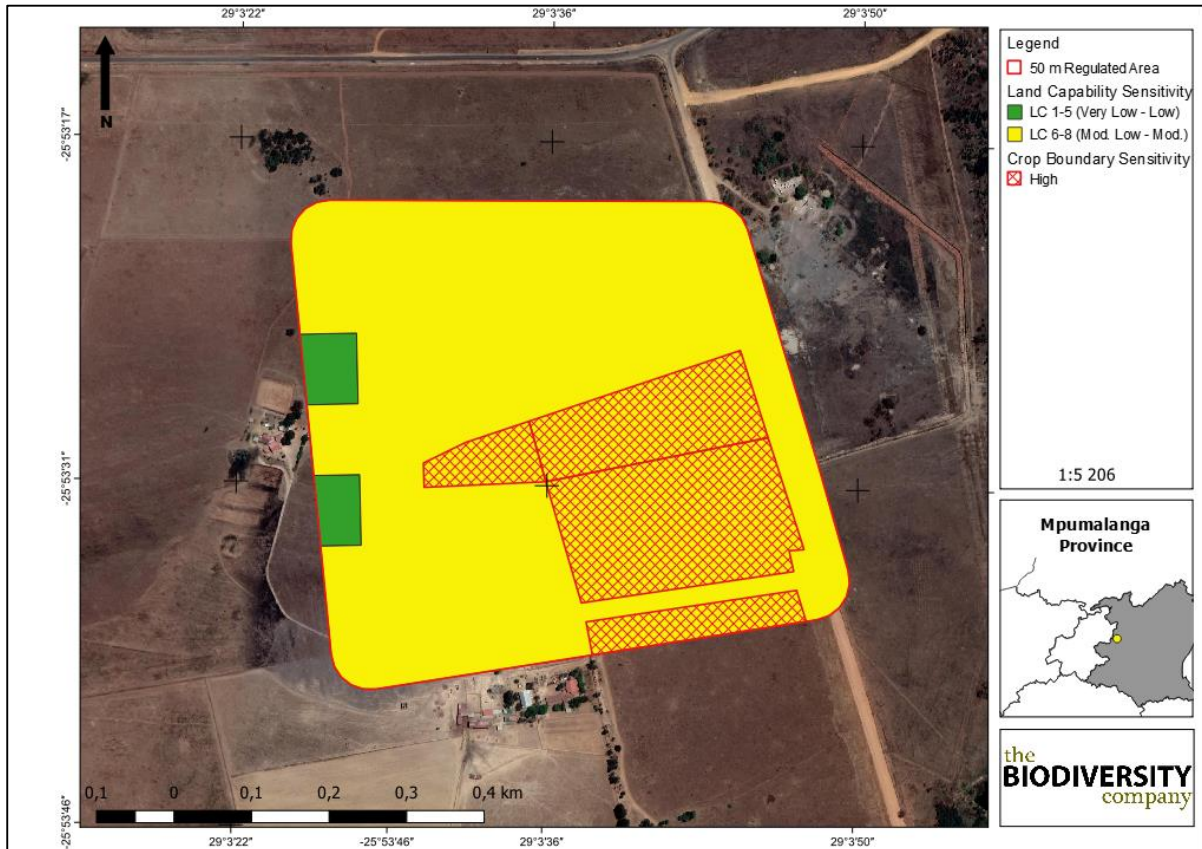


Figure 8-25 : Land Capability Sensitivity (DAFF, 2017)

## 8.21. Groundwater

The Geogydrology report (Tier 1 Groundwater Risk Assessment) was prepared by Peter Rosewarne in 2022 and the information in presented below. The report is attached as Appendix D4.

### 8.21.1. Aquifer Type

The main aquifer in the area comprises of a combination of weathered and fractured zones and is classed by the Department of Water and Sanitation and Forestry (DWAF) as an intergranular and fractured aquifer (see Figure 29). This has a mainly low to moderate groundwater potential with the aquifer at the site and surrounds being classed as d3, i.e. a median borehole yield of 0.5 – 2.0 l/s. The northern part of the site is classified as a fractured

rock aquifer b3, also with median borehole yields of 0.5 – 2 l/s. This band corresponds to the Wilge River Formation sandstones.

### 8.21.2. Groundwater Use

The NGIS of the Department of Human Settlements, Water and Sanitation (DHSWS) was interrogated to obtain the positions and any details on depth, yield, use and groundwater quality of existing registered boreholes in the site area and surrounds (Figure 8-26). Four registered boreholes are located within 1 – 3 km to the east of the site but with no useful information. A further five boreholes are located within 5 km of the site.

The hydrocensus found six boreholes, two on the site and four on adjacent properties. Information obtained is fairly sparse but the two boreholes on the proposed site, boreholes 5 and 6 on Figure 8-26, were not functional at the time of the site visit (March 2022). The others are used for domestic and agricultural purposes (Table 11). One of the on-site boreholes will be rehabilitated for site use. However, water from this borehole must not be used for domestic purposes, only for irrigation and wash-down and dust suppression on surfaces due to the risk of groundwater contamination.

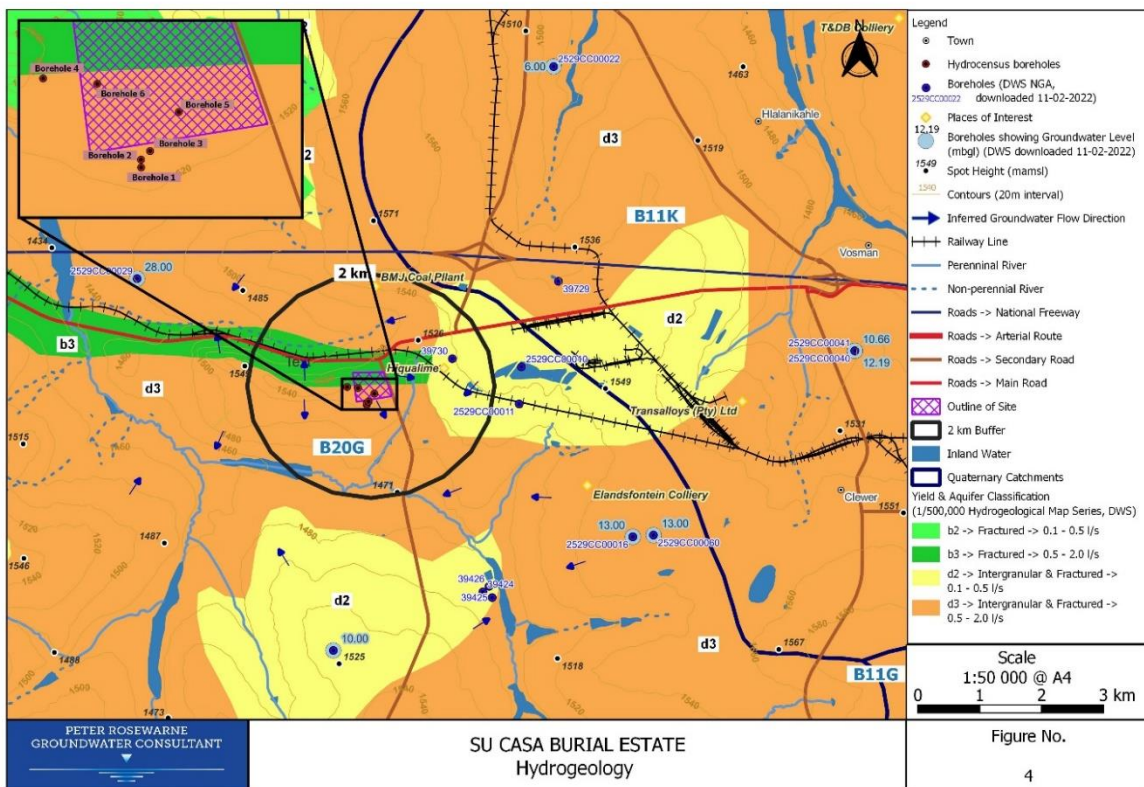


Figure 8-26 : Su Casa Burial Estate Hydrology

Table 8-7 : Data from the Hydrocensus

Landowner of portion 18 and 24	Portion 21	Portion 10
Owner: Johan Liebenberg	Owner: Piet Joubert	Owner: Applicant

Landowner of portion 18 and 24	Portion 21	Portion 10
Comments: Lives on portion 24 where all their farm development is. Nothing developed on portion 18 – only use it for grazing. The three boreholes below are all on Portion 24 and the owner pumps from them alternatively as needed. He uses it for domestic and agricultural purposes. The sample Collected come from the JoJo tanks that receive water from all three boreholes.	Comments: Lives on the portion and all farm development is within portion 21. He uses the water from the borehole for domestic and agricultural purposes. Sample collected represents the borehole below and no other source.	Comment: There are two boreholes on the property. Neither were functional at the time of the hydrocensus and neither are currently being used.
Borehole 1: - 25.89433251 29.05931097 Depth: c.100m – water level at c.23m	Borehole 4: -25.89145657 29.05614395 Depth: c.40m	Borehole 5: -25.89253758 29.06052668 Depth: ?m – water at ?m
Borehole 2: - 25.89407885 29.05930527 Depth: c.100m – water level at c.40m		Borehole 6: -25.89163212 29.05789141 Depth: ?m – water at ?m
Borehole 3: - 25.89380317 29.05960064 Depth: c.72m – water level at ?m		

### 8.21.3. Groundwater Levels

The nearest information to the site on groundwater levels comes from four boreholes at differing directions and about 4 – 5 km from the site. Groundwater levels vary between 10, 13 and 28 m below ground level (mbgl). Information obtained by the landowner of portion 18 and 24 indicates an approximate water level of 23 and 40 m in two of his boreholes.



### 8.21.4. Groundwater Recharge

According to the Groundwater Resource Assessment Phase 2 project data (DWAF, 2005) the area has a recharge potential of about 6% of the MAP. This is an area of relatively high recharge because of the MAP of 790 mm, which is high by regional South African norms (average precipitation in South Africa is 464 mm).

### 8.21.5. Groundwater Flow Direction

Groundwater flow generally follows the topography and inferred flow directions are to the southeast in the southern site area and possibly to the north from a very small area in the northern parts, as indicated on Figure 4. Boreholes 1, 2 and 3 are in the projected groundwater flow path from the site.

### 8.21.6. Groundwater Quality

According to the published hydrogeological map (Figure 31), the area has groundwater with an electrical conductivity (EC) of 70 – 300 mS/m, i.e. of good to moderate quality. The groundwater associated with the Wilge River Formation is typically of good quality and of a calcium-magnesium bicarbonate nature. Poorer quality groundwater is likely to be associated with the coal mining area to the east. This area is likely to show more elevated EC, acidic pH, and elevated concentrations of typically Na, SO<sub>4</sub>, F and Boron, characteristics typical of groundwater impacted by coal mining.

Water samples were taken from boreholes 1, 2 and 3 (composite sample from holding tank) and Borehole 4. The results of the laboratory chemical analyses by WATERLAB, Pretoria, are shown in Table 12.

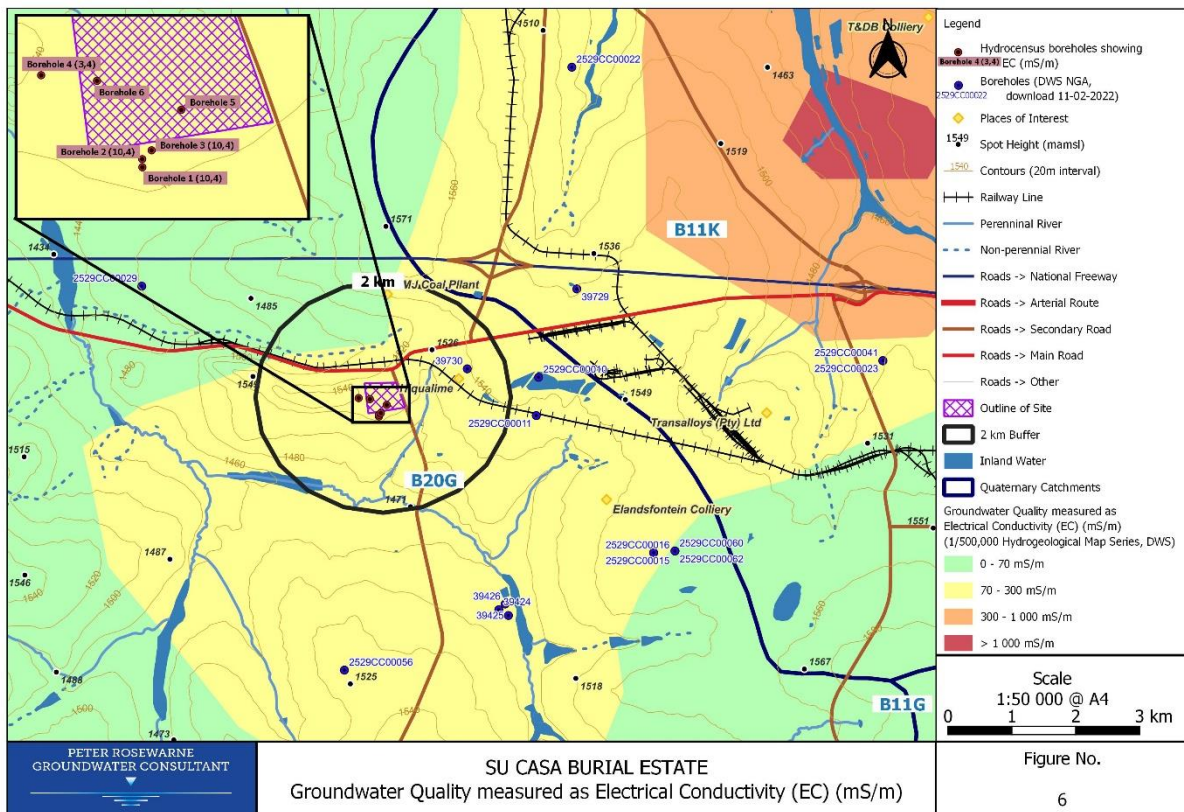




Figure 8-27 : Groundwater Quality measured as Electrical Conductivity (EC) (mS/m)

Table 8-8 : Laboratory Analyses of Groundwater Samples from the Hydrocensus

Determinand (mg/l unless otherwise stated)	Boreholes 1, 2 and 3	Borehole 4	SANAS 241-2015 Drinking water recommended limits
pH (pH units)	6.8		
EC (mS/m)	10.4		
TDS	54	14	<1 200
NA	4	1	200
K	0.6	<0.5	-
Ca	7	2	-
Mg	4	1	-
Cl	6	<2	300
SO <sub>4</sub>	14	8	250
TAL (as CaCO <sub>3</sub> )	20	<5	-
NO <sub>3</sub> (as N)	0.2	<0.1	11
F	0.3	0.3	1.5
Total PO <sub>4</sub>	<0.2	0.2	-
Cu	<0.01	0.088	2
Zn	0.106	0.112	5
Metals scan	<0.01	<0.01	-

The analytical results show that the site area groundwater is of very good quality. The groundwater from Borehole 4 is almost of rainwater quality and is acidic, which probably accounts for the Cu and Zn being slightly raised due to dissolving of copper or brass fittings and galvanised steel, respectively, by the acidic water. The groundwater from Borehole 1 appears to be of very good quality and fit for domestic use, according to the composite sample obtained from the holding tank.

#### 8.21.7. Abstraction of water from boreholes on site

The following information was sourced from the Groundwater Investigations for the Proposed Abstraction Boreholes Report prepared by Nyamoki Consulting and dated 2023. The Groundwater Investigations for the Proposed Abstraction Boreholes report is attached as Appendix D7.

The developer proposes to abstract water from existing boreholes on site. The locations of the boreholes are indicated on the maps below.

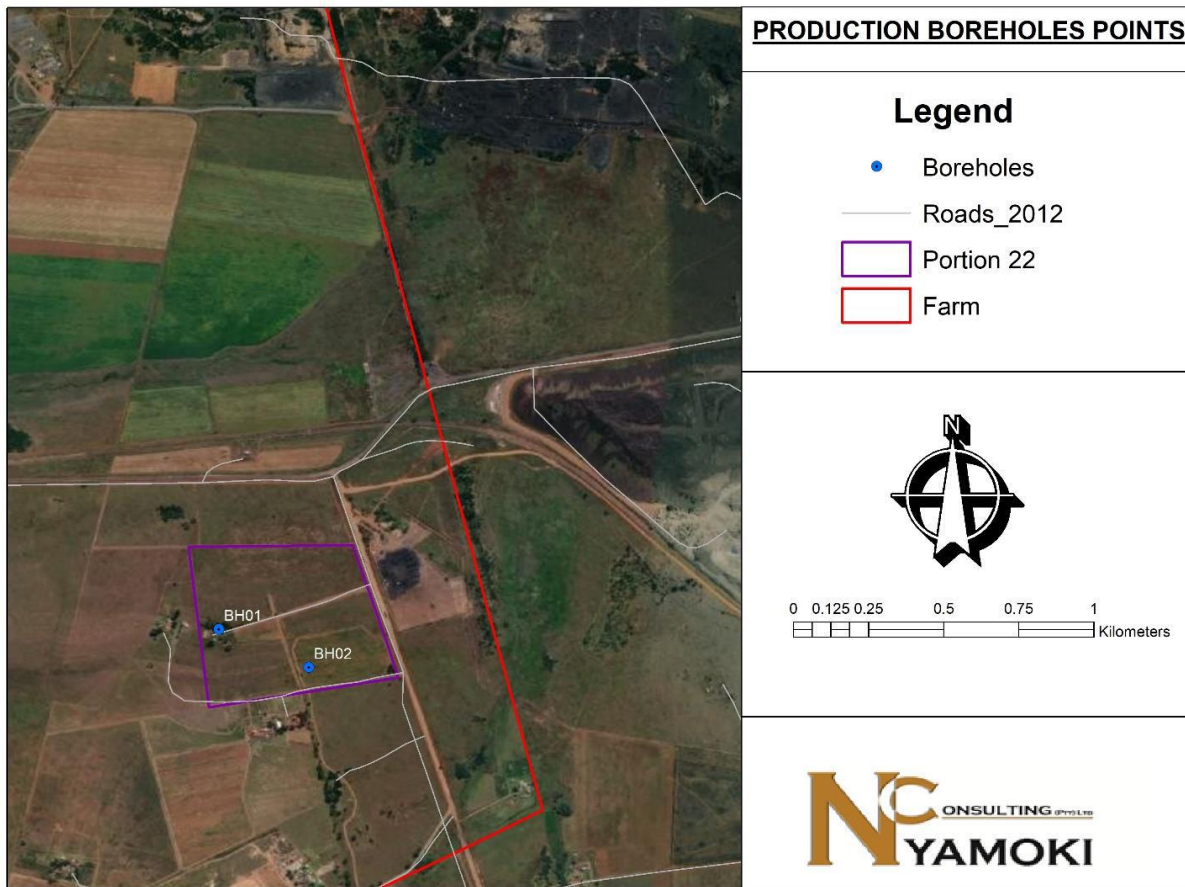


Figure 8-28 : Borehole locations (Source: Nyamoki Consulting)

- The study area is characterised by coal mines, farming both crop and livestock farming. Most of the area is covered by the farms surrounding the proposed cemetery, although coal mines are mostly located on the eastern side. Farmer houses are local houses adjacent to the site although they are very few in the south and on the western side.
- Faults zones may have an impact on the local hydrogeological regime as it can serve as potential preferred pathways for groundwater flow and contaminant transport. The Cemetery is located within the Class B fractured aquifers which is associated with hard and compact rock formations in which fractures, fissures and/or joints occur that are capable of both storing and transmitting water in useful quantities.
- The Ecca Group consists mainly of shales and sandstones that are very dense with permeability usually very low due to poorly sorted matrices. Water is stored mainly in decomposed/partly decomposed rock and water bearing fractures are principally restricted to a shallow zone below the static groundwater level. Sustainable borehole yields are limited to < 0.5 l/s, while higher yielding boreholes (> 3.0 l/s) may occur along structural

features i.e. fault and fracture zones. The study area shows that the general yield is 0.5 to 2.0 L/s influenced by fractured zone.

- From the water quality data BH01 it was found the water has high turbidity which was found not compliant with the SANS 241:2015 guideline, which requires that before use it must be treated. The high turbidity might be a result that the borehole is taking water from shallow aquifers which are highly weathered. BH02 indicated that the nitrate and manganese level were not compliant with the DWS guideline standards. High levels of nitrate in drinking water may increase the risk of colon cancer. Nitrate may enhance the cancer potential of other compounds or may turn into cancer-causing chemicals like the body. Nitrate in drinking water has not been shown to increase the risk of other kinds of cancer. Children and adults who drink water with high levels of manganese for a long time may have problems with memory, attention, and motor skills. Infants (babies under one year old) may develop learning and behaviour problems if they drink water with too much manganese in it. It is recommended that before the water is consumed be treated since it is not good for long term consumption.
- BH01 shows Type 2: Sodium-bicarbonate groundwater – Groundwater with sodium as the dominant cation and bicarbonate as the dominant anion. Type 2 water is typically found in deeper portions of the aquifer.
- BH02 shows Type 3: Calcium-bicarbonate/chloride/sulphate groundwater – Groundwater with calcium as the dominant cation and bicarbonate the dominant anion, but with relatively elevated chloride and sulphate concentrations. This water type consistently has higher levels of TDS than the other two types.,
- The similarity of hexagonal shape in BH01, BH02 and BH03 indicate water type of similar characteristics. HCO<sub>3</sub> is the dominant cation followed by the Ca<sup>2+</sup> and on the anion's species, Mg<sup>2+</sup> the is the most dominant in BH01 while BH02 Cl<sup>-</sup> is the dominant cation followed by the K<sup>+</sup> and on the anions species, SO<sub>4</sub> is the most dominant. By looking at the stiff diagram results, these 2 boreholes could be getting their water from the different aquifers.
- The ratings for the Aquifer System Management Classification and Aquifer Vulnerability Classification yield a Ground Water Quality Management Index of 4 for the Shallow Weathered Zone Aquifers within the study area, indicating that a Medium Level of groundwater protection is required.
- The study area is characterised by the predominantly arenaceous rocks (sandstone, feldspathic sandstone, arkose, sandstone-becoming-quartzitic-in-places) of the sedimentary types of rocks and predominantly meta-argillaceous rocks (slate, phyllite, meta-pelite, schist, serpentine, amphibolite, hornfels) which are metamorphosed rocks. The study area is deposited within the karoo supergroup rocks.
- The low borehole yields, fast water level drawdown and slow recovery observed during the aquifer testing indicate low transmissivity (T) aquifers, with low recharge. The highest pump rate measured (0.21 to 0.80 L/s)

was observed at boreholes BH 02 and borehole BH01 showed low water availability while only these are the only two boreholes that yielded a good quantity of water, and intercepted good water bearing fractures.

### 8.22. Hydropedology

The Hydropedological Report was prepared by The Biodiversity Company in 2022. The Hydropedological Report is attached as Appendix D8.

A Hydropedological Assessment Report was prepared by The Biodiversity Company in November 2022. According to the report, the hillslope hydrology of slopes intersected by the proposed Su Casa Burial Estate and associated infrastructure components are characterised by two distinct hydropedological patterns. Most of the slopes for the first distinctive hydropedological patterns are characterised by shallow recharge (see Figure 32) hydropedological types. These patterns occur from the crest to the upper mid-slope, after which a transition occurs from recharge to a responsive (saturated) section at the lower mid-slope to the valley bottom.

The second distinctive hydropedological pattern includes a shallow recharge soil forms in the crest to lower mid-slope area with a transition to a small responsive saturated hydropedological types. At the crest to lower mid-slope section, an increased Saturated Hydraulic Conductivity (Ks) occurs in the soil profile. Waterflow restrictions can also occur between the soil and the underlying parent material only if the substratum is impermeable.

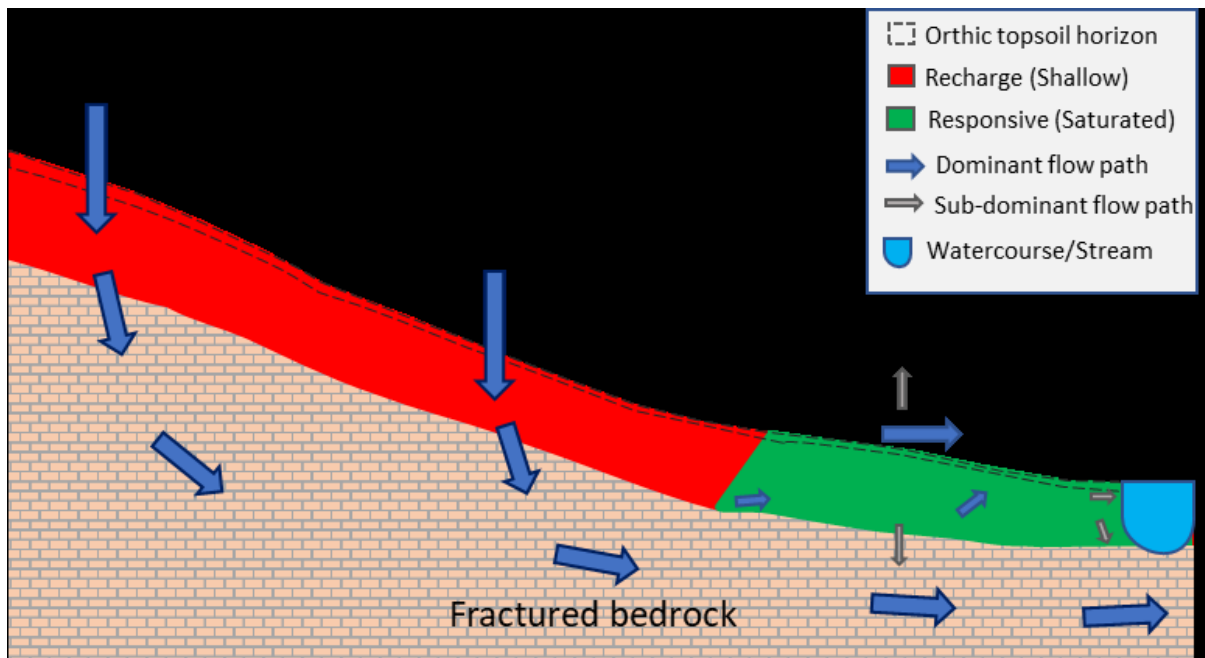


Figure 8-29 : Hillslope hydrology of one of two distinct hydropedological patterns prior to cemetery construction.



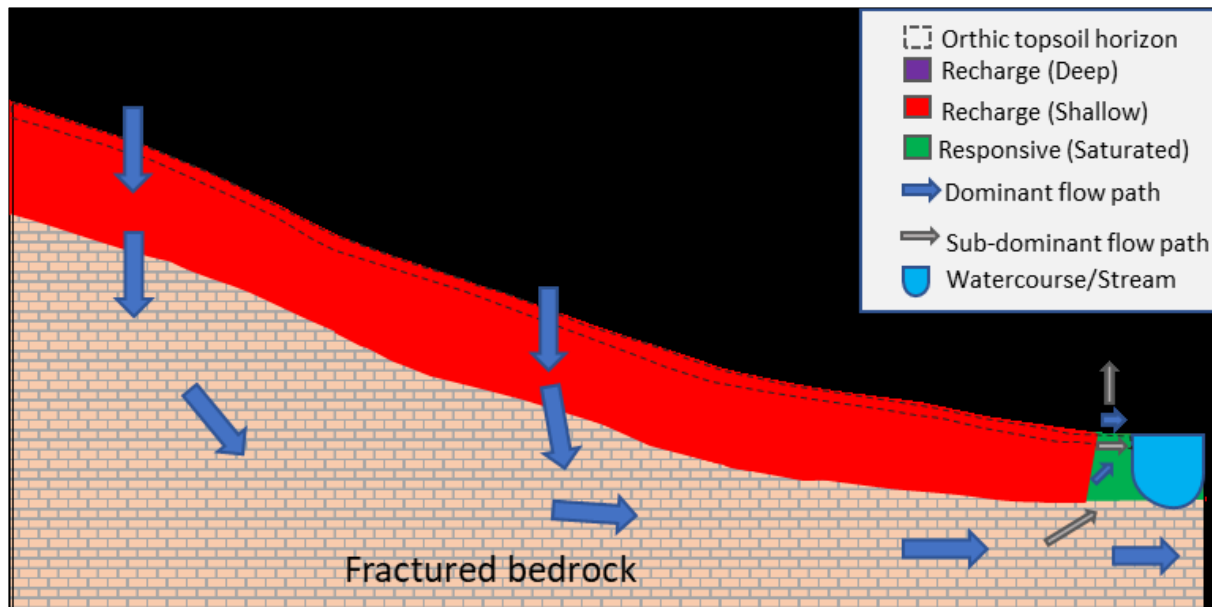


Figure 8-30 : Hillslope hydrology of the second of two distinct hydropedological patterns prior to cemetery construction.

The shallow Glenrosa and Mispah soil forms identified on-site are characterised with well drained profiles. The Glenrosa soil forms consist of an orthic topsoil profiles which include the presence of a fractured lithic horizon at the rock interface. The Mispah soil forms are characterised with orthic topsoil profiles merging into a fractured substratum. These profiles are characterised by extremely high Ks rates, including the lower lithic horizon.

No signs of leaching or oxidation/reduction processes were identified throughout the soil profile, which, together with the high Ks emphasises rapid vertical recharge of the groundwater stores as being the dominant flow path.

The valley bottom regions are characterised by a responsive (wet) hydropedological type. The soil form relevant to this observation point is that of the Kroonstad soil form. This soil form is characterised by an albic horizon subsoil with a gley horizon below, which is indicative of prolonged/permanently saturated soils which result in the formation of “responsive soils.” Responsive soils will be subject to overland/return flow during precipitation events (due to the naturally high-water content which will ensure rapid saturation). Between rainfall events, these soil forms will steadily feed watercourses and will lose moisture by means of Evapotranspiration (ET).

Albic horizons are often characterised by uniform white-greyish colours from the residual clay and quartz particles making up the matrix of the horizon. The main characteristic of this diagnostic horizon is a bleached colouration, which is a resultant product of distinct redox and ferrollysis pedological processes combined with eluvial processes. According to the Soil Classification Working Group (2018), albic horizons often receive lateral sub-surface flows from hillslope processes.

Gley horizons that are well developed and have homogenous dark to light grey colours with smooth transitions. Stagnant and reduced water over long periods is the main factor responsible for the formation of a gley horizon and could be characterised by green or blue tinges due to the presence of a mineral called Fougerite which includes sulphate and carbonate complexes. Even though grey colours are dominant, yellow and/or red striations can be

noticed throughout a gley horizon. The structure of a gley horizon mostly is characterised as strong pedal, with low hydraulic conductivities and a clay texture, although sandy gley horizons are known to occur. The gley soil form commonly occurs at the toe of hillslopes (or benches) where lateral water inputs (sub-surface) are dominant and the underlying geology is characterised by a low hydraulic conductivity. The gley horizon usually is second in diagnostic sequence in shallow profiles yet is known to be lower down in sequence and at greater depths (Soil Classification Working Group, 2018).

**8.23. Conceptual Impact Prediction**

The proposed Su Casa Burial Estate and associated infrastructure components will have very little impact on the hydrogeology of the relevant hillslopes, regardless of the position of the grave sites (crest, mid-slope or valley bottom). For recharge soils (which are dominant), recharge won't be affected at all given the fact that infiltration will only be impeded for the width of the grave site, which has been deemed insignificant given the size of the catchments as the dominant flow paths will remain vertical recharging groundwater stores (see Figure 34; Figure 35; for a conceptual example of interferences via the proposed grave sites).

The responsive (saturated) hydrogeological types, are usually not recommended for most activities as their interface can affect the total streamflow of sensitive receptors (e.g., the lower valley bottoms in Figure 34). Also, responsive (saturated) hydrogeological soil types tend to promote migration of contaminants towards water resources. In the case of the burial site body decomposition will occur.

The proposed Su Casa Burial Estate and associated infrastructure components located within the recharge hydrogeological type is not expected to affect the hillslope hydrology in any manner. Limited impacts can occur due the impeded vertical flows on the burial coffins and caskets are expected. These effects are however expected to have negligible impacts towards the total streamflow of sensitive receptors.

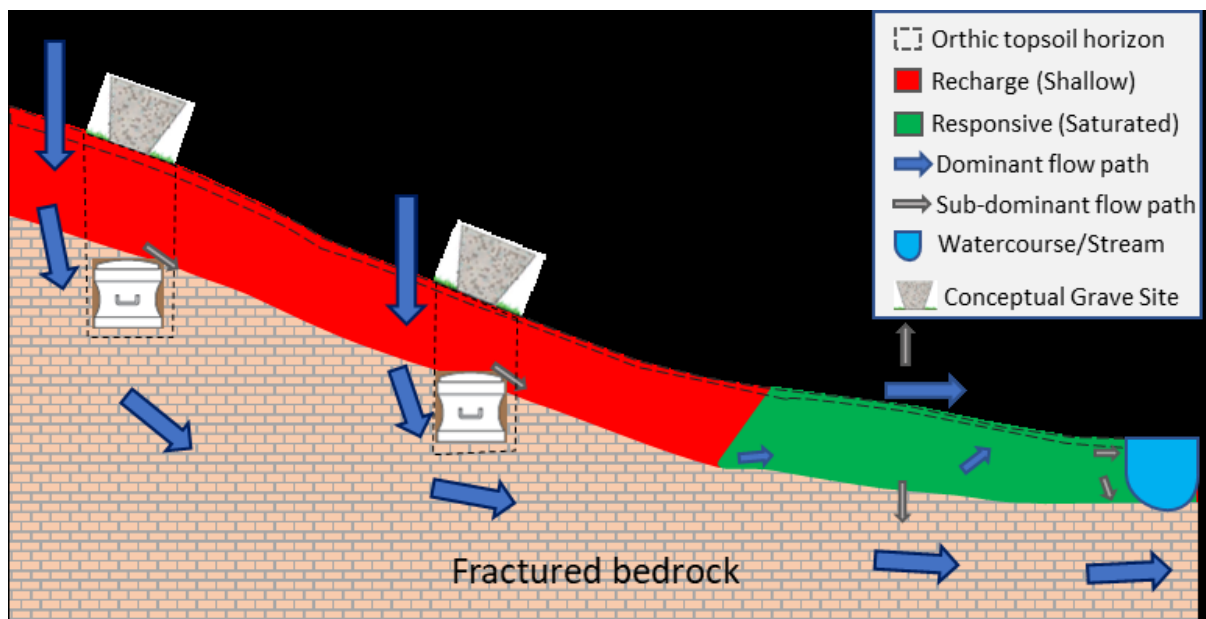


Figure 8-31 : Hillslope hydrology of one of two distinct hydrogeological patterns after the establishment of the burial estate and associated infrastructure.

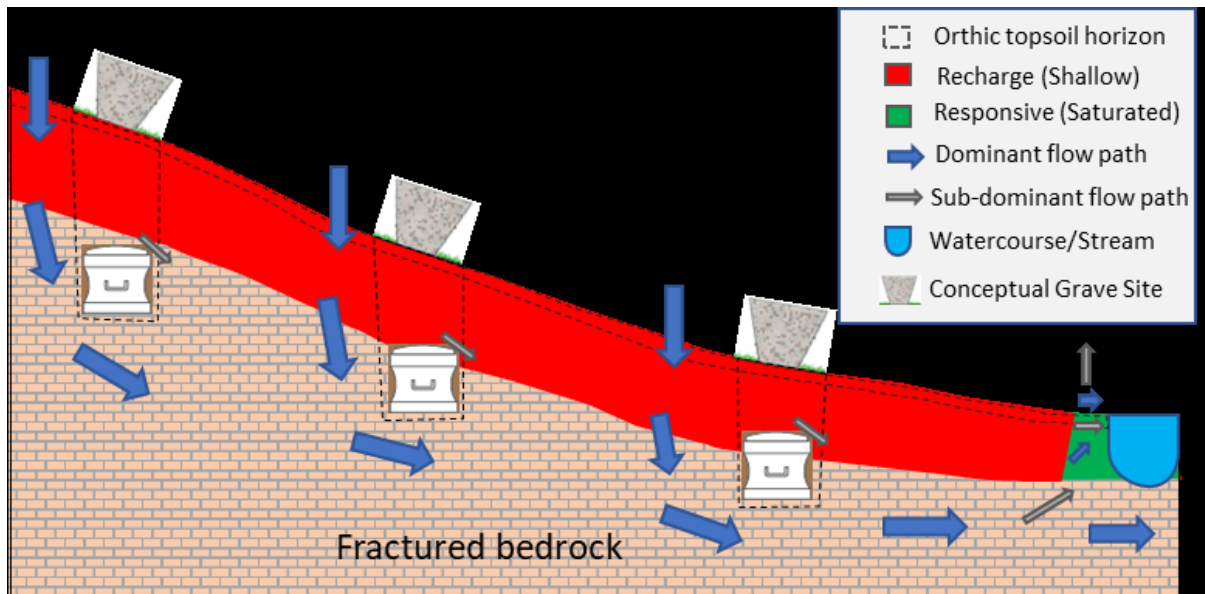


Figure 8-32 : Hillslope hydrology of two of two distinct hydrogeological patterns after the establishment of burial estate and associated infrastructure.

#### 8.24. Heritage / Archaeology

According to the Heritage Impact Assessment (HIA) report prepared by Xander Antonites in April 2022, (Appendix D2) the regional landscape is a sensitive heritage zone and contains Stone Age sites, Late Iron Age stone walled sites as well as buildings and locations of historical significance. As a result, a heritage assessment of the project area was conducted to identify any sensitive heritage sites/areas and to mitigate against future impacts on the heritage landscape.

The HAI study revealed that project area has been impacted by agriculture activities such as cultivation and livestock grazing. A 20<sup>th</sup> century buildings and stone features related to historical and recent farming activities were identified in the project area. The features are all of no or low heritage significance and no further mitigation is required.

This does not exclude the chance of heritage material or sites being found during future activities. Should any subsurface palaeontological, archaeological, or historical material, or burials be exposed during construction activities, all activities should be suspended, and an archaeological specialist should be notified immediately.

Historical aerial imagery and ground survey indicates area has been impacted by agricultural activities which include ploughed fields and livestock grazing.

The earliest aerial imagery available for the region is from 1943 and even at this early date, large portions the area was already used as ploughed farmland.

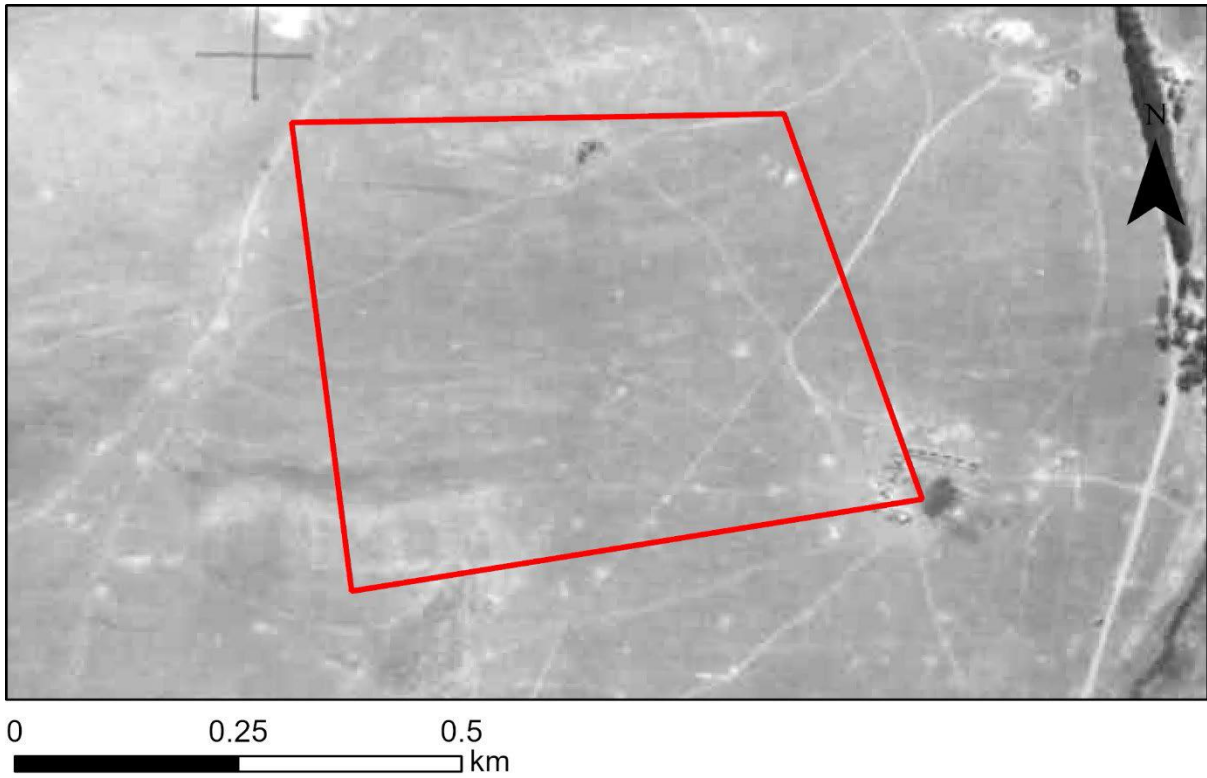


Figure 8-33 : Aerial imagery from 1943 with relatively pristine landscape.

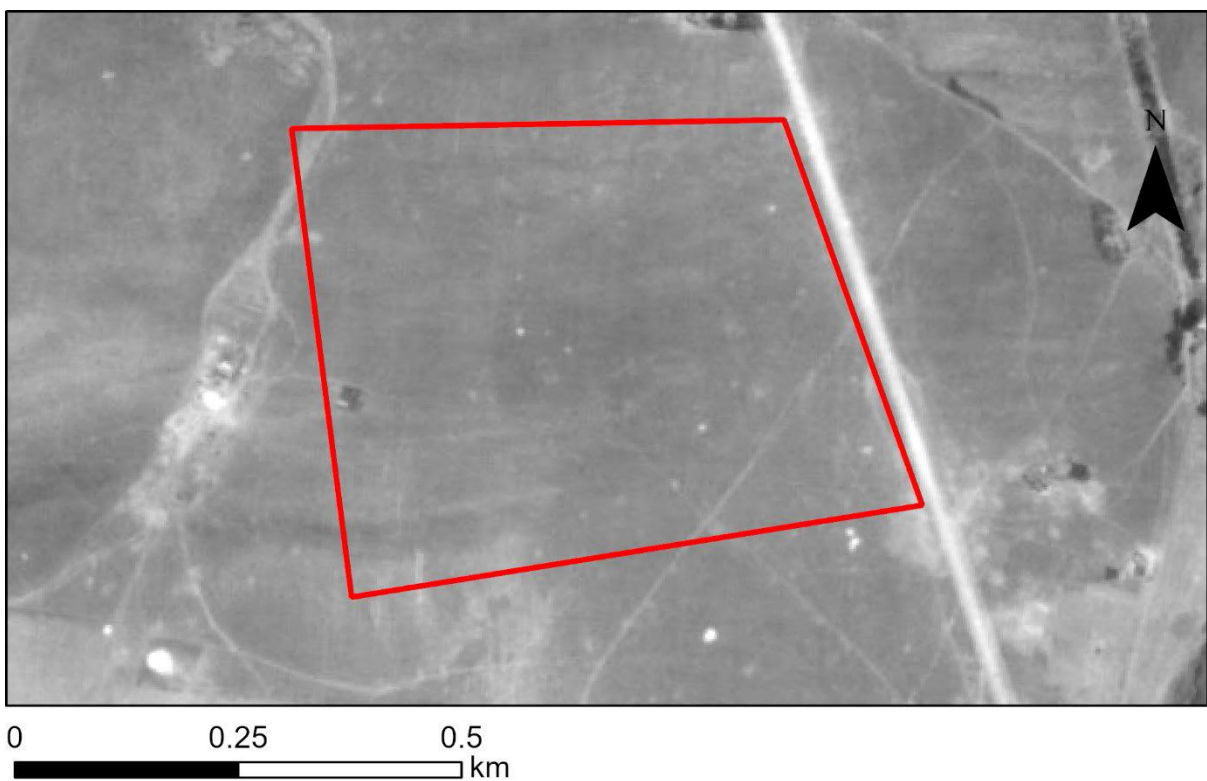


Figure 8-34 : Aerial imagery from 1962. Relatively pristine landscape with a single structure visible in on western boundary where UP-DRB-2529-01 is located.





Figure 8-35 : Aerial imagery from 1979. Expansion of UP-DRB-2529-01 on western boundary visible with footpaths linking it with UP-DRB-2529-06 and UP-DRB-2529-07 in the northern half of the project area.

Later Iron Age (LIA) (also Later Farmer Period) settlements and historical buildings are typically clearly discernible in remote sensed imagery, but close inspection of imagery from 1943 onwards failed to identify any visible trace of such sites.

LIA settlements and historical buildings are typically clearly discernible in remote sensed imagery, but close inspection of imagery from 1943 onwards failed to identify any visible trace of such sites.

**Site: UP-DRB-2529-01**

Description: Extant 20th Century farmhouse and outbuildings

Coordinates: S25.891839° E29.057555°

UP-DRB-2529-01 represent an extant house and outbuildings. A portion of the building may potentially be older than 60 years since historical images from 1962 indicates a single square building where the current house is located. It does not appear on earlier images from 1943. The northeast orientation of the building and the clearly visible wall joints indicates that the original structure likely corresponds to the southeast portion of the current house. Extensive expansions and alterations have been made to the original structure in subsequent years that have severely altered the original building severely diminishing its heritage value.

There are several outbuildings around the house. These include a stonewalled chicken coop/storeroom and brick garage. Aerial images and field inspection of building materials indicate that these are all less than 60 years old.



Figure 8-36 : UP-DR UP-DRB-2529-01 on Google Earth image from 2022.

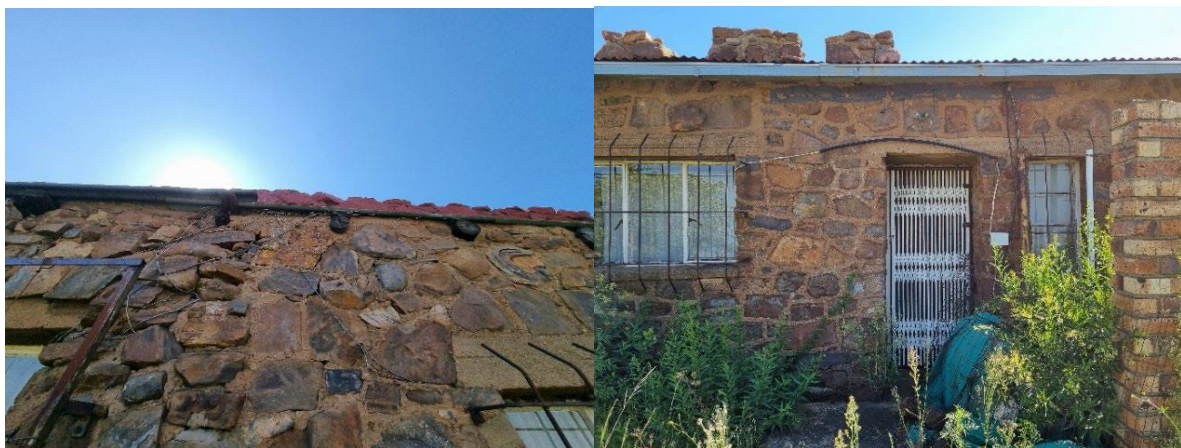


Figure 8-37 : Farm outbuilding. Likely livestock pen/chicken coop. Left, south facing wall; Right west facing wall.



Figure 8-38 : Farm outbuilding. Likely storeroom and livestock pen/chicken coop. Southwest corner of outbuilding, right north facing wall.





Figure 8-39: Likely storeroom and livestock/pen/chicken coop. South facing wall (left) and northwest corner (right).



Figure 8-40 : Late 20<sup>th</sup> century brick structure with metal roller doors.

**Site: UP-DRB-2529-02**

Description: Remains of 20th structure

Coordinates: S25.892437°; E29.059471°

Site UP-DRB-2529-02 is the remains of a two roomed rectangular structure roughly orientated in a northwest-southeast direction. The walls are dry stacked local stone, built up to a height of approximately 60cm. Wall abutting joints indicate that the structure was built in two phases. The first was the construction a 3mx5m northern room, and later, a 9mx5m southern room was added. There is a single entrance to structure which leads directly into the southern room with the doorway to the northern room immediately on the right. The interior of the northern room was covered with a cement plaster and a cement cap was placed on the top course of the wall. No cement reinforcing or plaster were observed at the southern room. It is possible that the walls supported a superstructure of material that has either perished or had been removed.

Determining the age is however difficult since it does not appear on early aerial images and no material culture was present to provide a relative date. The earliest aerial images where the site is clearly visible is dated 2005, but at this stage it is already in a ruined state. It is likely that this structure served as living quarters for farm labourers in the 20th century. Its absence on the 1962 and 1979 images implies that it was erected after these dates, and therefore less than 60 years old.





Figure 8-41 : UP-DRB-2529-02 outlines on Google Earth imagery.



Figure 8-42 : UP-DRB-2529-02, (left) looking east over both rooms, and north (right) with cement plaster visible on inside of northern room.



Figure 8-43 : UP-DRB-2529-02 (left) showing the joint of the two rooms along the west facing wall, and (right) the main entrance on the east facing wall.



**Sites: UP-DRB-2529-03**

UP-DRB-2529-04

Description: Circular stone features

Coordinates: S25.890951 E29.057902 (UP-DRB-2529-03) E25.893120 E29.059667 (UP-DRB-2529-04)

Two circular stone mounds were identified whose use/function is unknown. UP-DRB-2529-03 is approximately 60cm in diameter and formed by an outer ring of large stones and filled with smaller stones. UP-DRB-2529-04 is an approximately 1m wide pile of stones (~10-20cm range). No material culture was associated with the features, however, given the absence of prehistoric remains in the immediate vicinity, these most likely relate to 20th century activities.



Figure 8-44 : Stones features, UP-DRB-2529-03 (left) and UP-DRB-2529-04 (right), of unknown use and function, but likely related to 20th century farming activities.

**Sites: UP-DRB-2529-05**

Description: Linear field boundary walls in southwest section of project area

Coordinates: S25.892844 E29.058729 (centre coordinate)

In the southwestern section of the project area there are linear stone walls that demarcate old field boundaries. In places metal fence poles are and fencing wire is trapped in the stones. Some of these are faintly visible on aerial photos from 1979, and the absence of the other walls show that the majority may be more recent than this date.



Figure 8-45: Examples of stone field boundary sections (UP-DRB-2529-05)



Figure 8-46: Examples of stone field boundary sections (UP-DRB-2529-05)





Figure 8-47 : Linear field boundary walls (UP-DRB-2529-05) in green. Project area in red.

**Site:**

**UP-DRB-2529-06**

**UP-DRB-2529-07**

Description: Collapsed stone and brick walling.

Coordinates: S25.890433 E29.058116 (UP-DRB-2529-06)

S25.889638 E29.059267 (UP-DRB-2529-07)

In the northern section of the project area, the remains of two structures were identified. Both are completely collapsed which makes interpretation and reconstruction difficult. Google Earth images does suggest that each

were rectangular shape. Both were constructed from a combination of natural stone, brick, and cement mortar. The original walls seem to be around 60-80cm high. Fragments of plaster on some bricks indicates that the inside of these structures were plastered with cement and painted white. A few pieces of structural metal such as corrugated sheeting indicate that these may also have been used in the original building. Green glass bottle fragments on UP-DRB-2529-06 were the only material culture identified.

The earliest images where these features are visible are from 1979. In these historical images, there are clear footpaths connecting both to one another and to southwest to the main farmhouse complex northeast to the main road. These pathways suggest that these were likely the remains of farm labourer housing. Given their absence on earlier images, they likely date to the 1970s.



Figure 8-48: UP-DRB-2529-06 looking north (left) and east.



Figure 8-49: View of UP-DRB-2529-07 looking south (left) and looking east (right).





Figure 8-50 : Stone structures indicating the use of local stone, brick, cement and metal.



Figure 8-51 : Collapsed free standing brick and cement walls. UP-DRB-2529-06 (left) and UP-DRB-2529-07 (right).



Figure 8-52 : Glass bottle fragments on UP-DRB-2529-06.

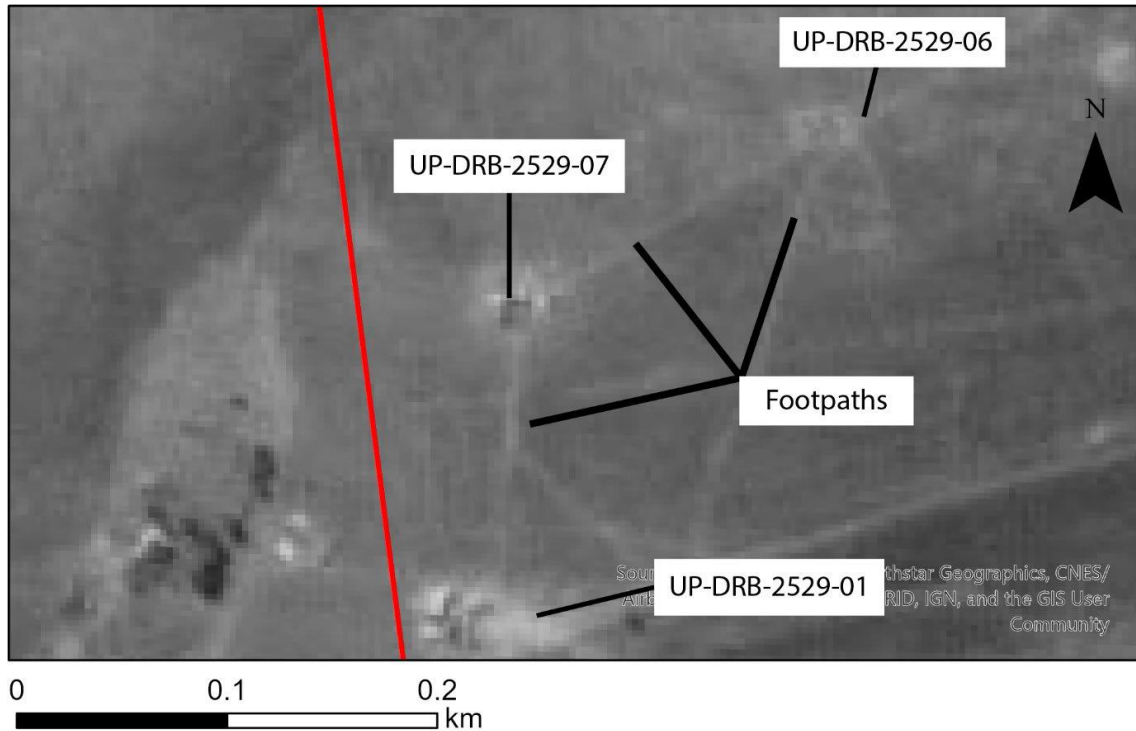


Figure 8-53 : 1979 aerial image in which footpaths are visible that link UP-DRB-2529-01 with UP-DRB-2529-06 and UP-DRB-2529-07.

#### 8.24.1. Graves and Burial Grounds

No graves or burial grounds were encountered during the survey. The current owner of the farm (whose family had lived there) stated that he is unaware of any graves.

The table below includes the summary of direct impact on heritage locations.

Table 8-9 : Summary of heritage sites

Site Code	Coordinates	Short Description	Mitigation Action
UP-DRB-2529-01	S25.891839° E29.057555°	Extant 20 <sup>th</sup> Century farmhouse and outbuildings	Low significance. Severely altered and mostly younger than 60 years. No action needed.
UP-DRB-2529-02	S25.892437° E29.059471°	Remains of 20 <sup>th</sup> building.	Low significance. Likely less than 60 years old. No action needed.
UP-DRB-2529-03	S25.890951 E29.057902	Circular stone features	No significance. Likely less than 60 years old. No action needed.
UP-DRB-2529-04	E25.893120 E29.059667		



Site Code	Coordinates	Short Description	Mitigation Action
UP-DRB-2529-05	Centre: S25.892844 E29.058729	Linear field boundary walls in southwest section of project area	No significance. Likely less than 60 years old. No action needed.
UP-DRB-2529-06	S25.890433 E29.058116	Collapsed stone and brick structures	No significance. Likely less than 60 years old. No action needed.
UP-DRB-2529-07	-25.889638 29.059267		

### 8.25. Palaeontology

The Palaeontological Impact Assessment Report was prepared by Professor Marion of the University of the Witwatersrand in February 2022. The Palaeontological Report is attached as Appendix D5.

### 8.26. Project location and geological context

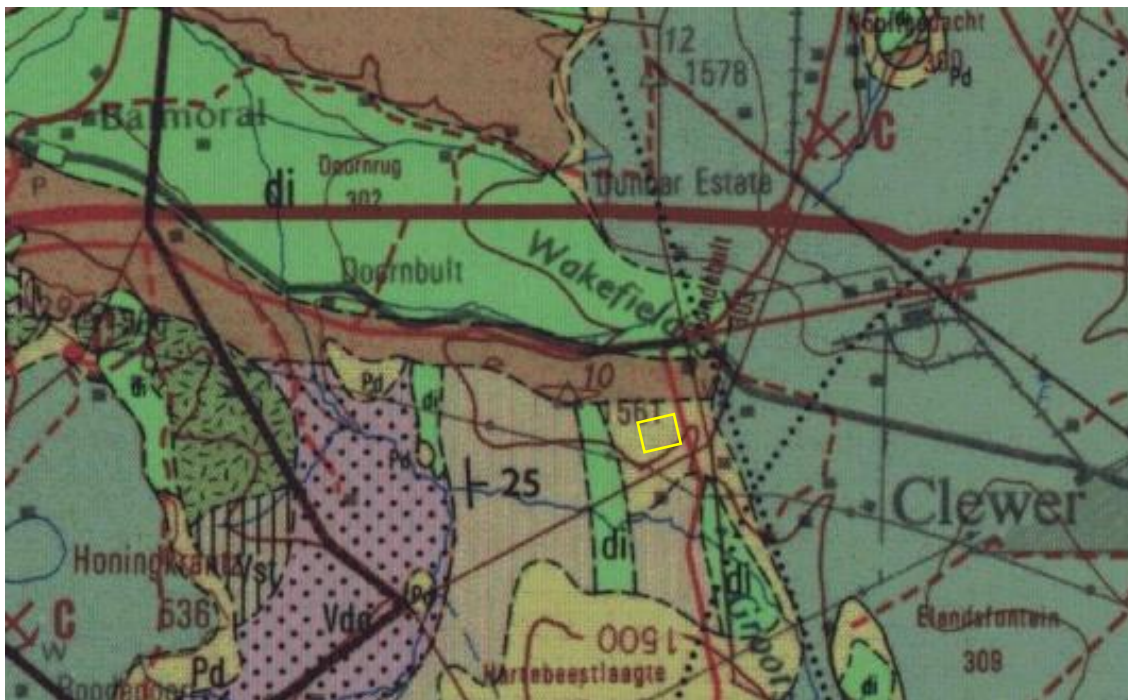


Figure 8-54 : Geological map of the area around the proposed cemetery with the location indicated within the yellow rectangle. Abbreviations of the rock types are explained in Table 2. Map enlarged from the Geological Survey 1: 250 000 map 2528 Pretoria.

Table 8-10 : Explanation of symbols for the geological map and approximate ages (Eriksson et al., 2006. Johnson et al., 2006). SG = Supergroup; Fm = Formation; Ma = million years; grey shading = formations impacted by the project.

Symbol	Group/Formation	Lithology	Approximate Age
Q	Quaternary	Alluvium, sand, calcrete	Neogene, ca 2.5 Ma to present
Jd	Jurassic dykes	Dolerite dykes, intrusive	Jurassic, approx. 180 Ma
Pe	Vryheid Fm, Ecca Group, Karoo SG	Shale, shaley sandstone, grit, sandstone, conglomerate, thin coal seams	Early Permian, ca 290-260 Ma
Pd	Dwyka Group, Karoo SG	Tillites, shale	Late Carboniferous to early Permian, ca 310-300 Ma
Mw	Wilgerivier Fm, Waterberg Group	Sandstone, quartzite, conglomerate	Ca 2050 – 2000 Ma
Mn	Nebo Granite, Bushveld Igneous Complex	Granite	Ca 2400 Ma
Di	Diabase	diabase	Post Transvaal SG
Vdr	Damwal Fm, Rooiberg Group	Volcanic rocks	Ca 2500 – 2400 Ma
Vsi	Silverton Formation, Pretoria Group, Transvaal SG	Shale, carbonaceous in places, hornfels, chert	Ca 2500 – 2400 Ma

The project lies in the southeastern margin of the Transvaal Basin with the sediments of the Transvaal Supergroup, and the northern margin of the Karoo Basin with the lower Karoo Supergroup sediments. There are also outliers of the Waterberg Group. The project site is on shales and tillites of the Dwyka Group.

The Karoo Supergroup rocks cover a very large proportion of South Africa and extend from the northeast (east of Pretoria) to the southwest and across to almost the KwaZulu Natal south coast. It is bounded along the southern margin by the Cape Fold Belt and along the northern margin by the much older Transvaal Supergroup rocks. Representing some 120 million years (300 – 183Ma), the Karoo Supergroup rocks have preserved a diversity of fossil plants, insects, vertebrates and invertebrates.

During the Carboniferous Period South Africa was part of the huge continental landmass known as Gondwanaland and it was positioned over the South Pole. As a result, there were several ice sheets that formed and melted, and covered most of South Africa (Visser, 1986, 1989; Isbell et al., 2012). Gradual melting of the ice as the continental mass moved northwards and the earth warmed, formed fine-grained sediments in the large inland sea. These are the oldest rocks in the system and are exposed around the outer part of the ancient Karoo Basin, and are known



as the Dwyka Group. They comprise tillites, diamictites, mudstones, siltstones and sandstones that were deposited as the basin filled. This group has been divided into two formations with Elandsvlei Formation occurring throughout the basin and the upper Mbizane Formation occurring only in the Free State and KwaZulu Natal (Johnson et al., 2006).

Overlying the Dwyka Group rocks are rocks of the Ecca Group that are Early Permian in age, then the Beaufort and Stormberg Groups. The whole Karoo sequence is capped by the Jurassic aged Drakensberg basalts. Associated with the latter are numerous intrusive dolerite dykes and sills that have cut through the Karoo sediments.

### 8.27. Palaeontological Context

The palaeontological sensitivity of the area under consideration is presented in Figure 54. The site for development is in the Dwyka Group that is indicated as having a moderate palaeosensitivity (green).

The Dwyka Group is made up of seven facies that were deposited in a marine basin under differing environmental settings of glacial formation and retreat (Visser, 1986, 1989; Johnson et al., 2006). In the north and east these are called the Mbizane Formation, and the Elandsvlei Formation in the south and west. Described below are the seven facies that occur in this group (Johnson et al., 2006 p. 463-465):

The massive diamictite facies comprises highly compacted diamictite that is clast-poor in the north. It was deposited in subaqueous or subglacial positions.

The stratified diamictite comprises alternating diamictite, mudrock, sandstone and conglomerate beds. They are interpreted as being rapidly deposited, sediment gravity flows but with some possible reworking of the subglacial diamictites.

The massive carbonate-rich diamictite facies is clast-poor and was formed by the rainout of debris, with the carbonate probably originating by crystallisation from interstitial waters.

The conglomerate facies ranges from single layer boulder beds to poorly sorted pebble and granule conglomerates. The boulder beds are interpreted as lodgement deposits whereas the poorly sorted conglomerates are a product of water-reworking of diamicton by high-density sediment gravity flows.

The sandstone facies were formed as turbidite deposits.

The mudrock with stones facies represents rainout deposits in the distal iceberg zone.

The mudrock facies consists of dark-coloured, commonly carbonaceous mudstone, shale or silty rhythmite that was formed when the mud or silt in suspension settled. This is the only fossiliferous facies of the Dwyka Group.

The Dwyka *Glossopteris* flora outcrops are very sporadic and rare. Of the seven facies that have been recognised in the Dwyka Group fossil plant fragments have only been recognised from the mudrock facies. They have been

recorded from around Douglas only (Johnson et al., 2006; Anderson and McLachlan 1976) although the Dwyka Group exposures are very extensive. Jurassic Dolerites do not contain fossils as they are igneous intrusives.



Figure 8-55 : SAHRIS palaeosensitivity map for the site for the proposed cemetery shown within the yellow rectangle. Background colours indicate the following degrees of sensitivity: red = very highly sensitive; orange/yellow = high; green = moderate; blue = low; grey = insignificant/zero.

According to the Palaeontological Impact Assessment Report, based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks are either much too old to contain fossils or are the correct age but wrong lithology. Furthermore, the material to be excavated is soil and this does not preserve fossils.

### 8.28. Geotechnical Aspect

The following information was sourced from the Report on a Geotechnical Site Investigation prepared by J Louis van Rooy and dated December 2022.

According to the 1:250 000 geological sheet 2528 Pretoria, the northern portion of this site is on sandstone and conglomerate of the Wilge River Formation, Waterberg Group and the southern part on tillite and shale of the Dwyka Group, Karoo Supergroup (Figure 3). Dolerite (diabase) intrusions are indicated to the west and north of the site with Silverton Shale Formation (Pretoria Group) bedrock further south and west.

As seen during the fieldwork phase of the investigation; shallow sandstone and conglomerate rock outcrops occur extensively on the northern half of the site including the entire area north of the access road as well as the area south of the farmhouse.

**This site is not underlain by dolomitic bedrock and a surface stability investigation is therefore not required.**

According to the geological maps and accompanied explanation no specific shallow mineral deposits are present on the site and no shallow undermining is expected. Both stratigraphic units are known to not host coal deposits.

According to Kijko et al (2003) the regional seismic hazard in the project area can be defined as LOW, exhibiting a 10% probability of a seismic event with a peak ground acceleration of less than 0.1 within a period of 50 years.

The Climatic N-Value (Weinert, 1980) for the area falls between 2 and 5; therefore, chemical weathering of the parent rocks in the regional setting is deemed the principal mode of weathering.

This mode of weathering favours soil formation, rather than an abundance of rocky fragments occurring within the soil matrix. Physical/mechanical disintegration of parent rock will take place but on a lower scale.

#### 8.28.1. Engineering and Material Characteristics

The foundation indicator test results conducted on the samples from this site are discussed below and summarised in Table 8-12 below.

The deeper residual conglomerate and sandstone has the following material properties:

- The results indicate gravelly soils with low plasticity, low linear shrinkage and low potential expansiveness.
- These materials fall into the GW/GC/SP/SM/SC groups of the Unified Soil Classification and classifies as A-1-b and A-2-4 material according to the AASHTO system.
- Typically, these materials will have a variable drainage nature once compacted.
- Compaction characteristics are good with bulk samples indicating G6- type materials according to the COLTO Classification System.

Some of the soil samples were tested for pH and electrical conductivity. The pH (4.3 – 5.1) are strongly acidic and mildly to very corrosive (0.011 to 0.034 S/m) electrical conductivity.

The applied load from a single storey masonry structure may be assumed to be between 30 kPa and 50 kPa, which will fall on the boundary between loose and medium dense consistencies. The shallow bedrock will provide adequate bearing pressures for any light structure. Possible additional settlements due to collapse of the voided structure in all site soils implies that foundation improvements will be necessary for structures on thicker soils.

The compaction test results are included in Table 8-11.

Table 8-11: Compaction test results

Locality	Material type	OMC (%)	MDD	Swell (%)	CBR	TRH14
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			(kg/m <sup>3</sup> )		At various densities				
					90%	93%	95%	98%	
Su07	Transported and residuum	8.8	2194	0.1	9	19	30	47	G6
Su12	Transported and residuum	8.4	2106	0.0	18	27	36	50	G6
Notes: OMC = Optimum moisture content MDD = Maximum dry density (Mod AASHTO) Swell = soaked at 100% Mod AASHTO compaction n/c = not classifiable									



Table 8-12: Indicator Test Results

Test Pit	Geotechnical Zone	DEPTH	MATERIAL	GRADING/ HYDROMETER				ATTERBERG LIMITS			GM	CLASSES			HEAVE
				%C	%M	%S	%G	LL	PI	LS		TRB	USC	COLTO	
Su07		0.0-1,8	Bulk	3	6	33	58	-	-	0.5	2.16	A-1-b	SP-SM	G6	Low
Su07		0.9-1.7	Residual conglomerate	6	12	49	33	26	3	3.5	1.62	A-2-4	SC-SM	-	Low
Su08		1.0-1.8	Residual sandstone	6	13	38	43	24	3	3.5	1.74	A-2-4	SC	-	Low
Su12		0.4-1.9	Residual sandstone	5	6	23	66	25	2	3.5	2.29	A-2-4	GW-GC	G6	Low
Su14		0.85-1.8	Residual sandstone	9	11	34	46	27	4	4.5	1.80	A-2-4	SC	-	Low
-1	Grading: Percentage clay (%C), silt (%M), sand (%M) and gravel (%G) by weight.														
-2	Atterberg Limits: Liquid Limit (LL), Plasticity Index weighted (PI), Linear Shrinkage (LS).														
-3	Heave: Potential expansiveness (acc. Van Der Merwe, 1964).														

8.28.2. Suitability Parameter

The graphic below depicts the evaluation parameters to assess the general suitability of the site for use as a small cemetery (Hall and Hanbury 1990; Dippenaar, et al, 2018):

Engineering Geological/ Geotechnical		Excavatability	Assessment	Score	
Excavatability ease to 1.80m	Easy spade	Geological pick pushed in 50 mm with ease		15	
	Pick and spade	Geological pick causes slight indentation		10	
	Machine	Firm blows with pick cause 1 – 3 mm indentations		5	
	Blasting	Backactor refusal		0	
Stability sidewalls stable for prolonged periods	Stability		Assessment	Score	
	Stable	Little overbreak with safe excavation profiling		20	
	Overbreak	Overbreak between 1.3 and 1.8 m		15	
	Slightly unstable	Minor falls of material		8	
Workability material to be used as compacted backfill	Unstable	Collapse of excavation likely		1	
	Workability		Unified	MOD AASHTO	Score
	Excellent to good	GW, SW, GP	> 1 800 kg/m <sup>3</sup>	10	
	Fair	SP, SM	< 1 800 kg/m <sup>3</sup>	5	
Sanitary/ Environmental/ Hydrogeological	Poor	OL, CL, ML	< 1 700 kg/m <sup>3</sup>	2	
	Very poor	OH, CH, MH	< 1 500 kg/m <sup>3</sup>	0	
	Water table		Water Table Depth (m)	Score	
	thickness of protective vadose zone	Deep water table	> 8	25	
Subsoil permeability preventing ponding and rapid infiltration	Intermediate water table	4 – 8		5	
	Possible perched water	0 – 4		5	
	Waterlogged soil	0 – 4		Fail	
	Subsoil Permeability		Percolation Rate	Approx. Permeability	Score
Backfill permeability preventing ponding and rapid infiltration	Impermeable	Not measurable	< 10 <sup>-7</sup> m/s	15	
	Relatively impermeable	10 – 15 mm/h	10 <sup>-6</sup> – 10 <sup>-7</sup> m/s	20	
	Relatively permeable	15 – 50 mm/h	10 <sup>-5</sup> – 10 <sup>-6</sup> m/s	10	
	Permeable	50 – 1 000 mm/h	< 10 <sup>-5</sup> m/s	0	
Final Ranking	Suitability	Backfill Permeability		Unified Class	Score
		Impermeable	OH, CL, CH		5
		Relatively impermeable	GC, SC, MH		10
		Relatively permeable	GP, SP, GW		7
> 90	Very good	Very permeable		SW, SP	0
75 – 90	Satisfactory				
60 – 75	Poor				
< 60	Unacceptable				

The table overleaf summarises the findings of this investigation with the associated suitability ranking per geotechnical zone as per the above table (Figure 8-57). The zoning is based on 16 soil profiles and surface mapping across the site and may change as more data becomes available during grave excavations where specific conditions at grave resolution will be exposed.



Figure 8-56: Site layout and test pit positions. Portion 22 Doornrug 302-JS Emalahleni





Figure 8-57: Geotechnical zoning. Portion 46 of the farm Drieziek 368-IQ

Note:

Su indicate profile positions

O indicate recorded solid outcrops.



Table 8-13: Geotechnical zonation with summarised findings and preliminary cemetery site suitability ranking

Geotechnical Zone	Basic Zone Description	Test Pits	Excavatability to 1.8 m below E.G.L	Excavation Stability Rating	Workability Rating	Water Table Rating*	Soil Rating*	Permeability	Backfill Permeability	Final Rating	Site Suitability
<b>Zone 17 Ha</b>	<ul style="list-style-type: none"> <li>Moderate slope in a southerly direction</li> <li>Artificially reworked surface with infrastructure including access road and buildings</li> <li>Surface seen to host ploughed fields</li> <li>Typically underlain by a coarse-grained transported soil (colluvium) and</li> </ul>	Su7, Su9, Su11 to Su15	Approximate average excavation depth across the zone: 1.80 m  Soft excavation conditions to a depth of between 1.5 and 2.4 m below E.G.L  Rating: 10 with localised 0	Sidewalls generally remained stable for a period of at least 1 hour with little or no over break or collapse occurring.  Rating: 20	Zone typically underlain by gravelly sand soils; with the exception of the highly weathered bedrock at the base of the excavations. Measured SM and SC; with localised GW/GC	Groundwater was not encountered in any of the test pits excavated across this zone.  It is predicted the groundwater temporarily perches upon the underlying less weathered Sandstone rock mass following prolonged precipitation events.			Possible perched water table with measured SM and SC  Rating: 7	57 to 77	Poor – mitigating actions include excavation with larger machines, good surface water management.

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Geotechnical Zone	Basic Zone Description	Test Pits	Excavatability to 1.8 m below E.G.L	Excavation Stability Rating	Workability Rating	Water Table Rating*	Soil Permeability Rating*	Backfill Permeability	Final Rating	Site Suitability
	residual conglomerate and sandstone. • Generally soft excavation in upper 1.5 m with variable refusal depths between 1.5 m and 2.4 m				Rating: 5	Rating: 25 with possible 5				
<b>Zone II</b> <b>17.5 Ha</b>	• Uneven and steep slopes on northern half and south-eastern boundaries • Rock outcrop and sub-outcrop across entire zone.	Su1 Su6,	Approximate average excavation depth across the zone: 0.3 m	Sidewalls generally travelling in coarse-grained thin soils	No material available	Groundwater was <b>not</b> encountered in any of the test pits excavated across this zone. It is predicted the groundwater temporarily perches upon the underlying	Upper soil horizon permeability high. The sandstone bedrock may inhibit water infiltration.	When excavated sandstone rock blocks used as	21 41	Unacceptable – the main flaw in this major portion of the site is the presence of

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Geotechnical Zone	Basic Zone Description	Test Pits	Excavatability to 1.8 m below E.G.L	Excavation Stability Rating	Workability Rating	Water Table Rating*	Soil Permeability Rating*	Backfill Permeability	Final Rating	Site Suitability
	<ul style="list-style-type: none"> <li>Thin (&lt; 0.3 m) surface gravelly sand soil cover on bedrock</li> <li>Typically underlain by slightly weathered horizontally bedded and jointed sandstone.</li> </ul>	Su10, Su16	Rating: 0	Rating: 1		less weathered Sandstone rock mass following prolonged precipitation events. Rating: 25 with possible 5	Predicted rating: 15	backfill it will be highly permeable. Rating: 0		shallow bedrock and absence of backfill material.

### 8.28.3. Geotechnical Findings

The majority of the proposed site falls within the unacceptable suitability rating rendering most of the farm portion not suitable for use as a cemetery. The zone comprising approximately 7 ha rates primarily as poor and will require additional precautionary measures prior to and following the development. The extent of each zone may change with additional information gained from future excavations.

The most critical geological and geomorphological constraints for this site will be:

- The shallow and outcropping bedrock on the northern half and most of the southwestern portion.
- The majority of the soils encountered across the site exhibits fair workability but relatively permeable properties.

Negative influences due to the specific site conditions may include sensitivity of the groundwater sources in the area that may need additional investigation where the regional geological and hydrogeological settings are complex.

The following suggestions may allow use of larger parts of the site within the context of a burial facility and can be regarded as mitigation measures with regards the poor ratings in the overall site classification for a cemetery:

- Larger excavators and pre-excavation of graves for later opening and use.
- Importation of backfill material in areas where excavated rock is not suitable for grave backfill.
- Utilization of parts of shallow bedrock for shallow soil graves taking proper cognisance of surface and groundwater protection and management.
- Earthwork to create 2 m of grave depth by importing fill, e.g. appropriately graded mine discard.
- Well planned and constructed management of surface water runoff.
- Surface structures rather than excavated graves, e.g. crematorium, mausoleums, etc., in the hard rock outcrop areas.

It is recommended that further investigations be considered if some of the above listed measures are considered

## **9. THE PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED AND THE DATE ON WHICH THE ACTIVITY IS CONCLUDED AND THE POST CONSTRUCTION MONITORING REQUIREMENTS FINALISED**

The Environmental Authorisation will be required for approximately five (5) years. The date of the conclusion of the activity is currently unknown. The proposed project will entail a burial site, it is not known as to when the post monitoring requirements will be finalised.



**10. A FULL DESCRIPTION OF THE PROCESS FOLLOWED TO REACH THE PROPOSED PREFERRED SITE INCLUDING****10.1. Details of the sites considered, including maps and coordinates**

The site was purchased and is owned by the developer for the purpose of development of a private cemetery.  
Refer to the map below.

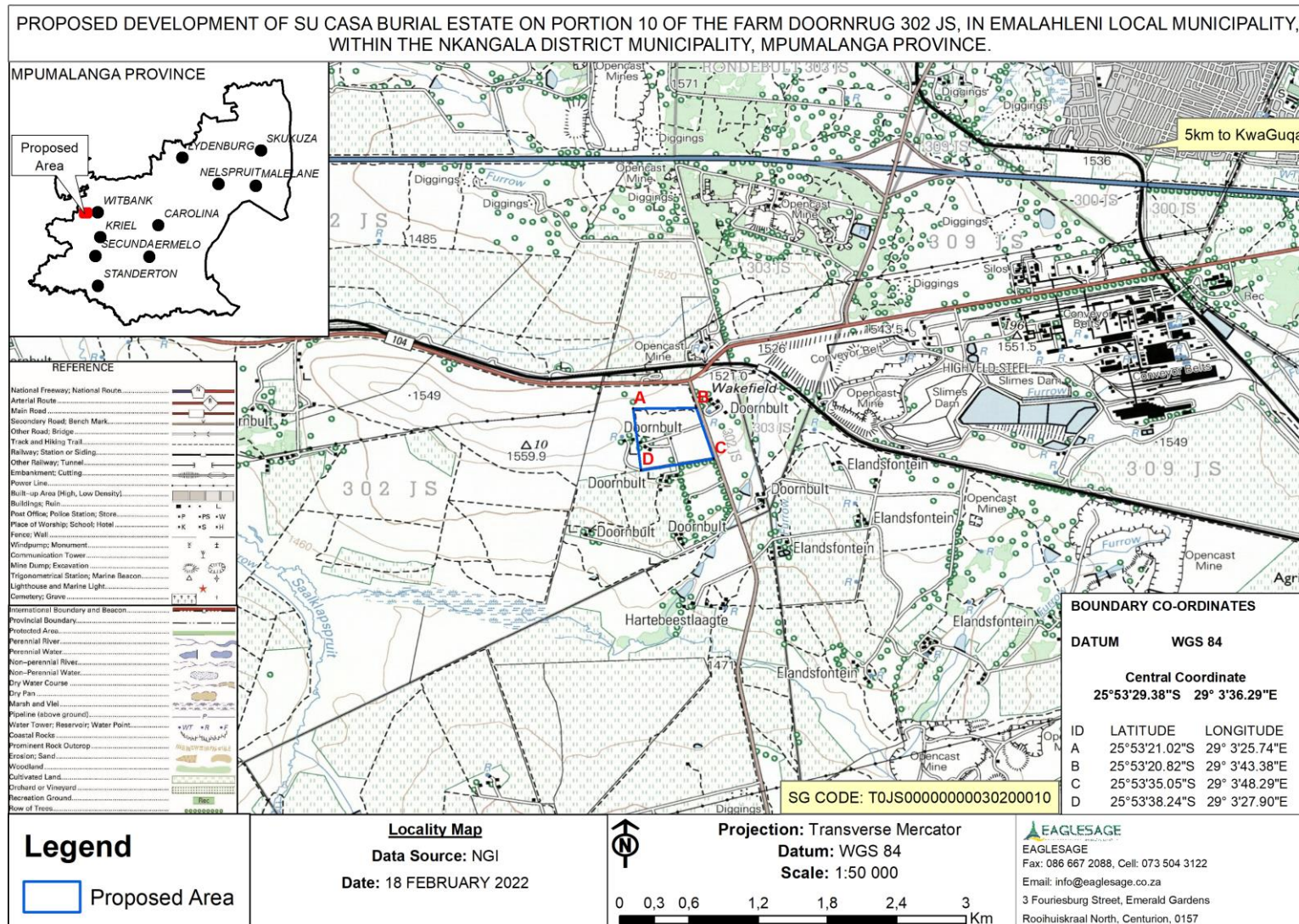


Figure 10.1-1 : Map indicating the proposed site that has been purchased by the Developer in red.

**10.2. Details of the public participation process undertaken at each of the sites in terms of regulation 44 of these Regulations, including copies of the supporting documents and inputs**

Public Participation Process (PPP) was undertaken in terms of the EIA Regulations of 2014 as amended.

**10.2.1. The following section presents the initial public participation process undertaken wherein notices were distributed inviting the public to register and Interested and Affected Parties and to comment on the proposed project.**

**10.2.1.1. Notifications**

Notification emails including Background Information Documents (BIDs) were sent to Government Departments, Emalahleni Local and District Municipalities, landowners adjacent to the proposed project site and the general Interested and Affected Parties. The purpose of the BID was to invite the public to register as Interested and Affected Parties (I&APs) and inform the public that they could participate on the project if they wished. Further, the BIDs included information regarding the proposed activity, project location, motivation, the commenting period (25 February 2022 – 30 March 2022) as well as the details of the EAP. Refer to Appendix A for the proof of notification emails.

**10.2.1.2. Newspaper Advert**

A newspaper advert was published on the Witbank News, on the 25th of February 2022 informing the public of the proposed project. Similar to the notification emails, the public was invited to register and I&APs and submit their comments. The comment period was also 25 February 2022 – 30 March 2022. Refer to Appendix E2 for the copy of the newspaper advert.

**10.2.1.3. Site Notices**

Notices were also placed at various conspicuous locations to inform the public of the proposed project. Similar to the notification emails and newspaper advert, the public was invited through the site notices, to register as I&APs and also submit comments on the project. Refer to Appendix E3 for the site notices.

**10.2.1.4. Comments Received**

Comments received from the I&APs and the responses by the Environmental Assessment Practitioner are attached as Appendix E4.

### **10.2.2. Stakeholder Database**

A database has been opened and Government Departments and I&APs are registered in it. The database will be updated as the project progresses. Refer to Appendix E5 for Stakeholder Database.

### **10.2.3. Comments on the Draft Basic Assessment Report**

The Draft BAR was made available to the I&APs for review and comment from 09 February 2013 to 14 March 2023 as follows:

- A hard copy of the Draft Basic Assessment Report was placed at the Kwa Guqa Library for public review on 10 February 2023 to 14 March 2023.
- A newspaper advert was placed on the Witbank News on 10 February 2023. Refer to Appendix E2.
- Site notices were placed on 09 February 2023. Refer to Appendix E3.
- Notification emails were sent on 13 February 2023. Refer to Appendix E1.
- Phone calls were made on 14 and 15 February 2023. Refer to Appendix E4.
- SMSs were sent to I&APs on 10 February 2023. Refer to Appendix E4.

The Comments raised are included in Appendix E4 of this Final Basic Assessment Report. Refer to Appendix E6.

### **10.2.4. Public Meetings**

The Interested and Affected Parties were invited to the public meeting as indicated in Appendices E1, E2, E3 and E4. However, no one attended the meetings.

### **10.3. A summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them**

The tables below include the issues/comments received and responses from the Environmental Assessment Practitioner (EAP).



Table 10.3-1 : Summary of issues raised by Interested and Affected Parties

**COMMENTS AND RESPONSE REPORT: BASIC ASSESSMENT PROCESS AND WATER USE LICENSE APPLICATION FOR THE PROPOSED SU CASA BURIAL ESTATE ON FARM DOORNRUG 302 JS PORTION 10, IN EMALAHLENI MUNICIPALITY IN THE MPUMALANGA PROVINCE**

**COMMENTS RAISED AFTER DISTRIBUTION OF THE BACKGROUND INFORMATION DOCUMENT TO THE INTERESTED AND AFFECTED PARTIES**

Date of Comment	Organisation	Name	Surname	Contact Details	Comment from I&AP	Response by the EAP	Date of Response
10 February 2022		Magda	Liebenberg	Tel: Cell: 065 970 8019 Email: Postal Address:	Ms. Liebenberg called and requested the notice in Afrikaans. She also requested the project documentation.	Tim Van Stormbroek explained to Ms. Liebenberg that the Background Information Document was being translated into Afrikaans. She was happy to wait till that was done.	10 February 2022
09 February 2022	Highveld Industrial Park	Thia	Oberholzer	Tel: N/A Cell: 082 610 9481 Email: <a href="mailto:thiav@hipark.co.za">thiav@hipark.co.za</a> Postal Address:	Ms. Oberholzer sent an email indicating the following:  "Good day I have received a notification on the intent to apply for the authorisation associated with the WUL and EA application for the "Su Casa Burial Site"	The EAP acknowledged Ms. Oberholzer's email and indicated that she would be registered as an Interested and Affected Party on behalf of Highveld Industrial Park. A Background Information Document was emailed to Ms. Oberholzer.	10 February 2022

Date of Comment	Organisation	Name	Surname	Contact Details	Comment from I&AP	Response by the EAP	Date of Response
					<p>on the farm Doornrug 302, Portion 22. Please register myself as an interested and affected party to the public participation process on behalf of Highveld industrial Park. Kindly forward the background information document to me electronically as well. Thanks”</p>		
04 May 2022	Highveld Industrial Park	Thia	Oberholzer	Tel: N/A Cell: 082 610 9481 Email: <a href="mailto:thiav@hipark.co.za">thiav@hipark.co.za</a> Postal Address:	<p>Good day Masala</p> <p>Any updates on the PPP in relation to the burial site development. I have registered as I&amp;AP but have not yet had any information shared in terms of draft assessment or scoping reports. Please advise.</p> <p>Regards</p>	<p>Dear Thia,</p> <p>Thank you for the email below.</p> <p>The client was sorting out the farm portion number and as a result we had to re-advertise the project. Please be advised that the project is continuing and we will keep you updated.</p> <p>Regards,</p>	04 May 2022

Date of Comment	Organisation	Name	Surname	Contact Details	Comment from I&AP	Response by the EAP	Date of Response
					<b>Thia Oberholzer</b>	Masala	
09 February 2022	MPUMALANGA DEPARTMENT OF PUBLIC WORKS, ROADS AND TRANSPORT	Mr Stephan	Pienaar	Private Bag X11302 Mbombela 1200 (T) 013 766 8620 (E) <a href="mailto:spienaar@mpg.gov.za">spienaar@mpg.gov.za</a>	Your email dated 09 February 2022 regarding the above-mentioned application has reference.	Noted.	17 January 2023
					There is no objection to the approval of the application as shown on your plan, subject to the strict adherence to the following conditions, and that the conditions/requirements listed below are imposed and met in all respects by the applicant.	Noted.	
					A. LIABILITY AND RESPONSIBILITY		
					These condition are applicable to the registered landowner. If the application concerns surface rights, mineral rights or similar activities, then the conditions	Noted.	

Date of Comment	Organisation	Name	Surname	Contact Details	Comment from I&AP	Response by the EAP	Date of Response
					will be applicable to the holder of the said rights.		
					If the applicant is none of the above-mentioned in point 1.1, then it is the responsibility of the applicant to inform his/her client of these conditions stated herein.	The letter from the DPWRT has been shared with the client.	
					The application falls within the jurisdiction of the Mpumalanga Province. the address of the Departmental Head is Private Bag X11310, Mbombela 1200. Telephone: 013 766 8620	Noted.	
					B. Conditions		
					1. DETERMINATION OF ROAD RESERVE BOUNDARIES, PLANS AND DECLARATIONS		



Date of Comment	Organisation	Name	Surname	Contact Details	Comment from I&AP	Response by the EAP	Date of Response
					<p>1) The following existing road(s) is/are affected, and the existing/planned road reserves must be withheld from the application.</p> <p>Provincial Road D432</p>	<p>Noted</p>	
					<p>2) The road centreline/boundary, where applicable, must be determined in conjunction with and to the satisfaction of the relevant Head: Public Works, Roads and Transport. The requirements as set forth in typical plans shall be adhered to, where applicable.</p>	<p>The application for the upgrade of the road to tar and the use of the southern gate as an overflow exist has been removed from the scope of this project and if necessary, will be handled on a separate application.</p>	
					<p>2. BUILDING RESTRICTIONS</p>		
					<p>1) A building restriction of 63 metres from the existing centre line of road D432 must be maintained for new buildings and structures, including graves.</p>	<p>A building restriction of 63 metres from the existing centre line of road D432 has been maintained.</p>	

Date of Comment	Organisation	Name	Surname	Contact Details	Comment from I&AP	Response by the EAP	Date of Response
					2) The building line, as laid down in the conditions of the establishment or subdivision of the property, or as required by the relevant Local Authority must be respected for all other roads/streets not under the jurisdiction of the Department of Public Works, Roads and Transport.	The building line will be respected.	
					3. ACCESS AND PHYSICAL BARRIER		
					1) Access to road D432 will be permitted at the existing access as shown on your Layout Plan	Access to site will be through the existing access point.	
					2) No other new accesses will be permitted from roads D432 into the proposed area.	Access to the site will be through the existing approved access point. The proposed access point through the southern side of the site no longer forms part of the proposed project scope.	

Date of Comment	Organisation	Name	Surname	Contact Details	Comment from I&AP	Response by the EAP	Date of Response
					a) NB: All the proposed servitudes and Right of way servitude over the water pipeline, dam and pump station are the responsibility of the Surveyor General.	The comment is noted.	
					3) Provision must be made for 15x45m road reserve splays or as determined by the Departmental Head. These road reserves must be fenced by the applicant/owner at his/her cost. (Note: the longest distance is measured parallel to the main road).	A Spatial Development Plan will be submitted to the DPWRT as part of the Draft Basic Assessment Report for review and comment.	
					4) All other accesses must be properly closed by means of a fence or barrier that extends along the full road frontage. After the permitted access has been built, the other accesses must be closed within 21 calendar days.	The southern access will be closed. Only the approved access will be used.	
					5) The application/ owner shall plan, design, build and maintain the access	The application for the upgrade of the road to tar and the use of the	

Date of Comment	Organisation	Name	Surname	Contact Details	Comment from I&AP	Response by the EAP	Date of Response
					<p>at his/her own cost the satisfaction of the Head: Public Works, Roads and Transport. The planning, design and construction of the access(es) shall be done in accordance with the latest specifications of the Department of Public Works, Roads and Transport (See MTP 311) and no work inside the road reserve may be done before the written permission of the Departmental Head has been obtained. (Application for a Wayleave)</p>	<p>southern gate as an overflow exist has been removed from the scope of this project and if necessary, will be handled separately. Access to the proposed property will be through the existing approved access point.</p>	
					<p>6) Any access to the property concerned, be it temporary or permanent, must be constructed to the satisfaction of the Head: Public Works, Roads and Transport, before it is put in place.</p>	<p>An approved access to site exists. Should there be a need to construct a temporary access, this will be constructed to the satisfaction of the Head: Public Works, Roads and Transport. Further, upon completion of construction activities on site, the temporary access will be closed.</p>	



Date of Comment	Organisation	Name	Surname	Contact Details	Comment from I&AP	Response by the EAP	Date of Response
					7) The permission for this will be summarily withdrawn should the access not be built and completed before the development is open to the public.	An approved access to the site exist. The application for the upgrade of the road to tar and the use of the southern gate as an overflow exist has been removed from the scope of this project and if necessary, will be handled on a separate application. Access to the proposed property will be through the existing approved access point.	
					8) No work may be done within the confines of the road reserve until the applicable plans and specifications as mentioned above have been submitted and approved by the Departmental Head.	No work will be done without the necessary permits. However, it should be noted that the proposed upgrade of the road no longer forms part of this project scope.	
					9) If and when it becomes necessary in the opinion of the Head: Public Works,		

Date of Comment	Organisation	Name	Surname	Contact Details	Comment from I&AP	Response by the EAP	Date of Response
					Roads and Transport in the interest if public safety he may demand that:		
					a) The access(es) must be re planned, redesigned and rebuilt to a higher standard and the applicant/owner/ successor – in – title shall do so within a period of 6 months after notification, at his/her own cost, according to the latest specifications of the Department of Public and Roads and Transport to the satisfaction of the Departmental Head.	The scope regarding upgrade the road (tar) no longer forms part of this project. However, the applicant will implement all the recommendations from the Department of Public and Roads and Transport accordingly.	
					c) The access(es) be restricted to only one carriageway of a dual carriageway road.	The condition is noted and will be complied with where applicable.	
					d) The access(es) be permanently closed and that an alternative access must be used e.g. by means of streets, access road(s) etc. without compensation being payable or any	The condition is noted and will be complied with where applicable.	

Date of Comment	Organisation	Name	Surname	Contact Details	Comment from I&AP	Response by the EAP	Date of Response
					claim considered. With township development in the vicinity the access(es) will be reconsidered without the applicant/ owner/ successor – in title having any claim.		
					4. INDEMNIFICATION OF THE DEPARTMENT AGAINST CLAIMS		
					1) With the construction and the maintenance of the access the applicant/ Local Authority must take the necessary precautionary steps, when construction / activities within the road reserve commences, to ensure the safety of the road and to prevent the occurrence of accidents.	There will be no activities within the road reserve a part of this project scope	
					2) The applicant/ owner/ successor – in – title shall indemnify the Department of Public Works, Roads and Transport against any claim arising out of any	The applicant indemnifies the Department of Public Works, Roads and Transport against any claim arising out of any incident or	

Date of Comment	Organisation	Name	Surname	Contact Details	Comment from I&AP	Response by the EAP	Date of Response
					incident or caused by or resulting from his activities in the rod reserve.	caused by or resulting from his activities in the rod reserve.	
					3) This will include any claims from damage to other services e.g. power lines, telephonic cables etc.	The applicant indemnifies the Department of Public Works, Roads and Transport from any claims from damage to other services e.g. power lines, telephonic cables etc.	
					5. REMOTE SERVICE ROAD(S)		
					1) Since access to road D432 will be limited it will become necessary, with the change in the use of land, to develop a service road system to enable landowners to have access to these planned accesses. These service roads must be remote from the road reserve of road D432.	The applicant will be develop a service road system to the satisfaction of the Departmental Head.	
					2) The applicant / owner must therefore at his own cost, plan and make available a remote adjacent service	The applicant will develop a service road at his own cost.	



Date of Comment	Organisation	Name	Surname	Contact Details	Comment from I&AP	Response by the EAP	Date of Response
					roads, which is to the satisfaction of the Departmental Head.		
					6. NOISE POLLUTION		
					1) The Department of Public Works, Roads and Transport will not be liable for any costs incurred for the erection of any acoustic noise attenuation or the like. The applicant/owner/ Location Authority will be responsible for the erection of, and costs incurred, from acoustic noise attenuation barriers.	The applicant will implement noise management system on site at his own cost.	
					7. ACCEPTANCE AND DISPOSAL OF STORMWATER		
					1) In terms of Section 84 of the Roads Ordinance, 1957, the applicant/ Local Authority shall arrange the drainage of the subdivision/development in such a way that it will fit in with the drainage of the road, taking into account the	A stormwater management plan is being prepared and can be made available to the Department of Public Works, Roads and Transport. The Plan can be made	

Date of Comment	Organisation	Name	Surname	Contact Details	Comment from I&AP	Response by the EAP	Date of Response
					<p>capacity of the system. He shall receive and dispose all the storm water running from the road or being diverted from the road. The State of Mpumalanga Provincial Government will not be responsible for any damage caused by or arising from such storm water</p>	<p>available to the Department on request.</p>	
					<p>2) Where in the opinion of the Head: Public Works, Roads and Transport, the system for the above road is too small to cope with any increased volume of storm water as a result of the establishment (of the subdivision), the applicant/Local Authority, (whoever is responsible for the drainage of the development / subdivision) shall be responsible for the cost of installing a larger drainage system for the road.</p>	<p>The applicant notes the comment and will implement the Department of Public Works, Roads and Transport's recommendations as they come.</p>	
					<p>8. PROTECTION OF EXISTING SERVICES</p>		

Date of Comment	Organisation	Name	Surname	Contact Details	Comment from I&AP	Response by the EAP	Date of Response
					<p>1) The road drainage and possible existing services of other parties, installed in, under or over the road, or any survey pegs and beacons shall not be damaged or disturbed. Steps be taken for the protection of such beacons/services. The Applicant/ owner/ successor – in – title shall be responsible for any damage or claim, which may result from the construction or maintenance work.</p>	<p>The scope of this project no longer includes upgrade of the road into tar. However, should any services be damaged as a result of the proposed project, the applicant will fix the issues accordingly.</p>	
					<p>9. ADVERTISEMENTS</p>		
					<p>1) No advertisements as described under article 2 of the Advertising on Roads and Ribbon Development Act, Act 21 of 1940 that may be visible from road D432 shall be displayed.</p>	<p>Should the applicant wish to place advertisements, he will comply with the requirements of the Advertising on Roads and Ribbon Development Act, Act 21 of 1940.</p>	
					<p>10. REVISED / AMPLIFIED PLAN</p>		

Date of Comment	Organisation	Name	Surname	Contact Details	Comment from I&AP	Response by the EAP	Date of Response
					<p>1) The applicant shall lodge, in writing, an acceptance of all the above conditions together with a revised layout plan portraying the conditions of the Department of Public Works, Roads and Transport, within six months from date of this letter. Noncompliance of this conditions will result in the above permission being rescinded, and the applicant will have to reapply.</p>	<p>The upgrade of road D432 into tar and the use of the southern gate no longer forms part of the proposed project. These activities may be addressed in a separate application. A layout plan will be submitted to the Department of Public Works, Roads and Transport to indicate the proposed project.</p>	
					<p>11. AUTHORITY</p>		
					<p>These conditions are laid down in terms of the delegated authority to the Head: Public Works, Roads and Transport in term of the provisions of the Advertising on Roads and Ribbon Development Act, 1940 (Act 21 of 1940 as amended) and the Roads Ordinance, 1957 (Ordinance no. 22 of</p>	<p>The applicant notes the condition. Further, the applicant is also applying for other applicable authorisations such as the Water Use Licence.</p>	



Date of Comment	Organisation	Name	Surname	Contact Details	Comment from I&AP	Response by the EAP	Date of Response
					1957) and does not exempt the applicant/ owner / successor – in – title from provisions of any other law / regulation.		
						<p>On 29 April 2022, Ms Mahumela sent an email to Mr Pienaar as follows:</p> <p>“Dear Stephan,</p> <p>The attached letter from the Department is hereby acknowledged.</p> <p>The developer has proposed the following:</p>	

Date of Comment	Organisation	Name	Surname	Contact Details	Comment from I&AP	Response by the EAP	Date of Response
						<ul style="list-style-type: none"> <li>- To tar the Road D432 which is currently in gravel form.</li>   <li>- To use the existing entrance which is located along the D432 on the eastern side of the farm.</li>   <li>- To use the existing gate/entrance at the south of the farm only as an overflow exist in case of traffic backlog inside the estate during the intended operation. It is important to note that the developer does not intend using the southern gate/entrance as a day-to-day entry or exit from the property during operations and will therefore be accessed upon authorization from the estate management.</li> </ul>	

Date of Comment	Organisation	Name	Surname	Contact Details	Comment from I&AP	Response by the EAP	Date of Response
						<p>1. May you kindly advise us regarding what needs to be done before tarring the section of the Road D432.</p> <p>2. Please advise us on the request to also use the existing southern gate as an overflow exit.</p> <p>Should you have any queries, please do not hesitate to contact the undersigned.</p> <p>Regards,</p> <p>Masala Mahumela Pr.Sci.Nat.”</p>	
					On 31 May 2022 Mr Pienaar responded as follows:		

Date of Comment	Organisation	Name	Surname	Contact Details	Comment from I&AP	Response by the EAP	Date of Response
					<p>“Dear Mr. Muhumela,</p> <p>We acknowledge your email below and wish to respond as set out below.</p> <p>1. Paving ("tarring") of Provincial Road D432</p> <p>An application to pave Provincial road D432 will be separate from the current application, as it is a more involved process that includes the following:</p> <ol style="list-style-type: none"> <li>1. An application for approval-in-principle, which should indicate the basic details of the proposal like proposed length (from where to where),</li> </ol>		



Date of Comment	Organisation	Name	Surname	Contact Details	Comment from I&AP	Response by the EAP	Date of Response
					<p>an indication of expected traffic counts, concept, etc.</p> <p>2. Detail design stage, where the applicant should submit a detail design, including but not limited to geometric design, pavement design, seal design, traffic counts, stormwater design, accesses, road signs, etc.</p> <p>Upon approval, a wayleave would then be issued for the work to be started.</p> <p>The application, planning, design, and implementation of the project must be done on the applicant's own cost and the Department of Public Works, Roads and Transport (DPWRT) will not be responsible to incur any financial expenditure.</p>		

Date of Comment	Organisation	Name	Surname	Contact Details	Comment from I&AP	Response by the EAP	Date of Response
					<p>2. Second access to D432</p> <p>In terms of the Department's policy, only one access per property will be allowed.</p> <p>If a second access is requested, the following will be required:</p> <ol style="list-style-type: none"> <li>1. Sketch plan, preferably on Google Earth or similar, detailing the position of the accesses.</li> <li>2. Spacing (distance) between the requested accesses as well as other affected accesses.</li> <li>3. Expected traffic volumes (peak hour) per requested</li> </ol>		

Date of Comment	Organisation	Name	Surname	Contact Details	Comment from I&AP	Response by the EAP	Date of Response
					<p>access. Alternatively, a detailed description of the operational use of the access.</p> <p>We trust that this will be satisfactory.</p> <p>Regards,</p> <p>Stephan Pienaar DD: Road Planning”</p>		
						<p>On 17 January 2023, Ms Mahumela responded as follows:</p> <p>“Dear Mr Pienaar,</p> <p>Thank you for the email below.</p>	

Final Basic Assessment Report for the Proposed Su Casa Burial Estate

Date of Comment	Organisation	Name	Surname	Contact Details	Comment from I&AP	Response by the EAP	Date of Response
						<p>This serves to advise you that the applicant has decided not to upgrade the road (tar) nor use the southern gate as overflow exit.</p> <p>You will receive a Draft Basic Assessment Report for review and comment.</p> <p>Kind regard,</p> <p>Masala Mahumela”</p>	
09 February 2021	DARDLEA	Charity	Mthimunye	Tel: Cell: 078 086 3395 Email: <a href="mailto:cnmthimunye@mpg.gov.za">cnmthimunye@mpg.gov.za</a> Postal Address:	Good day  BID received.  Kind Regards  Charity	The EAP acknowledged Ms. Mthimunye’s email.	10 February 2021.



Date of Comment	Organisation	Name	Surname	Contact Details	Comment from I&AP	Response by the EAP	Date of Response
27 January 2022	Landowner of portion 18 and 24	Johan and Magda	Liebenberg	Cell: 065 970 8019 Email: <a href="mailto:gerbermagda56@gmail.com">gerbermagda56@gmail.com</a> Postal Address:	Visited with the direct neighbour and land owners of portions 18 & 24 (portions to the north and the south). Discussed various aspects of the project over coffee. Mr Liebenberg shared the contact details of various neighbouring and nearby landowners. Detailed and helpful discussion. Mr. Liebenberg was interested in hearing if the applicant would be interested in purchasing his land to the north and the south. He plants maize on the land under application but has no further concerns.	Mostly provided verbally through face-to-face visits/interaction.	Numerous phone calls (6 x between 25 Feb and 16 March) and at least 3 face-to face visits.
14 February 2022	Emalahleni Local Municipality	Mzwokuthula	Hlungane	Tel: Cell: Email: <a href="mailto:Mzwokuthulapm@emalahleni.gov.za">Mzwokuthulapm@emalahleni.gov.za</a> Postal Address:	Good day,  For Attention : Tim Van Stormbroek  May you kindly confirm the property description for the above mentioned proposed burial site. Based on the	M. Mahumela Responded as follows:  Dear Mzwokuthula,  Thank you for the comment below.	29 April 2022

Date of Comment	Organisation	Name	Surname	Contact Details	Comment from I&AP	Response by the EAP	Date of Response
					<p>submitted documentation, the site/locality plan shows the proposed site located on Portion 10 of the Farm Doornrug and not the mentioned Portion 22 of the Farm Doornrug 302 JS</p> <p>Your assistance will be appreciated</p> <p>Regards</p>	<p>You are right, the property is located on Portion 10 (a portion of Portion 9) and a new notification was sent to Interested and Affected Parties on 25 February 2022 wherein you and Thabani were included. May you kindly confirm receipt.</p>	
16 February 2022	Landowner of portion 21	Piet	Joubert	Cell: 073 5066 177 Email: <a href="mailto:Pieterhendrick35@gmail.com">Pieterhendrick35@gmail.com</a> Postal Address:	Called on the phone. Discussed project with Mr. Joubert. No comments or concerns raised.	None required.	NA
16 February 2022	Landowner of portion 23	Jurrie	Schoeman	Tel: Cell: 072 088 6398 Email:	Called on the phone. No email address available. He has no comments or concerns. Happy for a physical visit if needed.	None required	NA
16 February 2022	Landowner of portion 20	Daan	Gerber	Tel: 063 284 1447 Cell: Email:	Called via phone. No concerns regarding the planned development.	None required	NA

Date of Comment	Organisation	Name	Surname	Contact Details	Comment from I&AP	Response by the EAP	Date of Response
					His wife will send her email address via WhatsApp.		
16 February 2022	Landowner of portion?	Mouritz	Van der Heever	Tel: Cell: 068 520 4537 Email:	Called Mr. van der Heever. No comments or concerns mentioned. He will WhatsApp his email address.	None required	NA
16 February 2022	Land occupier of portion 31	Gert	Unknown	Tel: Cell: Email:	Gert is the land occupier, and he had no comment regarding the project. Told me to speak to the landowner Mr. Pistorius	None required	NA
16 February 2022	Landowner of portion 31	Mr.	Pistorius	Tel: Cell:082 88 3371 Email:	Called Mr. Pistorius. He could not think of any concerns off the cuff. Said he would call if he thought of some concern.	None required	NA
16 March 2022	Landowner of portion 21	Piet	Joubert	Cell: 073 5066 177 Email: <a href="mailto:Pieterhendrick35@gmail.com">Pieterhendrick35@gmail.com</a>	Visited with Mr. Joubert. Handed over a hard copy of the BID. Had a discussion about the project plans. He stated that he had no specific concerns. We discussed his bore hole and its use. We collected a sample from his bore hole as part of the hydrocensus. His bore hole is	None required.	NA

Date of Comment	Organisation	Name	Surname	Contact Details	Comment from I&AP	Response by the EAP	Date of Response
					equipped. He is not sure of its depth but the pump lies at approximately 40m and never pumps dry.		
16 March 2022	Landowner of portion 18 and 24	Johan and Magda	Liebenberg	Cell: 065 970 8019 Email: <a href="mailto:gerbermagda56@gmail.com">gerbermagda56@gmail.com</a> Postal Address:	Visited with Mr. Liebenberg and discussed his bore holes with him. He has three (3) bore holes used for domestic and agricultural purposes. Collected a water sample from his home as part of the hydrocensus.	None required.	Site visit. NA.
08 December 2022	Nkangala District Municipality	Xolani	Motha	Email: <a href="mailto:MothaXV@nkangaladm.gov.za">MothaXV@nkangaladm.gov.za</a>	The Nkangala District Municipality as the Competent Authority for Licensing Atmospheric Emission Licence's has no objection or is not affected by the proposal to the application as no Listed Activities specified in Section 21 Listed Activities in terms of National Environmental Management Air Quality Act No 39 of 2004. As soon as the Final Basic Assessment Report is available, please share with Nkangala District Municipality as well.	"Dear Xolani,  The comments are hereby acknowledged.  Kind regards,  Masala Mahumela"	08 February 2023

**COMMENTS RAISED AFTER DISTRIBUTION OF THE DRAFT BASIC ASSESSMENT REPORT FOR REVIEW TO THE INTERESTED AND AFFECTED PARTIES**

Date of Comment	Organisation	Name	Surname	Contact Details	Comment from I&AP	Response by the EAP	Date of Response
29 March 2023	South African Heritage Resources Agency	Natasha	Higgitt	Tel: 021 202 8660 Email: <a href="mailto:nhiggitt@sahra.org.za">nhiggitt@sahra.org.za</a>	<p>The following comments are made as a requirement in terms of section 3(4) of the NEMA Regulations and section 38(8) of the NHRA in the format provided in section 38(4) of the NHRA and must be included in the Final BAR and EMPr:</p> <ul style="list-style-type: none"> <li>• 38(4)a – The SAHRA has no objections to the proposed development;</li> <li>• 38(4)b – The recommendations of the specialists are supported and must be adhered to. Further additional specific conditions are</li> </ul>	The EAP acknowledged the comments and included them in the Final Basic Assessment Report and the Final Environmental Management Programme.	03 April 2023



Date of Comment	Organisation	Name	Surname	Contact Details	Comment from I&AP	Response by the EAP	Date of Response
					<p>provided for the development as follows:</p> <ul style="list-style-type: none"> <li>• A tracklog of the completed survey must be submitted;</li> <li>• As Sites 02 – 07 are most likely not older than 60 years old, they are not considered to be heritage resources, however, demolition and ground clearance around sites 02, 03, 04, 06 and 07 must be monitored, as human remains may be present. These human remains would most likely be younger than 60 years and not protected by the NHRA, but will still be protected by other legislation;</li> </ul>		

Date of Comment	Organisation	Name	Surname	Contact Details	Comment from I&AP	Response by the EAP	Date of Response
					<ul style="list-style-type: none"> <li>• Should site 01 be older than 60 years, a permit must be applied for the destruction of the site in terms of section 34 of the NHRA from the Mpumalanga Provincial Heritage Resources Authority;</li> <li>• 38(4)c(i) – If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA (Natasha Higgitt</li> </ul>		

Date of Comment	Organisation	Name	Surname	Contact Details	Comment from I&AP	Response by the EAP	Date of Response
					<p>021 202 8660/nhiggitt@sahra.org.za) must be alerted as per section 35(3) of the NHRA. Non-compliance with section of the NHRA is an offense in terms of section 51(1)e of the NHRA and item 5 of the Schedule;</p> <ul style="list-style-type: none"> <li>• 38(4)c(ii) – If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Nggabutho Madida 012 320 8490), must be alerted immediately as per section 36(6) of the NHRA. Non-compliance with section of the NHRA is an offense in terms of</li> </ul>		

Date of Comment	Organisation	Name	Surname	Contact Details	Comment from I&AP	Response by the EAP	Date of Response
					<p>section 51(1)e of the NHRA and item 5 of the Schedule;</p> <ul style="list-style-type: none"> <li>• 38(4)d – See section 51 of the NHRA regarding offences;</li> <li>• 38(4)e – The following conditions apply with regards to the appointment of specialists:</li> <li>• With reference to the mitigation work noted above, a qualified archaeologist must be appointed to undertake the work in terms of the permit applied for as noted above;</li> <li>• If heritage resources are uncovered during the course of the development, a professional archaeologist or palaeontologist,</li> </ul>		

Date of Comment	Organisation	Name	Surname	Contact Details	Comment from I&AP	Response by the EAP	Date of Response
					<p>depending on the nature of the finds, must be contracted as soon as possible to inspect the heritage resource. If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA;</p> <ul style="list-style-type: none"> <li>• The Final BAR and EMPr must be submitted to SAHRA for record purposes;</li> <li>• The decision regarding the EA Application must be communicated to SAHRA and uploaded to the</li> </ul>		



Date of Comment	Organisation	Name	Surname	Contact Details	Comment from I&AP	Response by the EAP	Date of Response
					<ul style="list-style-type: none"> <li>SAHRIS Case application.</li> </ul>		
13 February 2023	Highveld Industrial Park	Thia	Oberholzer (SHEQ Manager)	E-mail: <a href="mailto:thiav@hipark.co.za">thiav@hipark.co.za</a> Mobile: 082 610 9481	<p>“Good day Masala</p> <p>Please register me as an interested and affected party to the proposed Su Casa Burial estate development and forward me the link to access both the draft BAR and WUL application process. Please confirm receipt of this email.</p> <p>Kind Regards</p> <p>Thia Oberholzer”</p>	<p>“Dear Thia,</p> <p>Your email is hereby acknowledged.</p> <p>Please download the Report from this link <a href="https://we.tl/t-roGBjBJqjC">https://we.tl/t-roGBjBJqjC</a></p> <p>Should you have any queries please do not hesitate to contact the undersigned.</p> <p>Kind regards,</p> <p>Masala Mahumela Pr.Sci.Nat. I EAPASA”</p>	13 February 2023

Date of Comment	Organisation	Name	Surname	Contact Details	Comment from I&AP	Response by the EAP	Date of Response
05 April 2023	Highveld Industrial Park	Thia	Oberholzer (SHEQ Manager)	E-mail: <a href="mailto:thiav@hipark.co.za">thiav@hipark.co.za</a> Mobile: 082 610 9481	<p>Mr Oberholzer commented on the Draft Basic Assessment Report and send it to Eaglesage with the following:</p> <ul style="list-style-type: none"> <li>Page 29: "Would the actual placement of bodies in a grave not constitute a S21g activity?"</li> <li>Page 35: Please take note that aerial images dated from 1943 indicate that this wetland existed, since before the placement of any material upstream of this area. note that this wetland therefore is not an artificial wetland as indicated in this report.</li> </ul>	<p>The EAP sent an updated Wetland Assessment Report to Ms Oberholzer and responded as follows:</p> <p>Response to the comment of page 29:</p> <p>The Department of Water and Sanitation only deemed installation of the septic tanks as an activity that triggers Section 21 g of the National Water Act No. 36 of 1998.</p> <p>Response to the comment on page 35:</p>	11 April 2023

Date of Comment	Organisation	Name	Surname	Contact Details	Comment from I&AP	Response by the EAP	Date of Response
					<ul style="list-style-type: none"> <li>Page 47: "Not sure what the red dots mean, please advise"</li> </ul>	<p>This has been corrected. Please refer to Section 2.6 of the attached report.</p> <p>"Two types of NFEPA wetlands were identified within the MRA, namely channelled valley bottom wetlands as well as seeps (see Figure 2-6). The channelled valley bottom and seep wetlands are classified as natural".</p> <p>Response to the comment on page 47:</p> <p>The red dots refer to botanical records.</p>	

Date of Comment	Organisation	Name	Surname	Contact Details	Comment from I&AP	Response by the EAP	Date of Response
04 April 2023	Mpumalanga Department of Public Works, Roads And Transport	Mr Kenneth	Mpe	Private Bag X11302 Mbombela 1200 (C) 082 964 4379 (T) 013 766 8620 / 013 753 3191 (E) <a href="mailto:kenneth@smlprojects.co.za">kenneth@smlprojects.co.za</a>	<p>On 04 April 2023 Ms Masala Mahumela held a meeting which was attended by Ms Lungile Mahlangu of Zitholama and Mr Kenneth Mpe of the Department of Public Works, Roads and Transport. Following the meeting Ms Mahumela sent the following email to Mr Mpe:</p> <p>“Dear Kenneth,</p> <p>Our meeting this morning regarding the email below and the attached letter from Mr Stephan Pienaar have reference.</p> <p>As Discussed, the Applicant proposes to use the southern gate as an overflow exist. He further, proposes to tar the access road. To this you indicated that an Engineering Report including the Traffic Impact</p>		06 April 2023

Date of Comment	Organisation	Name	Surname	Contact Details	Comment from I&AP	Response by the EAP	Date of Response
					<p>Assessment Report would be required by the Department.</p> <p>In light of the above, we (Lungile and I) suggested that the process of applying for access through the southern gate and tarring the road be separated from the Basic Assessment so as not to delay the Basic Assessment process.</p> <p>Should you have any queries, please do not hesitate to contact the undersigned.</p> <p>Regards,</p>		



Final Basic Assessment Report for the Proposed Su Casa Burial Estate

Date of Comment	Organisation	Name	Surname	Contact Details	Comment from I&AP	Response by the EAP	Date of Response
					<p>Masala Mahumela”</p> <p>Mr Mpe responded to the above-mentioned email as follows:</p> <p>“Good day</p> <p>Your email is duly noted.</p> <p>Kind Regards</p> <p>Kenneth Mpe”</p>		

#### 10.4. The environmental attributes associated with the sites identified focusing on the geographical, physical, biological, social, economic and cultural aspects

##### 10.4.1. Climate

The information below has been sourced from the Wetland Assessment Report prepared by The Biodiversity Company in February 2022. The Wetland Impact Assessment Report is attached as Appendix D3.

The climate for the Rand Highveld Grassland is characterised by a summer rainfall with a mean annual precipitation of 654 mm which is slightly lower in the western parts of this vegetation type (see Figure 5). These areas are known to have warm-temperate conditions with dry winters. The likelihood of frost however is greater in the western parts with the incidence of frost ranging from 30 to 40 days compared to the east which has a frost incidence of 10 to 35 days (Mucina & Rutherford, 2006). This vegetation type is also classified as endangered even though very little conservation has been done for this vegetation type.

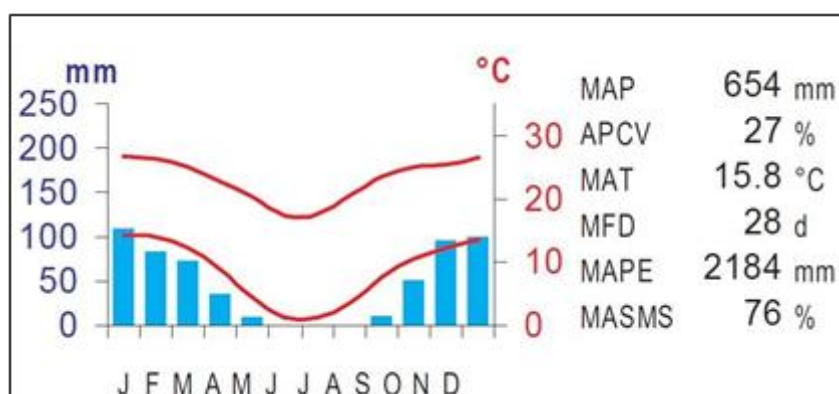


Figure 10.4-1 : Climate for the Rand Highveld Grassland.

##### 10.4.2. Soils

The information below has been sourced from the Wetland Assessment Report prepared by The Biodiversity Company in February 2022. The Wetland Impact Assessment Report is attached as Appendix D3.

According to the land type database (Land Type Survey Staff, 1972 - 2006), the project area is characterised by the Bb 16 land type. The Bb land type consists of plinthic catena. Upland duplex and marginalitic soils are rare and dystrophic and/or mesotrophic red soils are not wide spread. Figure 6 illustrates the respective terrain units relevant to the Bb 16 land type.

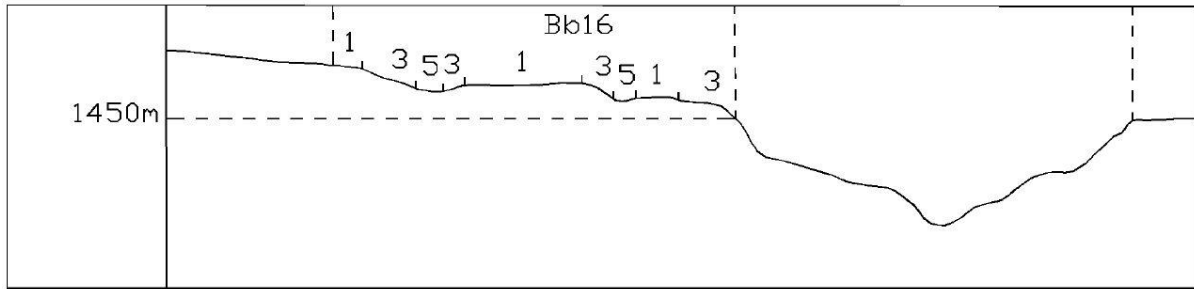


Figure 10.4-2 : Illustration of land type Bb 16 terrain units (Land Type Survey Staff, 1972 - 2006)

### 10.4.3. Topographical Inland Water and River Line Data

One perennial stream has been identified within the proposed project area by means of the “2529” quarter degree square topographical river line data set. A single inland water area has also been identified within the 500 m regulated area (see Figure 7).

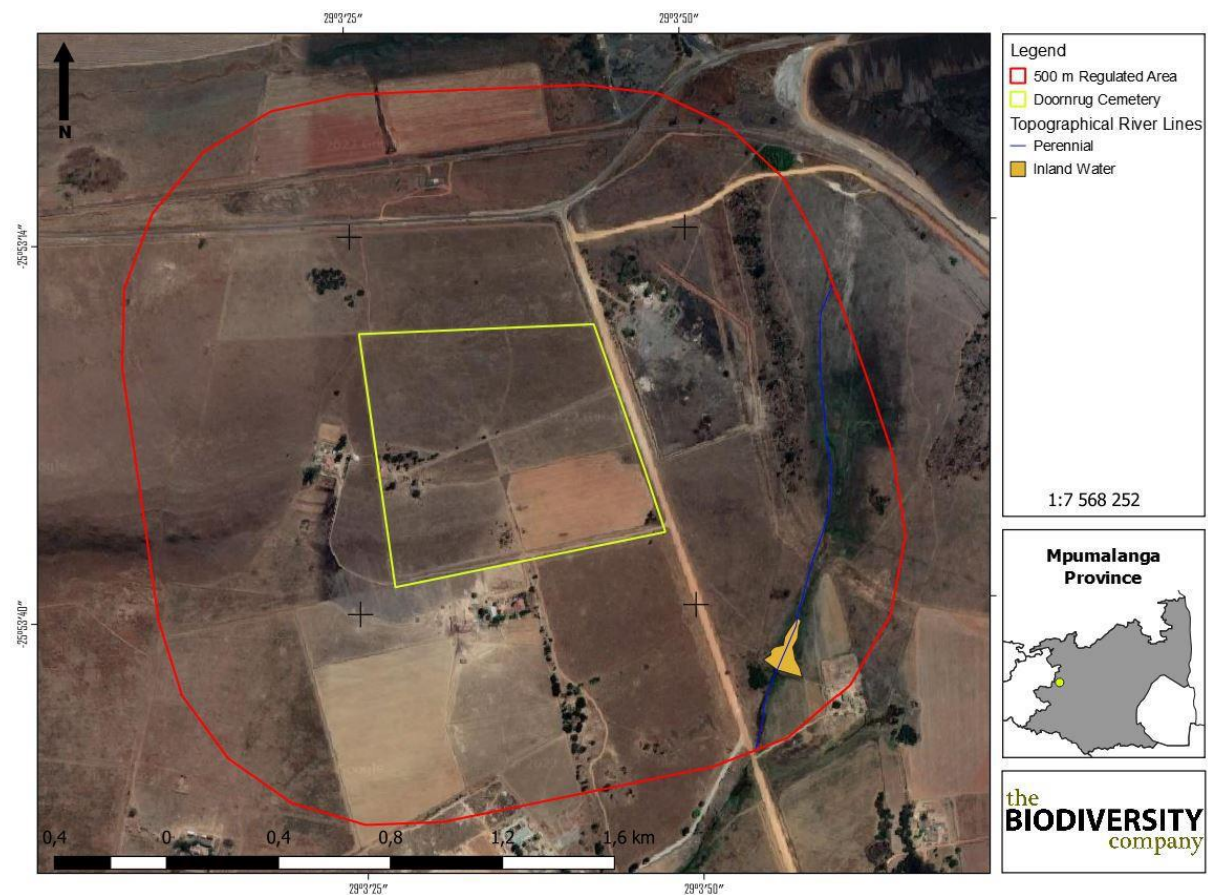


Figure 10.4-3 : Illustration of topographical river lines and the inland water area located within the 500 m regulated area

#### 10.4.4. Mpumalanga Highveld Grassland Wetlands

The Wetland Impact Assessment Report is attached as Appendix D3.

The Mpumalanga Highveld Grassland Wetland Layer indicates additional wetlands within the 500 m regulated area, namely a channelled valley bottom, a floodplain wetland as well as a seep wetland (see Figure 8).

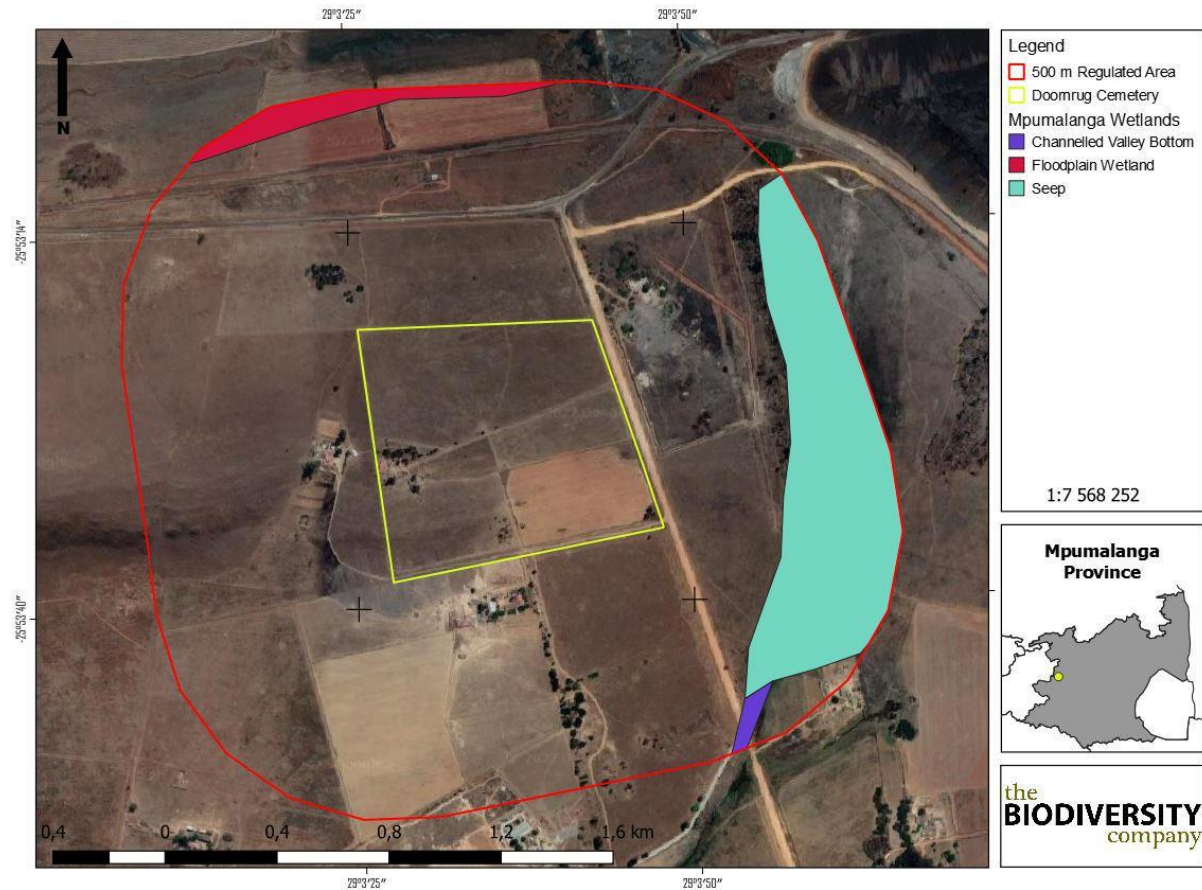


Figure 10.4-4 : Wetlands located inside the 500 m regulated area according to the Mpumalanga wetland dataset

##### 10.4.4.1. NFEPA Wetlands

Two types of NFEPA wetlands were identified within the MRA, namely channelled valley bottom wetlands as well as seeps. The channelled valley bottom and seep wetlands are classified as natural.



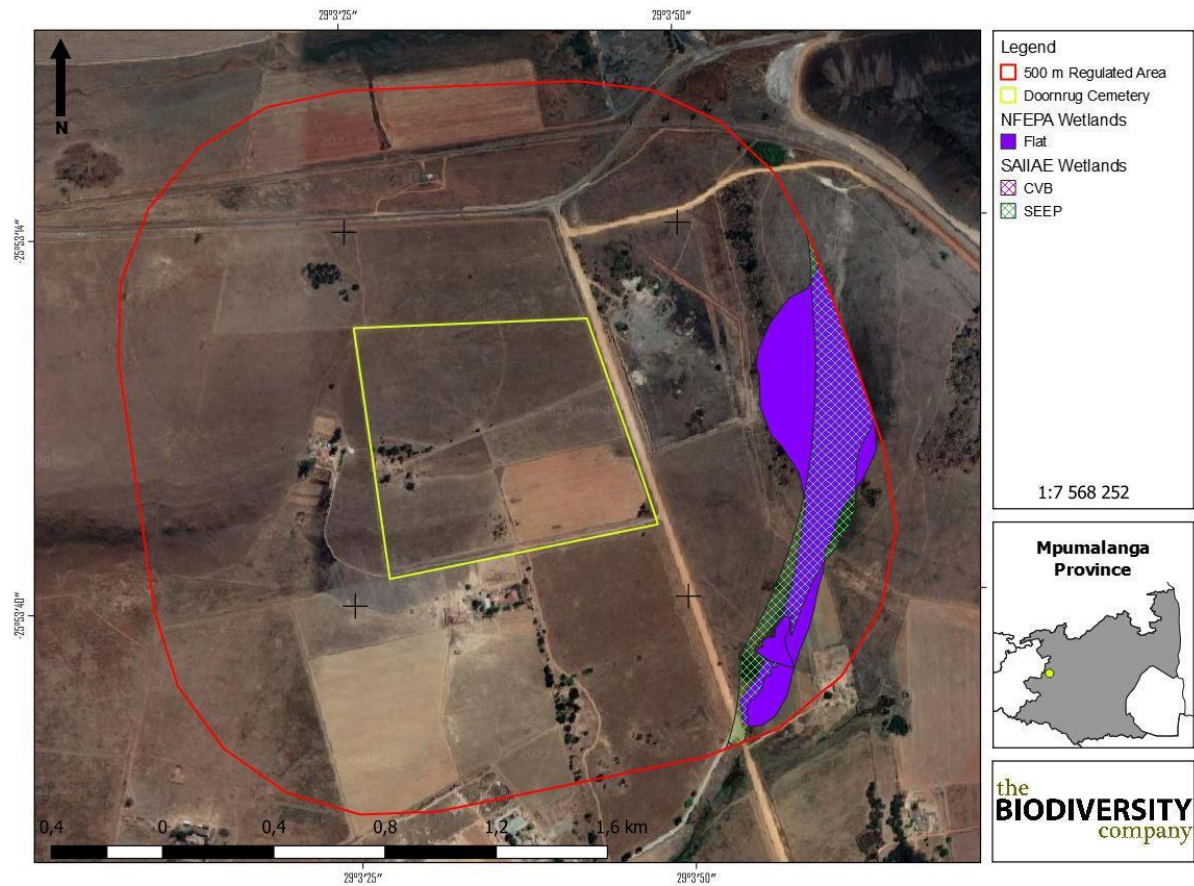


Figure 10.4-5 : NFEPA and SAIIE wetlands within the project area and its surroundings

#### 10.4.4.2. Wetland Delineation and Description

Two HGM units both unchannelled valley bottom has been identified within the 500 m regulated area (see Figure 10 and Figure 11). In addition, multiple drainage features were identified within the 500 m regulated area. These drainage feature although not classified as wetland areas still require conservation while the proposed activity takes place. These drainage systems have been excluded from the functional assessment. Some recommendations have been made to conserve the integrity of the drainage features.



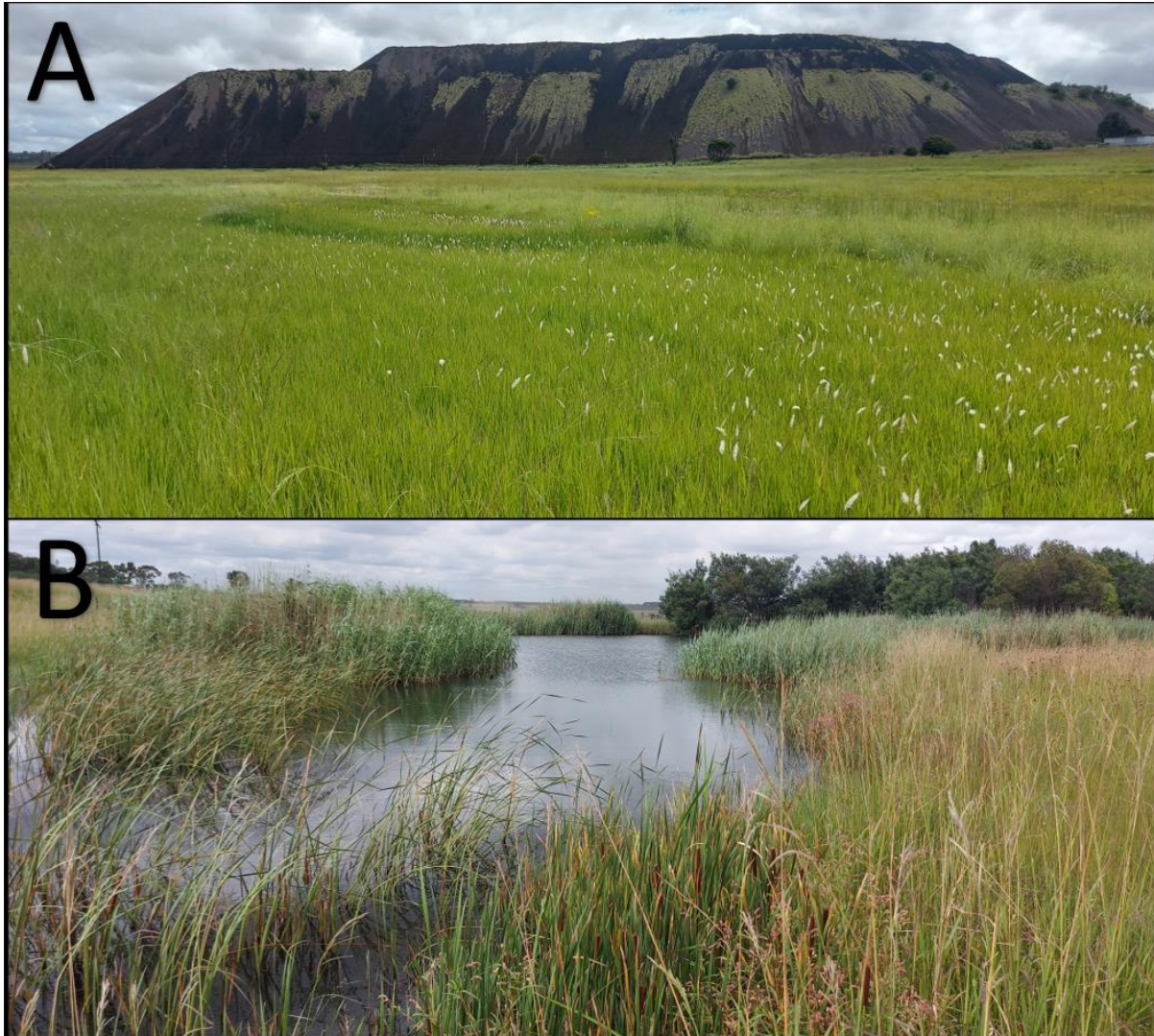


Figure 10.4-6 : Examples of the different HGM units delineated within the project area. A) Unchanneled valley bottom at HGM 1, B) Dam located within the Unchanneled valley bottom at HGM 1.

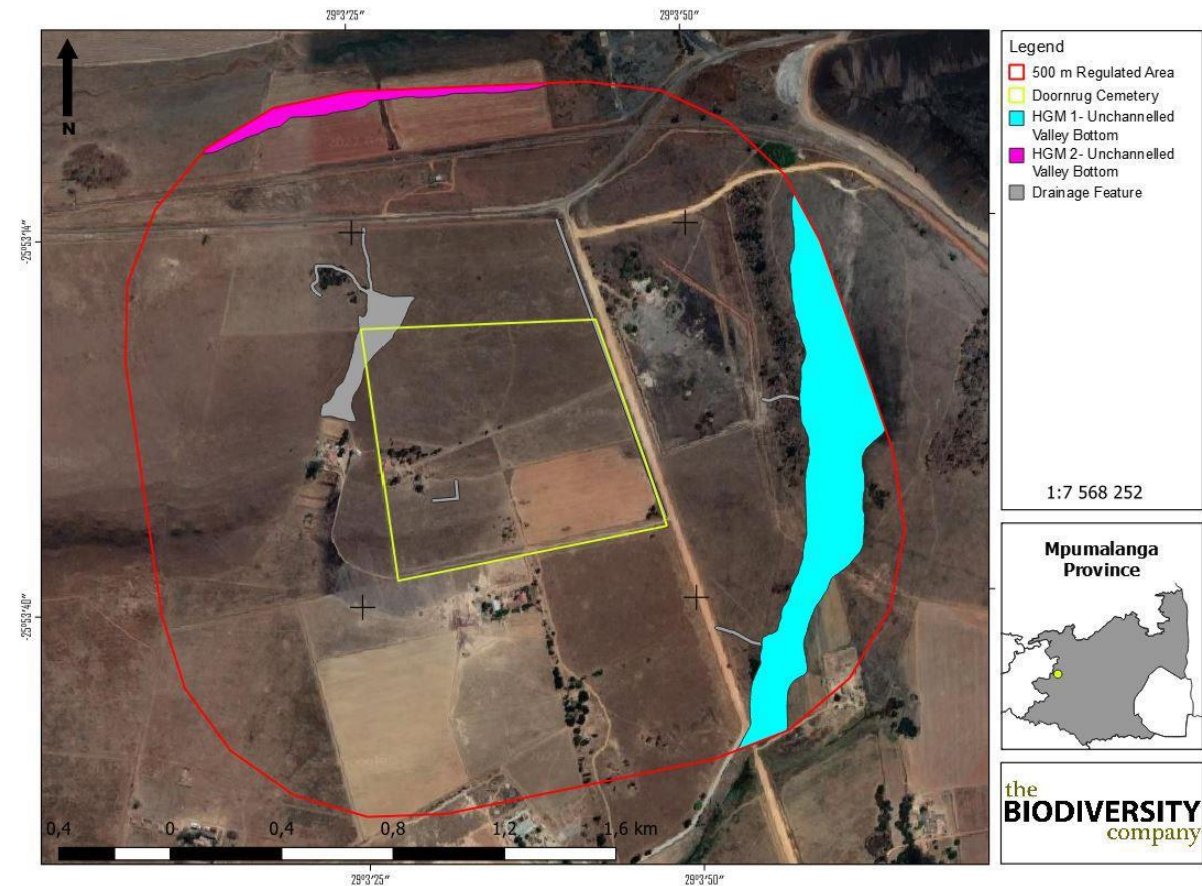


Figure 10.4-7 : Delineation of wetlands within project area

The wetland classification as per SANBI guidelines (Ollis *et al.*, 2013) is presented in Table 5. One wetland type was identified within the project area, namely an unchannelled valley bottom (HGM 1 and 2).

Figure 10.4-8 : Wetland classification as per SANBI guideline (Ollis *et al.* 2013)

Wetland System	Level 1		Level 2	Level 3	Level 4		
	System	DWS Ecoregion/s	NFEPA Wet Veg Group/s	Landscape Unit	4A (HGM)	4B	4C
HGM 1 and 2	Inland	Highveld	Mesic Highveld Grassland Group 4	Valley Floor	Unchannelled Valley Bottom	N/A	N/A

#### 10.4.5. Ecosystem Threat Status

The Ecosystem Threat Status is an indicator of an ecosystem’s wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition. According to the spatial dataset, the proposed development overlaps with a VU ecosystem (Figure 12).





Figure 10.4-9 : Map illustrating the ecosystem threat status associated with the proposed project area

#### 10.4.6. Ecosystem Protection Level

Indicator of the extent to which ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP), based on the proportion of the biodiversity target for each ecosystem type that is included within one or more protected areas. Not Protected, Poorly Protected or Moderately Protected ecosystem types are collectively referred to as under-protected ecosystems. The proposed development overlaps with a PP ecosystem (Figure 13).



Figure 10.4-10 : Map illustrating the ecosystem protection level associated with the proposed project area

#### 10.4.7. Protected Areas

According to the protected area spatial dataset from SAPAD (2021), SACAD (2021) and SAMPAZ (2021), the proposed development does not occur within any protected area and there is no protected area in close proximity to the project area. The De Hoop Private Nature Reserve is situated more than 20 km away from the project area.

##### 10.4.7.1. Terrestrial Critical Biodiversity Areas (CBAs)

Figure 14 shows the project area superimposed on the Mpumalanga Biodiversity Sector Plan (MBSP) Terrestrial CBA map. Based on this, the proposed development areas will potentially overlap with:

- Critical Biodiversity Area (CBA): Irreplaceable;
- Critical Biodiversity Area (CBA): Optimal;
- Moderately modified- old lands;
- Heavily Modified Areas (HMA); and
- Other Natural Areas.

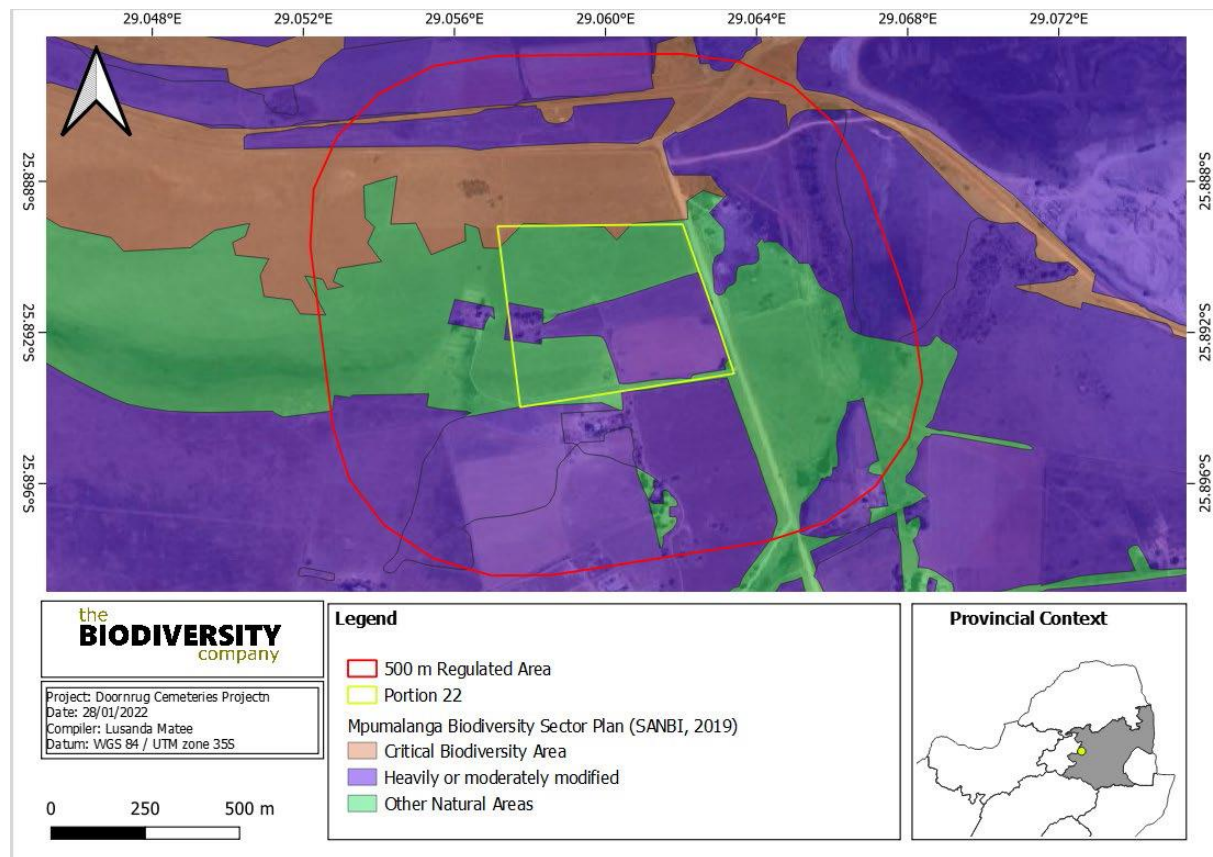


Figure 10.4-11: The project areas superimposed on the MBSP (MTPA, 2015)

#### 10.4.7.2. The National List of Threatened Terrestrial Ecosystems

The Su Casa Burial Estate project and associated infrastructure traverse Rand Highveld Grassland which is listed as Vulnerable under criterion A1 due to irreversible loss of natural habitat (Figure 15). Loss of natural habitat includes outright loss, for example, the removal of natural habitat for cultivation, building of infrastructure, mining etc., as well as severe degradation. An ecosystem is categorised as vulnerable if the extent of the remaining natural habitat in the ecosystem is less than or equal to 60% of the original extent of the ecosystem. For this purpose, habitat is considered severely degraded if it would be unable to recover to a natural or near-natural state following the removal of the cause of the degradation (e.g., invasive aliens, over-grazing), even after very long periods. For EIAs, the 2011 National list of Threatened Ecosystems remains the trigger for a Basic Assessment in terms of Listing Notice 3 of the EIA Regulations published under the NEMA.



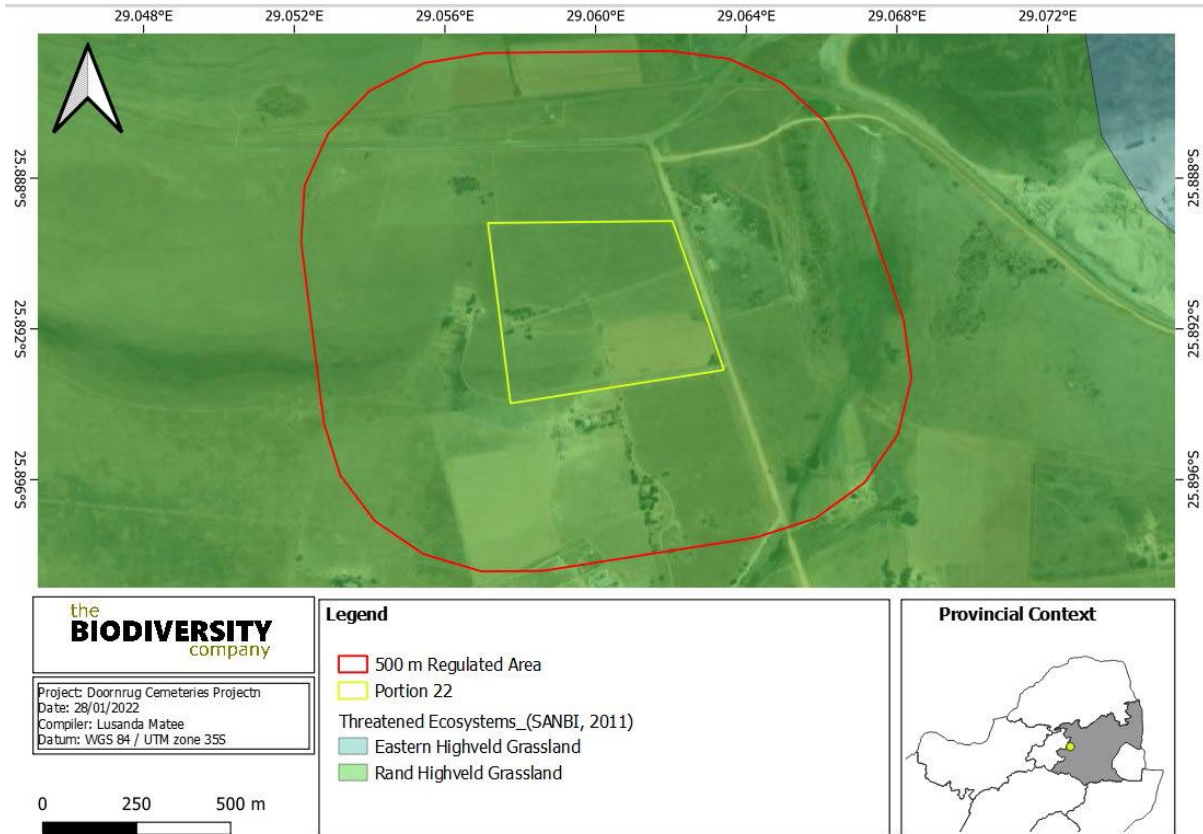


Figure 10.4-12 : The Doornrug Cemeteries Project in relation to National Threatened or Protected Ecosystems

### 10.4.7.3. Important Bird & Biodiversity Areas

The Doornrug Cemeteries Project area is not located within an Important Bird and Biodiversity Areas (IBA) nor is there one within the immediate landscape.

### 10.4.8. Hydrological Setting

The project area does not overlap or traverse any Ecological Support Area (NBA) River or NBA wetlands, it is however close to Critically Endangered (CR) Rivers and Critically Endangered (CR) wetlands (Figure 16).

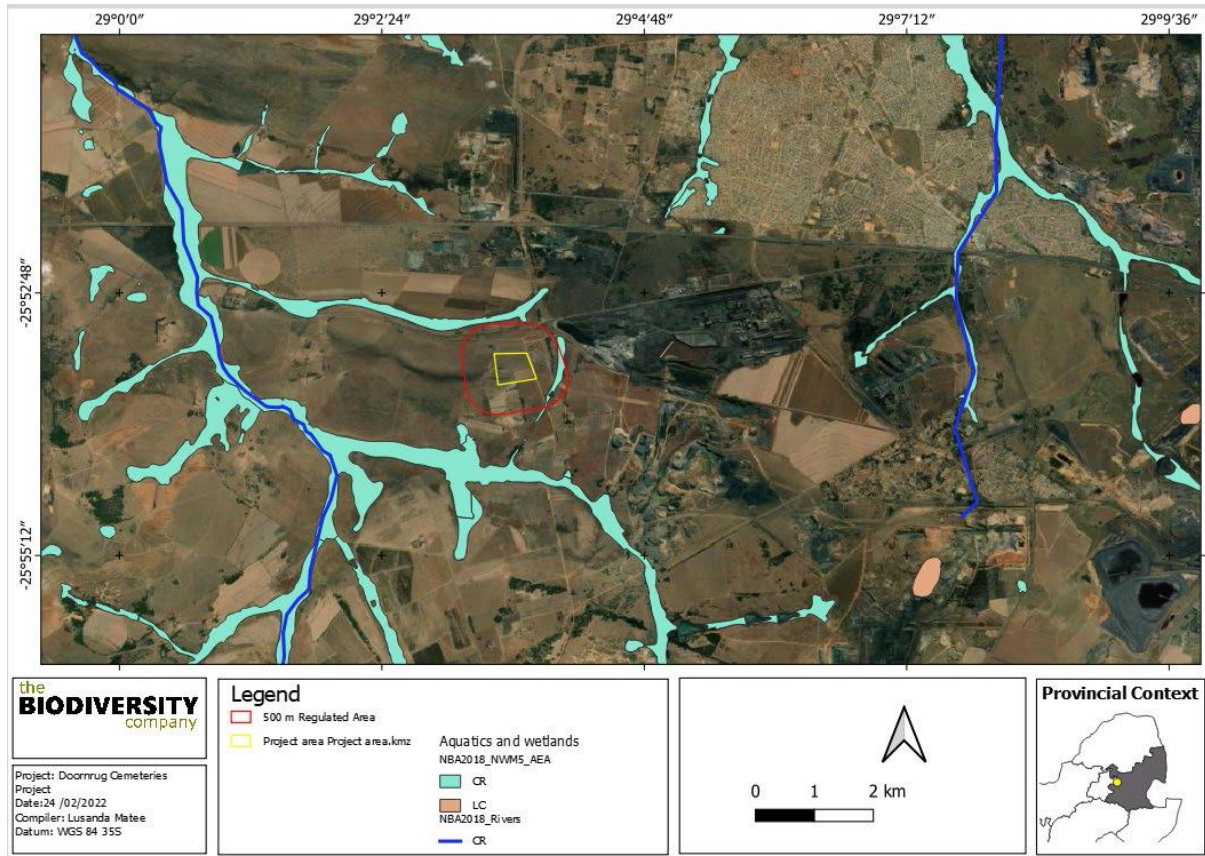


Figure 10.4-13 : Map illustrating ecosystem threat status of river and wetland ecosystems in the project area.

#### 10.4.9. National Freshwater Ecosystem Priority Area Status

The National Freshwater Ecosystem Priority Areas (NFEPA) spatial data indicates that no Freshwater Ecosystem Priority Areas (FEPA) rivers were identified within the project area however the closest FEPA wetland (Unclassified) is less than a km from the project area (Figure 17).

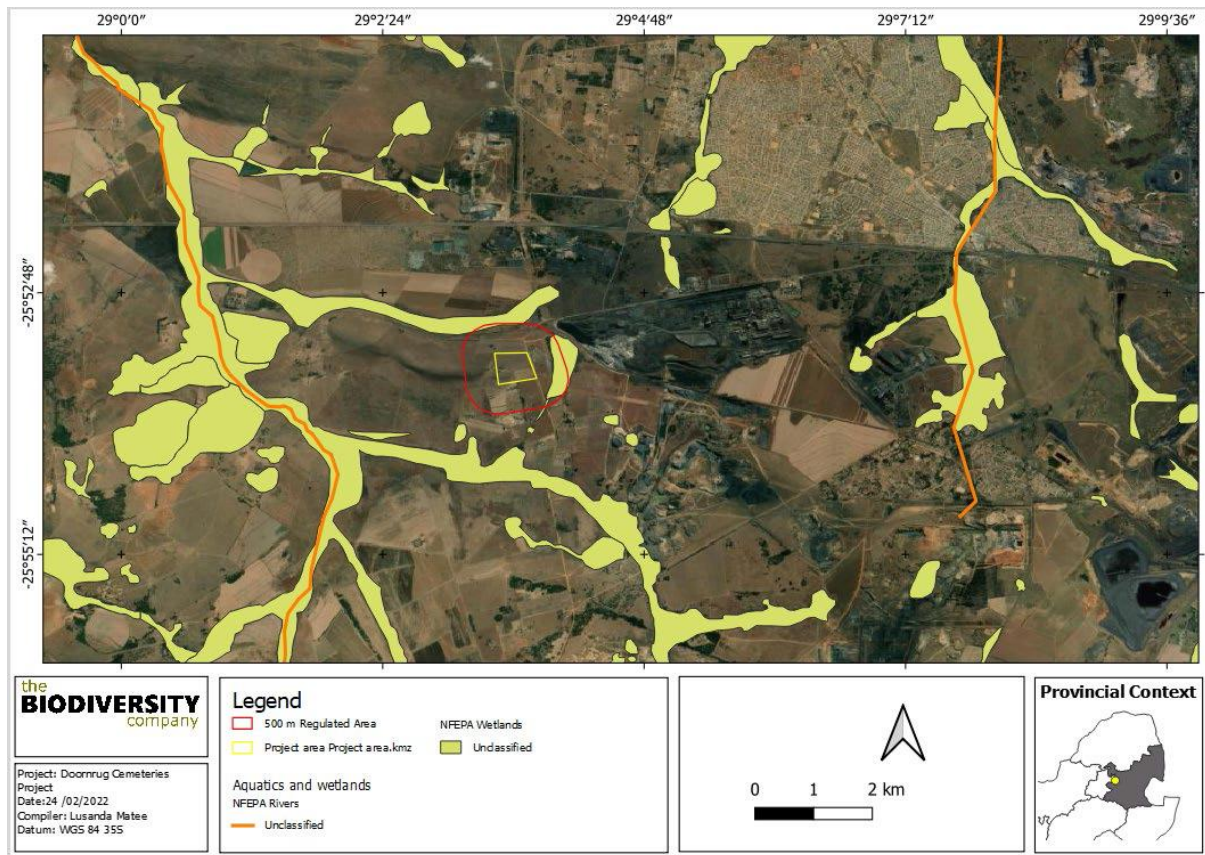


Figure 10.4-14 : The project area in relation to the National Freshwater Ecosystem Priority Areas

#### 10.4.10. Flora

The following information was sourced from the Terrestrial Compliance Statement prepared by The Biodiversity Company in 2022. The Terrestrial Compliance Report is attached as Appendix D1.

According to Mucina & Rutherford, the vegetation type that is predominate within the project area is the Rand Highveld Grassland (Figure 18), which is in the Mesic Highveld Grassland Bioregion of the Grassland Biome (Mucina & Rutherford 2006; SANBI, 2018). The Rand Highveld Grassland Type is virtually confined to Mpumalanga Province, although both also extend marginally into eastern Gauteng.



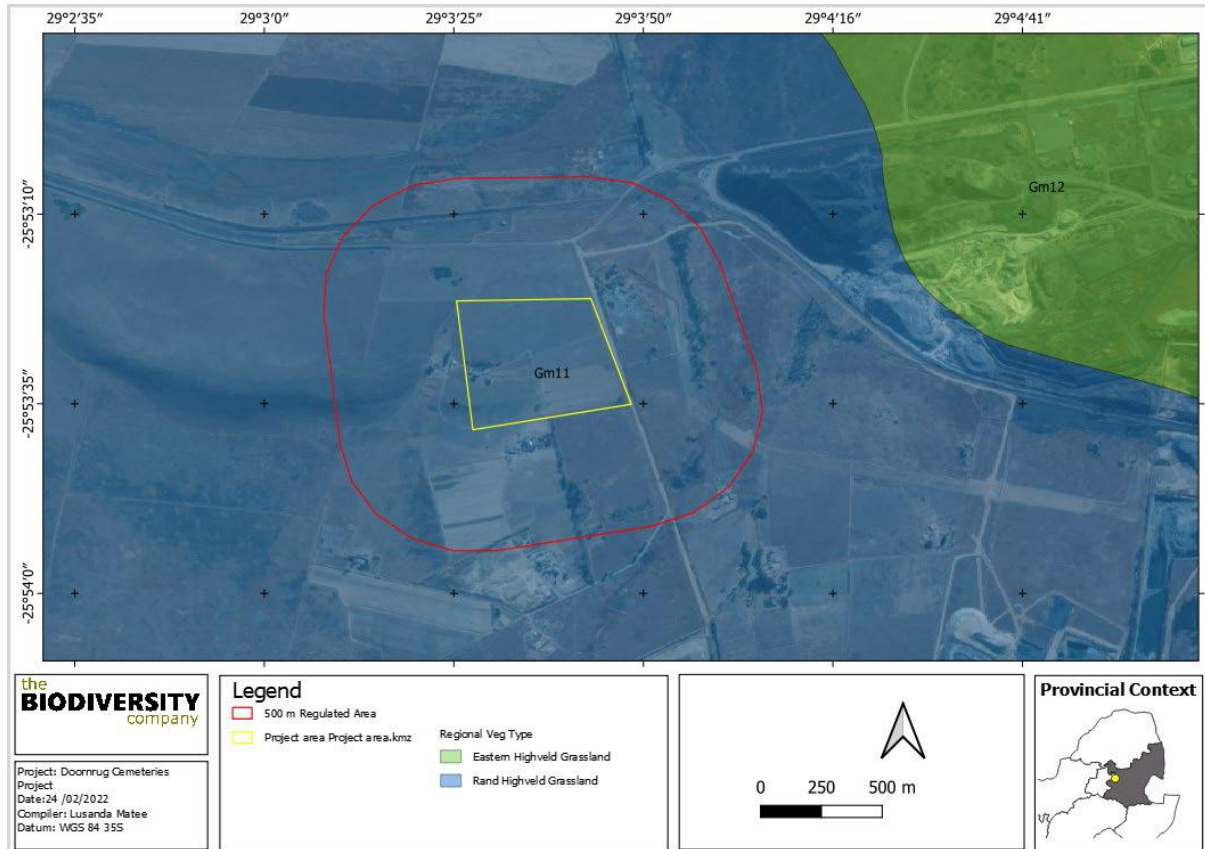


Figure 10.4-15 : Map illustrating the vegetation type associated with the project area

#### 10.4.11. Expected Flora Species

According to the new Plants of Southern Africa (POSA) database underpinned by the Botanical Database of Southern Africa (BODATSA), a total of 485 species of indigenous plants are expected to occur within the assessment area and immediate landscape. Appendix C of the Terrestrial Compliance Statement provides the list of species and their respective conservation status and endemism. A total of 8 Red List/ SCC according to the IUCN Red List status could be expected to occur within the assessment area and are provided in Table 6 below (according to the relevant POSA Grid Squares)(Figure 19).

Table 10.4-1 : Threatened flora species that may occur within the assessment area associated with the proposed project area. VU= Vulnerable, DD=Data Deficient

Family	Species	IUCN	IUCN
Iridaceae	<i>Gladiolus paludosus</i>	VU	Indigenous; Endemic
Asphodelaceae	<i>Aloe bergeriana</i>	DD	Indigenous; Endemic
Apocynaceae	<i>Aspidoglossum validum</i>	DD	Indigenous; Endemic

A total of 54 woody, graminoid, shrub and herbaceous plant species belonging to were recorded in the project area during the field assessment. This includes two species that have been assigned alien invader plant categories

under the National Environmental Management: Biodiversity Act (NEMBA). Some of the plant species recorded can be seen in Figure 10.4-16.

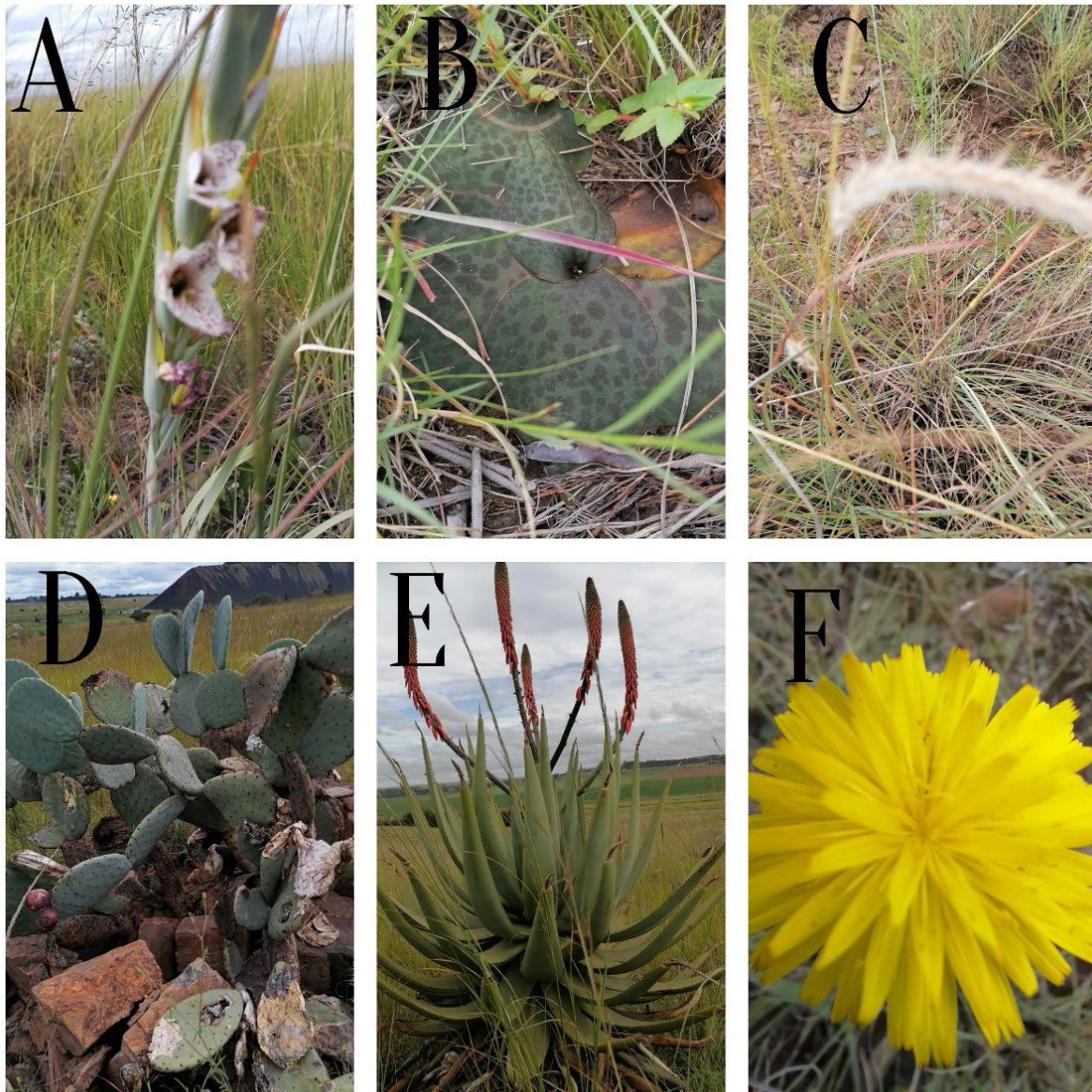


Figure 10.4-16 : Photographs illustrating some of the flora recorded within the assessment area. A) *Gladiolus ecklonii* (Sheath Glad), B) *Ledebouria ovatifolia* (Flat-leaved African Hyacinth). C) *Elionurus muticus* (Wire Grass), D) *Opuntia ficus-indica* (Sweet prickly pear), E) *Aloe castanea* (Cat's Tail Aloe) and F) *Hypochaeris radicata* (Cat's ear)



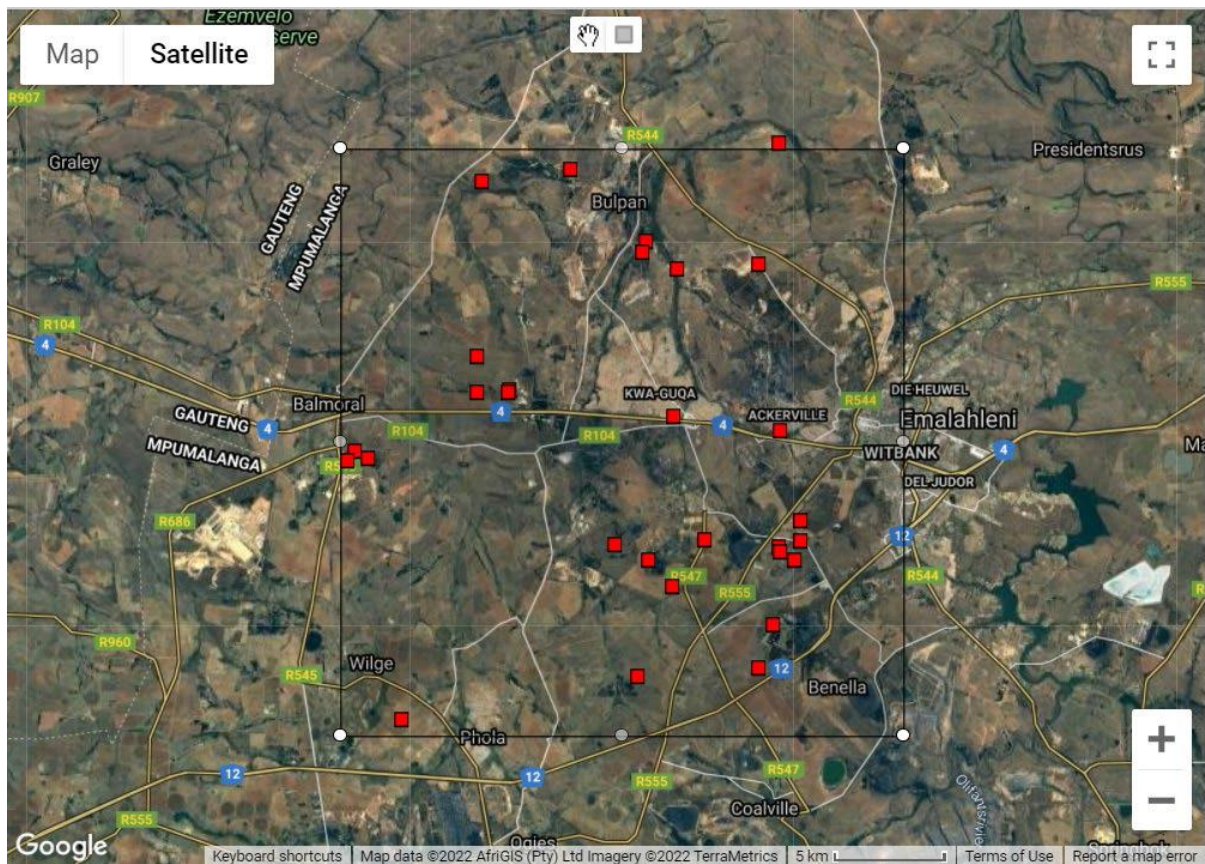


Figure 10.4-17 : Map showing the grid drawn to compile an expected species list (BODATSA-POSA, 2016)

### 10.5. Invasive Alien Plants

Ten (10) Invasive Alien Plant (IAP) species listed under the Alien and Invasive Species List 2016, Government Gazette No. 40166 as Category 1b were recorded for the area. These IAP species must be controlled by implementing an Invasive Alien Plant Management Programme in compliance of section 75 of the Act. Plants listed as Category 1 alien or invasive species under the National Environmental Management: Biodiversity Act (NEMBA) appear in the green text, whilst category 2 appear in blue (Table 7).

Table 10.4-2 : IAPs recorded in the project area

Scientific Name	Common Name	Threat Status (SANBI, 2017)	SA Endemic	Alien Category
<i>Cereus jamacaru</i>	Queen-of-the-Night	NE	Not Indigenous; Naturalized exotic weed	NEMBA Category 1b.
<i>Cirsium vulgare</i>	Spear Thistle, Scotch Thistle	NE	Not Indigenous; Naturalized exotic weed	NEMBA Category 1b.

<b>Scientific Name</b>	<b>Common Name</b>	<b>Threat Status (SANBI, 2017)</b>	<b>SA Endemic</b>	<b>Alien Category</b>
<i>Datura ferox</i>	Large Thorn Apple	NE	Not Indigenous; Naturalized exotic weed	NEMBA Category 1b.
<i>Eucalyptus camaldulensis</i>	Red River Gum	NE	Not Indigenous; Naturalized exotic weed	NEMBA Category 1b.
<i>Gleditsia triacanthos</i>	Honey Locust	NE	Not Indigenous; Naturalized exotic weed	NEMBA Category 1b.
<i>Opuntia ficus- indica</i>	Sweet prickly pear	NE	Not Indigenous; Naturalized exotic weed	NEMBA Category 1b.
<i>Pinus patula</i>	Jejecote Pine	NE	Not Indigenous; Naturalized exotic weed	NEMBA Category 2
<i>Schinus molle</i>	Peruvian Pepper Tree	NE	Not Indigenous; Naturalized exotic weed	NEMBA Category 1b.
<i>Senna occidentalis</i>	Coffee Senna	NE	Not Indigenous; Naturalized exotic weed	NEMBA Category 1b.
<i>Verbena bonariensis</i>	Purpletop Vervain	NE	Not Indigenous; Naturalized exotic weed	NEMBA Category 1b.

## 10.6. Species of conservation concern (SCC)

### 10.6.1. Avifauna

A total of thirty-three (33) bird species were recorded in the project area during the survey based on either direct observation or the presence of visual tracks & signs. Avian diversity within this habitat was relatively poor due to the project area's surrounding land-use. In addition to this, the areas of the Grassland Biome, which therefore suggests that the sensitivity of the site, from an avian perspective, will not be of any great significance. One species of Conservation Concern (SCC) was however recorded, namely *Falco biarmicus* (Lanner Falcon)

### 10.6.2. Amphibians

No reptile or amphibian species were recorded in the project area during the survey, this can be attributed to the lack of suitable habitat, the past human settlements and adjacent mining areas. No indigenous tree species occur on the site; hence the lack of arboreal reptiles.

### 10.6.3. Mammals

A total of three mammal species were recorded in the project area. The presence of humans, overgrazing by livestock as well as the frequent burning of the grassland vegetation reduces available refuge habitat and expose remaining smaller terrestrial mammals to increased predation levels, this may have also contributed to the low diversity observed in the project area. The Species recorded are listed in Table 8.

Table 10.4-3: Mammal species recorded in the project area

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
<i>Herpestes sanguineus</i>	Slender Mongoose	LC	LC
<i>Hystrix africaeaustralis</i>	Cape Porcupine	LC	LC
<i>Lepus saxatilis</i>	Scrub Hare	LC	LC

### 10.7. Species of conservation concern (SCC)

Four habitats were recorded in the project area (Figure 21) and are discussed below:

#### 10.7.1. Transformed

These include areas classified that have been transformed and are considered to no longer represent functioning ecosystems with intact or near-intact ecological and evolutionary processes. These areas are not in climax condition due to factors other than physical disturbance. This habitat unit represents the area that has been cleared of all vegetation or transformed to cropland and the high disturbance levels in such habitats have provided the necessary conditions for alien and invasive plant (AIP) species to proliferate and dominate the landscape. This habitat is regarded as transformed due to the nature of the modification of the area to an extent where it would not be able to return to its previous state.

#### 10.7.2. Degraded Grassland

This habitat unit includes grassland communities that have not been historically transformed but the various sections have received different historical and current impacts. This habitat unit is degraded to some degree and some areas are within a recovering state and mainly consist of pioneer species and IAPs.

### **10.7.3. Grassland**

The grassland habitat type identified in the project area was the remaining natural grassland after the majority of the project area was utilized for agricultural activities, predominantly maize farming and pasture fields. From a grass succession perspective, climax and sub climax grass species were more prominent than pioneer species, indicating an established grass sward moving towards a climax state, from a successional aspect. Although not completely degraded or transformed, this habitat unit did display some forms of disturbance.

### **10.7.4. Rocky Outcrop Habitat Unit**

Occasional ridges or rocky outcrops interrupt the grassland cover. The Rocky Outcrop Habitat Unit comprises scattered rocky outcrops within the proposed Su Casa Burial Estate project area. The vegetation occurring within these areas is almost similar to that of the grassland habitat unit. This habitat unit has several small rocky outcrops, with largely intact vegetation composition and structure, a high diversity of floral species and increased diversity and abundance of floral species. There is a similarity between the two vegetation units, with a few species occurring within this habitat unit which are typical of the rocky outcrops of the area.

### **10.7.5. Areas of Concern**

The following concerns are associated with the two feasibility areas:

- According to the spatial dataset, the proposed development overlaps with a VU ecosystems; and
- Traverses a protected area expansion area

### **10.7.6. Site Ecological Importance**

The vegetation structure and species composition of the two habitats have been completely altered as such, has a very low conservation value and ecological sensitivity from a floral perspective.



Final Basic Assessment Report for the Proposed Su Casa Burial Estate

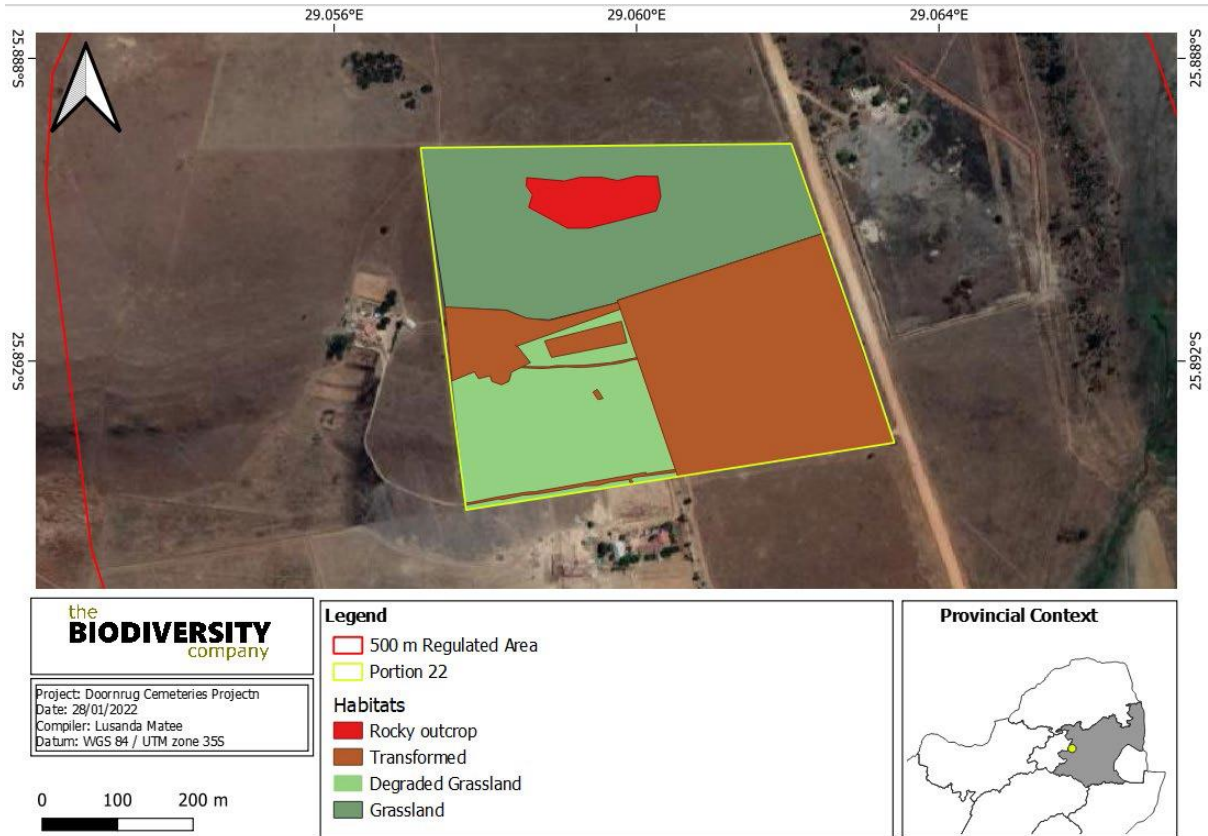


Figure 10.4-18 : The habitat units identified in the project area

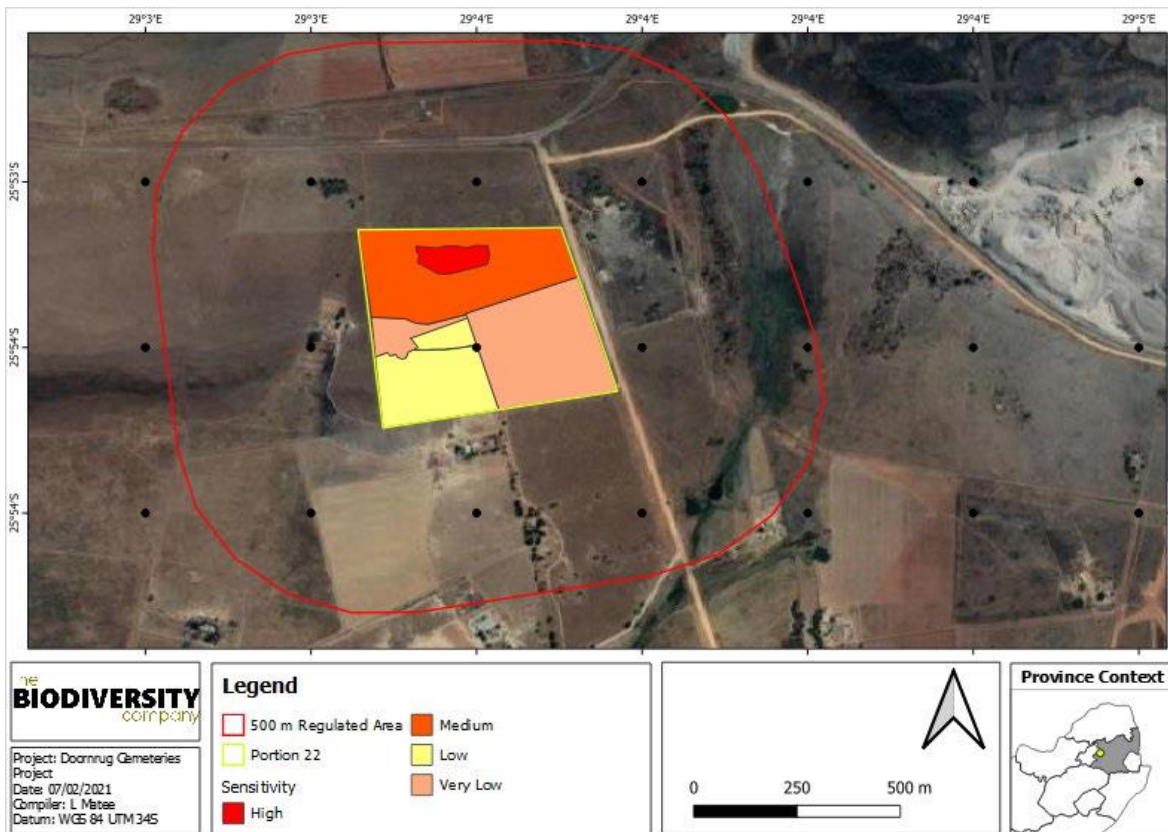


Figure 10.4-19 : The sensitivity of the project area



### 10.8. Land Capability

The following information was sourced from the Agricultural Compliance Statement Report prepared by The Biodiversity Company on February 2022.

According to the land type database (Land Type Survey Staff, 1972 - 2006), the project area is characterised by the Ba5 land type as well as the Bb16 land type which is illustrated in Figure 23. The Ba and Bb land types consists of duplex and marginalitic soils which tend to be dystrophic or mesotrophic. The subsoils consists of widespread red soils and according to Mucina & Rutherford (2006), Glenrosa as well as Mispah soil forms tend to dominate these areas. These soil forms are predominantly formed on rocky ridges.

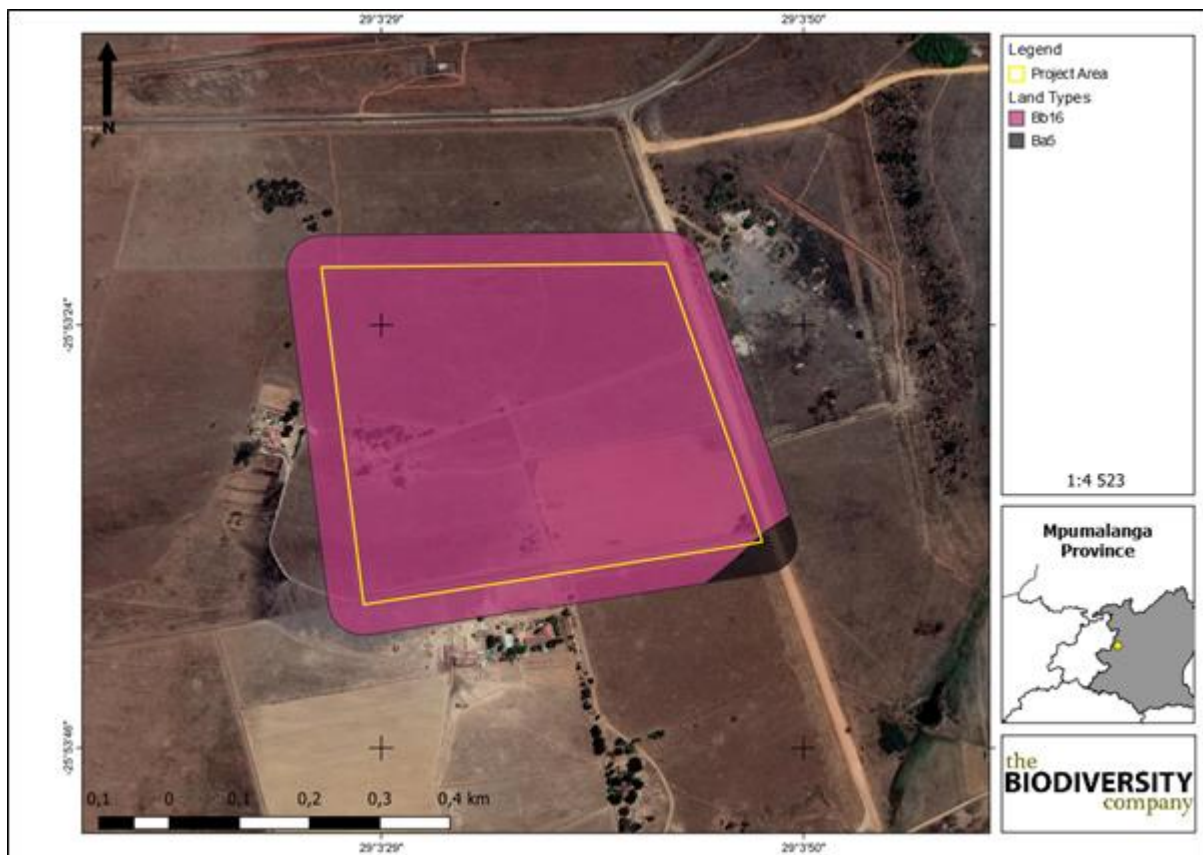


Figure 10.4-20 : The land types associated with the project area

The Ba5 land type terrain unit is illustrated in Figure 10.4-21. The various soil forms that are expected throughout these land types terrain units are shown in Table 10.4-4. The Bb16 land type terrain unit is illustrated in Figure 10.4-22. The various soil forms that are expected throughout the Bb16 land types terrain units are shown in Table 10.4-5.

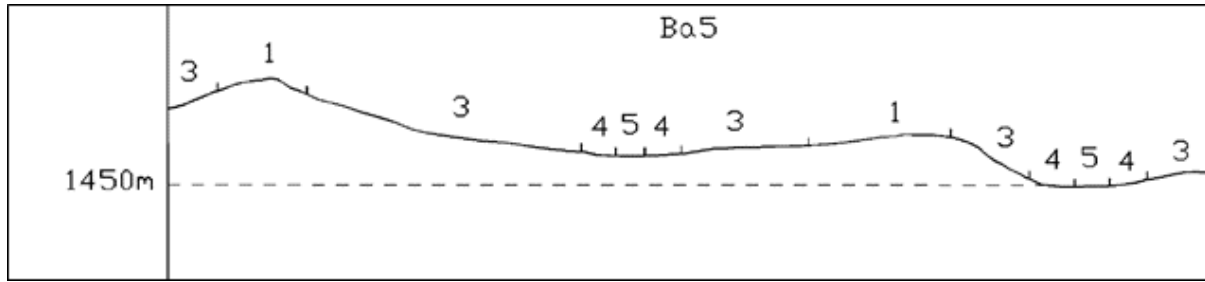


Figure 10.4-21 : Illustration of the Ba5 land type terrain units (Land Type Survey Staff, 1972 - 2006)

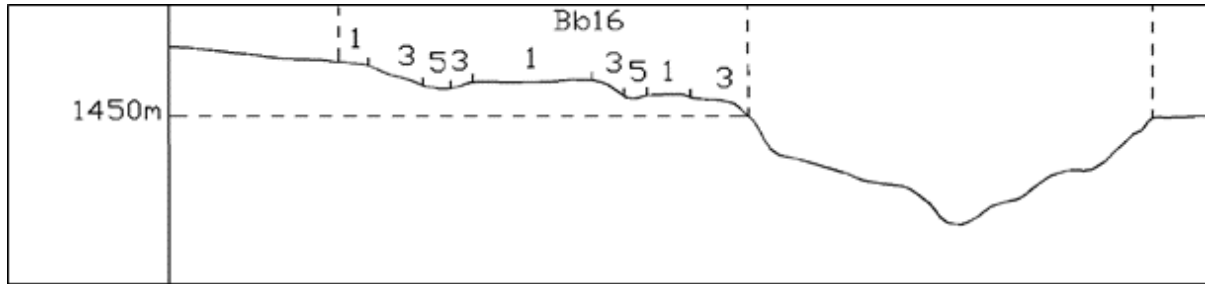


Figure 10.4-22 : Illustration of the Bb16 land type terrain units (Land Type Survey Staff, 1972 - 2006)

Table 10.4-4 : Soils expected at the respective terrain units within the Ba5 land type (Land Type Survey Staff, 1972 - 2006)

Terrain Units							
1 (20%)		3 (60%)		4 (15%)		5 (5%)	
<b>Hutton</b>	50%	Hutton	40%	Hutton	25%	Willowbrook	50%
<b>Glenrosa</b>	20%	Avalon	15%	Avalon	15%	Katspruit	30%
<b>Clovelly</b>	10%	Glenrosa	10%	Longlands	15%	Longlands	20%
<b>Bare rock</b>	10%	Glencoe	10%	Kroonstad	10%		
		Clovelly	5%	Bonheim	10%		
		Longlands	5%	Clovelly	10%		
		Sawrtland	5%	Swartland	5%		
		Wasbank	5%	Glencoe	5%		
		Mispah	5%	Wasbank	5%		

Table 10.4-5 : Soils expected at the respective terrain units within the Bb16 land type (Land Type Survey Staff, 1972 - 2006)

Terrain Units					
1 (50%)		3 (45%)		5 (5%)	
<b>Clovelly</b>	35%	Clovelly	35%	Stream beds	30%
<b>Mispah</b>	15%	Bare Rock	10%	Katspruit	30%
<b>Hutton</b>	15%	Mispah	15%	Longlands	15%

<b>Avalon</b>	15%	Cartref	15%	Wasbank	15%
<b>Cartref</b>	5%	Hutton	10%	Swartland	10%
<b>Glenrosa</b>	5%	Avalon	10%		
<b>Glencoe</b>	5%	Longlands	5%		
<b>Bare Rock</b>	5%				

The geology of this region is included within the Witwatersrand Supergroup and the Pretoria Group. According to Mucina & Rutherford (2006), the Selons River formation, which forms part of the Rooiberg Group, can also be expected in this area with many Quartzite ridges visible from the surface.

**10.8.1. Terrain**

The slope percentage of the project area has been calculated and is illustrated in Figure Error! Reference source not found.. The majority of the regulated area is characterised by a slope percentage between 0% and 5%. A smaller part of the regulated area is characterised by a slope percentage between 5% and 10%, with some smaller patches within the project area characterised by a slope percentage up to 15. This illustration indicates a non-uniform topography with gentle to steep slopes being present. The Digital Elevation Model (DEM) of the project area (Figure 10.4-24) indicates an elevation of 1 514 to 1 539 Metres Above Sea Level (MASL).

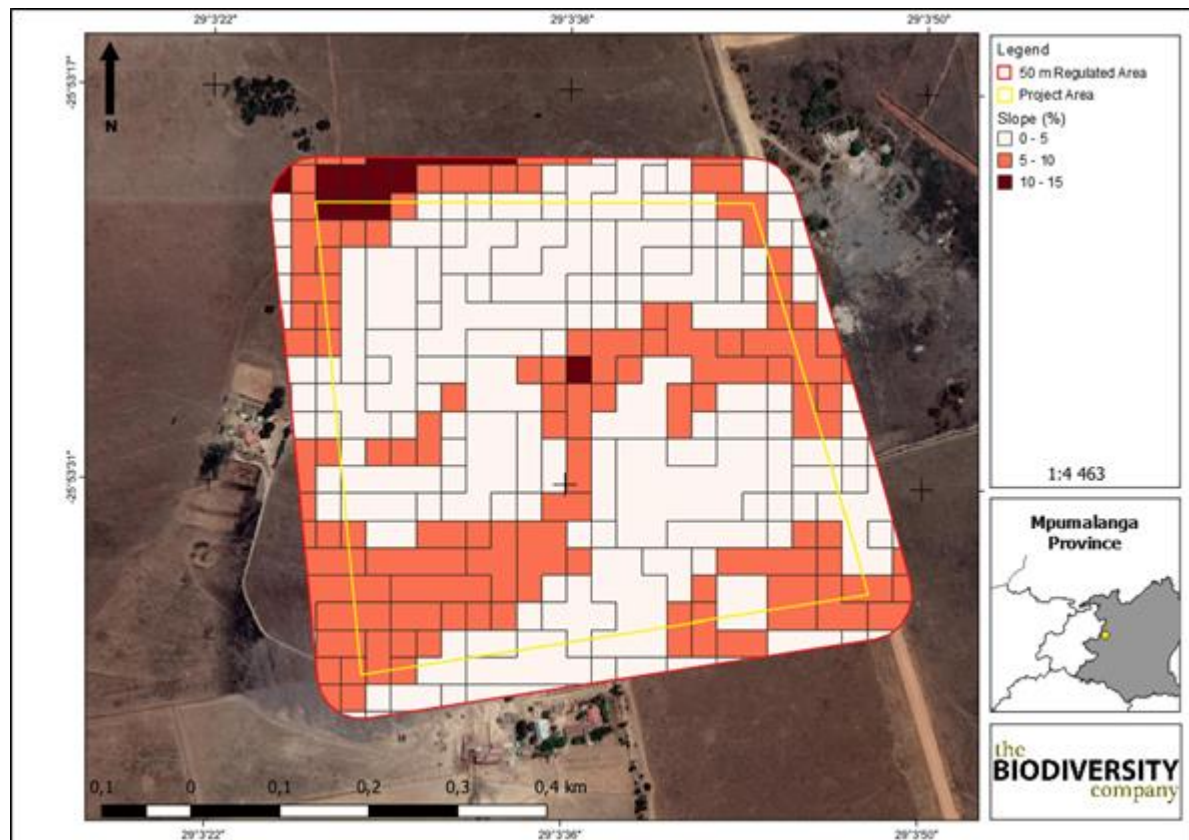


Figure 10.4-23 : Slope percentage map for the regulated area

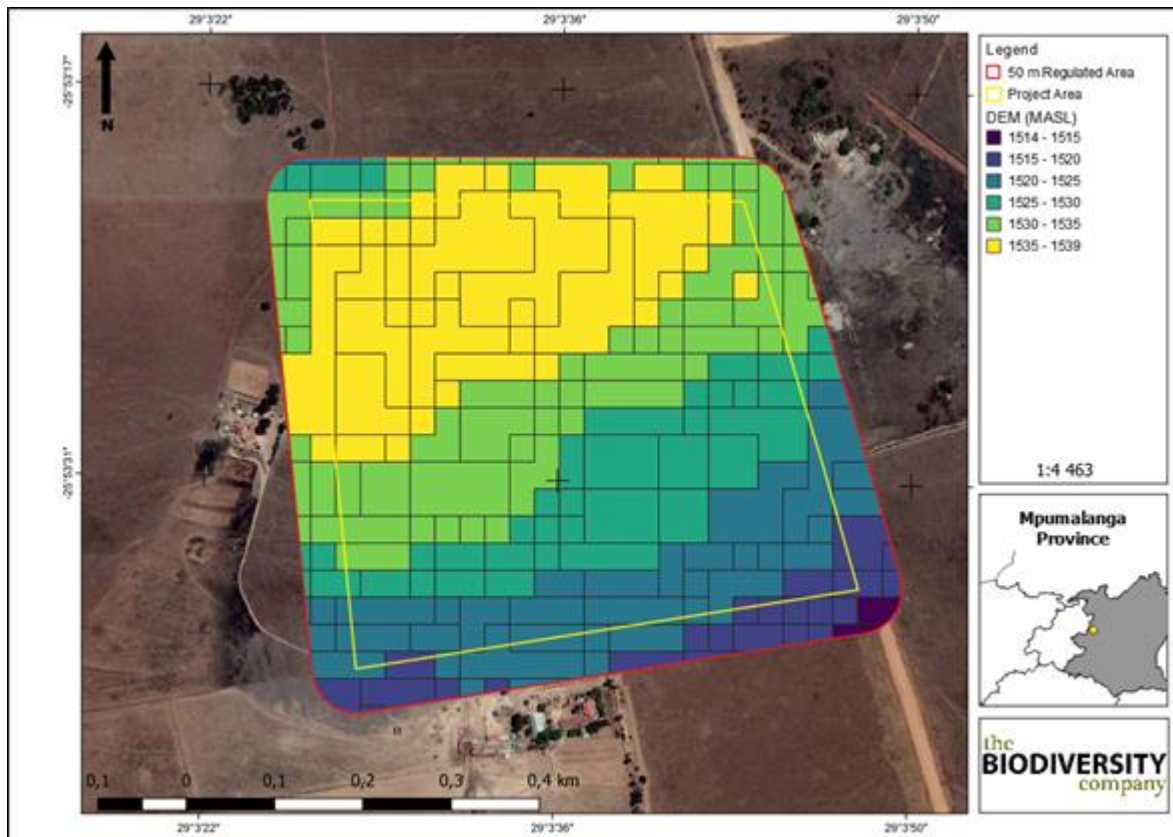


Figure 10.4-24 : Digital Elevation Model of the regulated area (metres above sea level)

### 10.8.2. Soil forms

Three soil forms were identified within the 50 m regulated area namely Mispah, Glenrosa and Clovelly. Of these soil forms, the Clovelly soil form is most sensitive.



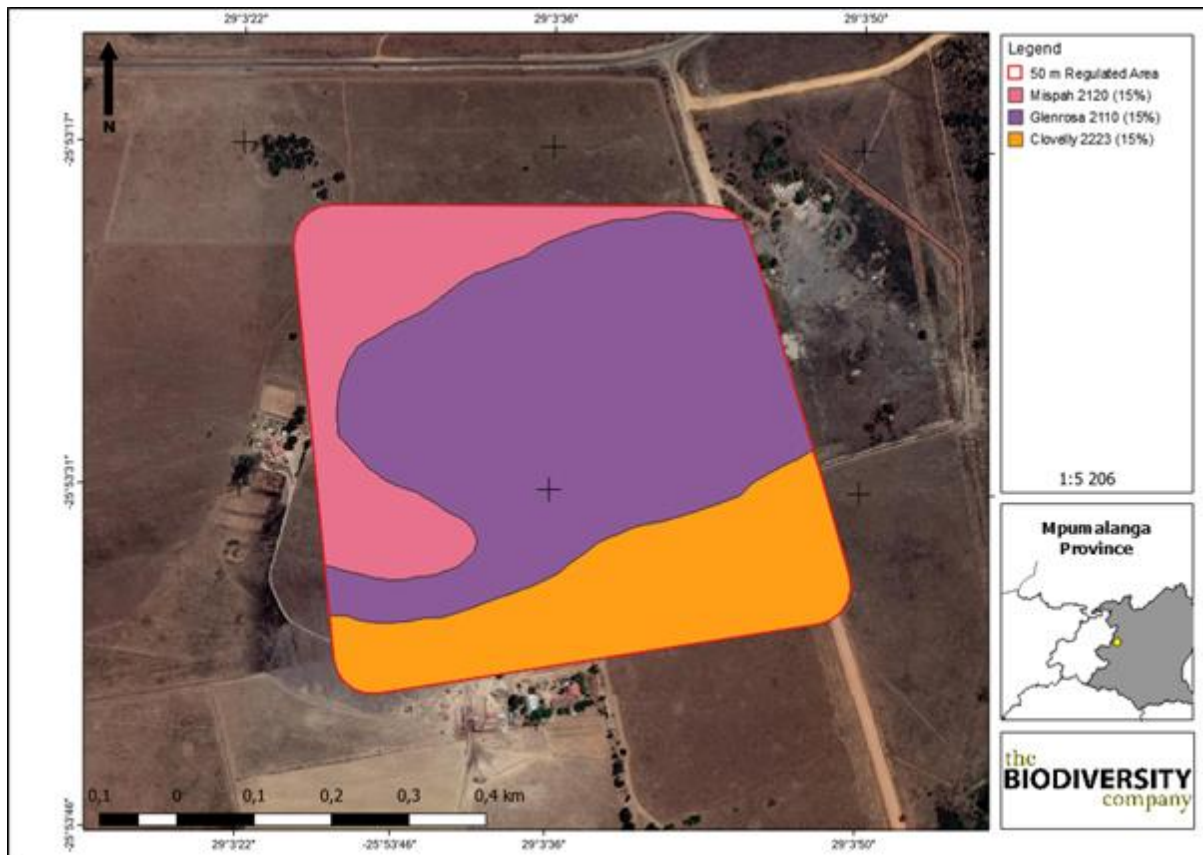


Figure 10.4-25 : Soil forms delineated within the 50 m regulated area

The land capability of the Mispah, Glenrosa and Clovelly soils have been determined to be class “VI”, class “VI” and a class “IV” respectively with a climate capability level 8 given the low Mean Annual Precipitation and the high evaporation rates. The combination between the determined land capabilities and climate capabilities results in a land potential “L7” and “L6” respectively.

The “L6” land potential is regarded to have very restricted potential. It has regular and/or severe limitations due to soil, slope, temperatures or rainfall and is non-arable. The “L7” land potential is regarded to have low potential. It has severe limitations due to soil, slope, temperatures or rainfall and is non-arable.

### Sensitivity Verification

The following land potential level has been determined;

- Land potential level 6 (this land potential level is characterised by very restricted potential. Regular and/or severe limitations due to soil, slope, temperatures or rainfall. Non-arable); and
- Land potential 7 (this land potential level is characterised by low potential. Severe limitations due to soil, slope, temperatures or rainfall. Non-arable).

Fifteen land capabilities have been digitised by (DAFF, 2017) across South Africa, of which eight potential land capability classes are located within the proposed footprint area’s assessment corridor, namely land capability 1 to 8 (ranging from very low to moderate) (see Figure 10.2-26). The baseline findings and the sensitivities as per



the Department of Agriculture, Forestry and Fisheries (DAFF, 2017) national raster doesn't concur with one another in the sense that no "Moderate" sensitivity land potential areas were identified during the site visit.

It is worth noting that this nation-wide data set has some constraints of its own. According to DAFF (2017), inaccuracies and the level of detail of these data sets are of concern. Additionally, the scale used to model these data sets are large (1:50 000 to 1:100 000) and is not suitable for farm level planning. Furthermore, it is mentioned by DAFF (2017) that these data sets should not replace any site-based assessments given the accuracies perceived.

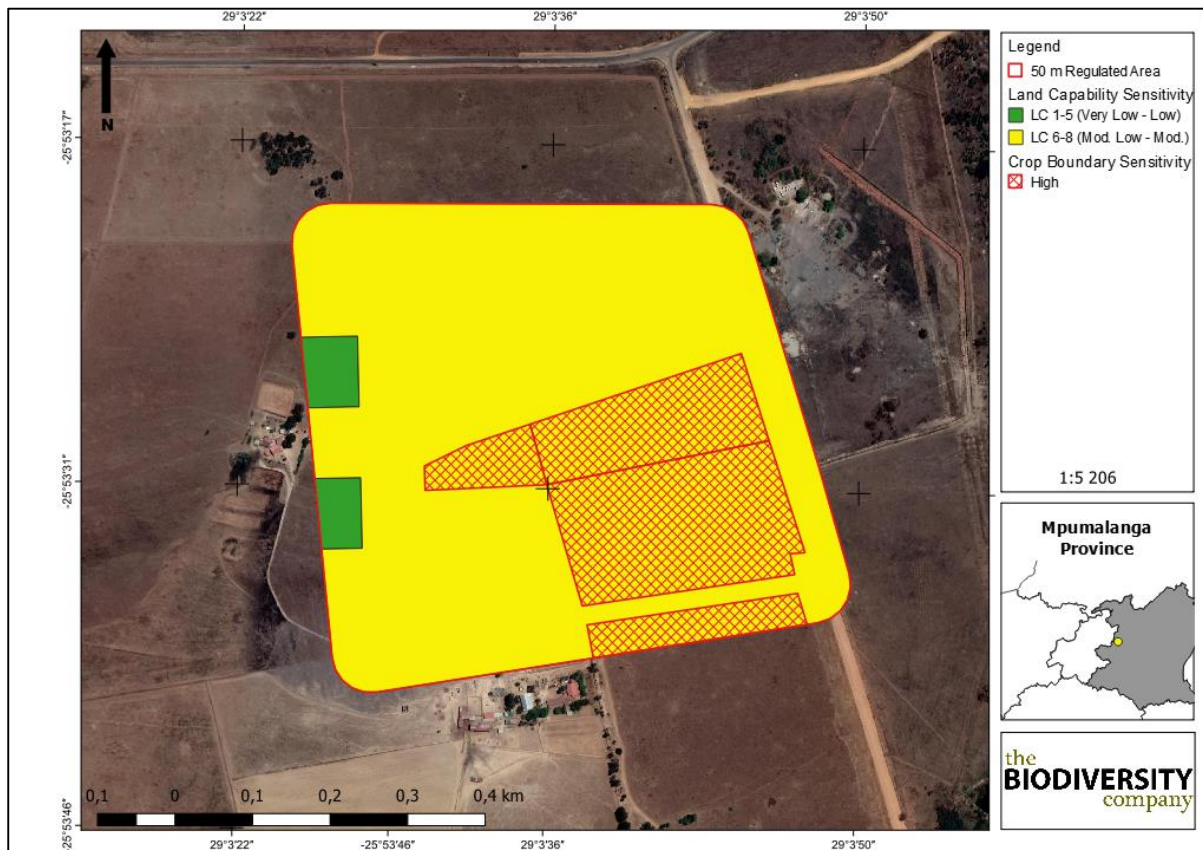


Figure 10.4-26 : Land Capability Sensitivity (DAFF, 2017)

## 10.9. Groundwater

### 10.9.1. Aquifer Type

The main aquifer in the area comprises of a combination of weathered and fractured zones and is classed by the Department of Water and Sanitation and Forestry (DWAf) as an intergranular and fractured aquifer (see Figure 29). This has a mainly low to moderate groundwater potential with the aquifer at the site and surroundings being classed as d3, i.e. a median borehole yield of 0.5 – 2.0 l/s. The northern part of the site is classified as a fractured rock aquifer b3, also with median borehole yields of 0.5 – 2 l/s. This band corresponds to the Wilge River Formation sandstones.

**10.9.2. Groundwater Use**

The NGIS of the Department of Human Settlements, Water and Sanitation (DHSWS) was interrogated to obtain the positions and any details on depth, yield, use and groundwater quality of existing registered boreholes in the site area and surrounds (Figure 30). Four registered boreholes are located within 1 – 3 km to the east of the site but with no useful information. A further five boreholes are located within 5 km of the site.

The hydrocensus found six boreholes, two on the site and four on adjacent properties. Information obtained is fairly sparse but the two boreholes on the proposed site, boreholes 5 and 6 on Figure 30, were not functional at the time of the site visit (March 2022). The others are used for domestic and agricultural purposes (Table 11). One of the on-site boreholes will be rehabilitated for site use. However, water from this borehole must not be used for domestic purposes, only for irrigation and wash-down and dust suppression on surfaces due to the risk of groundwater contamination, as outlined in Subsection 5.1.

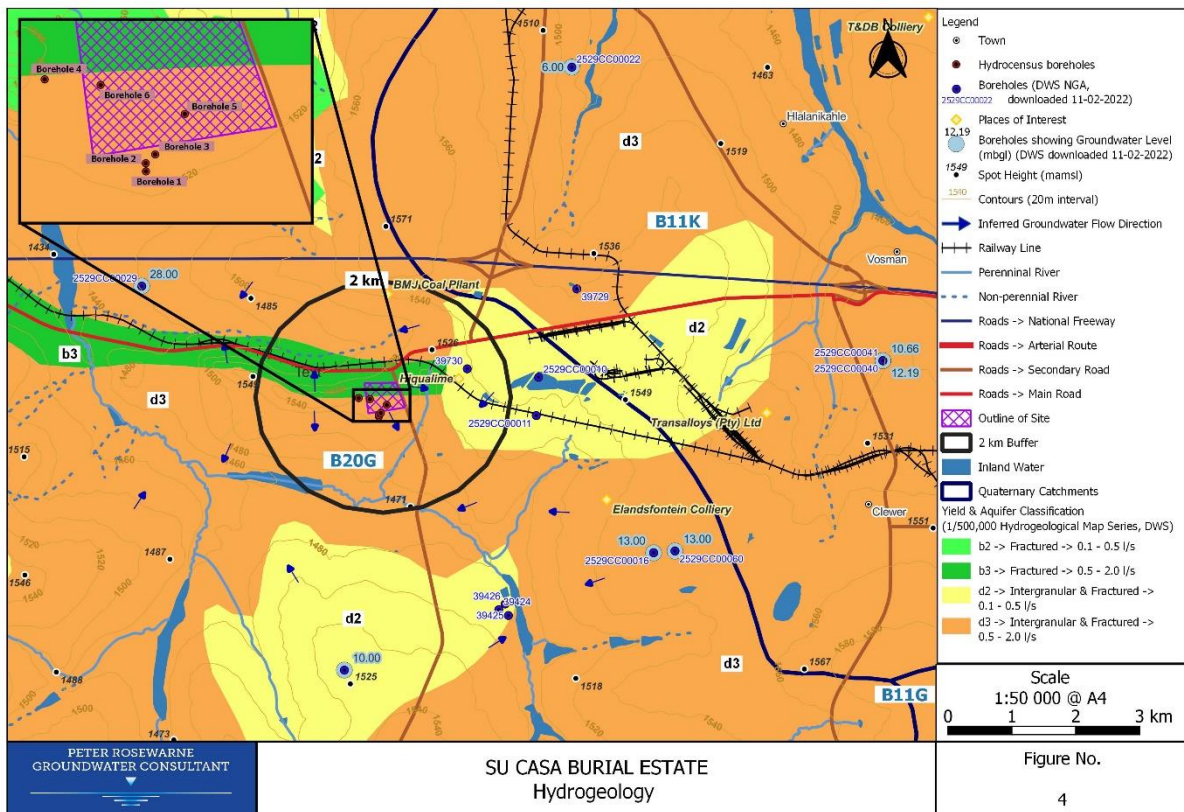


Figure 10.4-27 : Su Casa Burial Estate Hydrology

Table 10.4-6 : Data from the Hydrocensus

Landowner of portion	Portion 21	Portion 10
<b>18 and 24</b>		
Owner: Johan Liebenberg	Owner: Piet Joubert	Owner: Applicant
Comments: Lives on portion 24 where all their farm development it.	Comments: Lives on the portion and all farm development is within	Comment: There are two boreholes on the property.

Landowner of portion 18 and 24	Portion 21	Portion 10
Nothing developed on portion 18 – only use it for grazing. The three boreholes below are all on Portion 24 and the owner pumps from them alternatively as needed. He uses it for domestic and agricultural purposes. The sample Collected come from the JoJo tanks that receive water from all three boreholes.	portion 21. He uses the water from the borehole for domestic and agricultural purposes. Sample collected represents the borehole below and no other source.	Neither were functional at the time of the hydrocensus and neither are currently being used.
Borehole 1: - 25.89433251 29.05931097 Depth: c.100m – water level at c.23m	Borehole 4: -25.89145657 29.05614395 Depth: c.40m	Borehole 5: -25.89253758 29.06052668 Depth: ?m – water at ?m
Borehole 2: - 25.89407885 29.05930527 Depth: c.100m – water level at c.40m		Borehole 6: -25.89163212 29.05789141 Depth: ?m – water at ?m
Borehole 3: - 25.89380317 29.05960064 Depth: c.72m – water level at ?m		

### 10.9.3. Groundwater Levels

The nearest information to the site on groundwater levels comes from four boreholes at differing directions and about 4 – 5 km from the site. Groundwater levels vary between 10, 13 and 28 m below ground level (mbgl). Information obtained by the landowner of portion 18 and 24 indicates an approximate water level of 23 and 40 m in two of his boreholes.



### 10.9.4. Groundwater Recharge

According to the Groundwater Resource Assessment Phase 2 project data (DWAF, 2005) the area has a recharge potential of about 6% of the MAP. This is an area of relatively high recharge because of the MAP of 790 mm, which is high by regional South African norms (average precipitation in South Africa is 464 mm).

### 10.9.5. Groundwater Flow Direction

Groundwater flow generally follows the topography and inferred flow directions are to the southeast in the southern site area and possibly to the north from a very small area in the northern parts, as indicated on Figure 4. Boreholes 1, 2 and 3 are in the projected groundwater flow path from the site.

### 10.9.6. Groundwater Quality

According to the published hydrogeological map (Figure 31), the area has groundwater with an electrical conductivity (EC) of 70 – 300 mS/m, i.e. of good to moderate quality. The groundwater associated with the Wilge River Formation is typically of good quality and of a calcium-magnesium bicarbonate nature. Poorer quality groundwater is likely to be associated with the coal mining area to the east. This area is likely to show more elevated EC, acidic pH, and elevated concentrations of typically Na, SO<sub>4</sub>, F and Boron, characteristics typical of groundwater impacted by coal mining.

Water samples were taken from boreholes 1, 2 and 3 (composite sample from holding tank) and Borehole 4. The results of the laboratory chemical analyses by WATERLAB, Pretoria, are shown in Table 10.4-7.

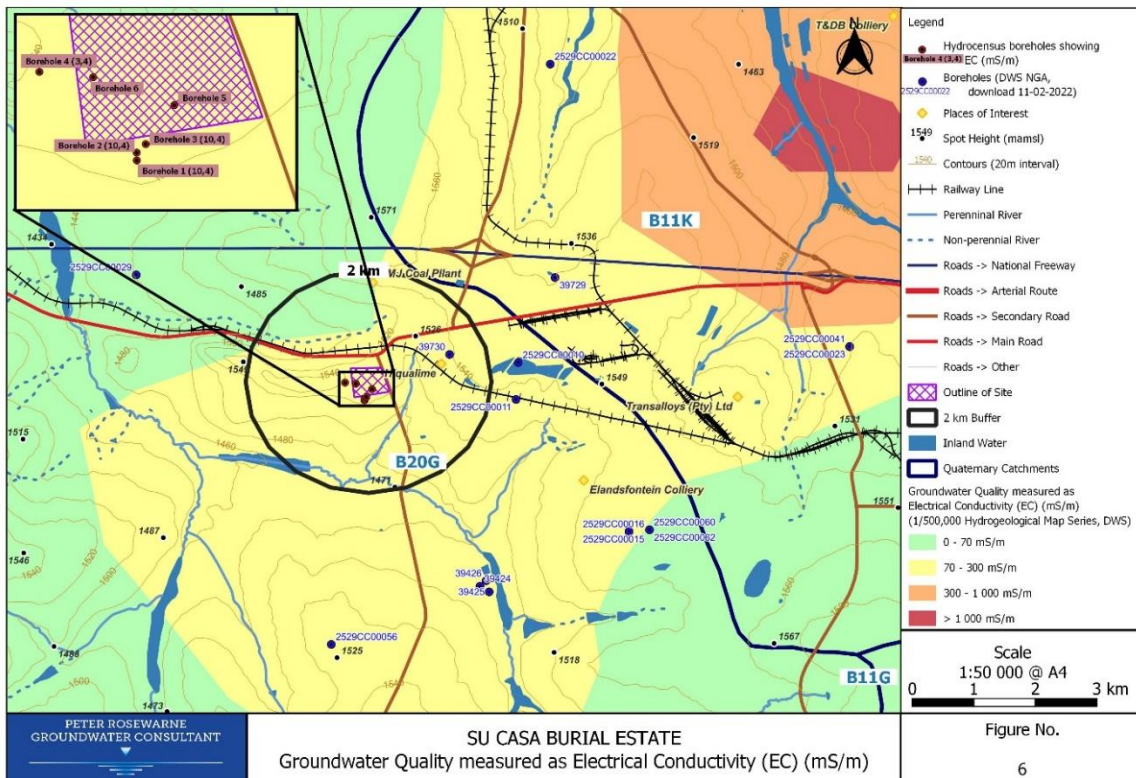


Figure 10.4-28 : Groundwater Quality measured as Electrical Conductivity (EC) (mS/m)

Table 10.4-7 : Laboratory Analyses of Groundwater Samples from the Hydrocensus

Determinand (mg/l unless otherwise stated)	Boreholes 1, 2 and 3	Borehole 4	SANAS 241-2015 Drinking water recommended limits
pH (pH units)	6.8		
EC (mS/m)	10.4		
TDS	54	14	<1 200
NA	4	1	200
K	0.6	<0.5	-
Ca	7	2	-
Mg	4	1	-
Cl	6	<2	300
SO <sub>4</sub>	14	8	250
TAL (as CaCO <sub>3</sub> )	20	<5	-
NO <sub>3</sub> (as N)	0.2	<0.1	11
F	0.3	0.3	1.5
Total PO <sub>4</sub>	<0.2	0.2	-
Cu	<0.01	0.088	2
Zn	0.106	0.112	5
Metals scan	<0.01	<0.01	-

The analytical results show that the site area groundwater is of very good quality. The groundwater from Borehole 4 is almost of rainwater quality and is acidic, which probably accounts for the Cu and Zn being slightly raised due to dissolving of copper or brass fittings and galvanised steel, respectively, by the acidic water. The groundwater from Borehole 1 appears to be of very good quality and fit for domestic use, according to the composite sample obtained from the holding tank.

#### 10.10. Hydrogeology

The Hydrogeological Report was prepared by The Biodiversity Company in 2022. The Hydrogeological Report is attached as Appendix D8.

A Hydrogeological Assessment Report was prepared by The Biodiversity Company in November 2022. According to the report, the hillslope hydrology of slopes intersected by the proposed Su Casa Burial Estate and associated infrastructure components are characterised by two distinct hydrogeological patterns. Most of the slopes for the first distinctive hydrogeological patterns are characterised by shallow recharge (see Figure 32) hydrogeological



types. These patterns occur from the crest to the upper mid-slope, after which a transition occurs from recharge to a responsive (saturated) section at the lower mid-slope to the valley bottom.

The second distinctive hydrogeological pattern includes a shallow recharge soil forms in the crest to lower mid-slope area with a transition to a small responsive saturated hydrogeological types. At the crest to lower mid-slope section, an increased Saturated Hydraulic Conductivity (Ks) occurs in the soil profile. Waterflow restrictions can also occur between the soil and the underlying parent material only if the substratum is impermeable.

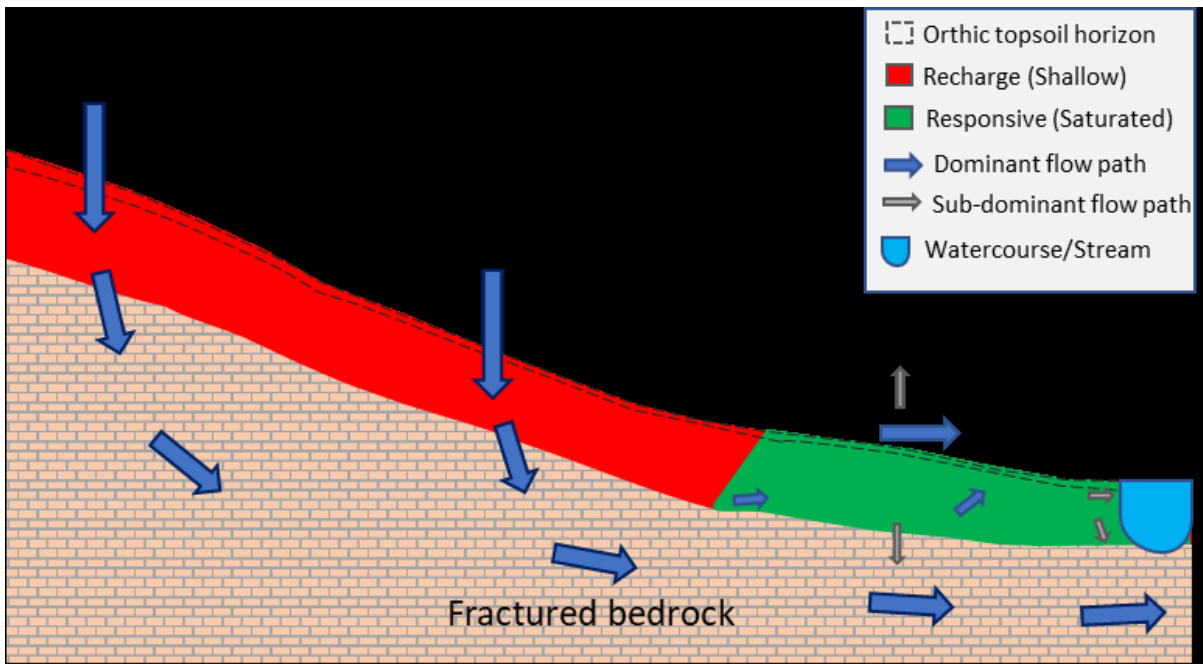


Figure 10.4-29 : Hillslope hydrology of one of two distinct hydrogeological patterns prior to cemetery construction.

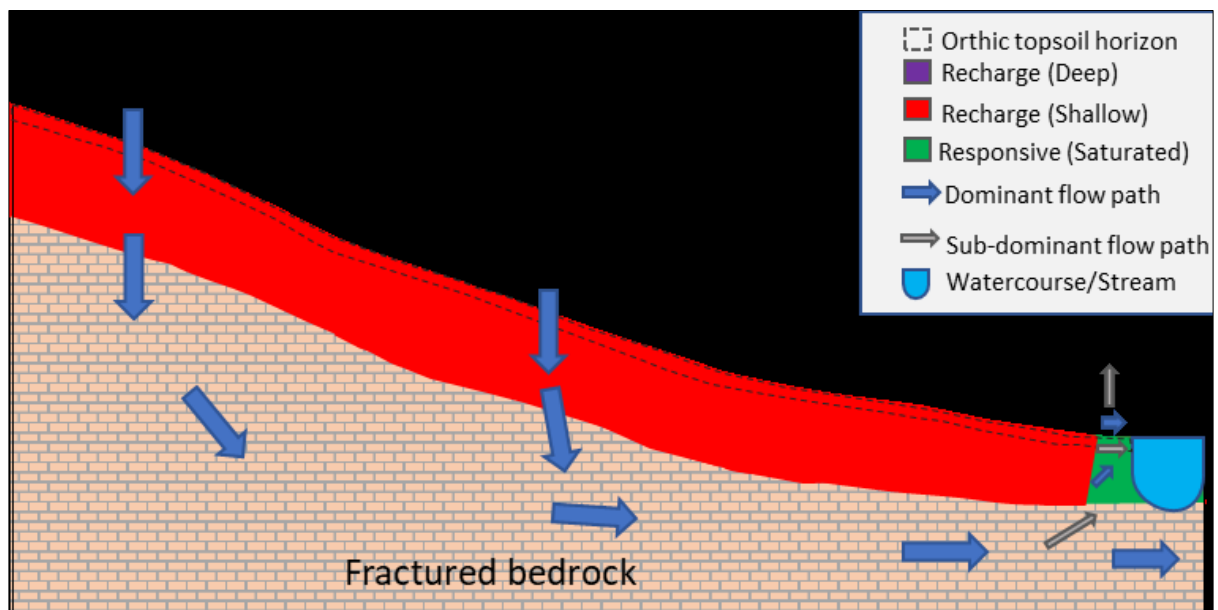


Figure 10.4-30 : Hillslope hydrology of the second of two distinct hydrogeological patterns prior to cemetery construction.

The shallow Glenrosa and Mispah soil forms identified on-site are characterised with well drained profiles. The Glenrosa soil forms consist of an orthic topsoil profiles which include the presence of a fractured lithic horizon at the rock interface. The Mispah soil forms are characterised with orthic topsoil profiles merging into a fractured substratum. These profiles are characterised by extremely high Ks rates, including the lower lithic horizon.

No signs of leaching or oxidation/reduction processes were identified throughout the soil profile, which, together with the high Ks emphasises rapid vertical recharge of the groundwater stores as being the dominant flow path.

The valley bottom regions are characterised by a responsive (wet) hydrogeological type. The soil form relevant to this observation point is that of the Kroonstad soil form. This soil form is characterised by an albic horizon subsoil with a gley horizon below, which is indicative of prolonged/permanently saturated soils which result in the formation of “responsive soils.” Responsive soils will be subject to overland/return flow during precipitation events (due to the naturally high-water content which will ensure rapid saturation). Between rainfall events, these soil forms will steadily feed watercourses and will lose moisture by means of Evapotranspiration (ET).

Albic horizons are often characterised by uniform white-greyish colours from the residual clay and quartz particles making up the matrix of the horizon. The main characteristic of this diagnostic horizon is a bleached colouration, which is a resultant product of distinct redox and ferrolysis pedological processes combined with eluvial processes. According to the Soil Classification Working Group (2018), albic horizons often receive lateral sub-surface flows from hillslope processes.

Gley horizons that are well developed and have homogenous dark to light grey colours with smooth transitions. Stagnant and reduced water over long periods is the main factor responsible for the formation of a gley horizon and could be characterised by green or blue tinges due to the presence of a mineral called Fougerite which includes sulphate and carbonate complexes. Even though grey colours are dominant, yellow and/or red striations can be noticed throughout a gley horizon. The structure of a gley horizon mostly is characterised as strong pedal, with low hydraulic conductivities and a clay texture, although sandy gley horizons are known to occur. The gley soil form commonly occurs at the toe of hillslopes (or benches) where lateral water inputs (sub-surface) are dominant and the underlying geology is characterised by a low hydraulic conductivity. The gley horizon usually is second in diagnostic sequence in shallow profiles yet is known to be lower down in sequence and at greater depths (Soil Classification Working Group, 2018).

#### 10.11. Conceptual Impact Prediction

The proposed Su Casa Burial Estate and associated infrastructure components will have very little impact on the hydrogeology of the relevant hillslopes, regardless of the position of the grave sites (crest, mid-slope or valley bottom). For recharge soils (which are dominant), recharge won't be affected at all given the fact that infiltration will only be impeded for the width of the grave site, which has been deemed insignificant given the size of the

catchments as the dominant flow paths will remain vertical recharging groundwater stores (see Figure 34; Figure 35; for a conceptual example of interferences via the proposed grave sites).

The responsive (saturated) hydrogeological types, are usually not recommended for most activities as their interface can affect the total streamflow of sensitive receptors (e.g., the lower valley bottoms in Figure 34). Also, responsive (saturated) hydrogeological soil types tend to promote migration of contaminants towards water resources. In the case of the burial site body decomposition will occur.

The proposed Su Casa Burial Estate and associated infrastructure components located within the recharge hydrogeological type is not expected to affect the hillslope hydrology in any manner. Limited impacts can occur due the impeded vertical flows on the burial coffins and caskets are expected. These effects are however expected to have negligible impacts towards the total streamflow of sensitive receptors.

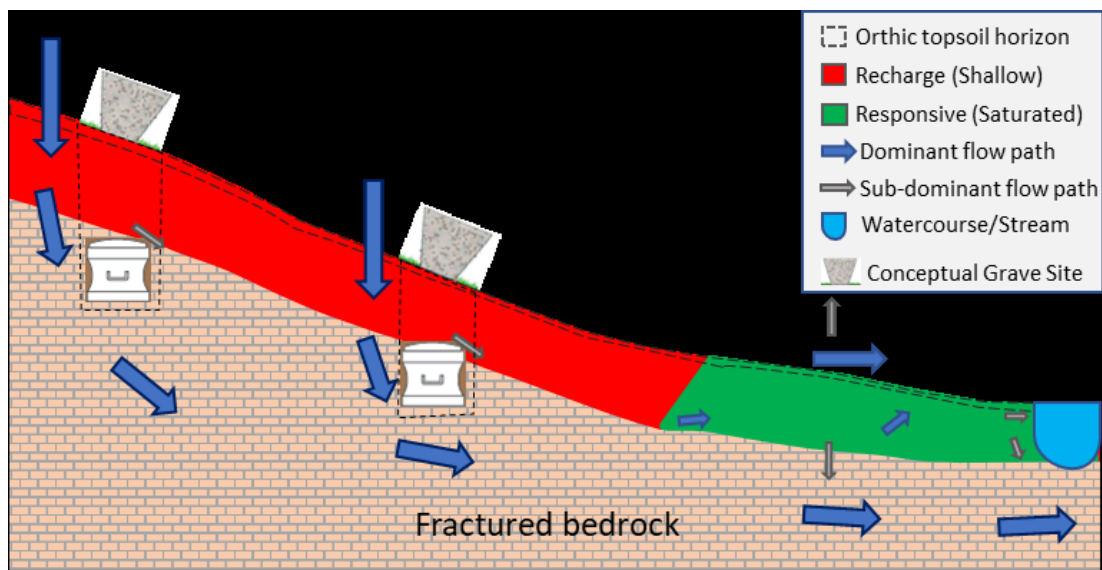


Figure 10.4-31 : Hillslope hydrology of one of two distinct hydrogeological patterns after the establishment of the burial estate and associated infrastructure.

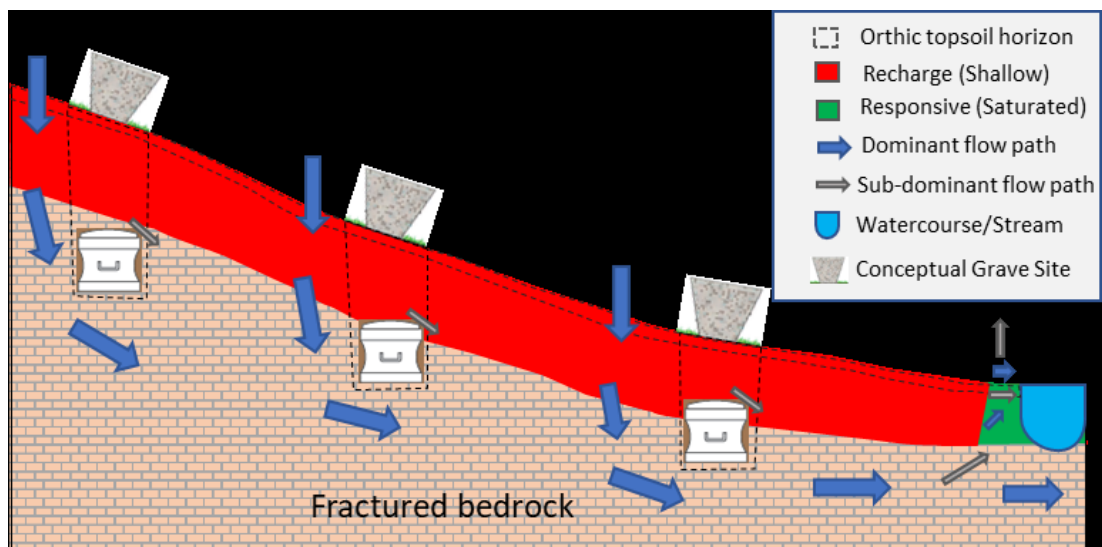


Figure 10.4-32 : Hillslope hydrology of two of two distinct hydropedological patterns after the establishment of burial estate and associated infrastructure.

10.12. **Heritage / Archaeology**

According to the Heritage Impact Assessment (HIA) report prepared by Xander Antonites in April 2022, (Appendix D2) the regional landscape is a sensitive heritage zone and contains Stone Age sites, Late Iron Age stone walled sites as well as buildings and locations of historical significance. As a result, a heritage assessment of the project area was conducted to identify any sensitive heritage sites/areas and to mitigate against future impacts on the heritage landscape.

The HAI study revealed that project area has been impacted by agriculture activities such as cultivation and livestock grazing. A 20<sup>th</sup> century buildings and stone features related to historical and recent farming activities were identified in the project area. The features are all of no or low heritage significance and no further mitigation is required.

This does not exclude the chance of heritage material or sites being found during future activities. Should any subsurface palaeontological, archaeological, or historical material, or burials be exposed during construction activities, all activities should be suspended, and an archaeological specialist should be notified immediately.

Historical aerial imagery and ground survey indicates area has been impacted by agricultural activities which include ploughed fields and livestock grazing.

The earliest aerial imagery available for the region is from 1943 and even at this early date, large portions the area was already used as ploughed farmland.

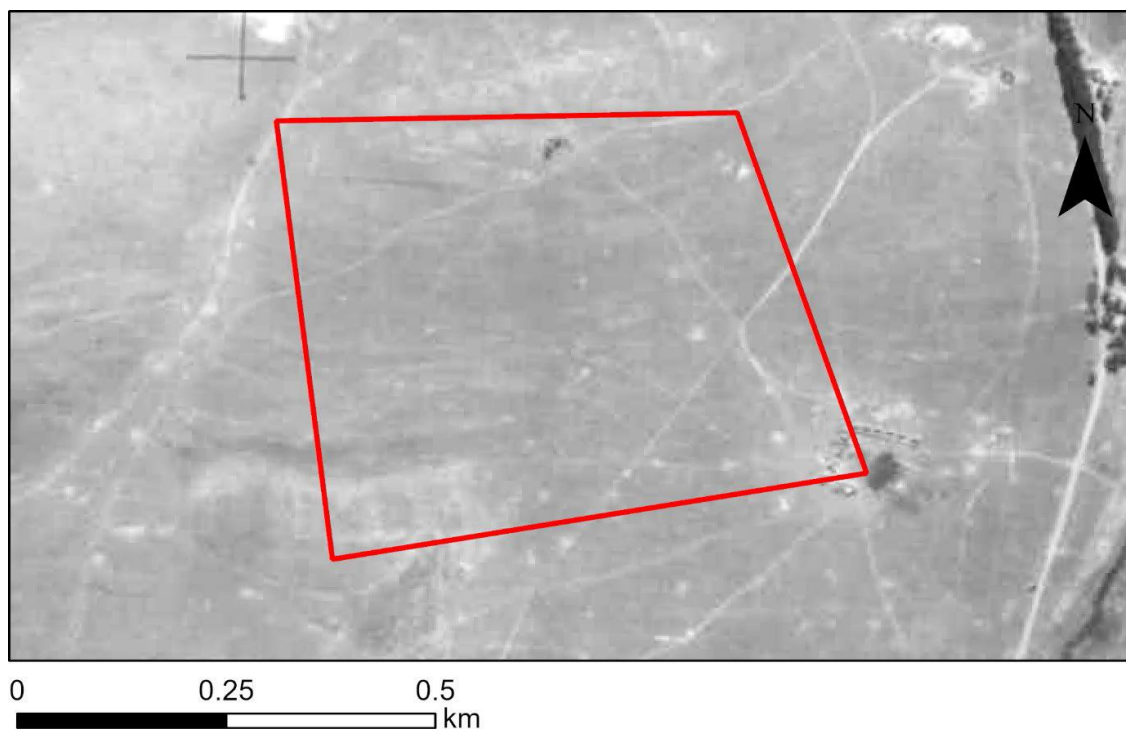


Figure 10.4-33 : Aerial imagery from 1943 with relatively pristine landscape.



0 0.25 0.5  
km

Figure 10.4-34 : Aerial imagery from 1962. Relatively pristine landscape with a single structure visible in on western boundary where UP-DRB-2529-01 is located.



0 0.25 0.5  
km



Figure 10.4-35 : Aerial imagery from 1979. Expansion of UP-DRB-2529-01 on western boundary visible with footpaths linking it with UP-DRB-2529-06 and UP-DRB-2529-07 in the northern half of the project area.

Later Iron Age (LIA) (also Later Farmer Period) settlements and historical buildings are typically clearly discernible in remote sensed imagery, but close inspection of imagery from 1943 onwards failed to identify any visible trace of such sites.

LIA settlements and historical buildings are typically clearly discernible in remote sensed imagery, but close inspection of imagery from 1943 onwards failed to identify any visible trace of such sites.

**Site: UP-DRB-2529-01**

Description: Extant 20th Century farmhouse and outbuildings

Coordinates: S25.891839° E29.057555°

UP-DRB-2529-01 represent an extant house and outbuildings. A portion of the building may potentially be older than 60 years since historical images from 1962 indicates a single square building where the current house is located. It does not appear on earlier images from 1943. The northeast orientation of the building and the clearly visible wall joints indicates that the original structure likely corresponds to the southeast portion of the current house. Extensive expansions and alterations have been made to the original structure in subsequent years that have severely altered the original building severely diminishing its heritage value.

There are several outbuildings around the house. These include a stonewalled chicken coop/storeroom and brick garage. Aerial images and field inspection of building materials indicate that these are all less than 60 years old.



Figure 10.4-36 : UP-DR UP-DRB-2529-01 on Google Earth image from 2022.



Figure 10.4-37 : Farm outbuilding. Likely livestock pen/chicken coop. Left, south facing wall; Right west facing wall.



Figure 10.4-38 : Farm outbuilding. Likely storeroom and livestock pen/chicken coop. Southwest corner of outbuilding, right north facing wall.



Figure 10.4-39: Likely storeroom and livestock/pen/chicken coop. South facing wall (left) and northwest corner (right).





Figure 10.4-40 : Late 20<sup>th</sup> century brick structure with metal roller doors.

**Site: UP-DRB-2529-02**

Description: Remains of 20th structure

Coordinates: S25.892437°; E29.059471°

Site UP-DRB-2529-02 is the remains of a two roomed rectangular structure roughly orientated in a northwest-southeast direction. The walls are dry stacked local stone, built up to a height of approximately 60cm. Wall abutting joints indicate that the structure was built in two phases. The first was the construction a 3mx5m northern room, and later, a 9mx5m southern room was added. There is a single entrance to structure which leads directly into the southern room with the doorway to the northern room immediately on the right. The interior of the northern room was covered with a cement plaster and a cement cap was placed on the top course of the wall. No cement reinforcing or plaster were observed at the southern room. It is possible that the walls supported a superstructure of material that has either perished or had been removed.

Determining the age is however difficult since it does not appear on early aerial images and no material culture was present to provide a relative date. The earliest aerial images where the site is clearly visible is dated 2005, but at this stage it is already in a ruined state. It is likely that this structure served as living quarters for farm labourers in the 20th century. Its absence on the 1962 and 1979 images implies that it was erected after these dates, and therefore less than 60 years old.





Figure 10.4-41 : UP-DRB-2529-02 outlines on Google Earth imagery.



Figure 10.4-42 : UP-DRB-2529-02, (left) looking east over both rooms, and north (right) with cement plaster visible on inside of northern room.





Figure 10.4-43 : UP-DRB-2529-02 (left) showing the joint of the two rooms along the west facing wall, and (right) the main entrance on the east facing wall.

**Sites: UP-DRB-2529-03**

UP-DRB-2529-04

Description: Circular stone features

Coordinates: S25.890951 E29.057902 (UP-DRB-2529-03) E25.893120 E29.059667 (UP-DRB-2529-04)

Two circular stone mounds were identified whose use/function is unknown. UP-DRB-2529-03 is approximately 60cm in diameter and formed by an outer ring of large stones and filled with smaller stones. UP-DRB-2529-04 is an approximately 1m wide pile of stones (~10-20cm range). No material culture was associated with the features, however, given the absence of prehistoric remains in the immediate vicinity, these most likely relate to 20th century activities.



Figure 10.4-44 : Stones features, UP-DRB-2529-03 (left) and UP-DRB-2529-04 (right), of unknown use and function, but likely related to 20<sup>th</sup> century farming activities.

**Sites: UP-DRB-2529-05**

Description: Linear field boundary walls in southwest section of project area

Coordinates: S25.892844 E29.058729 (centre coordinate)

In the southwestern section of the project area there are linear stone walls that demarcate old field boundaries. In places metal fence poles are and fencing wire is trapped in the stones. Some of these are faintly visible on aerial photos from 1979, and the absence of the other walls show that the majority may be more recent than this date.





Figure 10.4-45 : Examples of stone field boundary sections (UP-DRB-2529-05)



Figure 10.4-46 : Examples of stone field boundary sections (UP-DRB-2529-05)



Figure 10.4-47 : Linear field boundary walls (UP-DRB-2529-05) in green. Project area in red.

**Site:**

**UP-DRB-2529-06**

**UP-DRB-2529-07**

Description: Collapsed stone and brick walling.

Coordinates: S25.890433 E29.058116 (UP-DRB-2529-06)

S25.889638 E29.059267 (UP-DRB-2529-07)

In the northern section of the project area, the remains of two structures were identified. Both are completely collapsed which makes interpretation and reconstruction difficult. Google Earth images does suggest that each



were rectangular shape. Both were constructed from a combination of natural stone, brick, and cement mortar. The original walls seem to be around 60-80cm high. Fragments of plaster on some bricks indicates that the inside of these structures were plastered with cement and painted white. A few pieces of structural metal such as corrugated sheeting indicate that these may also have been used in the original building. Green glass bottle fragments on UP-DRB-2529-06 were the only material culture identified.

The earliest images where these features are visible are from 1979. In these historical images, there are clear footpaths connecting both to one another and to southwest to the main farmhouse complex northeast to the main road. These pathways suggest that these were likely the remains of farm labourer housing. Given their absence on earlier images, they likely date to the 1970s.



Figure 10.4-48 : UP-DRB-2529-06 looking north (left) and east.



Figure 10.4-49 : View of UP-DRB-2529-07 looking south (left) and looking east (right)





Figure 10.4-50 : Stone structures indicating the use of local stone, brick, cement and metal.



Figure 10.4-51 : Collapsed free standing brick and cement walls. UP-DRB-2529-06 (left) and UP-DRB-2529-07 (right).



Figure 10.4-52 : Glass bottle fragments on UP-DRB-2529-06.



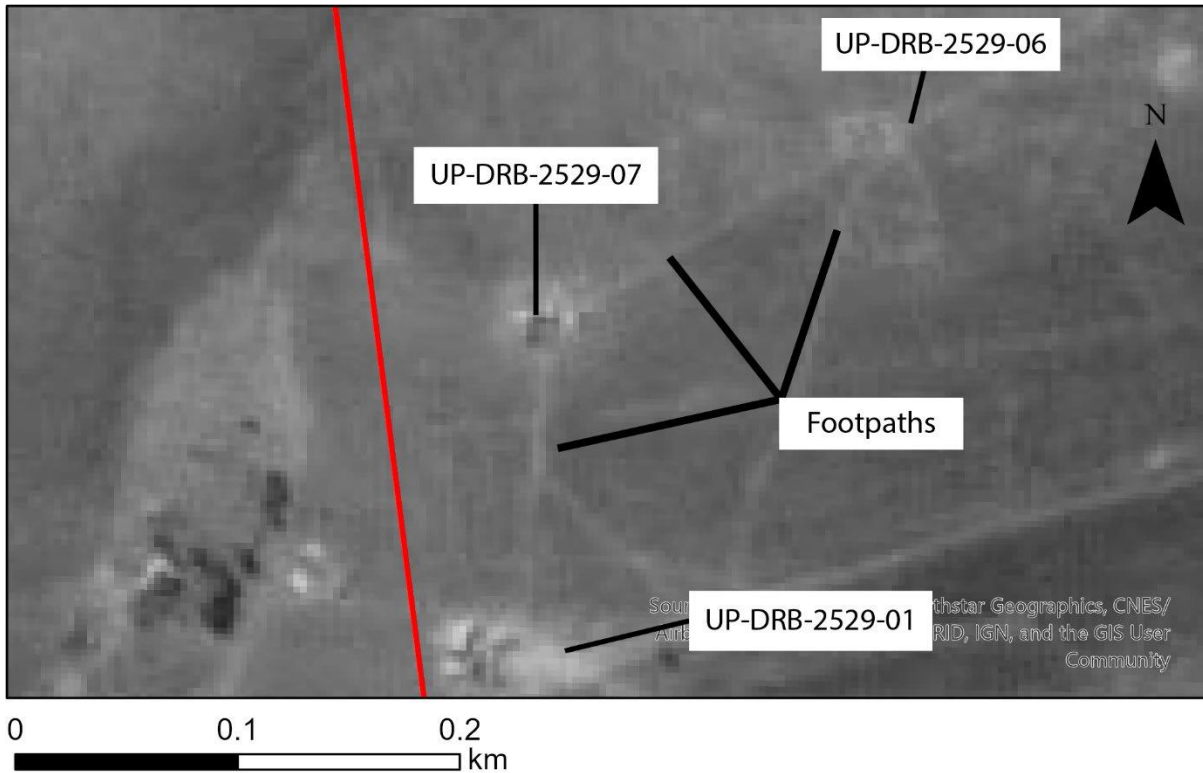


Figure 10.4-53 : 1979 aerial image in which footpaths are visible that link UP-DRB-2529-01 with UP-DRB-2529-06 and UP-DRB-2529-07.

**10.12.1. Graves and Burial Grounds**

No graves or burial grounds were encountered during the survey. The current owner of the farm (whose family had lived there) stated that he is unaware of any graves.

The table below includes the summary of direct impact on heritage locations.

Table 10.4-8 : Summary of heritage sites

Site Code	Coordinates	Short Description	Mitigation Action
UP-DRB-2529-01	S25.891839° E29.057555°	Extant 20 <sup>th</sup> Century farmhouse and outbuildings	Low significance. Severely altered and mostly younger than 60 years. No action needed.
UP-DRB-2529-02	S25.892437° E29.059471°	Remains of 20 <sup>th</sup> building.	Low significance. Likely less than 60 years old. No action needed.
UP-DRB-2529-03	S25.890951 E29.057902	Circular stone features	No significance. Likely less than 60 years old. No action needed.
UP-DRB-2529-04	E25.893120 E29.059667		

Site Code	Coordinates	Short Description	Mitigation Action
UP-DRB-2529-05	Centre: S25.892844 E29.058729	Linear field boundary walls in southwest section of project area	No significance. Likely less than 60 years old. No action needed.
UP-DRB-2529-06	S25.890433 E29.058116	Collapsed stone and brick structures	No significance. Likely less than 60 years old. No action needed.
UP-DRB-2529-07	-25.889638 29.059267		

### 10.13. Palaeontology

The Palaeontological Impact Assessment Report was prepared by Professor Marion of the University of the Witwatersrand in February 2022. The Palaeontological Report is attached as Appendix D5.

### 10.14. Project location and geological context

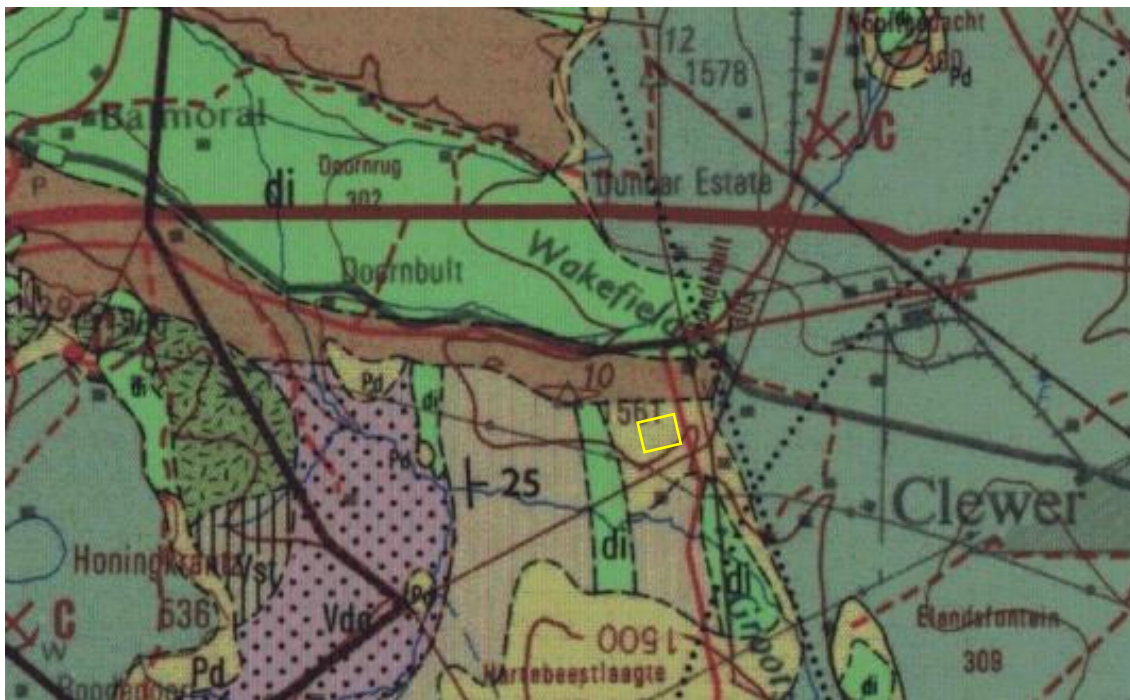


Figure 10.4-54 : Geological map of the area around the proposed cemetery with the location indicated within the yellow rectangle. Abbreviations of the rock types are explained in Table 2. Map enlarged from the Geological Survey 1: 250 000 map 2528 Pretoria.

Table 10.4-9 : Explanation of symbols for the geological map and approximate ages (Eriksson et al., 2006. Johnson et al., 2006). SG = Supergroup; Fm = Formation; Ma = million years; grey shading = formations impacted by the project.

Symbol	Group/Formation	Lithology	Approximate Age
Q	Quaternary	Alluvium, sand, calcrete	Neogene, ca 2.5 Ma to present
Jd	Jurassic dykes	Dolerite dykes, intrusive	Jurassic, approx. 180 Ma
Pe	Vryheid Fm, Ecca Group, Karoo SG	Shale, shaley sandstone, grit, sandstone, conglomerate, thin coal seams	Early Permian, ca 290-260 Ma
Pd	Dwyka Group, Karoo SG	Tillites, shale	Late Carboniferous to early Permian, ca 310-300 Ma
Mw	Wilgerivier Fm, Waterberg Group	Sandstone, quartzite, conglomerate	Ca 2050 – 2000 Ma
Mn	Nebo Granite, Bushveld Igneous Complex	Granite	Ca 2400 Ma
Di	Diabase	diabase	Post Transvaal SG
Vdr	Damwal Fm, Rooiberg Group	Volcanic rocks	Ca 2500 – 2400 Ma
Vsi	Silverton Formation, Pretoria Group, Transvaal SG	Shale, carbonaceous in places, hornfels, chert	Ca 2500 – 2400 Ma

The project lies in the southeastern margin of the Transvaal Basin with the sediments of the Transvaal Supergroup, and the northern margin of the Karoo Basin with the lower Karoo Supergroup sediments. There are also outliers of the Waterberg Group. The project site is on shales and tillites of the Dwyka Group.

The Karoo Supergroup rocks cover a very large proportion of South Africa and extend from the northeast (east of Pretoria) to the southwest and across to almost the KwaZulu Natal south coast. It is bounded along the southern margin by the Cape Fold Belt and along the northern margin by the much older Transvaal Supergroup rocks. Representing some 120 million years (300 – 183Ma), the Karoo Supergroup rocks have preserved a diversity of fossil plants, insects, vertebrates and invertebrates.

During the Carboniferous Period South Africa was part of the huge continental landmass known as Gondwanaland and it was positioned over the South Pole. As a result, there were several ice sheets that formed and melted, and covered most of South Africa (Visser, 1986, 1989; Isbell et al., 2012). Gradual melting of the ice as the continental mass moved northwards and the earth warmed, formed fine-grained sediments in the large inland sea. These are the oldest rocks in the system and are exposed around the outer part of the ancient Karoo Basin, and are known as the Dwyka Group. They comprise tillites, diamictites, mudstones, siltstones and sandstones that were deposited as the basin filled. This group has been divided into two formations with Elandsvlei Formation occurring throughout

the basin and the upper Mbizane Formation occurring only in the Free State and KwaZulu Natal (Johnson et al., 2006).

Overlying the Dwyka Group rocks are rocks of the Ecca Group that are Early Permian in age, then the Beaufort and Stormberg Groups. The whole Karoo sequence is capped by the Jurassic aged Drakensberg basalts. Associated with the latter are numerous intrusive dolerite dykes and sills that have cut through the Karoo sediments.

#### 10.15. Palaeontological Context

The palaeontological sensitivity of the area under consideration is presented in Figure 54. The site for development is in the Dwyka Group that is indicated as having a moderate palaeosensitivity (green).

The Dwyka Group is made up of seven facies that were deposited in a marine basin under differing environmental settings of glacial formation and retreat (Visser, 1986, 1989; Johnson et al., 2006). In the north and east these are called the Mbizane Formation, and the Elandsvlei Formation in the south and west. Described below are the seven facies that occur in this group (Johnson et al., 2006 p. 463-465):

The massive diamictite facies comprises highly compacted diamictite that is clast-poor in the north. It was deposited in subaqueous or subglacial positions.

The stratified diamictite comprises alternating diamictite, mudrock, sandstone and conglomerate beds. They are interpreted as being rapidly deposited, sediment gravity flows but with some possible reworking of the subglacial diamictites.

The massive carbonate-rich diamictite facies is clast-poor and was formed by the rainout of debris, with the carbonate probably originating by crystallisation from interstitial waters.

The conglomerate facies ranges from single layer boulder beds to poorly sorted pebble and granule conglomerates. The boulder beds are interpreted as lodgement deposits whereas the poorly sorted conglomerates are a product of water-reworking of diamicton by high-density sediment gravity flows.

The sandstone facies were formed as turbidite deposits.

The mudrock with stones facies represents rainout deposits in the distal iceberg zone.

The mudrock facies consists of dark-coloured, commonly carbonaceous mudstone, shale or silty rhythmite that was formed when the mud or silt in suspension settled. This is the only fossiliferous facies of the Dwyka Group.

The Dwyka *Glossopteris* flora outcrops are very sporadic and rare. Of the seven facies that have been recognised in the Dwyka Group fossil plant fragments have only been recognised from the mudrock facies. They have been recorded from around Douglas only (Johnson et al., 2006; Anderson and McLachlan 1976) although the Dwyka Group exposures are very extensive. Jurassic Dolerites do not contain fossils as they are igneous intrusives.





Figure 10.4-55 : SAHRIS palaeosensitivity map for the site for the proposed cemetery shown within the yellow rectangle. Background colours indicate the following degrees of sensitivity: red = very highly sensitive; orange/yellow = high; green = moderate; blue = low; grey = insignificant/zero.

According to the Palaeontological Impact Assessment Report, based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks are either much too old to contain fossils or are the correct age but wrong lithology. Furthermore, the material to be excavated is soil and this does not preserve fossils.

#### 10.16. Geotechnical Aspect

The following information was sourced from the Report on a Geotechnical Site Investigation prepared by J Louis van Rooy and dated December 2022.

According to the 1:250 000 geological sheet 2528 Pretoria, the northern portion of this site is on sandstone and conglomerate of the Wilge River Formation, Waterberg Group and the southern part on tillite and shale of the Dwyka Group, Karoo Supergroup (Figure 3). Dolerite (diabase) intrusions are indicated to the west and north of the site with Silverton Shale Formation (Pretoria Group) bedrock further south and west.

As seen during the fieldwork phase of the investigation; shallow sandstone and conglomerate rock outcrops occur extensively on the northern half of the site including the entire area north of the access road as well as the area south of the farmhouse.

**This site is not underlain by dolomitic bedrock and a surface stability investigation is therefore not required.**

According to the geological maps and accompanied explanation no specific shallow mineral deposits are present on the site and no shallow undermining is expected. Both stratigraphic units are known to not host coal deposits. According to Kijko et al (2003) the regional seismic hazard in the project area can be defined as LOW, exhibiting a 10% probability of a seismic event with a peak ground acceleration of less than 0.1 within a period of 50 years. The Climatic N-Value (Weinert, 1980) for the area falls between 2 and 5; therefore, chemical weathering of the parent rocks in the regional setting is deemed the principal mode of weathering.

This mode of weathering favours soil formation, rather than an abundance of rocky fragments occurring within the soil matrix. Physical/mechanical disintegration of parent rock will take place but on a lower scale.

#### 10.16.1. Engineering and Material Characteristics

The foundation indicator test results conducted on the samples from this site are discussed below and summarised in Table 8-12 below.

The deeper residual conglomerate and sandstone has the following material properties:

- The results indicate gravelly soils with low plasticity, low linear shrinkage and low potential expansiveness.
- These materials fall into the GW/GC/SP/SM/SC groups of the Unified Soil Classification and classifies as A-1-b and A-2-4 material according to the AASHTO system.
- Typically, these materials will have a variable drainage nature once compacted.
- Compaction characteristics are good with bulk samples indicating G6- type materials according to the COLTO Classification System.

Some of the soil samples were tested for pH and electrical conductivity. The pH (4.3 – 5.1) are strongly acidic and mildly to very corrosive (0.011 to 0.034 S/m) electrical conductivity.

The applied load from a single storey masonry structure may be assumed to be between 30 kPa and 50 kPa, which will fall on the boundary between loose and medium dense consistencies. The shallow bedrock will provide adequate bearing pressures for any light structure. Possible additional settlements due to collapse of the voided structure in all site soils implies that foundation improvements will be necessary for structures on thicker soils.

The compaction test results are included in Table 8-11.

Table 10.4-10: Compaction test results

Locality	Material type	OMC (%)	MDD	Swell (%)	CBR	TRH14
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			(kg/m <sup>3</sup> )		At various densities				
					90%	93%	95%	98%	
Su07	Transported and residuum	8.8	2194	0.1	9	19	30	47	G6
Su12	Transported and residuum	8.4	2106	0.0	18	27	36	50	G6
Notes: OMC = Optimum moisture content MDD = Maximum dry density (Mod AASHTO) Swell = soaked at 100% Mod AASHTO compaction n/c = not classifiable									

Table 10.4-11: Indicator Test Results

Test Pit	Geotechnical Zone	DEPTH	MATERIAL	GRADING/ HYDROMETER				ATTERBERG LIMITS			GM	CLASSES			HEAVE
				%C	%M	%S	%G	LL	PI	LS		TRB	USC	COLTO	
Su07		0.0-1,8	Bulk	3	6	33	58	-	-	0.5	2.16	A-1-b	SP-SM	G6	Low
Su07		0.9-1.7	Residual conglomerate	6	12	49	33	26	3	3.5	1.62	A-2-4	SC-SM	-	Low
Su08		1.0-1.8	Residual sandstone	6	13	38	43	24	3	3.5	1.74	A-2-4	SC	-	Low
Su12		0.4-1.9	Residual sandstone	5	6	23	66	25	2	3.5	2.29	A-2-4	GW-GC	G6	Low
Su14		0.85-1.8	Residual sandstone	9	11	34	46	27	4	4.5	1.80	A-2-4	SC	-	Low
-1	Grading: Percentage clay (%C), silt (%M), sand (%M) and gravel (%G) by weight.														
-2	Atterberg Limits: Liquid Limit (LL), Plasticity Index weighted (PI), Linear Shrinkage (LS).														
-3	Heave: Potential expansiveness (acc. Van Der Merwe, 1964).														



10.16.2. Suitability Parameter

The graphic below depicts the evaluation parameters to assess the general suitability of the site for use as a small cemetery (Hall and Hanbury 1990; Dippenaar, et al, 2018)):

Engineering Geological/ Geotechnical		Excavatability	Assessment	Score
Excavatability ease to 1.80m	Easy spade	Geological pick pushed in 50 mm with ease		15
	Pick and spade	Geological pick causes slight indentation		10
	Machine	Firm blows with pick cause 1 – 3 mm indentations		5
	Blasting	Backactor refusal		0
Stability sidewalls stable for prolonged periods	Stability	Assessment	Score	
	Stable	Little overbreak with safe excavation profiling		20
	Overbreak	Overbreak between 1.3 and 1.8 m		15
	Slightly unstable	Minor falls of material		8
Workability material to be used as compacted backfill	Unstable	Collapse of excavation likely		1
	Workability	Unified	MOD AASHTO	Score
	Excellent to good	GW, SW, GP	> 1 800 kg/m <sup>3</sup>	10
	Fair	SP, SM	< 1 800 kg/m <sup>3</sup>	5
Poor	OL, CL, ML	< 1 700 kg/m <sup>3</sup>	2	
Very poor	OH, CH, MH	< 1 500 kg/m <sup>3</sup>	0	
Sanitary/ Environmental/ Hydrogeological	Water Table	Water Table Depth (m)		Score
	Deep water table	> 8		25
	Intermediate water table	4 – 8		5
	Possible perched water	0 – 4		5
Subsoil permeability preventing ponding and rapid infiltration	Waterlogged soil	0 – 4		Fail
	Subsoil Permeability	Percolation Rate	Approx. Permeability	Score
	Impermeable	Not measurable	< 10 <sup>-7</sup> m/s	15
	Relatively impermeable	10 – 15 mm/h	10 <sup>-6</sup> – 10 <sup>-7</sup> m/s	20
Relatively permeable	15 – 50 mm/h	10 <sup>-5</sup> – 10 <sup>-6</sup> m/s	10	
Permeable	50 – 1 000 mm/h	< 10 <sup>-5</sup> m/s	0	
Backfill permeability preventing ponding and rapid infiltration	Backfill Permeability	Unified Class		Score
	Impermeable	OH, CL, CH		5
	Relatively impermeable	GC, SC, MH		10
	Relatively permeable	GP, SP, GW		7
Permeable	SW, SP		0	
Final Ranking	Suitability			
> 90	Very good			
75 – 90	Satisfactory			
60 – 75	Poor			
< 60	Unacceptable			

The table overleaf summarises the findings of this investigation with the associated suitability ranking per geotechnical zone as per the above table (Figure 8-57). The zoning is based on 16 soil profiles and surface mapping across the site and may change as more data becomes available during grave excavations where specific conditions at grave resolution will be exposed.



Figure 10.4-56: Site layout and test pit positions. Portion 22 Doornrug 302-JS Emalahleni





Figure 10.4-57: Geotechnical zoning. Portion 46 of the farm Drieziek 368-IQ

Note:

Su indicate profile positions

O indicate recorded solid outcrops.

Geotechnical zonation with summarised findings and preliminary cemetery site suitability ranking.

Geotechnical Zone	Basic Zone Description	Test Pits	Excavatability to 1.8 m below E.G.L	Excavation Stability Rating	Workability Rating	Water Table Rating*	Soil Permeability Rating*	Backfill Permeability	Final Rating	Site Suitability
<b>Zone I 7 Ha</b>	<ul style="list-style-type: none"> <li>Moderate slope in a southerly direction</li> <li>Artificially reworked surface with infrastructure including access road and buildings</li> <li>Surface seen to host ploughed fields</li> <li>Typically underlain by a coarse-grained transported soil</li> </ul>	Su7 to Su9, Su11 to Su15	<p>Approximate average excavation depth across the zone: 1.80 m</p> <p>Soft excavation conditions to a depth of between 1.5 and 2.4 m below E.G.L</p> <p>Rating: 10 with localised 0</p>	<p>Sidewalls generally remained stable for a period of at least 1 hour with little or no over break or collapse occurring.</p>	<p>Zone typically underlain by gravelly sand soils; with the exception of the highly weathered bedrock at the base of the excavations.</p> <p>Measured SM and SC; with</p>	<p>Groundwater was <b>not</b> encountered in any of the test pits excavated across this zone.</p> <p>It is predicted the groundwater temporarily perches upon the underlying less weathered Sandstone rock mass following</p>	<p>Soil classification indicates variable values with generally permeable conditions.</p> <p>Predicted rating: 10</p>	<p>Possible perched water table with measured SM and SC</p> <p>Rating: 7</p>	<p>57 to 77</p>	<p>Poor – mitigating actions include excavation with larger machines, good surface water management.</p>



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Geotechnical Zone	Basic Zone Description	Test Pits	Excavatability to 1.8 m below E.G.L	Excavation Stability Rating	Workability Rating	Water Table Rating*	Soil Permeability Rating*	Backfill Permeability	Final Rating	Site Suitability
	<ul style="list-style-type: none"> <li>(colluvium) and residual conglomerate and sandstone.</li> <li>• Generally soft excavation in upper 1.5 m with variable refusal depths between 1.5 m and 2.4 m</li> </ul>			Rating: 20	<ul style="list-style-type: none"> <li>localised GW/GC</li> <li>Rating: 5</li> </ul>	<ul style="list-style-type: none"> <li>prolonged precipitation events.</li> <li>Rating: 25 with possible 5</li> </ul>				
	<ul style="list-style-type: none"> <li>• Uneven and steep slopes on northern half and south-eastern boundaries</li> </ul>					<ul style="list-style-type: none"> <li>Groundwater was <b>not</b> encountered in any of the test pits excavated across</li> </ul>				

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Geotechnical Zone	Basic Zone Description	Test Pits	Excavatability to 1.8 m below E.G.L	Excavation Stability Rating	Workability Rating	Water Table Rating*	Soil Permeability Rating*	Backfill Permeability	Final Rating	Site Suitability
<b>Zone II</b> <b>17.5 Ha</b>	<ul style="list-style-type: none"> <li>Rock outcrop and sub-outcrop across entire zone.</li> <li>Thin (&lt; 0.3 m) surface gravelly sand soil cover on bedrock</li> <li>Typically underlain by slightly weathered horizontally bedded and jointed sandstone.</li> </ul>	Su1 to Su6, Su10, Su16	Approximate average excavation depth across the zone: 0.3 m  Rating: 0	Sidewalls generally ravelling in coarse-grained thin soils  Rating: 1	No material available  Rating: 0	this zone.  It is predicted the groundwater temporarily perches upon the underlying less weathered Sandstone rock mass following prolonged precipitation events.  Rating: 25 with possible 5	Upper soil horizon permeability high. The sandstone bedrock may inhibit water infiltration.  Predicted rating: 15	When excavated sandstone rock blocks used as backfill it will be highly permeable.  Rating: 0	21 and 41	Unacceptable – the main flaw in this major portion of the site is the presence of shallow bedrock and absence of backfill material.

### 10.16.3. Findings

The majority of the proposed site falls within the unacceptable suitability rating rendering most of the farm portion not suitable for use as a cemetery. The zone comprising approximately 7 ha rates primarily as poor and will require additional precautionary measures prior to and following the development. The extent of each zone may change with additional information gained from future excavations.

The most critical geological and geomorphological constraints for the proposed site will be:

- The shallow and outcropping bedrock on the northern half and most of the southwestern portion.
- The majority of the soils encountered across the site exhibits fair workability but relatively permeable properties.

The sensitivity of the water sources in the area may need additional investigation if the regional geological and hydrogeological settings are complex.

The use of the poorly suitable part of the site will need specific mitigating measures with regards surface drainage, excavation means (hand excavation not possible everywhere) and selection of importing of acceptable backfill materials.

It is recommended that a phase 2 investigation is executed to refine the zone boundaries based on this investigation.

## 11. THE PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED AND THE DATE ON WHICH THE ACTIVITY IS CONCLUDED AND THE POST CONSTRUCTION MONITORING REQUIREMENTS FINALISED

The Environmental Authorisation will be required for approximately five (5) years. The date of the conclusion of the activity is currently unknown. The proposed project will entail a burial site, it is not known as to when the post monitoring requirements will be finalised.

### 11.1. The impacts identified including the significance, probability and duration of the impacts

Various potential impacts have been identified and these are included in the table below. The table below should be read in conjunction with Section 12.

Table 11.1-1 : Impacts identified for the proposed project with mitigation measures

Impact	Significance	Probability	Duration
Job creation (This is a positive impact)	N/A	N/A	N/A
Light Pollution	27 = Low	3 = Medium	3 = Medium

Impact	Significance	Probability	Duration
Visual Impact	27 = Low	3 = Medium	2 = Short term
Noise impact	42 = Medium	3 = Medium	5 = Permanent
Crime activities in the area due to the development of a burial estate	18 = Low	2 = Low	3 = Medium
Potential fire incidents	8 = Low	2 = Low	1 = Immediate
Traffic	10 = Low	2 = Low	2 = Short term
Loss of Regionally Protected Species	8 = Low	2 = Low	1 = Immediate
Loss of vegetation and habitats	8 = Low	2 = Low	1 = Immediate
Potential disturbance of fauna	8 = Low	2 = Low	1 = Immediate
Waste generation	22 = Low	2 = Low	2 = Short term
Sewage generation	10 = Low	2 = Low	2 = Short term
Non-compliance with permits and licenses due to poor or no Environmental awareness training	10 = Low	2 = Low	2 = Short term
Stormwater	12 = Low	2 = Low	2 = Short term
Soil Erosion and Dust Emission	16 = Low	2 = Low	2 = Short term
Impact on groundwater	12 = Low	2 = Low	2 = Short term
Hydropedology	16 = Low	2 = Low	2 = Short term
Impact on palaeontology	16 = Low	2 = Low	2 = Short term
Loss of land capability	44 = Medium	4 = High	5 = Permanent
Potential impacts on wetlands	14 = Low	2 = Low	4 = Long term
Destruction or alteration of heritage finds	36 = Low	3 = Medium	4 = Long term
Abstraction of groundwater through boreholes may result in sinking water table.	14 = Low	2 = Low	1 = Immediate
Geotechnical	24 = Low	2 - Low	4 = Long term

### 11.2. The methodology used in determining the significance of potential environmental impacts and risks

The identification and assessment of environmental impacts is a multi-faceted process, using a combination of quantitative and qualitative descriptions and evaluations. It involves applying scientific measurements and professional judgment to determine the significance of environmental impacts associated with the proposed project. The process involves consideration of, inter alia: the purpose and need for the project; views and concerns of interested and affected parties; social and political norms, and general public interest.



The methodology used for assessing impacts associated with the proposed project follows the philosophy of environmental impact assessments, as described in the booklet Impact Significance, Integrated Environmental Management Information Series 5 (DEAT, 2002b). The philosophy is summarised by the following extracts:

“The impact magnitude [or intensity] and significance should as far as possible be determined by reference to legal requirements, accepted scientific standards or social acceptability. If no legislation or scientific standards are available, the EIA practitioner can evaluate impact magnitude based on clearly described criteria. Except for the exceeding of standards set by law or scientific knowledge, the description of significance is largely judgemental, subjective and variable. However, generic criteria can be used systematically to identify, predict, evaluate and determine the significance of impacts.” (DEAT, 2002b).

“Determining significance [of impacts] is ultimately a judgement call. Judgemental factors can be applied rigorously and consistently by displaying information related to an issue in a standard worksheet format.” (Haug et al., 1984 taken from DEAT, 2002b).

The purpose of undertaking an impact assessment is to ensure that the project proactively considers environmental issues as part of the project planning and decision-making processes throughout the project life cycle.

The Impact Rating System:

Details of the impact assessment methodology used to determine the significance of physical, bio- physical and socio-economic impacts are provided below.

The impacts are assessed as either having a:  
negative effect (i.e. at a `cost' to the environment),  
positive effect (i.e. a `benefit' to the environment),  
or Neutral effect on the environment.

Extent of the Impact

- (1) Site (site only),
- (2) Local (site boundary and immediate surrounds),
- (3) Regional (within the City of Johannesburg),
- (4) National, or
- (5) International.

Duration of the Impact

The length that the impact will last for is described as either:

- (1) Immediate (<1 year)

- (2) Short term (1-5 years),
- (3) Medium term (5-15 years),
- (4) Long term (ceases after the operational life span of the project),
- (5) Permanent.

#### Magnitude of the Impact

The intensity or severity of the impacts is indicated as either:

- (0) None,
- (2) Minor,
- (4) Low,
- (6) Moderate (environmental functions altered but continue),
- (8) High (environmental functions temporarily cease), or
- (10) Very high / Unsure (environmental functions permanently cease).

#### Probability of Occurrence

The likelihood of the impact actually occurring is indicated as either:

- (0) None (the impact will not occur),
- (1) Improbable (probability very low due to design or experience)
- (2) Low probability (unlikely to occur),
- (3) Medium probability (distinct probability that the impact will occur),
- (4) High probability (most likely to occur), or
- (5) Definite.

#### Significance of the Impact

Based on the information contained in the points above, the potential impacts are assigned a significance rating (S). This rating is formulated by adding the sum of the numbers assigned to extent (E), duration (D) and magnitude (M) and multiplying this sum by the probability (P) of the impact.  $S=(E+D+M)P$

The significance ratings are given below

- (<30) low (i.e. where this impact would not have a direct influence on the decision to develop in the area),  
(30-60) medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated),  
(>60) high (i.e. where the impact must have an influence on the decision process to develop in the area).

### **11.3. The advantages and disadvantages that the proposed activity and alternatives will have on the environment and on the community that may be affected**

**Advantages**

- Jobs will be created during construction and operational phases.
- The facility will increase burial sites within the municipality.

**Disadvantage**

- Loss of agricultural land

**11.4. The possible mitigation measure that could be applied and level of residual risk**

The mitigation measures are included in Section 10.2 above and the EMPr attached as Appendix F.

**11.5. The outcome of the site selection matrix**

The proposed site was purchased by the Developer for the sole purpose of developing a cemetery. Therefore, there is no other alternative location that is preferred. The proposed site has been assessed by various specialists and none have found it to be a fatal flaw for the proposed project. In addition, mitigation measures for the identified impacts have been included in the EMPr attached as Appendix F. Therefore, a site selection matrix was not used to determine an alternative as there is only one site.

**11.6. If no alternative sites were investigated, the motivation for not considering alternative sites**

The proposed site was purchased by the Developer for the sole purpose of developing a cemetery. Therefore, there is no other alternative location that is preferred. The proposed site has been assessed by various specialists and none have found it to be a fatal flaw for the proposed project. In addition, mitigation measures for the identified impacts have been included in the EMPr attached as Appendix F. Therefore, a site selection matrix was not used to determine an alternative as there is only one site.

**11.7. A statement motivating the preferred site.**

The finding and recommendations of the specialists support the proposed site. These are indicated below:

**Biodiversity**

Through the analysis of various database and satellite imagery as well as the infield screening assessment it was determined that although majority of the site is degraded to different degrees it still possess quite a number of sensitive ecological receptors. These sensitivity receptors relate to being located in VU ecosystems, traversing two threatened ecosystems and traversing a protected area. In addition to this the Lanner Falcon (*Falco biarmicus*) listed as VU was also recorded in the project area. The rocky outcrop was assigned a high sensitivity. It is therefore

recommended that it is demarcated as a no-go area and no laydown areas, access roads or other project activities must occur within this area during either the construction or operational phase.

The majority of the project area is in a highly degraded state as the vegetation structure and species composition has been completely altered as such, has a very low conservation value and ecological sensitivity from a floral perspective.

No fatal flaws are evident for the proposed project. It is the opinion of the specialists that the project, may be favourably considered for authorisation and a follow-up survey is not considered essential for decision-making. All prescribed mitigation measures and supporting recommendations must be considered by the issuing authority. Mitigation measures as described in this report will reduce the significance of the risk to an acceptable level.

### **Heritage**

Investigation of the Project Area identified seven sites. These however respectively carry no (category 1 – no mitigation) and low (category 2a - recording) heritage significance. These ratings mean that no further mitigation is needed and that the proposed cemetery can continue from a heritage point of view.

### **Hydropedology**

Two main hillslope types were identified, which includes the presence of recharge (shallow) and responsive hydro-pedological types. The proposed Su Casa Burial Estate and associated infrastructure components will have no effect on the hillslope hydrology due to the extent of the grave sites (diameter), the fact that recharge dominates even though shallow throughout as well as the size of the greater catchment. Also, no impacts on the total streamflow of watercourses as both lateral and vertical flow paths will occur in response to the flow impediment.

Therefore, it is recommended that the proposed activities may proceed as have been planned due to negligible impacts expected on most of the identified hillslopes. Measures can be set on soils with some expected changes in flow paths prior to the burial estate establishment. Development should avoid areas with responsive (saturated) hydro-pedological soil types as they can promote contaminates migration and also act as receptors for groundwater stores.

### **Palaeontology**

Based on experience and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would be preserved in the Dwyka Group shales and tillites and not in the overlying soils and sands of the Quaternary. There is a very small chance that fossils may occur below ground in the adjacent shales and tillites of the Dwyka Group (Karoo Supergroup). If fossils are found by the environmental officer, or other responsible person once excavations have commenced then they should be rescued and a palaeontologist called to assess and collect a representative sample. The impact on the palaeontological heritage would be low so as far as the palaeontology is concerned, the project should be authorised.

### **Pedology**



The Hydropedological Report was prepared by The Biodiversity Company in 2022. The Hydropedological Report is attached as Appendix D6.

Three soil forms were identified within the 50 m regulated area, namely Mispah, Glenrosa and Clovelly soil forms. The most sensitive of these soil forms are characterised by a land potential 6, due to the poor climate, with a 'Low' sensitivity. The land capability sensitivities (DAFF, 2017) indicate land capabilities with "Moderate" sensitivities, which do not correlate with the findings from the baseline assessment.

Considering the nature of the proposed activities and the low sensitivity soil resources, it is the specialist's opinion that no loss of land capability is expected, and no segregation of high production agricultural resources are expected. Therefore, it is recommended that the proposed activities may proceed as have been planned.

### **Wetland**

Two HGM units were identified within the 500 m regulated area, of which both have been classified as unchanneled valley bottom wetlands. The average ecosystem service scores for the HGM units were rated as "Intermediate". The integrity of the systems was determined to be "Largely Modified" (class D). The ecological importance and sensitivity of the delineated wetlands was classified as "Moderate". A 15 m post-mitigation buffer zone has been calculated and recommended for the proposed housing development.

No wetland systems are located within the project area, thus all direct risks to wetlands are avoided. Considering the distance between the proposed activity as well as the fact that the area between the proposed cemetery and the relevant HGM units are characterised by the Glenrosa soil forms with deep, freely drained orthic topsoil with a lithic subsoil (which completely eliminates overland flow), no indirect risks are foreseen.

Since no risks are expected towards natural wetland systems, it is recommended that the proposed activities may proceed without the application for a water use license or general authorisation.

### **Groundwater**

Based on the information presented above, the following conclusions are drawn:

- The site is located in quaternary catchment B20G with local flow to the south and then to the west along the Grootspuit.
- There are industrial and mining sites to the north and east of the site, including coal and lime plants, ferroalloys and Elandsfontein Colliery, with slimes dams and waste rock dumps immediately to the east.
- The northern part of the site is located on sandstones and shales of the Wilge River Formation of the Waterberg Group, while the southern part overlies shales of the Pretoria Group.
- Soils at the site are of low agricultural potential.
- The local aquifer is an intergranular & fractured and fractured type with a low to moderate yield potential, with median borehole yields of 0.5 – 2 ℓ/s.

- There are nine registered boreholes located within a 5 km radius of the site but none (registered) within 1 km.
- There are two non-functional boreholes on the site and a further four functional boreholes on adjacent properties.
- Groundwater in the region and site area occurs at 10 – 40 mbgl.
- Groundwater flow direction is inferred to be to the southeast from the southern part of the site and possibly to the north from a very small area of the northern part.
- Groundwater in the area is of generally good to moderate quality with an indicated EC of 70 – 300 mS/m and likely to be of a calcium/magnesium bicarbonate type.
- Groundwater in the site area is of very good quality with EC of 3.4 – 10.4 mS/m, acidic pH and very low concentrations of all major and minor ions.
- The potential receptors for any contamination from the site via groundwater are boreholes 1, 2 and 3 and the minor stream to the east of the site.
- The site has a moderate groundwater risk according to this Tier 1 assessment.
- The EIS for the site is moderate and alterations to the PES, i.e. possible deterioration in groundwater quality, will be limited to the site and buffer areas.

It is recommended that the following mitigation measures/monitoring be carried out:

- Digging of geotechnical test pits on site to assess soil characteristics such as thickness, clay content and permeability.
- Establishment of an upstream and a downstream monitoring borehole, for which use the two on-site boreholes 5 and 6 could possibly be adapted.
- Establishment of a lateral buffer zone of 65 m from the site boundaries for rivers, wells and springs.
- Establishment of a lateral buffer zone of 350 m from the site boundaries for drinking water sources.
- The taking of a water sample from these boreholes prior to the establishment of the cemetery and laboratory analysis for pH, EC, TDS, Na, K, Mg, Ca, Cl, SO<sub>4</sub>, NO<sub>3</sub>, F, Fe, Mn, Cu, Ni, Cd, Cr, Zn, Al, As and Total Alkalinity, plus bacteriological/pathogen indicators.
- Taking of a water sample on a biannual basis from these boreholes and analysis for the above parameters.
- Compilation of a monitoring record of water levels and quality and assessment of the data by a hydrogeologist every six months. Submission of reports to the DHSWS, as required by them. Continuation or modification of the monitoring programme as dictated by results or the regulatory authorities.

**11.8. A full description of the process undertaken to identify, assess and rank the impacts and risks the activity will impose on the preferred site through the life of the activity**

The potential impacts identified for the proposed project are included in Section 10.32 above. The description of the impact assessment and rating methodology are included in Section 10.33.

The sources of information used in the assessment process are as follows:

- Site observation;
- Specialist studies undertake.

## 12. AN ASSESSMENT OF EACH IDENTIFIED POTENTIALLY SIGNIFICANT IMPACT AND RISK

### 12.1. Impacts anticipated during construction and operational phases

The following tables include impact rating and describes the mitigation measures for the identified impacts.

12.1.1. Impact: Job creation (This is a positive impact)									
Extent		Duration		Magnitude		Probability		Significance	
Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
3		4		10		5		85 = High	
Mitigation Measures:									
<ul style="list-style-type: none"> <li>• The Developer and Contractor should follow the applicable legislation when hiring staff.</li> </ul>									

12.1.2. Impact: Light Pollution									
Extent		Duration		Magnitude		Probability		Significance	
Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
3	2	4	3	8	4	4	3	60 = Medium	27 = Low
Mitigation Measures:									
<ul style="list-style-type: none"> <li>• Switch off unnecessary lights to reduce light pollution.</li> <li>• Where possible use automatic systems to turn off street light at certain times.</li> <li>• Outdoor lights should not be directed towards neighboring properties as they create discomfort.</li> <li>• Where possible, use glare-free bulbs, installing low hanging bulbs.</li> <li>• Where possible, ensure that lights are facing downwards.</li> <li>• Where possible, cover the bulbs to reduce bright skies at night.</li> </ul>									

Impact: Noise Pollution									
Extent		Duration		Magnitude		Probability		Significance	
Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation

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3	2	4	2	6	4	4	3	52 = Medium	24 = Low
<p>Mitigation Measures:</p> <ul style="list-style-type: none"> <li>• Use noise barriers and equipment with low noise.</li> <li>• Noise control plant should be prepared</li> <li>• Site vehicles and equipment should be maintained.</li> <li>• Where necessary staff should be provided with ear plugs.</li> </ul>									

12.1.3. Visual Impact

Extent		Duration		Magnitude		Probability		Significance	
Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
3	2	5	5	6	4	3	3	42 = Medium	42 = Medium
<p>Mitigation Measures:</p> <ul style="list-style-type: none"> <li>• The proposed site is located close to a mine dump, therefore, it is not expected to have a major negative impact on site.</li> <li>• Install a palisade fence to limit visual intrusion.</li> </ul>									

12.1.4. Impact: Crime activities in the area due to the development of a burial estate

Extent		Duration		Magnitude		Probability		Significance	
Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
3	2	4	3	8	4	4	2	60 = Medium	18 = Low
<p>Mitigation Measures:</p> <ul style="list-style-type: none"> <li>• Security staff should be available on site.</li> <li>• Contact details of the nearest Police Station should be made available on site and communicated staff members.</li> </ul>									

12.1.5. Impact: Potential fire incidents

Extent		Duration		Magnitude		Probability		Significance	
Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
3	1	3	1	8	4	4	2	56 = Medium	8 = Low
<p>Mitigation Measures:</p>									



- Serviced fire extinguishers and fire beater should be available on site.
- Contact details of the nearest Fire Department should be made available on site and communicated staff members.
- Relevant staff should be treated on fire management.
- A fire prevention and emergency response plan needs to be compiled and implemented to restrict the impact fire might have on the project area and it's immediate surrounding.

12.1.6. Impact: Traffic

Extent		Duration		Magnitude		Probability		Significance	
Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
2	1	2	2	4	2	2	2	16 = Low	10 = Low

Mitigation Measures:

- The surrounding road network are currently operating at an acceptable level of service;
- The traffic generated by the proposed development will have no major impact on the nearby R104.
- There would be a schedule for each funeral to ensure that that there is order.

12.1.7. Impact: Loss of Regionally Protected Species

Extent		Duration		Magnitude		Probability		Significance	
Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
2	1	5	1	6	2	4	2	52 = Medium	8 = Low

Mitigation Measures:

- Regionally protected (SCC species) must be marked for rescue and relocation, or removal (where permit application would then apply) before any vegetation removal commences.

12.1.8. Impact: Loss of vegetation and habitats

Extent		Duration		Magnitude		Probability		Significance	
Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
2	1	5	1	6	2	4	2	52 = Medium	8 = Low

Mitigation Measures:

- All construction activities must be carried out according to the generally accepted environmental best practice and the spatial footprint must be kept to a minimum.
- Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further. Clearing of vegetation should be minimized and avoided where possible. All activities must be restricted within the development footprint sensitivity areas. No loss of areas surrounding the development area. It is recommended that areas to be developed be specifically demarcated so that during the construction phase, only the demarcated areas be impacted upon (including fencing off the defined project area);
- Should any indigenous vegetation be removed outside the designated areas or direct project footprint, the Contractor must notify the relevant person on site, i.e., the PM, and the site must be rehabilitated if required and the structures replaced.
- Where possible, existing access routes and walking paths must be made use of, and the development of new routes limited.
- Disturbed sites must be rehabilitated as soon as construction in an area is complete or near-complete and not left until the end of the project to be rehabilitated (concurrent rehabilitation).
- Effective landscaping must be conducted in areas affected by erosion/ sedimentation. The developer must ensure that any open spaces are rehabilitated, and the appropriate indigenous vegetation is introduced.
- All laydown, chemical toilets etc. should be restricted to low sensitivity areas. Any materials may not be stored for extended periods of time and must be removed from the project area once the construction/closure phase has been concluded. Buildings should preferably be prefabricated or constructed of re-usable/recyclable materials. No storage of vehicles or equipment will be allowed outside of the designated project areas.
- It is recommended that the supervisor of the vegetation clearing contractors receive adequate training as to the presence, identity, and management of species of conservation importance, and that a botanical specialist/ECO (Environmental Control Officer) be appointed during vegetation clearing to conduct monthly on-site audits of the vegetation clearing process.
- A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that, it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. No servicing of equipment on-site during construction unless necessary. All contaminated soil/yard stone shall be treated in situ or removed and be placed in containers.
- Leaking equipment and vehicles must be repaired immediately or be removed from the project areas to facilitate the repair.
- Through the analysis of various database and satellite imagery as well as the infield screening assessment it was determined that although majority of the site is degraded to different degrees it still possess quite a number of sensitive ecological receptors. These sensitivity receptors relate to being located in Vulnerable (VU)

ecosystems, traversing two threatened ecosystems and traversing a protected area. In addition to this the Lanner Falcon (*Falco biarmicus*) listed as VU was also recorded in the project area. The rocky outcrop was assigned a high sensitivity. It is therefore recommended that it is demarcated as a no-go area and no laydown areas, access roads or other project activities must occur within this area during either the construction or operational phase.

12.1.9. Impact: Potential disturbance of fauna

Extent		Duration		Magnitude		Probability		Significance	
Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
2	1	2	1	6	2	4	2	40 = Medium	8 = Low

Mitigation Measures:

- Employees and contractors should be made aware of the presence of, and rules regarding fauna through suitable induction training and on-site signage.
- It is recommended that the supervisors of the vegetation clearing, and construction contractors receive adequate training as to the presence, identity and management of on-site fauna.
- IAP species should be managed using the existing mine AIP management plan. Removal AIPs should preferably commence during the pre-construction phase and continue throughout the construction and operational phases. AIPs should be cleared within the project area before any vegetation clearing activities commence, thereby ensuring that no AIP propagules are spread, or soils contaminated with AIP seeds during the construction phase; and the existing mine AIP Management/Control Plan should be implemented by a qualified professional. No chemical control of AIPs to occur without a certified professional.
- Regular monitoring of the implementation of this plan for the rehabilitation of disturbed areas must be conducted by the appointed Environmental Control Officer (ECO).

12.1.10. Impact: Waste generation

Extent		Duration		Magnitude		Probability		Significance	
Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
3	2	3	3	8	6	4	2	56 = Medium	22 = Low

Mitigation Measures:

- Formal waste management and sewerage systems must be put in place for contractors.
- Waste management must be a priority and all waste must be collected and stored effectively.

- No dumping of litter, rubble or cleared vegetation on site should be allowed. Infrastructure and rubble removed as a result of the construction activities should be reduced, re-used or recycled with disposal to landfill as last resort. No temporary dump sites should be allowed in areas with natural vegetation. It is advised that waste disposal containers and bins be provided during the construction phase for all construction rubble and general waste. Vegetation cuttings must be carefully collected and disposed of at a separate waste facility. Refuse bins must be placed at strategic positions to ensure that litter does not accumulate within the construction site.
- Burying of any waste including rubble, domestic waste, empty containers on the site should be strictly prohibited;
- All construction rubble waste and any other types of waste must be removed and disposed of at a suitable registers disposal facility.
- Contractors and construction crew conducting the works on site should be informed about approved waste disposal facilities.
- The skips and bins should be properly marked to indicate the type of waste that should be stored.
- Waste should be stored at approved areas.
- It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site.
- The Contractor should supply sealable and properly marked domestic waste collection bins or skips and all solid waste collected shall be disposed of at a registered waste disposal site.
- Where a registered disposal facility is not available close to the project area, the Contractor shall provide a method statement with regard to waste management.
- Under no circumstances may domestic waste be burned on site.
- Temporary storage of domestic waste shall be in covered waste bins/skips.

12.1.11. Impact: Sewage generation and use of septic tanks

Extent		Duration		Magnitude		Probability		Significance	
Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
3	1	3	2	8	2	4	2	56 = Medium	10 = Low

Mitigation Measures:

- Mobile chemical toilets should be provided.
- The toilets should be anchored to prevent them from being blown by the wind.
- A minimum of one toilet must be provided per 10 persons.
- Portable toilets must be pumped dry to ensure the system does not degrade over time and spill into the surrounding area.
- The toilets should be cleaned on a regular basis.



- Safe Disposal Certificates for sewage disposal should be provided to the Environmental Control Officer/Environmental Manager/Environmental Officer.
- All staff on site should use the toilets.
- The septic tanks should be installed according to the manufacture's design.
- The septic tanks will be installed in bunded surfaces to ensure that no sewage reach the ground in case of a spill.
- The septic tanks should be regularly emptied.
- Sewage removed from the septic tanks should be disposed at a registered waste water treatment works and the Safe Disposal Certificates (SDC) should be kept on site.

12.1.12. Impact: Non-compliance with permits and licenses due to poor or no Environmental awareness training

Extent		Duration		Magnitude		Probability		Significance	
Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
3	1	3	2	8	2	4	2	56 = Medium	10 = Low

Mitigation Measures:

- All personnel and contractors should undergo Environmental Awareness Training.
- Ensure that all site personnel have a basic level of environmental awareness training.
- The training should focus on the compliance of the conditions of the Environmental Authorisation (EA), Environmental Management Programme (EMPr), and any other relevant permits and licences.
- A signed register of attendance must be kept for proof.
- Awareness posters should be placed on the site notice board or any other placed allowed on site.
- Discussions are required on sensitive environmental receptors within the project area to inform contractors and site staff of the possible presence of SSC, their identification, conservation status and importance, biology, habitat requirements and management requirements the Environmental Authorisation and within the EMPr.
- The avoidance and protection of the surrounding watercourses and riparian areas must be included into a site induction.
- Contractors and employees must all undergo the induction and be made aware of the areas to be avoided.
- The Contractor must provide method statements on the protocols to be followed and contingencies to be implemented.

12.1.13. Impact: Stormwater

Extent		Duration		Magnitude		Probability		Significance	
Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation

3	2	4	2	6	2	4	2	52 = Medium	12 = Low
<p>Mitigation Measures:</p> <ul style="list-style-type: none"> <li>• A Stormwater Management Plan must be developed to control runoff and prevent erosion of the site and its surroundings.</li> <li>• Appropriate stormwater structures alongside a stormwater management plan must be designed to minimise erosion of the surrounding environment and sedimentation of surrounding watercourses.</li> </ul>									

12.1.14. Impact: Soil Erosion and Dust Emission									
Extent		Duration		Magnitude		Probability		Significance	
Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
3	2	4	2	6	4	4	2	52 = Medium	16 = Low
<p>Mitigation Measures:</p> <ul style="list-style-type: none"> <li>• Dust minimization and control measures should be implemented on the construction site at regular intervals. This includes wetting of exposed soft soil surfaces.</li> <li>• No water may be abstracted from any water source without an applicable License from the Department of Water and Sanitation (DWS).</li> <li>• The frequency of implementation of dust suppression measures should be increased when it is expected that high wind conditions will develop.</li> <li>• Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events. This will also reduce the likelihood of encroachment by alien invasive plant species.</li> <li>• Vegetation clearing should only occur immediately prior to the commencement of construction activities in an area to minimize the amount of exposed soil on the site.</li> <li>• Stockpiles and spoil heaps must be covered with tarps or straw to prevent fugitive dust.</li> </ul>									

12.1.15. Impact on groundwater									
Extent		Duration		Magnitude		Probability		Significance	
Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
3	2	5	2	8	2	3	2	48 = Medium	12 = Low
<p>Mitigation Measures:</p>									

- Digging of geotechnical test pits on site to assess soil characteristics such as thickness, clay content and permeability.
- Establishment of an upstream and a downstream monitoring borehole, for which use the two on-site boreholes 5 and 6 could possibly be adapted.
- Establishment of a lateral buffer zone of 65 m from the site boundaries for rivers, wells and springs.
- Establishment of a lateral buffer zone of 350 m from the site boundaries for drinking water sources.
- The taking of a water sample from these boreholes prior to the establishment of the cemetery and laboratory analysis for pH, EC, TDS, Na, K, Mg, Ca, Cl, SO<sub>4</sub>, NO<sub>3</sub>, F, Fe, Mn, Cu, Ni, Cd, Cr, Zn, Al, As and Total Alkalinity, plus bacteriological/pathogen indicators.
- Taking of a water sample on a biannual basis from these boreholes and analysis for the above parameters.
- Compilation of a monitoring record of water levels and quality and assessment of the data by a hydrogeologist every six months. Submission of reports to the DHSWS, as required by them.
- Continuation or modification of the monitoring programme as dictated by results or the regulatory authorities.

**Monitoring**

It is recommended that monitoring boreholes be established at the upstream (north) and downstream (south) boundaries of the site. On-site boreholes 5 and 6 could possibly be adapted for this purpose.

The following groundwater monitoring activities are recommended:

- The taking of a water sample from “Upstream” (No 6) and “Downstream” (No 5) boreholes prior to the establishment of the cemetery. Laboratory analysis for:
  - Physical parameters pH, EC, TDS;
  - Major ions, Na, K, Mg, Ca, Cl, SO<sub>4</sub>, NO<sub>3</sub> and Total Alkalinity;
  - Trace ions and metals, F, As, Fe, Mn, Pb, Cd, Cu, Cr, Ni, Cd, Zn and Al;
  - Bacteriological indicators.
- Taking of a water sample on a biannual basis from these boreholes and analysis for the above parameters;
- Compilation of a monitoring record of quality and assessment of the data by a hydrogeologist annually. Continuation or modification of the monitoring programme as dictated by results; and as directed by the DEA/DWS.

12.1.16. Hydropedology

Extent		Duration		Magnitude		Probability		Significance	
Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
3	2	4	2	6	4	4	2	52 = Medium	16 = Low

Mitigation Measures:

- Measures can be set on soils with some expected changes in flow paths prior to the burial estate establishment. Development should avoid areas with responsive (saturated) hydrogeological soil types as they can promote contaminates migration and also act as receptors for groundwater stores.

**Surface Water Monitoring**

The limits prescribed in this monitoring programme are stipulated in the Target Water Quality Range (TWQR) for aquatic ecosystems (DWAF, 1996). This prescribed monitoring programme should be conducted in conjunction with other aspects of riverine monitoring in the form of aquatic biomonitoring which addresses macroinvertebrate and ichthyofauna assemblages on a bi-yearly basis. The surface water monitoring programme will require monthly monitoring of the adjacent valley bottom wetland at two sites, upstream (control site) and a downstream monitoring site. The watercourse should be monitored for the prescribed aspects below (Table 25).

Contaminants emanating from burial practices are typically based on the following:

- Their sources (whether from the body's decomposition, accessory burial materials, or associated activities)
- The rate at which they are released to the subsurface
- Their mobility and persistence in the subsurface, and
- Their toxicity or health effects on receptors.

Table Proposed water quality parameters

Parameters	pH	Conductivity (µS/cm)	Dissolved Oxygen (mg/l)	Temperature (°C)
TWQR*	6.5-9.0	-	>5.00	5-30*
Metals	Ti, Cr, Cd, Pb, Fe, Mn, Ni, Zn, As			
Nutrients	NO3, PO4, Cl, salts of Ca, Na, K, Mg			
Organics	Formaldehyde, Methanol			
Pathogens	Bacteria, Viruses, Microorganisms, Fungi			
*TWQR – Target Water Quality Range (DWAF, 1996)				

12.1.17. Impact on palaeontology

Extent		Duration		Magnitude		Probability		Significance	
Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
2	2	2	2	4	4	2	2	16 = Low	16 = Low
Mitigation Measures:									



- It is extremely unlikely that any fossils would be preserved in the Dwyka Group shales and tillites and not in the overlying soils and sands of the Quaternary.
- There is a very small chance that fossils may occur below ground in the adjacent shales and tillites of the Dwyka Group (Karoo Supergroup).
- If fossils are found by the environmental officer, or other responsible person once excavations have commenced then they should be rescued and a palaeontologist called to assess and collect a representative sample.

12.1.18. Impact: Loss of land capability

Extent		Duration		Magnitude		Probability		Significance	
Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
2	2	5	5	4	4	4	4	44 = Medium	44 = Medium

Mitigation Measures:

- Monitor compaction on site.
- Detailed investigation into ideal locations for the construction of all the infrastructure on site.
- Clearing of vegetation.
- Implement proper storm water management plans.

12.1.19. Potential impacts on wetlands

Extent		Duration		Magnitude		Probability		Significance	
Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
3	2	4	1	6	4	3	2	39 = Low	14 = Low

Mitigation Measures:

The following mitigation measures are aimed at the conservation of wetlands in general:

- The contractors used for the construction should have spill kits available prior to construction to ensure that any fuel, oil or hazardous substance spills are cleaned-up and discarded correctly;
- All construction activities must be restricted to the development footprint area. This includes laydown and storage areas, ablutions, offices etc.;
- During construction activities, all rubble generated must be removed from the site;
- Construction vehicles and machinery must make use of existing access routes;
- All chemicals and toxicants to be used for the construction must be stored in a demarcated area;

- All machinery and equipment should be inspected regularly for faults and possible leaks, these should be serviced off-site;
- All contractors and employees should undergo induction which is to include a component of environmental awareness. The induction is to include aspects such as the need to avoid littering, the reporting and cleaning of spills and leaks and general good “housekeeping”;
- Adequate sanitary facilities and ablutions on the servitude must be provided for all personnel throughout the project area. Use of these facilities must be enforced (these facilities must be kept clean so that they are a desired alternative to the surrounding vegetation);
- All removed soil and material stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds;
- Any exposed earth should be rehabilitated promptly by planting suitable vegetation (vigorous indigenous grasses) to protect the exposed soil;
- No dumping of construction material on site may take place;
- All waste generated on site during construction must be adequately managed. Separation and recycling of different waste materials should be supported.

**Recommendations**

The following recommendations have been made to ensure the conservation of the delineated wetlands during the construction and operational phase:

- It is recommended that a stormwater management plan be implemented for the cemetery. This is to prioritise the appropriate management of surface water;
- A condition for the Environmental Authorisation should be the bi-annual monitoring of surface water in both the HGM units during the operational phase of the cemetery. In the event contamination of the system by the functioning of the cemetery is recorded, reactive measures must be taken and the issuing authority consulted in this regard; and
- A 15 m buffer area must be adhered to for the identified watercourse within the 500 m regulated area.

12.1.20. Impact: Destruction or alteration of heritage finds (UP-DRB-2529-01, UP-DRB-2529-02, UP-DRB-2529-03, UP-DRB-2529-04, UP-DRB-2529-05, UP-DRB-2529-06 and UP-DRB-2529-07)

Extent		Duration		Magnitude		Probability		Significance	
Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
2	2	4	4	6	6	3	3	36 = Low	36 = Low

Mitigation Measures:

- UP-DRB-2529-01 is a farmhouse with associated outbuildings. Precise dating of the building is difficult, but aerial imagery suggests an original structure was erected in the late 1950s - early 1960s. In subsequent years, several major alterations were applied to the building to convert it into a house. The numerous alterations and severe alterations of the building means that it has very little heritage value. This assessment therefore finds that the building is of low significance (2a). No further steps are required.
- UP-DRB-2529-02, UP-DRB-2529-06 and UP-DRB-2529-07 are the remains of farm labourer quarters. While one (UP-DRB-2529-02) still has its walls mostly intact, the others are completely demolished. Surface material and aerial photos suggests an age likely less than 60 years. This date and the fact that the buildings and surrounding area have no archaeological or cultural deposits, means that UP-DRF-2529-01 carries low significance (2a) as a heritage site. It was recorded and documented in this Phase I assessment. No further mitigation steps are required.
- UP-DRB-2529-03 and UP-DRB-2529-04 are circular stone features of unknown use/function. No evidence suggests that these are archaeological in nature, and they likely relate to 20th century farming activities. As a result, it carries no significance (1) as a heritage site. No further mitigation steps are required.
- UP-DRB-2529-05 are the remains of 20th century linear field boundary walls less than 60 years old. These walls carry no significance (1). It was adequately recorded and documented in the Phase I Heritage Assessment. No further mitigation steps are required.

12.1.21. Impact: Abstraction of groundwater through boreholes may result in sinking water table

Extent		Duration		Magnitude		Probability		Significance	
Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
3	2	4	1	8	4	4	2	60 = Medium	14 = Low

Mitigation Measure:

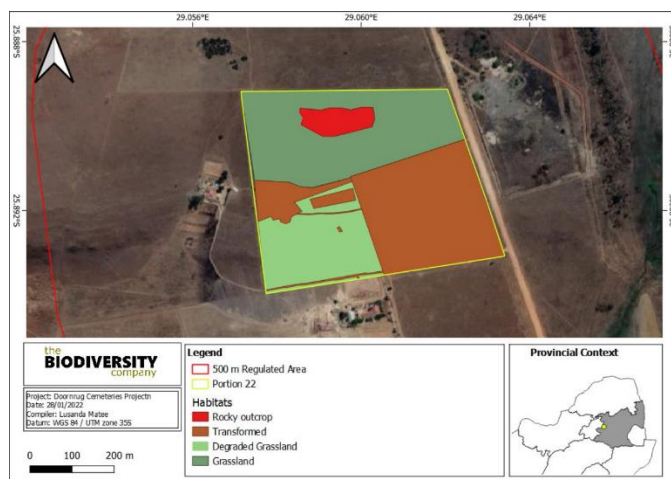
- A Water use Licence should be obtained before any water uses can commence and its recommendations should be complied with.

12.1.22. Impact: Disturbance of the sub-surface environment (Geotechnical) and potential impact on ground water.

Extent		Duration		Magnitude		Probability		Significance	
Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
3	2	5	4	8	6	3	2	48 = Medium	24 = Low

Mitigation Measure:

- The majority of the proposed site falls within the unacceptable suitability rating rendering most of the farm portion not suitable for use as a cemetery. The zone comprising approximately 7 ha rates primarily as poor and will require additional precautionary measures prior to and following the development. The extent of each zone may change with additional information gained from future excavations.
- The most critical geological and geomorphological constraints for this site will be:
  - The shallow and outcropping bedrock on the northern half and most of the southwestern portion.
  - The majority of the soils encountered across the site exhibits fair workability but relatively permeable properties.
- Negative influences due to the specific site conditions may include sensitivity of the groundwater sources in the area that may need additional investigation where the regional geological and hydrogeological settings are complex.
- The following suggestions may allow use of larger parts of the site within the context of a burial facility and can be regarded as mitigation measures with regards the poor ratings in the overall site classification for a cemetery:
  - Larger excavators and pre-excavation of graves for later opening and use.
  - Importation of backfill material in areas where excavated rock is not suitable for grave backfill.
  - Utilization of parts of shallow bedrock for shallow soil graves taking proper cognisance of surface and groundwater protection and management.
  - Earthwork to create 2 m of grave depth by importing fill, e.g. appropriately graded mine discard.
  - Well planned and constructed management of surface water runoff.
  - Surface structures rather than excavated graves, e.g. crematorium, mausoleums, etc., in the hard rock outcrop areas.
- It is recommended that further investigations be considered if some of the above listed measures are considered.
- No burials or any activities will be undertaken on the rocky outcrop. Refer to the map below.





### 12.2. Impacts anticipated during Decommissioning phase

During Decommissioning phase, there are not much impacts anticipated as the grave site would have reached capacity. No burial activities will be undertaken. In addition, it is not anticipated that any of the structures would need to be removed from site. Families who have buried their loved ones may want to visit the grave site even after the grave site has reached capacity.

However, if the authorities at the time that the site reaches capacity require that certain permits be obtained, the Developer will comply with these.

#### Cumulative impacts

The proposed site is located near a mine dump which is causing visual impact in the surrounding. The cemetery site may also cause negative visual impact, but the impact will be Low as the area is currently negatively impacted by the dump. Refer to the Figure below.



Figure 12.2-1: Mine dump near the proposed site

#### No-Go Option

The No-go option is the option of not going ahead with the proposed project. This means that the site remains as is and no negative / positive impacts occur.

**13. AN ENVIRONMENTAL IMPACT STATEMENT WHICH CONTAINS**

The proposed site is disturbed by agricultural activities that have been taking place over time. Positive and negative impacts have been identified and mitigation measures have been put in place. There are no fatal flaws that have been identified. Suitable mitigation measures have been provided for each negative impact. Refer to the table below for the impacts identified and their impact rating. Interested and Affected parties have been involved in the project and their comments addressed. Based on the specialist findings and recommendations, the impact assessment done and the feedback from the Authorities and Interested and Affected Parties, the EAP is of the opinion that the proposed project should be authorised.

Table 13-1: Summary of impacts assessed

Impact	Extent		Duration		Magnitude		Probability		Significance	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Impact: Job creation (This is a positive impact)	3		4		10		5		85 = High	
Impact: Light Pollution	3	2	4	3	8	4	4	3	60 = Medium	27 = Low
Impact: Noise Pollution	3	2	4	2	6	4	4	3	52 = Medium	24 = Low
Visual Impact	3	2	5	5	6	4	3	3	42 = Medium	42 = Medium
Impact: Crime activities in the area due to the development of a burial estate	3	2	4	3	8	4	4	2	60 = Medium	18 = Low
Impact: Potential fire incidents	3	1	3	1	8	4	4	2	56 = Medium	8 = Low
Impact: Traffic	2	1	2	2	4	2	2	2	16 = Low	10 = Low
Impact: Loss of Regionally Protected Species	2	1	5	1	6	2	4	2	52 = Medium	8 = Low
Impact: Loss of vegetation and habitats	2	1	5	1	6	2	4	2	52 = Medium	8 = Low
Impact: Potential disturbance of fauna	2	1	2	1	6	2	4	2	40 = Medium	8 = Low
Impact: Waste generation	3	2	3	3	8	6	4	2	56 = Medium	22 = Low
Impact: Sewage generation	3	1	3	2	8	2	4	2	56 = Medium	10 = Low

Final Basic Assessment Report for the Proposed Su Casa Burial Estate

Impact	Extent		Duration		Magnitude		Probability		Significance	
Non-compliance with permits and licenses due to poor or no Environmental awareness training	3	1	3	2	8	2	4	2	56 = Medium	10 = Low
Stormwater	3	2	4	2	6	2	4	2	52 = Medium	12 = Low
Soil Erosion and Dust Emission	3	2	4	2	6	4	4	2	52 = Medium	16 = Low
Impact on groundwater	3	2	5	2	8	2	3	2	48 = Medium	12 = Low
Hydrogeology	3	2	4	2	6	4	4	2	52 = Medium	16 = Low
Palaeontology	2	2	2	2	4	4	2	2	16 = Low	16 = Low
Loss of land capability	2	2	5	5	4	4	4	4	44 = Medium	44 = Medium
Potential impacts on wetland	3	2	4	1	6	4	3	2	39 = Low	14 = Low
Impact: Destruction or alteration of heritage finds (UP-DRB-2529-01, UP-DRB-2529-02, UP-DRB-2529-03, UP-DRB-2529-04, UP-DRB-2529-05, UP-DRB-2529-06 and UP-DRB-2529-07)	2	2	4	4	6	6	3	3	36 = Low	36 = Low
Abstraction of groundwater through a borehole may result in sinking water table	3	2	4	1	8	4	4	2	60 = Medium	14 = Low



Final Basic Assessment Report for the Proposed Su Casa Burial Estate

Impact	Extent		Duration		Magnitude		Probability		Significance	
Geotechnical	3	2	5	4	8	6	3	2	48 = Medium	24 = Low

**14. A SUMMARY OF THE FINDINGS AND RECOMMENDATIONS OF ANY SPECIALIST REPORT COMPLYING WITH APPENDIX 6 TO THE REGULATIONS AND AN INDICATION AS TO HOW THESE FINDINGS AND RECOMMENDATIONS HAVE BEEN INCLUDED IN THE FINAL ASSESSMENT REPORT**

The table below includes the summary of the specialist finding and recommendations and an indication of how these have been included in the Basic Assessment Report.

Table 14-1 : Summary of the Findings of the Specialist Reports		
Name of the report	Findings and recommendation	Section of the report where the information is included
Terrestrial Compliance Statement	<p>The area has been altered from its original state however it can still affect species in the surrounding area by means of erosion, dust, fire, alien vegetation introduction and proliferation, poor waste management resulting in increase in pest numbers, as well as chemical spills.</p> <p>Through the analysis of various database and satellite imagery as well as the infield screening assessment it was determined that although majority of the site is degraded to different degrees it still possess quite a number of sensitive ecological receptors. These sensitivity receptors relate to being located in VU ecosystems, traversing two threatened ecosystems and traversing a protected area. In addition to this the Lanner Falcon (<i>Falco biarmicus</i>) listed as VU was also recorded in the project area. The rocky outcrop was assigned a high sensitivity. It is therefore recommended that it is demarcated as a no-go area and no laydown areas, access roads or other project activities must occur within this area during either the construction or operational phase.</p> <p>The majority of the project area is in a highly degraded state as the vegetation structure and species composition has been completely altered as such, has a very low conservation value and ecological sensitivity from a floral perspective.</p> <p>No fatal flaws are evident for the proposed project. It is the opinion of the specialists that the project, may be favourably considered for authorisation and a follow-up survey is not considered essential for decision-making. All prescribed</p>	It is included in Section 14 of this report and the EMPr attached as Appendix F.

Table 14-1 : Summary of the Findings of the Specialist Reports		
Name of the report	Findings and recommendation	Section of the report where the information is included
	<p>mitigation measures and supporting recommendations must be considered by the issuing authority. Mitigation measures as described in this report will reduce the significance of the risk to an acceptable level.</p> <ul style="list-style-type: none"> <li>• All construction activities must be carried out according to the generally accepted environmental best practice and the spatial footprint must be kept to a minimum.</li> <li>• Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further. Clearing of vegetation should be minimized and avoided where possible. All activities must be restricted within the development footprint sensitivity areas. No loss of areas surrounding the development area. It is recommended that areas to be developed be specifically demarcated so that during the construction phase, only the demarcated areas be impacted upon (including fencing off the defined project area).</li> <li>• Should any indigenous vegetation be removed outside the designated areas or direct project footprint, the Contractor must notify the relevant person on site, i.e., the PM, and the site must be rehabilitated if required and the structures replaced.</li> <li>• Regionally protected (SCC species) must be marked for rescue and relocation, or removal (where permit application would then apply) before any vegetation removal commences.</li> <li>• Where possible, existing access routes and walking paths must be made use of, and the development of new routes limited.</li> </ul>	

Table 14-1 : Summary of the Findings of the Specialist Reports		
Name of the report	Findings and recommendation	Section of the report where the information is included
	<ul style="list-style-type: none"> <li>• Disturbed sites must be rehabilitated as soon as construction in an area is complete or near-complete and not left until the end of the project to be rehabilitated (concurrent rehabilitation).</li> <li>• Effective landscaping must be conducted in areas affected by erosion/ sedimentation. The developer must ensure that any open spaces are rehabilitated, and the appropriate indigenous vegetation is introduced.</li> <li>• All laydown, chemical toilets etc. should be restricted to low sensitivity areas. Any materials may not be stored for extended periods of time and must be removed from the project area once the construction/closure phase has been concluded. Buildings should preferably be prefabricated or constructed of re-usable/recyclable materials. No storage of vehicles or equipment will be allowed outside of the designated project areas.</li> <li>• It is recommended that the supervisor of the vegetation clearing contractors receive adequate training as to the presence, identity, and management of species of conservation importance, and that a botanical specialist/ECO (Environmental Control Officer) be appointed during vegetation clearing to conduct monthly on-site audits of the vegetation clearing process.</li> <li>• A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that, it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. No servicing of equipment on-site during construction unless necessary. All contaminated soil/yard stone shall be treated in situ or removed and be placed in containers.</li> </ul>	



Table 14-1 : Summary of the Findings of the Specialist Reports		
Name of the report	Findings and recommendation	Section of the report where the information is included
	<ul style="list-style-type: none"> <li>• Leaking equipment and vehicles must be repaired immediately or be removed from the project areas to facilitate the repair.</li> <li>• A fire prevention and emergency response plan needs to be compiled and implemented to restrict the impact fire might have on the project area and its immediate surrounding.</li> <li>• Employees and contractors should be made aware of the presence of, and rules regarding fauna through suitable induction training and on-site signage.</li> <li>• It is recommended that the supervisors of the vegetation clearing, and construction contractors receive adequate training as to the presence, identity and management of on-site fauna.</li> <li>• IAP species should be managed using the existing mine AIP management plan. Removal AIPs should preferably commence during the pre-construction phase and continue throughout the construction and operational phases. AIPs should be cleared within the project area before any vegetation clearing activities commence, thereby ensuring that no AIP propagules are spread, or soils contaminated with AIP seeds during the construction phase; and the existing mine AIP Management/Control Plan should be implemented by a qualified professional. No chemical control of AIPs to occur without a certified professional.</li> <li>• Regular monitoring of the implementation of this plan for the rehabilitation of disturbed areas must be conducted by the appointed ECO.</li> <li>• Formal waste management and sewerage systems must be put in place for contractors.</li> <li>• Waste management must be a priority and all waste must be collected and stored effectively.</li> </ul>	

Table 14-1 : Summary of the Findings of the Specialist Reports		
Name of the report	Findings and recommendation	Section of the report where the information is included
	<ul style="list-style-type: none"> <li>• No dumping of litter, rubble or cleared vegetation on site should be allowed. Infrastructure and rubble removed as a result of the construction activities should be reduced, re-used or recycled with disposal to landfill as last resort. No temporary dump sites should be allowed in areas with natural vegetation. It is advised that waste disposal containers and bins be provided during the construction phase for all construction rubble and general waste. Vegetation cuttings must be carefully collected and disposed of at a separate waste facility. Refuse bins must be placed at strategic positions to ensure that litter does not accumulate within the construction site.</li> <li>• A minimum of one toilet must be provided per 10 persons. Portable toilets must be pumped dry to ensure the system does not degrade over time and spill into the surrounding area.</li> <li>• Ensure that all site personnel have a basic level of environmental awareness training. A signed register of attendance must be kept for proof. Discussions are required on sensitive environmental receptors within the project area to inform contractors and site staff of the possible presence of SSC, their identification, conservation status and importance, biology, habitat requirements and management requirements the Environmental Authorisation and within the EMP. The avoidance and protection of the surrounding watercourses and riparian areas must be included into a site induction. Contractors and employees must all undergo the induction and be made aware of the areas to be avoided.</li> <li>• The Contractor must provide method statements on the protocols to be followed and contingencies to be implemented.</li> <li>• A Stormwater Management Plan must be developed to control runoff and prevent erosion of the site and its surroundings.</li> </ul>	

Table 14-1 : Summary of the Findings of the Specialist Reports		
Name of the report	Findings and recommendation	Section of the report where the information is included
	<ul style="list-style-type: none"> <li>• Appropriate stormwater structures alongside a stormwater management plan must be designed to minimise erosion of the surrounding environment and sedimentation of surrounding watercourses.</li> <li>• Dust minimization and control measures should be implemented on the construction site at regular intervals. This includes wetting of exposed soft soil surfaces. No water may be abstracted from any water source without an applicable License from DWS. The frequency of implementation of dust suppression measures should be increased when it is expected that high wind conditions will develop.</li> <li>• Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events. This will also reduce the likelihood of encroachment by alien invasive plant species.</li> <li>• Vegetation clearing should only occur immediately prior to the commencement of construction activities in an area to minimize the amount of exposed soil on the site. Stockpiles and spoil heaps must be covered with tarps or straw to prevent fugitive dust.</li> </ul>	
Groundwater	The source of water to the aquifer is natural recharge from precipitation. Recharge was stated to be approximately 6% of the MAP of 790 mm, which equates to 474 m <sup>3</sup> /ha/a. Typical contaminants from cemeteries include, <i>E.coli</i> , pathogens, ammonia, nitrate, and an increase in EC. Groundwater levels at the site are reportedly 23 – 40 mbgl and so there would appear to be a relatively thick unsaturated zone present which will provide mitigation by means of attenuation of the infiltration of contaminants.	It is included in Section 14 of this report and the EMPr attached as Appendix F.

Table 14-1 : Summary of the Findings of the Specialist Reports		
Name of the report	Findings and recommendation	Section of the report where the information is included
	<p>There will be minimal modification to the flow drivers, which for groundwater will be throughflow of groundwater from upstream, i.e. from the north and northeast. However, the site is situated on a ridge and a small portion of the northern part of the site will drain towards the north-northwest.</p> <p>Research carried out by the Faculty of Natural and Agricultural Sciences at the University of Pretoria (? 2015) derived the following buffer zones for cemeteries:</p> <ul style="list-style-type: none"> <li>• Minimum depth to the water table of 4.0 m;</li> <li>• Lateral distance to rivers, wells or springs of 30 – 100 m; and</li> <li>• Lateral distance to a drinking water source of 250 – 500 m.</li> </ul> <p>The minimum and maximum lateral distances relate to the expected speed of groundwater movement so aquifers with higher hydraulic conductivity/transmissivity would require a larger lateral separation from a cemetery. Groundwater levels at the site are reportedly 23 – 40 mbgl and so comfortably exceed the minimum requirement in this respect. The DWAF aquifer classification indicates moderate to low borehole yields at the site and surrounds and so a conservative buffer under bullet points two and three above would be 65 m and 375 m, respectively. It is concluded that the EIS for the site is moderate and that alterations to the PES, i.e. possible deterioration in groundwater quality, will be limited to the site and buffer areas.</p> <p><b>Recommendations</b></p>	

Table 14-1 : Summary of the Findings of the Specialist Reports		
Name of the report	Findings and recommendation	Section of the report where the information is included
	<p>Based on the information presented above, the following conclusions are drawn:</p> <ul style="list-style-type: none"> <li>• The site is located in quaternary catchment B20G with local flow to the south and then to the west along the Grootspuit.</li> <li>• There are industrial and mining sites to the north and east of the site, including coal and lime plants, ferroalloys and Elandsfontein Colliery, with slimes dams and waste rock dumps immediately to the east.</li> <li>• The northern part of the site is located on sandstones and shales of the Wilge River Formation of the Waterberg Group, while the southern part overlies shales of the Pretoria Group.</li> <li>• Soils at the site are of low agricultural potential.</li> <li>• The local aquifer is an intergranular &amp; fractured and fractured type with a low to moderate yield potential, with median borehole yields of 0.5 – 2 l/s.</li> <li>• There are nine registered boreholes located within a 5 km radius of the site but none (registered) within 1 km.</li> <li>• There are two non-functional boreholes on the site and a further four functional boreholes on adjacent properties.</li> <li>• Groundwater in the region and site area occurs at 10 – 40 mbgl.</li> <li>• Groundwater flow direction is inferred to be to the southeast from the southern part of the site and possibly to the north from a very small area of the northern part.</li> <li>• Groundwater in the area is of generally good to moderate quality with an indicated EC of 70 – 300 mS/m and likely to be of a calcium/magnesium bicarbonate type.</li> <li>• Groundwater in the site area is of very good quality with EC of 3.4 – 10.4 mS/m, acidic pH and very low concentrations of all major and minor ions.</li> </ul>	



Table 14-1 : Summary of the Findings of the Specialist Reports		
Name of the report	Findings and recommendation	Section of the report where the information is included
	<ul style="list-style-type: none"> <li>• The potential receptors for any contamination from the site via groundwater are boreholes 1, 2 and 3 and the minor stream to the east of the site.</li> <li>• The site has a moderate groundwater risk according to this Tier 1 assessment.</li> <li>• The EIS for the site is moderate and alterations to the PES, i.e. possible deterioration in groundwater quality, will be limited to the site and buffer areas.</li> </ul> <p>It is recommended that the following mitigation measures/monitoring be carried out:</p> <ul style="list-style-type: none"> <li>• Digging of geotechnical test pits on site to assess soil characteristics such as thickness, clay content and permeability.</li> <li>• Establishment of an upstream and a downstream monitoring borehole, for which use the two on-site boreholes 5 and 6 could possibly be adapted.</li> <li>• Establishment of a lateral buffer zone of 65 m from the site boundaries for rivers, wells and springs.</li> <li>• Establishment of a lateral buffer zone of 350 m from the site boundaries for drinking water sources.</li> <li>• The taking of a water sample from these boreholes prior to the establishment of the cemetery and laboratory analysis for pH, EC, TDS, Na, K, Mg, Ca, Cl, SO<sub>4</sub>, NO<sub>3</sub>, F, Fe, Mn, Cu, Ni, Cd, Cr, Zn, Al, As and Total Alkalinity, plus bacteriological/pathogen indicators.</li> <li>• Taking of a water sample on a biannual basis from these boreholes and analysis for the above parameters.</li> </ul>	

Table 14-1 : Summary of the Findings of the Specialist Reports		
Name of the report	Findings and recommendation	Section of the report where the information is included
	<ul style="list-style-type: none"> <li>• Compilation of a monitoring record of water levels and quality and assessment of the data by a hydrogeologist every six months. Submission of reports to the DHSWS, as required by them. Continuation or modification of the monitoring programme as dictated by results or the regulatory authorities.</li> </ul> <p><b>Monitoring</b></p> <p>It is recommended that monitoring boreholes be established at the upstream (north) and downstream (south) boundaries of the site. On-site boreholes 5 and 6 could possibly be adapted for this purpose.</p> <p>The following groundwater monitoring activities are recommended:</p> <ul style="list-style-type: none"> <li>• The taking of a water sample from “Upstream” (No 6) and “Downstream” (No 5) boreholes prior to the establishment of the cemetery. Laboratory analysis for:               <ul style="list-style-type: none"> <li>○ Physical parameters pH, EC, TDS;</li> <li>○ Major ions, Na, K, Mg, Ca, Cl, SO<sub>4</sub>, NO<sub>3</sub> and Total Alkalinity;</li> <li>○ Trace ions and metals, F, As, Fe, Mn, Pb, Cd, Cu, Cr, Ni, Cd, Zn and Al;</li> <li>○ Bacteriological indicators.</li> </ul> </li> <li>• Taking of a water sample on a biannual basis from these boreholes and analysis for the above parameters;</li> <li>• Compilation of a monitoring record of quality and assessment of the data by a hydrogeologist annually. Continuation or modification of the monitoring programme as dictated by results; and as directed by the DEA/DWS.</li> </ul>	
Heritage Impact Assessment	Heritage finds were discovered.	It is included in Section 14 of this report and the

Table 14-1 : Summary of the Findings of the Specialist Reports		
Name of the report	Findings and recommendation	Section of the report where the information is included
	<p><u>Site: UP-DRB-2529-01</u></p> <p>Description: Extant 20th Century farmhouse and outbuildings</p> <p>Coordinates: S25.891839° E29.057555°</p> <p>UP-DRB-2529-01 represent an extant house and outbuildings. A portion of the building may potentially be older than 60 years since historical images from 1962 indicates a single square building where the current house is located. It does not appear on earlier images from 1943. The northeast orientation of the building and the clearly visible wall joints indicates that the original structure likely corresponds to the southeast portion of the current house. Extensive expansions and alterations have been made to the original structure in subsequent years that have severely altered the original building severely diminishing its heritage value.</p> <p>There are several outbuildings around the house. These include a stonewalled chicken coop/storeroom and brick garage. Aerial images and field inspection of building materials indicate that these are all less than 60 years old.</p> <p><u>Site: UP-DRB-2529-02</u></p> <p>Description: Remains of 20th structure</p> <p>Coordinates: S25.892437°; E29.059471°</p> <p>Site UP-DRB-2529-02 is the remains of a two roomed rectangular structure roughly orientated in a northwest-southeast direction. The walls are dry stacked local stone, built up to a height of approximately 60cm. Wall abutting joints indicate that the structure was built in two phases. The first was the construction a 3mx5m northern room, and later, a 9mx5m southern room was added. There is a single entrance to structure which leads directly into the southern room with the</p>	<p>EMPr attached as Appendix F.</p>

Table 14-1 : Summary of the Findings of the Specialist Reports		
Name of the report	Findings and recommendation	Section of the report where the information is included
	<p>doorway to the northern room immediately on the right. The interior of the northern room was covered with a cement plaster and a cement cap was placed on the top course of the wall. No cement reinforcing or plaster were observed at the southern room. It is possible that the walls supported a superstructure of material that has either perished or had been removed.</p> <p>Determining the age is however difficult since it does not appear on early aerial images and no material culture was present to provide a relative date. The earliest aerial images where the site is clearly visible is dated 2005, but at this stage it is already in a ruined state. It is likely that this structure served as living quarters for farm labourers in the 20th century. Its absence on the 1962 and 1979 images implies that it was erected after these dates, and therefore less than 60 years old.</p> <p><u>Sites: UP-DRB-2529-03 UP-DRB-2529-04</u></p> <p>Description: Circular stone features</p> <p>Coordinates: S25.890951 E29.057902 (UP-DRB-2529-03) E25.893120 E29.059667 (UP-DRB-2529-04)</p> <p>Two circular stone mounds were identified whose use/function is unknown. UP-DRB-2529-03 is approximately 60cm in diameter and formed by an outer ring of large stones and filled with smaller stones. UP-DRB-2529-04 is an approximately 1m wide pile of stones (~10-20cm range). No material culture was associated with the features, however, given the absence of prehistoric remains in the immediate vicinity, these most likely relate to 20th century activities.</p> <p><u>Sites: UP-DRB-2529-05</u></p>	

Table 14-1 : Summary of the Findings of the Specialist Reports		
Name of the report	Findings and recommendation	Section of the report where the information is included
	<p>Description: Linear field boundary walls in southwest section of project area Coordinates: S25.892844 E29.058729 (centre coordinate)</p> <p>In the southwestern section of the project area there are linear stone walls that demarcate old field boundaries. In places metal fence poles are and fencing wire is trapped in the stones. Some of these are faintly visible on aerial photos from 1979, and the absence of the other walls show that the majority may be more recent than this date.</p> <p><u>Site: UP-DRB-2529-06 UP-DRB-2529-07</u></p> <p>Description: Collapsed stone and brick walling. Coordinates: S25.890433 E29.058116 (UP-DRB-2529-06) S25.889638 E29.059267 (UP-DRB-2529-07)</p> <p>In the northern section of the project area, the remains of two structures were identified. Both are completely collapsed which makes interpretation and reconstruction difficult. Google Earth images does suggest that each were rectangular shape. Both were constructed from a combination of natural stone, brick, and cement mortar. The original walls seem to be around 60-80cm high. Fragments of plaster on some bricks indicates that the inside of these structures were plastered with cement and painted white. A few pieces of structural metal such as corrugated sheeting indicate that these may also have been used in the original building. Green glass bottle fragments on UP-DRB-2529-06 were the only material culture identified.</p> <p>The earliest images where these features are visible are from 1979. In these historical images, there are clear footpaths connecting both to one another and to southwest to the main farmhouse complex northeast to the main road. These</p>	



Table 14-1 : Summary of the Findings of the Specialist Reports		
Name of the report	Findings and recommendation	Section of the report where the information is included
	<p>pathways suggest that these were likely the remains of farm labourer housing. Given their absence on earlier images, they likely date to the 1970s.</p> <p><u>Graves and burial grounds</u></p> <p>No graves or burial grounds were encountered during the survey. The current owner of the farm (whose family had lived there) stated that he is unaware of any graves.</p> <p><b>Recommendations</b></p> <ul style="list-style-type: none"> <li>UP-DRB-2529-01 is a farmhouse with associated outbuildings. Precise dating of the building is difficult, but aerial imagery suggests an original structure was erected in the late 1950s - early 1960s. In subsequent years, several major alterations were applied to the building to convert it into a house. The numerous alterations and severe alterations of the building means that it has very little heritage value. This assessment therefore finds that the building is of low significance (2a). No further steps are required.</li> <li>UP-DRB-2529-02, UP-DRB-2529-06 and UP-DRB-2529-07 are the remains of farm labourer quarters. While one (UP-DRB-2529-02) still has its walls mostly intact, the others are completely demolished. Surface material and aerial photos suggests an age likely less than 60 years. This date and the fact that the buildings and surrounding area have no archaeological or cultural deposits, means that UP-DRF-2529-01 carries low significance (2a) as a heritage site. It was recorded and documented in this Phase I assessment. No further mitigation steps are required.</li> </ul>	

Table 14-1 : Summary of the Findings of the Specialist Reports		
Name of the report	Findings and recommendation	Section of the report where the information is included
	<ul style="list-style-type: none"> <li>UP-DRB-2529-03 and UP-DRB-2529-04 are circular stone features of unknown use/function. No evidence suggests that these are archaeological in nature, and they likely relate to 20th century farming activities. As a result, it carries no significance (1) as a heritage site. No further mitigation steps are required.</li> <li>UP-DRB-2529-05 are the remains of 20th century linear field boundary walls less than 60 years old. These walls carry no significance (1). It was adequately recorded and documented in the Phase I Heritage Assessment. No further mitigation steps are required.</li> </ul> <p>Investigation of the Project Area identified seven sites. These however respectively carry no (category 1 – no mitigation) and low (category 2a - recording) heritage significance. These ratings mean that no further mitigation is needed and that the proposed cemetery can continue from a heritage point of view.</p>	
Palaeontological Impact Assessment	<p>Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks are either much too old to contain fossils or are the correct age but wrong lithology. Furthermore, the material to be excavated is soil and this does not preserve fossils. Since there is a very small chance that plant fossils from the Dwyka Group may be disturbed a Fossil Chance Find Protocol has been added to this report. Taking account of the defined criteria, the potential impact to fossil heritage resources is very low.</p> <p>Based on experience and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would be preserved in the Dwyka Group shales and tillites and not in the overlying soils and sands of the Quaternary. There is a very small chance that fossils may occur below ground in the adjacent shales and tillites of the Dwyka Group</p>	It is included in Section 14 of this report and the EMPr attached as Appendix F.

Table 14-1 : Summary of the Findings of the Specialist Reports		
Name of the report	Findings and recommendation	Section of the report where the information is included
	<p>(Karoo Supergroup) so a Fossil Chance Find Protocol should be added to the EMP. If fossils are found by the environmental officer, or other responsible person once excavations have commenced then they should be rescued and a palaeontologist called to assess and collect a representative sample. The impact on the palaeontological heritage would be low so as far as the palaeontology is concerned, the project should be authorised.</p> <p><b>Chance Find Protocol</b></p> <p>Monitoring Programme for Palaeontology – to commence once the excavations begin.</p> <ul style="list-style-type: none"> <li>• The following procedure is only required if fossils are seen on the surface and when excavations commence.</li> <li>• When excavations begin the rocks and must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (plants, insects, bone, coal) should be put aside in a suitably protected place. This way the project activities will not be interrupted.</li> <li>• Photographs of similar fossils must be provided to the developer to assist in recognizing the fossil plants, vertebrates, invertebrates or trace fossils in the shales and mudstones (for example see Figure 115). This information will be built into the EMP’s training and awareness plan and procedures.</li> <li>• Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.</li> </ul>	

Table 14-1 : Summary of the Findings of the Specialist Reports		
Name of the report	Findings and recommendation	Section of the report where the information is included
	<ul style="list-style-type: none"> <li>• If there is any possible fossil material found by the developer/environmental officer then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the selected material and check the dumps where feasible.</li> <li>• Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.</li> <li>• If no good fossil material is recovered then no site inspections by the palaeontologist will be necessary. A final report by the palaeontologist must be sent to SAHRA once the project has been completed and only if there are fossils.</li> <li>• If no fossils are found and the excavations have finished then no further monitoring is required.</li> </ul> <p>Examples of fossils from the Dwyka Group.</p>	


Table 14-1 : Summary of the Findings of the Specialist Reports		
Name of the report	Findings and recommendation	Section of the report where the information is included
	 <p><b>Figure 14-1: Photographs of fossil plants of the early Glossopteris flora that occur in the Dwyka Group sediments in north western South Africa.</b></p>	
Hydropedology	The proposed Su Casa Burial Estate and associated infrastructure components will have very little impact on the hydropedology of the relevant hillslopes, regardless of the position of the grave sites (crest, mid-slope or valley bottom). For recharge soils (which are dominant), recharge won't be affected at all given the fact that infiltration will only be impeded	Included in Section 11 of this report and the EMPr attached as Appendix F.



Table 14-1 : Summary of the Findings of the Specialist Reports		
Name of the report	Findings and recommendation	Section of the report where the information is included
	<p>for the width of the grave site, which has been deemed insignificant given the size of the catchments as the dominant flow paths will remain vertical recharging groundwater stores; for a conceptual example of interferences via the proposed grave sites).</p> <p>The responsive (saturated) hydropedological types, are usually not recommended for most activities as their interface can affect the total streamflow of sensitive receptors. Also, responsive (saturated) hydropedological soil types tend to promote migration of contaminates towards water resources. In the case of the burial site body decomposition will occur. The proposed Su Casa Burial Estate and associated infrastructure components located within the recharge hydropedological type is not expected to affect the hillslope hydrology in any manner. Limited impacts can occur due the impeded vertical flows on the burial coffins and caskets are expected. These effects are however expected to have negligible impacts towards the total streamflow of sensitive receptors.</p> <p>Two main hillslope types were identified, which includes the presence of recharge (shallow) and responsive hydropedological types. The proposed Su Casa Burial Estate and associated infrastructure components will have no effect on the hillslope hydrology due to the extent of the grave sites (diameter), the fact that recharge dominates even though shallow throughout as well as the size of the greater catchment. Also, no impacts on the total streamflow of watercourses as both lateral and vertical flow paths will occur in response to the flow impediment.</p>	

Table 14-1 : Summary of the Findings of the Specialist Reports		
Name of the report	Findings and recommendation	Section of the report where the information is included
	<p>Measures can be set on soils with some expected changes in flow paths prior to the burial estate establishment. Development should avoid areas with responsive (saturated) hydrogeological soil types as they can promote contaminates migration and also act as receptors for groundwater stores.</p> <p><b>Surface Water Monitoring Programme</b></p> <p>The limits prescribed in this monitoring programme are stipulated in the Target Water Quality Range (TWQR) for aquatic ecosystems (DWAF, 1996). This prescribed monitoring programme should be conducted in conjunction with other aspects of riverine monitoring in the form of aquatic biomonitoring which addresses macroinvertebrate and ichthyofauna assemblages on a bi-yearly basis. The surface water monitoring programme will require monthly monitoring of the adjacent valley bottom wetland at two sites, upstream (control site) and a downstream monitoring site. The watercourse should be monitored for the prescribed aspects below (Table 29).</p> <p>Contaminants emanating from burial practices are typically based on the following:</p> <ul style="list-style-type: none"> <li>• Their sources (whether from the body's decomposition, accessory burial materials, or associated activities)</li> <li>• The rate at which they are released to the subsurface</li> <li>• Their mobility and persistence in the subsurface, and</li> <li>• Their toxicity or health effects on receptors.</li> </ul>	

Table 14-1 : Summary of the Findings of the Specialist Reports																																								
Name of the report	Findings and recommendation				Section of the report where the information is included																																			
	<p>Table 27: Proposed water quality parameters</p> <table border="1"> <thead> <tr> <th>Parameters</th> <th>pH</th> <th>Conductivity (µS/cm)</th> <th>Dissolved Oxygen (mg/l)</th> <th>Temperature (°C)</th> </tr> </thead> <tbody> <tr> <td>TWQR*</td> <td>6.5-9.0</td> <td>-</td> <td>&gt;5.00</td> <td>5-30*</td> </tr> <tr> <td>Metals</td> <td colspan="4">Ti, Cr, Cd, Pb, Fe, Mn, Ni, Zn, As</td> </tr> <tr> <td>Nutrients</td> <td colspan="4">NO3, PO4, Cl, salts of Ca, Na, K, Mg</td> </tr> <tr> <td>Organics</td> <td colspan="4">Formaldehyde, Methanol</td> </tr> <tr> <td>Pathogens</td> <td colspan="4">Bacteria, Viruses, Microorganisms, Fungi</td> </tr> <tr> <td colspan="5" style="text-align: center;">*TWQR – Target Water Quality Range (DWAF, 1996)</td> </tr> </tbody> </table>				Parameters	pH	Conductivity (µS/cm)	Dissolved Oxygen (mg/l)	Temperature (°C)	TWQR*	6.5-9.0	-	>5.00	5-30*	Metals	Ti, Cr, Cd, Pb, Fe, Mn, Ni, Zn, As				Nutrients	NO3, PO4, Cl, salts of Ca, Na, K, Mg				Organics	Formaldehyde, Methanol				Pathogens	Bacteria, Viruses, Microorganisms, Fungi				*TWQR – Target Water Quality Range (DWAF, 1996)					
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Pedology	<p>Three soil forms were identified within the 50 m regulated area, namely Mispah, Glenrosa and Clovelly soil forms. The most sensitive of these soil forms are characterised by a land potential 6, due to the poor climate, with a 'Low' sensitivity. The land capability sensitivities (DAFF, 2017) indicate land capabilities with "Moderate" sensitivities, which do not correlate with the findings from the baseline assessment.</p> <p>Considering the nature of the proposed activities and the low sensitivity soil resources, it is the specialist's opinion that no loss of land capability is expected, and no segregation of high production agricultural resources are expected. Therefore, it is recommended that the proposed activities may proceed as have been planned.</p> <p><b>Mitigation measures</b></p>				Section 11 of this report and the EMPr attached as Appendix F.																																			

Table 14-1 : Summary of the Findings of the Specialist Reports		
Name of the report	Findings and recommendation	Section of the report where the information is included
	<ul style="list-style-type: none"> <li>• Monitor compaction on site</li> <li>• Detailed investigation into ideal locations for the construction of all the infrastructure on site</li> <li>• Clearing of vegetation.</li> <li>• Implement proper storm water management plans</li> </ul>	
Wetland Assessment	<p>Considering the distance between the proposed cemetery development as well as the fact that the area between the proposed activity and the relevant HGM units is characterised by Glenrosa soil forms with deep, freely drained orthic topsoil with a lithic subsoil (which completely eliminates overland flow), no indirect risks are foreseen.</p> <p><b>Mitigation Measures</b></p> <p>The following mitigation measures are aimed at the conservation of wetlands in general;</p> <ul style="list-style-type: none"> <li>• The contractors used for the construction should have spill kits available prior to construction to ensure that any fuel, oil or hazardous substance spills are cleaned-up and discarded correctly;</li> <li>• All construction activities must be restricted to the development footprint area. This includes laydown and storage areas, ablutions, offices etc.;</li> <li>• During construction activities, all rubble generated must be removed from the site;</li> <li>• Construction vehicles and machinery must make use of existing access routes;</li> <li>• All chemicals and toxicants to be used for the construction must be stored in a demarcated area;</li> </ul>	Section 11 of this report and the EMPr attached as Appendix F.

Table 14-1 : Summary of the Findings of the Specialist Reports		
Name of the report	Findings and recommendation	Section of the report where the information is included
	<ul style="list-style-type: none"> <li>• All machinery and equipment should be inspected regularly for faults and possible leaks, these should be serviced off-site;</li> <li>• All contractors and employees should undergo induction which is to include a component of environmental awareness. The induction is to include aspects such as the need to avoid littering, the reporting and cleaning of spills and leaks and general good “housekeeping”;</li> <li>• Adequate sanitary facilities and ablutions on the servitude must be provided for all personnel throughout the project area. Use of these facilities must be enforced (these facilities must be kept clean so that they are a desired alternative to the surrounding vegetation);</li> <li>• All removed soil and material stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds;</li> <li>• Any exposed earth should be rehabilitated promptly by planting suitable vegetation (vigorous indigenous grasses) to protect the exposed soil;</li> <li>• No dumping of construction material on site may take place;</li> <li>• All waste generated on site during construction must be adequately managed. Separation and recycling of different waste materials should be supported.</li> </ul> <p><b>Recommendations</b></p>	



Table 14-1 : Summary of the Findings of the Specialist Reports		
Name of the report	Findings and recommendation	Section of the report where the information is included
	<p>The following recommendations have been made to ensure the conservation of the delineated wetlands during the construction and operational phase;</p> <ul style="list-style-type: none"> <li>• It is recommended that a stormwater management plan be implemented for the cemetery. This is to prioritise the appropriate management of surface water;</li> <li>• A condition for the Environmental Authorisation should be the bi-annual monitoring of surface water in both the HGM units during the operational phase of the cemetery. In the event contamination of the system by the functioning of the cemetery is recorded, reactive measures must be taken and the issuing authority consulted in this regard; and</li> <li>• A 15m buffer areas must be adhered to for the identified watercourse within the 500m regulated area.</li> </ul> <p>Two HGM units were identified within the 500 m regulated area, of which both have been classified as unchanneled valley bottom wetlands. The average ecosystem service scores for the HGM units were rated as “Intermediate”. The integrity of the systems was determined to be “Largely Modified” (class D). The ecological importance and sensitivity of the delineated wetlands was classified as “Moderate”. A 15 m post-mitigation buffer zone has been calculated and recommended for the proposed housing development.</p> <p>No wetland systems are located within the project area, thus all direct risks to wetlands are avoided. Considering the distance between the proposed activity as well as the fact that the area between the proposed cemetery and the relevant HGM units are characterised by the Glenrosa soil forms with deep, freely drained orthic topsoil with a lithic subsoil (which completely eliminates overland flow), no indirect risks are foreseen.</p>	

Table 14-1 : Summary of the Findings of the Specialist Reports		
Name of the report	Findings and recommendation	Section of the report where the information is included
	<p>Since no risks are expected towards natural wetland systems, it is recommended that the proposed activities may proceed without the application for a water use license or general authorisation.</p> <p>Due to the presence of drainage lines/features in relation to the project area, the following Listing Notice is applicable:</p> <p><u>Regulatory authorisation required</u></p> <p>Listed activities in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) EIA Regulations (2014), as amended.</p> <p>Department of Environmental Affairs and Development Planning (DEA&amp;DP)</p> <p><u>Zone of applicability</u></p> <p><i>Activity 12 of Listing Notice 1 (GN 327) of the National Environmental Management Act, 1998 (Act No.107 of 1998) EIA regulations, 2014 (as amended) states that:</i></p> <p><i>The development of:</i></p> <p><i>(xii) Infrastructure or structures with a physical footprint of 100 square meters or more;</i></p> <p><i>Where such development occurs—</i></p> <p><i>a) Within a watercourse;</i></p> <p><i>b) In front of a development setback; or</i></p> <p><i>c) If no development setback has been adopted, within 32 meters of a watercourse, measured from the edge of a watercourse.</i></p>	

Table 14-1 : Summary of the Findings of the Specialist Reports		
Name of the report	Findings and recommendation	Section of the report where the information is included
Groundwater investigations for the proposed abstraction boreholes on the Portion 10 Of The Farm Doornrug 302 In The Mpumalanga Province of South Africa	<p><b>Findings</b></p> <ul style="list-style-type: none"> <li>• The study area is characterised by coal mines, farming both crop and livestock farming. Most of the area is covered by the farms surrounding the proposed cemetery, although coal mines are mostly located on the eastern side. Farmer houses are local houses adjacent to the site although they are very few in the south and on the western side.</li> <li>• Faults zones may have an impact on the local hydrogeological regime as it can serve as potential preferred pathways for groundwater flow and contaminant transport. The Cemetery is located within the Class B fractured aquifers which is associated with hard and compact rock formations in which fractures, fissures and/or joints occur that are capable of both storing and transmitting water in useful quantities.</li> <li>• The Eccca Group consists mainly of shales and sandstones that are very dense with permeability usually very low due to poorly sorted matrices. Water is stored mainly in decomposed/partly decomposed rock and water bearing fractures are principally restricted to a shallow zone below the static groundwater level. Sustainable borehole yields are limited to &lt; 0.5 l/s, while higher yielding boreholes (&gt; 3.0 l/s) may occur along structural features i.e. fault and fracture zones. The study area shows that the genera yield is 0.5 to 2.0 L/s influenced by fractured zone.</li> </ul>	It is included in Section 14 of this report and the EMPr attached as Appendix F.

Table 14-1 : Summary of the Findings of the Specialist Reports		
Name of the report	Findings and recommendation	Section of the report where the information is included
	<ul style="list-style-type: none"> <li>From the water quality data BH01 it was found the water has high turbidity which was found not compliant with the SANS 241:2015 guideline, which requires that before use it must be treated. The high turbidity might be a result that the borehole is taking water from shallow aquifers which are highly weathered. BH02 indicated that the nitrate and manganese level were not compliant with the DWS guideline standards. High levels of nitrate in drinking water may increase the risk of colon cancer. Nitrate may enhance the cancer potential of other compounds or may turn into cancer-causing chemicals like the body. Nitrate in drinking water has not been shown to increase the risk of other kinds of cancer. Children and adults who drink water with high levels of manganese for a long time may have problems with memory, attention, and motor skills. Infants (babies under one year old) may develop learning and behaviour problems if they drink water with too much manganese in it. It is recommended that before the water is consumed be treated since it is not good for long term consumption.</li> <li>BH01 shows Type 2: Sodium-bicarbonate groundwater –Groundwater with sodium as the dominant cation and bicarbonate as the dominant anion. Type 2 water is typically found in deeper portions of the aquifer.</li> <li>BH02 shows Type 3: Calcium-bicarbonate/chloride/sulphate groundwater – Groundwater with calcium as the dominant cation and bicarbonate the dominant anion, but with relatively elevated chloride and sulphate concentrations. This water type consistently has higher levels of TDS than the other two types.,</li> <li>The similarity of hexagonal shape in BH01, BH02 and BH03 indicate water type of similar characteristics. HCO<sup>3-</sup> is the dominant cation followed by the Ca<sup>2+</sup> and on the anion's species, Mg<sup>2+</sup> the is the most dominant in BH01 while BH02 Cl<sup>-</sup> is the dominant cation followed by the K<sup>+</sup> and on the anions species, SO<sub>4</sub> is the most dominant. By looking at the stiff diagram results, these 2 boreholes could be getting their water from the different aquifers.</li> </ul>	

Table 14-1 : Summary of the Findings of the Specialist Reports		
Name of the report	Findings and recommendation	Section of the report where the information is included
	<ul style="list-style-type: none"> <li>The ratings for the Aquifer System Management Classification and Aquifer Vulnerability Classification yield a Ground Water Quality Management Index of 4 for the Shallow Weathered Zone Aquifers within the study area, indicating that a Medium Level of groundwater protection is required.</li> <li>The study area is characterised by the predominantly arenaceous rocks (sandstone, feldspathic sandstone, arkose, sandstone-becoming-quartzitic-in-places) of the sedimentary types of rocks and predominantly meta-argillaceous rocks (slate, phyllite, meta-pelite, schist, serpentine, amphibolite, hornfels) which are metamorphosed rocks. The study area is deposited within the karoo supergroup rocks.</li> <li>The low borehole yields, fast water level drawdown and slow recovery observed during the aquifer testing indicate low transmissivity (T) aquifers, with low recharge. The highest pump rate measured (0.21 to 0.80 L/s) was observed at boreholes BH 02 and borehole BH01 showed low water availability while only these are the only two boreholes that yielded a good quantity of water, and intercepted good water bearing fractures.</li> </ul> <p><b>Recommendations</b></p> <ul style="list-style-type: none"> <li>The aquifer in the cemetery is located within shallow zones which pose risk to the local users since the area is going to be used for the burial of human remains, therefore, it is recommended that monitoring and sampling of water quality be done in accordance with the proposed motoring requirements. Monitoring programmes must be effectively done on a monthly basis in order to monitor seepages that might to the groundwater course.</li> </ul>	



Table 14-1 : Summary of the Findings of the Specialist Reports										
Name of the report	Findings and recommendation	Section of the report where the information is included								
	<ul style="list-style-type: none"> <li>• It is recommended that the area might be used as a cemetery as it is zoned within the farming zone. The certain measure needs to be taken into consideration during the construction of the cemetery such as the depth as the geology of the area indicate fractured lithologies.</li> <li>• It is recommended that two boreholes must be drilled downstream of the Cemetery position to monitor the pollution.</li> <li>• Care must be followed in case the water is used for human consumption, the water quality from the boreholes is not suitable for human health, therefore, it is recommended that the water be treated especially for the nitrate level in BH02 and high turbidity in BH01.</li> <li>• The two boreholes' yields were measured hence the BH01 showed low yield due to shallow aquifer water availability which for human consumption or domestic use might be useful while borehole BH02 indicated high water yield which in this case of use of the water by human consumption is very sustainable. The two boreholes may be used for domestic use, while in case of the cemetery use, it is recommended.</li> </ul> <p><b>Monitoring Programme</b></p> <p>Table 28: proposed Monitoring Programme Requirements</p> <table border="1"> <thead> <tr> <th>Class</th> <th>Parameter</th> <th>Frequency</th> <th>Motivation</th> </tr> </thead> <tbody> <tr> <td>Physical</td> <td>Static groundwater levels</td> <td>Monthly</td> <td>Time dependent data is required to understand the</td> </tr> </tbody> </table>	Class	Parameter	Frequency	Motivation	Physical	Static groundwater levels	Monthly	Time dependent data is required to understand the	
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Table 14-1 : Summary of the Findings of the Specialist Reports

Name of the report	Findings and recommendation				Section of the report where the information is included
				<p>groundwater flow dynamics of the site. An anomaly in static water levels caused by mounding below the drainage field may give early warning to spillages or leakages from lined/unlined facilities.</p>	
		Rainfall	Daily	<p>Recharge to the saturated zone is an important parameter in assessing groundwater vulnerability. Time dependent data is required to understand</p>	

Table 14-1 : Summary of the Findings of the Specialist Reports					
Name of the report	Findings and recommendation				Section of the report where the information is included
				the groundwater flow dynamics of the site.	
		Groundwater abstraction rates (if present)	Monthly	Response of groundwater levels to abstraction rates could be useful to calculate aquifer storativity – important for groundwater management. Could also explain anomalous groundwater level measurements.	
	Chemical	Major chemical parameters: Ca, Mg, Na, K, NO3,	Quarterly (Jan., Apr., Jul., Sept) May be	Background information is crucial to assess impacts during operation and thereafter. Changes in	

Table 14-1 : Summary of the Findings of the Specialist Reports					
Name of the report	Findings and recommendation				Section of the report where the information is included
		NH4, SO4, Cl, Fe, Mn, F, Alkalinity, pH, EC, TDS.	reduced to biannual (April & Sept.) as more data becomes available)	chemical composition may indicate areas of groundwater contamination and be used as an early warning system to implement management/remedial actions. Legal requirement.	
		Minor chemical Constituents Cr & Cr6, Ni, As, Cu, Pb, Cd, Zn Stable isotopes	Ad hoc Basis.	Changes in chemical composition may indicate areas of groundwater contamination and be used as an early warning system to implement management/remedial	

Table 14-1 : Summary of the Findings of the Specialist Reports				
Name of the report	Findings and recommendation			Section of the report where the information is included
			actions. The monitoring program should allow for research and refinement of the conceptual hydrogeological model. This may, from time to time, require special analyses like stable isotopes.	
Geotechnical Site Investigation for the establishment of a cemetery on Portion 22 of the farm Doornrug 302-JS	<p>The majority of the proposed site falls within the unacceptable suitability rating rendering most of the farm portion not suitable for use as a cemetery. The zone comprising approximately 7 ha rates primarily as poor and will require additional precautionary measures prior to and following the development. The extent of each zone may change with additional information gained from future excavations.</p> <p>The most critical geological and geomorphological constraints for this site will be:</p> <ul style="list-style-type: none"> <li>• The shallow and outcropping bedrock on the northern half and most of the southwestern portion.</li> <li>• The majority of the soils encountered across the site exhibits fair workability but relatively permeable properties.</li> </ul>			It is included in Section 14 of this report and the EMPr attached as Appendix F.



Table 14-1 : Summary of the Findings of the Specialist Reports		
Name of the report	Findings and recommendation	Section of the report where the information is included
Emalahleni, Mpumalanga Province.	<p>Negative influences due to the specific site conditions may include sensitivity of the groundwater sources in the area that may need additional investigation where the regional geological and hydrogeological settings are complex.</p> <p>The following suggestions may allow use of larger parts of the site within the context of a burial facility and can be regarded as mitigation measures with regards the poor ratings in the overall site classification for a cemetery:</p> <ul style="list-style-type: none"> <li>• Larger excavators and pre-excavation of graves for later opening and use.</li> <li>• Importation of backfill material in areas where excavated rock is not suitable for grave backfill.</li> <li>• Utilization of parts of shallow bedrock for shallow soil graves taking proper cognisance of surface and groundwater protection and management.</li> <li>• Earthwork to create 2 m of grave depth by importing fill, e.g. appropriately graded mine discard.</li> <li>• Well planned and constructed management of surface water runoff.</li> <li>• Surface structures rather than excavated graves, e.g. crematorium, mausoleums, etc., in the hard rock outcrop areas.</li> </ul> <p>It is recommended that further investigations be considered if some of the above listed measures are considered</p>	
South African Heritage Resources Agency	<ul style="list-style-type: none"> <li>• 38(4)a – The SAHRA has no objections to the proposed development;</li> <li>• 38(4)b – The recommendations of the specialists are supported and must be adhered to. Further additional specific conditions are provided for the development as follows:</li> <li>• A tracklog of the completed survey must be submitted;</li> <li>• As Sites 02 – 07 are most likely not older than 60 years old, they are not considered to be heritage resources, however, demolition and ground clearance around sites 02, 03, 04, 06 and 07 must be monitored, as human</li> </ul>	Included in the EMPr

Table 14-1 : Summary of the Findings of the Specialist Reports		
Name of the report	Findings and recommendation	Section of the report where the information is included
	<p>remains may be present. These human remains would most likely be younger than 60 years and not protected by the NHRA, but will still be protected by other legislation;</p> <ul style="list-style-type: none"> <li>• Should site 01 be older than 60 years, a permit must be applied for the destruction of the site in terms of section 34 of the NHRA from the Mpumalanga Provincial Heritage Resources Authority;</li> <li>• 38(4)c(i) – If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA (Natasha Higgitt 021 202 8660/ nhiggitt@sahra.org.za) must be alerted as per section 35(3) of the NHRA. Non-compliance with section of the NHRA is an offence in terms of section 51(1)e of the NHRA and item 5 of the Schedule;</li> <li>• 38(4)c(ii) – If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Ngqabutho Madida 012 320 8490), must be alerted immediately as per section 36(6) of the NHRA. Non-compliance with section of the NHRA is an offence in terms of section 51(1)e of the NHRA and item 5 of the Schedule;</li> <li>• 38(4)d – See section 51 of the NHRA regarding offences;</li> <li>• 38(4)e – The following conditions apply with regards to the appointment of specialists:</li> <li>• With reference to the mitigation work noted above, a qualified archaeologist must be appointed to undertake the work in terms of the permit applied for as noted above;</li> <li>• If heritage resources are uncovered during the course of the development, a professional archaeologist or palaeontologist, depending on the nature of the finds, must be contracted as soon as possible to inspect the heritage resource. If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA;</li> <li>• The Final BAR and EMPr must be submitted to SAHRA for record purposes;</li> <li>• The decision regarding the EA Application must be communicated to SAHRA and uploaded to the SAHRIS</li> </ul>	

Table 14-1 : Summary of the Findings of the Specialist Reports		
Name of the report	Findings and recommendation	Section of the report where the information is included
	Case application.	

## **15. RECOMMENDATIONS FROM SPECIALIST REPORTS, THE PROPOSED IMPACT MANAGEMENT OBJECTIVES AND THE IMPACT MANAGEMENT OUTCOMES FOR THE DEVELOPMENT FOR INCLUSION IN THE EMPR**

The proposed Impact Management Objectives and Outcomes are indicated below.

The environmental objectives are:

- To prevent pollution
- To minimise waste generated
- To minimise air pollution
- To minimise disturbance of cultural /heritage features
- To prevent disturbance of wetlands

The environmental outcomes are:

- To ensure that waste generated is managed as per the National Environmental Management Waste Act
- To ensure that groundwater quality remains within acceptable limits.
- To protect heritage resources
- To protect wetlands

The table below includes the recommendations from the specialist reports

Table 15-1 : Recommendations from the specialist reports, proposed Impact Management Objectives and Outcomes

Name of the report	Recommendations
Terrestrial Compliance Statement	<ul style="list-style-type: none"> <li>• All construction activities must be carried out according to the generally accepted environmental best practice and the spatial footprint must be kept to a minimum.</li> <li>• Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further. Clearing of vegetation should be minimized and avoided where possible. All activities must be restricted within the development footprint sensitivity areas. No loss of areas surrounding the development area. It is recommended that areas to be developed be specifically demarcated so that during the construction phase, only the demarcated areas be impacted upon (including fencing off the defined project area).</li> <li>• Should any indigenous vegetation be removed outside the designated areas or direct project footprint, the Contractor must notify the relevant person on site, i.e., the PM, and the site must be rehabilitated if required and the structures replaced.</li> <li>• Regionally protected (SCC species) must be marked for rescue and relocation, or removal (where permit application would then apply) before any vegetation removal commences.</li> <li>• Where possible, existing access routes and walking paths must be made use of, and the development of new routes limited.</li> <li>• Disturbed sites must be rehabilitated as soon as construction in an area is complete or near-complete and not left until the end of the project to be rehabilitated (concurrent rehabilitation).</li> <li>• Effective landscaping must be conducted in areas affected by erosion/ sedimentation. The developer must ensure that any open spaces are rehabilitated, and the appropriate indigenous vegetation is introduced.</li> <li>• All laydown, chemical toilets etc. should be restricted to low sensitivity areas. Any materials may not be stored for extended periods of time and must be removed from the project area once the construction/closure phase has been concluded. Buildings should preferably be prefabricated or constructed of re-usable/recyclable materials. No storage of vehicles or equipment will be allowed outside of the designated project areas.</li> </ul>



Name of the report	Recommendations
	<ul style="list-style-type: none"> <li>• It is recommended that the supervisor of the vegetation clearing contractors receive adequate training as to the presence, identity, and management of species of conservation importance, and that a botanical specialist/ECO (Environmental Control Officer) be appointed during vegetation clearing to conduct monthly on-site audits of the vegetation clearing process.</li> <li>• A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that, it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. No servicing of equipment on-site during construction unless necessary. All contaminated soil/yard stone shall be treated in situ or removed and be placed in containers.</li> <li>• Leaking equipment and vehicles must be repaired immediately or be removed from the project areas to facilitate the repair.</li> <li>• A fire prevention and emergency response plan needs to be compiled and implemented to restrict the impact fire might have on the project area and its immediate surrounding.</li> <li>• Employees and contractors should be made aware of the presence of, and rules regarding fauna through suitable induction training and on-site signage.</li> <li>• It is recommended that the supervisors of the vegetation clearing, and construction contractors receive adequate training as to the presence, identity and management of on-site fauna.</li> <li>• IAP species should be managed using the existing mine AIP management plan. Removal AIPs should preferably commence during the pre-construction phase and continue throughout the construction and operational phases. AIPs should be cleared within the project area before any vegetation clearing activities commence, thereby ensuring that no AIP propagules are spread, or soils contaminated with AIP seeds during the construction phase; and the existing mine AIP Management/Control Plan should be implemented by a qualified professional. No chemical control of AIPs to occur without a certified professional.</li> <li>• Regular monitoring of the implementation of this plan for the rehabilitation of disturbed areas must be conducted by the appointed ECO.</li> <li>• Formal waste management and sewerage systems must be put in place for contractors.</li> </ul>

Name of the report	Recommendations
	<ul style="list-style-type: none"> <li>• Waste management must be a priority and all waste must be collected and stored effectively.</li> <li>• No dumping of litter, rubble or cleared vegetation on site should be allowed. Infrastructure and rubble removed as a result of the construction activities should be reduced, re-used or recycled with disposal to landfill as last resort. No temporary dump sites should be allowed in areas with natural vegetation. It is advised that waste disposal containers and bins be provided during the construction phase for all construction rubble and general waste. Vegetation cuttings must be carefully collected and disposed of at a separate waste facility. Refuse bins must be placed at strategic positions to ensure that litter does not accumulate within the construction site.</li> <li>• A minimum of one toilet must be provided per 10 persons. Portable toilets must be pumped dry to ensure the system does not degrade over time and spill into the surrounding area.</li> <li>• Ensure that all site personnel have a basic level of environmental awareness training. A signed register of attendance must be kept for proof. Discussions are required on sensitive environmental receptors within the project area to inform contractors and site staff of the possible presence of SSC, their identification, conservation status and importance, biology, habitat requirements and management requirements the Environmental Authorisation and within the EMPr. The avoidance and protection of the surrounding watercourses and riparian areas must be included into a site induction. Contractors and employees must all undergo the induction and be made aware of the areas to be avoided.</li> <li>• The Contractor must provide method statements on the protocols to be followed and contingencies to be implemented.</li> <li>• A Stormwater Management Plan must be developed to control runoff and prevent erosion of the site and its surroundings.</li> <li>• Appropriate stormwater structures alongside a stormwater management plan must be designed to minimise erosion of the surrounding environment and sedimentation of surrounding watercourses.</li> <li>• Dust minimization and control measures should be implemented on the construction site at regular intervals. This includes wetting of exposed soft soil surfaces. No water may be abstracted from any water source without an applicable License from DWS. The frequency of implementation of dust suppression measures should be increased when it is expected that high wind conditions will develop.</li> <li>• Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events. This will also reduce the likelihood of encroachment by alien invasive plant species.</li> </ul>

Name of the report	Recommendations
	<ul style="list-style-type: none"> <li>Vegetation clearing should only occur immediately prior to the commencement of construction activities in an area to minimize the amount of exposed soil on the site. Stockpiles and spoil heaps must be covered with tarps or straw to prevent fugitive dust.</li> </ul>
Groundwater	<p>Based on the information presented above, the following conclusions are drawn:</p> <ul style="list-style-type: none"> <li>The site is located in quaternary catchment B20G with local flow to the south and then to the west along the Grootspuit.</li> <li>There are industrial and mining sites to the north and east of the site, including coal and lime plants, ferroalloys and Elandsfontein Colliery, with slimes dams and waste rock dumps immediately to the east.</li> <li>The northern part of the site is located on sandstones and shales of the Wilge River Formation of the Waterberg Group, while the southern part overlies shales of the Pretoria Group.</li> <li>Soils at the site are of low agricultural potential.</li> <li>The local aquifer is an intergranular &amp; fractured and fractured type with a low to moderate yield potential, with median borehole yields of 0.5 – 2 l/s.</li> <li>There are nine registered boreholes located within a 5 km radius of the site but none (registered) within 1 km.</li> <li>There are two non-functional boreholes on the site and a further four functional boreholes on adjacent properties.</li> <li>Groundwater in the region and site area occurs at 10 – 40 mbgl.</li> <li>Groundwater flow direction is inferred to be to the southeast from the southern part of the site and possibly to the north from a very small area of the northern part.</li> <li>Groundwater in the area is of generally good to moderate quality with an indicated EC of 70 – 300 mS/m and likely to be of a calcium/magnesium bicarbonate type.</li> <li>Groundwater in the site area is of very good quality with EC of 3.4 – 10.4 mS/m, acidic pH and very low concentrations of all major and minor ions.</li> </ul>

Name of the report	Recommendations
	<ul style="list-style-type: none"> <li>• The potential receptors for any contamination from the site via groundwater are boreholes 1, 2 and 3 and the minor stream to the east of the site.</li> <li>• The site has a moderate groundwater risk according to this Tier 1 assessment.</li> <li>• The EIS for the site is moderate and alterations to the PES, i.e. possible deterioration in groundwater quality, will be limited to the site and buffer areas.</li> </ul> <p>It is recommended that the following mitigation measures/monitoring be carried out:</p> <ul style="list-style-type: none"> <li>• Digging of geotechnical test pits on site to assess soil characteristics such as thickness, clay content and permeability.</li> <li>• Establishment of an upstream and a downstream monitoring borehole, for which use the two on-site boreholes 5 and 6 could possibly be adapted.</li> <li>• Establishment of a lateral buffer zone of 65 m from the site boundaries for rivers, wells and springs.</li> <li>• Establishment of a lateral buffer zone of 350 m from the site boundaries for drinking water sources.</li> <li>• The taking of a water sample from these boreholes prior to the establishment of the cemetery and laboratory analysis for pH, EC, TDS, Na, K, Mg, Ca, Cl, SO<sub>4</sub>, NO<sub>3</sub>, F, Fe, Mn, Cu, Ni, Cd, Cr, Zn, Al, As and Total Alkalinity, plus bacteriological/pathogen indicators.</li> <li>• Taking of a water sample on a biannual basis from these boreholes and analysis for the above parameters.</li> <li>• Compilation of a monitoring record of water levels and quality and assessment of the data by a hydrogeologist every six months. Submission of reports to the DHSWS, as required by them. Continuation or modification of the monitoring programme as dictated by results or the regulatory authorities.</li> </ul> <p><b>Monitoring</b></p> <p>It is recommended that monitoring boreholes be established at the upstream (north) and downstream (south) boundaries of the site. On-site boreholes 5 and 6 could possibly be adapted for this purpose.</p>


Name of the report	Recommendations
	<p>The following groundwater monitoring activities are recommended:</p> <ul style="list-style-type: none"> <li>• The taking of a water sample from “Upstream” (No 6) and “Downstream” (No 5) boreholes prior to the establishment of the cemetery. Laboratory analysis for: <ul style="list-style-type: none"> <li>○ Physical parameters pH, EC, TDS;</li> <li>○ Major ions, Na, K, Mg, Ca, Cl, SO<sub>4</sub>, NO<sub>3</sub> and Total Alkalinity;</li> <li>○ Trace ions and metals, F, As, Fe, Mn, Pb, Cd, Cu, Cr, Ni, Cd, Zn and Al;</li> <li>○ Bacteriological indicators.</li> </ul> </li> <li>• Taking of a water sample on a biannual basis from these boreholes and analysis for the above parameters;</li> <li>• Compilation of a monitoring record of quality and assessment of the data by a hydrogeologist annually. Continuation or modification of the monitoring programme as dictated by results; and as directed by the DEA/DWS.</li> </ul>
<p>Heritage Impact Assessment</p>	<p><b>Recommendations</b></p> <ul style="list-style-type: none"> <li>• UP-DRB-2529-01 is a farmhouse with associated outbuildings. Precise dating of the building is difficult, but aerial imagery suggests an original structure was erected in the late 1950s - early 1960s. In subsequent years, several major alterations were applied to the building to convert it into a house. The numerous alterations and severe alterations of the building means that it has very little heritage value. This assessment therefore finds that the building is of low significance (2a). No further steps are required.</li> <li>• UP-DRB-2529-02, UP-DRB-2529-06 and UP-DRB-2529-07 are the remains of farm labourer quarters. While one (UP-DRB-2529-02) still has its walls mostly intact, the others are completely demolished. Surface material and aerial photos suggests an age likely less than 60 years. This date and the fact that the buildings and surrounding area have no archaeological or cultural deposits, means that UP-DRF-2529-01 carries low significance (2a) as a heritage site. It was recorded and documented in this Phase I assessment. No further mitigation steps are required.</li> <li>• UP-DRB-2529-03 and UP-DRB-2529-04 are circular stone features of unknown use/function. No evidence suggests that these are archaeological in nature, and they likely relate to 20th century farming activities. As a result, it carries no significance (1) as a heritage site. No further mitigation steps are required.</li> </ul>



Name of the report	Recommendations
	<ul style="list-style-type: none"> <li>• UP-DRB-2529-05 are the remains of 20th century linear field boundary walls less than 60 years old. These walls carry no significance (1). It was adequately recorded and documented in the Phase I Heritage Assessment. No further mitigation steps are required.</li> </ul> <p>Investigation of the Project Area identified seven sites. These however respectively carry no (category 1 – no mitigation) and low (category 2a - recording) heritage significance. These ratings mean that no further mitigation is needed and that the proposed cemetery can continue from a heritage point of view.</p>
<p>Palaeontological Impact Assessment</p>	<p><b>Chance Find Protocol</b></p> <p>Monitoring Programme for Palaeontology – to commence once the excavations begin.</p> <ul style="list-style-type: none"> <li>• The following procedure is only required if fossils are seen on the surface and when excavations commence.</li> <li>• When excavations begin the rocks and must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (plants, insects, bone, coal) should be put aside in a suitably protected place. This way the project activities will not be interrupted.</li> <li>• Photographs of similar fossils must be provided to the developer to assist in recognizing the fossil plants, vertebrates, invertebrates or trace fossils in the shales and mudstones (for example see Figure 115). This information will be built into the EMP's training and awareness plan and procedures.</li> <li>• Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.</li> <li>• If there is any possible fossil material found by the developer/environmental officer then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the selected material and check the dumps where feasible.</li> </ul>

## Final Basic Assessment Report for the Proposed Su Casa Burial Estate

Name of the report	Recommendations
	<ul style="list-style-type: none"><li>• Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.</li><li>• If no good fossil material is recovered then no site inspections by the palaeontologist will be necessary. A final report by the palaeontologist must be sent to SAHRA once the project has been completed and only if there are fossils.</li><li>• If no fossils are found and the excavations have finished then no further monitoring is required.</li></ul> <p>Examples of fossils from the Dwyka Group.</p>

Name of the report	Recommendations
	 <p>Figure 115: Photographs of fossil plants of the early Glossopteris flora that occur in the Dwyka Group sediments in north western South Africa.</p>
Hydropedology	<p><b>Surface Water Monitoring Programme</b></p> <p>The limits prescribed in this monitoring programme are stipulated in the Target Water Quality Range (TWQR) for aquatic ecosystems (DWAF, 1996). This prescribed monitoring programme should be conducted in conjunction with other aspects of riverine monitoring in the form of aquatic biomonitoring which addresses macroinvertebrate and ichthyofauna assemblages on a bi-yearly basis. The surface water monitoring programme will require monthly</p>

Name of the report	Recommendations																																			
	<p>monitoring of the adjacent valley bottom wetland at two sites, upstream (control site) and a downstream monitoring site. The watercourse should be monitored for the prescribed aspects below (Table 29).</p> <p>Contaminants emanating from burial practices are typically based on the following:</p> <ul style="list-style-type: none"> <li>• Their sources (whether from the body’s decomposition, accessory burial materials, or associated activities)</li> <li>• The rate at which they are released to the subsurface</li> <li>• Their mobility and persistence in the subsurface, and</li> <li>• Their toxicity or health effects on receptors.</li> </ul> <p>Table 30: Proposed water quality parameters</p> <table border="1"> <thead> <tr> <th>Parameters</th> <th>pH</th> <th>Conductivity (µS/cm)</th> <th>Dissolved Oxygen (mg/l)</th> <th>Temperature (°C)</th> </tr> </thead> <tbody> <tr> <td>TWQR*</td> <td>6.5-9.0</td> <td>-</td> <td>&gt;5.00</td> <td>5-30*</td> </tr> <tr> <td>Metals</td> <td colspan="4">Ti, Cr, Cd, Pb, Fe, Mn, Ni, Zn, As</td> </tr> <tr> <td>Nutrients</td> <td colspan="4">NO3, PO4, Cl, salts of Ca, Na, K, Mg</td> </tr> <tr> <td>Organics</td> <td colspan="4">Formaldehyde, Methanol</td> </tr> <tr> <td>Pathogens</td> <td colspan="4">Bacteria, Viruses, Microorganisms, Fungi</td> </tr> <tr> <td colspan="5" style="text-align: center;">*TWQR – Target Water Quality Range (DWAf, 1996)</td> </tr> </tbody> </table>	Parameters	pH	Conductivity (µS/cm)	Dissolved Oxygen (mg/l)	Temperature (°C)	TWQR*	6.5-9.0	-	>5.00	5-30*	Metals	Ti, Cr, Cd, Pb, Fe, Mn, Ni, Zn, As				Nutrients	NO3, PO4, Cl, salts of Ca, Na, K, Mg				Organics	Formaldehyde, Methanol				Pathogens	Bacteria, Viruses, Microorganisms, Fungi				*TWQR – Target Water Quality Range (DWAf, 1996)				
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Pedology	<p><b>Mitigation measures</b></p> <ul style="list-style-type: none"> <li>• Monitor compaction on site</li> <li>• Detailed investigation into ideal locations for the construction of all the infrastructure on site</li> </ul>																																			

Name of the report	Recommendations
	<ul style="list-style-type: none"> <li>• Clearing of vegetation.</li> <li>• Implement proper storm water management plans</li> </ul>
Wetland Assessment	<p><b>Mitigation Measures</b></p> <p>The following mitigation measures are aimed at the conservation of wetlands in general;</p> <ul style="list-style-type: none"> <li>• The contractors used for the construction should have spill kits available prior to construction to ensure that any fuel, oil or hazardous substance spills are cleaned-up and discarded correctly;</li> <li>• All construction activities must be restricted to the development footprint area. This includes laydown and storage areas, ablutions, offices etc.;</li> <li>• During construction activities, all rubble generated must be removed from the site;</li> <li>• Construction vehicles and machinery must make use of existing access routes;</li> <li>• All chemicals and toxicants to be used for the construction must be stored in a demarcated area;</li> <li>• All machinery and equipment should be inspected regularly for faults and possible leaks, these should be serviced off-site;</li> <li>• All contractors and employees should undergo induction which is to include a component of environmental awareness. The induction is to include aspects such as the need to avoid littering, the reporting and cleaning of spills and leaks and general good “housekeeping”;</li> <li>• Adequate sanitary facilities and ablutions on the servitude must be provided for all personnel throughout the project area. Use of these facilities must be enforced (these facilities must be kept clean so that they are a desired alternative to the surrounding vegetation);</li> <li>• All removed soil and material stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds;</li> <li>• Any exposed earth should be rehabilitated promptly by planting suitable vegetation (vigorous indigenous grasses) to protect the exposed soil;</li> <li>• No dumping of construction material on site may take place;</li> </ul>



Name of the report	Recommendations
	<ul style="list-style-type: none"> <li>• All waste generated on site during construction must be adequately managed. Separation and recycling of different waste materials should be supported.</li> </ul> <p><b>Recommendations</b></p> <p>The following recommendations have been made to ensure the conservation of the delineated wetlands during the construction and operational phase;</p> <ul style="list-style-type: none"> <li>• It is recommended that a stormwater management plan be implemented for the cemetery. This is to prioritise the appropriate management of surface water;</li> <li>• A condition for the Environmental Authorisation should be the bi-annual monitoring of surface water in both the HGM units during the operational phase of the cemetery. In the event contamination of the system by the functioning of the cemetery is recorded, reactive measures must be taken and the issuing authority consulted in this regard; and</li> <li>• A 15m buffer areas must be adhered to for the identified watercourse within the 500m regulated area.</li> </ul> <p>Two HGM units were identified within the 500 m regulated area, of which both have been classified as unchanneled valley bottom wetlands. The average ecosystem service scores for the HGM units were rated as “Intermediate”. The integrity of the systems was determined to be “Largely Modified” (class D). The ecological importance and sensitivity of the delineated wetlands was classified as “Moderate”. A 15 m post-mitigation buffer zone has been calculated and recommended for the proposed housing development.</p> <p>No wetland systems are located within the project area, thus all direct risks to wetlands are avoided. Considering the distance between the proposed activity as well as the fact that the area between the proposed cemetery and the relevant HGM units are characterised by the Glenrosa soil forms with deep, freely drained orthic topsoil with a lithic subsoil (which completely eliminates overland flow), no indirect risks are foreseen.</p>

Name of the report	Recommendations
	<p>Since no risks are expected towards natural wetland systems, it is recommended that the proposed activities may proceed without the application for a water use license or general authorisation.</p> <p>Due to the presence of drainage lines/features in relation to the project area, the following Listing Notice is applicable:</p> <p><u>Regulatory authorisation required</u></p> <p>Listed activities in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) EIA Regulations (2014), as amended. Department of Environmental Affairs and Development Planning (DEA&amp;DP)</p> <p><u>Zone of applicability</u></p> <p>Activity 12 of Listing Notice 1 (GN 327) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) EIA regulations, 2014 (as amended) states that:</p> <p>The development of:</p> <p>(xii) Infrastructure or structures with a physical footprint of 100 square meters or more;</p> <p>Where such development occurs—</p> <p>a) Within a watercourse;</p> <p>b) In front of a development setback; or</p> <p>c) If no development setback has been adopted, within 32 meters of a watercourse, measured from the edge of a watercourse.</p>
<p>Groundwater investigations for the proposed abstraction boreholes on the</p>	<p><b>Recommendations</b></p> <ul style="list-style-type: none"> <li>The aquifer in the cemetery is located within shallow zones which pose risk to the local users since the area is going to be used for the burial of human remains, therefore, it is recommended that monitoring and sampling of water quality be done in accordance with the proposed motoring</li> </ul>

Name of the report	Recommendations												
Portion 10 Of The Farm Doornrug 302 In The Mpumalanga Province of South Africa	<p>requirements. Monitoring programmes must be effectively done on a monthly basis in order to monitor seepages that might to the groundwater course.</p> <ul style="list-style-type: none"> <li>It is recommended that the area might be used as a cemetery as it is zoned within the farming zone. The certain measure needs to be taken into consideration during the construction of the cemetery such as the depth as the geology of the area indicate fractured lithologies.</li> <li>It is recommended that two boreholes must be drilled downstream of the Cemetery position to monitor the pollution.</li> <li>Care must be followed in case the water is used for human consumption, the water quality from the boreholes is not suitable for human health, therefore, it is recommended that the water be treated especially for the nitrate level in BH02 and high turbidity in BH01.</li> <li>The two boreholes' yields were measured hence the BH01 showed low yield due to shallow aquifer water availability which for human consumption or domestic use might be useful while borehole BH02 indicated high water yield which in this case of use of the water by human consumption is very sustainable. The two boreholes may be used for domestic use, while in case of the cemetery use, it is recommended.</li> </ul> <p><b>Monitoring Programme</b></p> <p>Table 15-2 : proposed Monitoring Programme Requirements</p> <table border="1"> <thead> <tr> <th>Class</th> <th>Parameter</th> <th>Frequency</th> <th>Motivation</th> </tr> </thead> <tbody> <tr> <td>Physical</td> <td>Static groundwater levels</td> <td>Monthly</td> <td>Time dependent data is required to understand the groundwater flow dynamics of the site. An anomaly in static water levels caused by mounding below the drainage field may give early warning to spillages or leakages from lined/unlined facilities.</td> </tr> <tr> <td></td> <td>Rainfall</td> <td>Daily</td> <td>Recharge to the saturated zone is an important parameter in assessing groundwater vulnerability.</td> </tr> </tbody> </table>	Class	Parameter	Frequency	Motivation	Physical	Static groundwater levels	Monthly	Time dependent data is required to understand the groundwater flow dynamics of the site. An anomaly in static water levels caused by mounding below the drainage field may give early warning to spillages or leakages from lined/unlined facilities.		Rainfall	Daily	Recharge to the saturated zone is an important parameter in assessing groundwater vulnerability.
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	Rainfall	Daily	Recharge to the saturated zone is an important parameter in assessing groundwater vulnerability.										

Name of the report	Recommendations			
				Time dependent data is required to understand the groundwater flow dynamics of the site.
		Groundwater abstraction rates (if present)	Monthly	Response of groundwater levels to abstraction rates could be useful to calculate aquifer storativity – important for groundwater management. Could also explain anomalous groundwater level measurements.
	Chemical	Major chemical parameters: Ca, Mg, Na, K, NO <sub>3</sub> , NH <sub>4</sub> , SO <sub>4</sub> , Cl, Fe, Mn, F, Alkalinity, pH, EC, TDS.	Quarterly (Jan., Apr., Jul., Sept) May be reduced to biannual (April & Sept.) as more data becomes available)	Background information is crucial to assess impacts during operation and thereafter. Changes in chemical composition may indicate areas of groundwater contamination and be used as an early warning system to implement management/remedial actions. Legal requirement.
		Minor chemical Constituents Cr & Cr <sub>6</sub> , Ni, As, Cu, Pb, Cd, Zn Stable isotopes	Ad hoc Basis.	Changes in chemical composition may indicate areas of groundwater contamination and be used as an early warning system to implement management/remedial actions. The monitoring program should allow for research and refinement of the conceptual hydrogeological model. This may, from time to time, require special analyses like stable isotopes.

Name of the report	Recommendations
Geotechnical	<p>The majority of the proposed site falls within the unacceptable suitability rating rendering most of the farm portion not suitable for use as a cemetery. The zone comprising approximately 7 ha rates primarily as poor and will require additional precautionary measures prior to and following the development. The extent of each zone may change with additional information gained from future excavations.</p> <p>The most critical geological and geomorphological constraints for this site will be:</p> <ul style="list-style-type: none"> <li>• The shallow and outcropping bedrock on the northern half and most of the southwestern portion.</li> <li>• The majority of the soils encountered across the site exhibits fair workability but relatively permeable properties.</li> </ul> <p>Negative influences due to the specific site conditions may include sensitivity of the groundwater sources in the area that may need additional investigation where the regional geological and hydrogeological settings are complex.</p> <p>The following suggestions may allow use of larger parts of the site within the context of a burial facility and can be regarded as mitigation measures with regards the poor ratings in the overall site classification for a cemetery:</p> <ul style="list-style-type: none"> <li>• Larger excavators and pre-excavation of graves for later opening and use.</li> <li>• Importation of backfill material in areas where excavated rock is not suitable for grave backfill.</li> <li>• Utilization of parts of shallow bedrock for shallow soil graves taking proper cognisance of surface and groundwater protection and management.</li> <li>• Earthwork to create 2 m of grave depth by importing fill, e.g. appropriately graded mine discard.</li> <li>• Well planned and constructed management of surface water runoff.</li> <li>• Surface structures rather than excavated graves, e.g. crematorium, mausoleums, etc., in the hard rock outcrop areas.</li> </ul> <p>It is recommended that further investigations be considered if some of the above listed measures are considered</p>
South African Heritage Resources Agency	<ul style="list-style-type: none"> <li>• 38(4)a – The SAHRA has no objections to the proposed development;</li> <li>• 38(4)b – The recommendations of the specialists are supported and must be adhered to. Further additional specific conditions are provided for the development as follows:</li> <li>• A tracklog of the completed survey must be submitted;</li> </ul>



Name of the report	Recommendations
	<ul style="list-style-type: none"> <li>• As Sites 02 – 07 are most likely not older than 60 years old, they are not considered to be heritage resources, however, demolition and ground clearance around sites 02, 03, 04, 06 and 07 must be monitored, as human remains may be present. These human remains would most likely be younger than 60 years and not protected by the NHRA, but will still be protected by other legislation;</li> <li>• Should site 01 be older than 60 years, a permit must be applied for the destruction of the site in terms of section 34 of the NHRA from the Mpumalanga Provincial Heritage Resources Authority;</li> <li>• 38(4)c(i) – If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA (Natasha Higgitt 021 202 8660/ nhiggitt@sahra.org.za) must be alerted as per section 35(3) of the NHRA. Non-compliance with section of the NHRA is an offense in terms of section 51(1)e of the NHRA and item 5 of the Schedule;</li> <li>• 38(4)c(ii) – If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Ngqabutho Madida 012 320 8490), must be alerted immediately as per section 36(6) of the NHRA. Non-compliance with section of the NHRA is an offense in terms of section 51(1)e of the NHRA and item 5 of the Schedule;</li> <li>• 38(4)d – See section 51 of the NHRA regarding offences;</li> <li>• 38(4)e – The following conditions apply with regards to the appointment of specialists:</li> <li>• With reference to the mitigation work noted above, a qualified archaeologist must be appointed to undertake the work in terms of the permit applied for as noted above;</li> <li>• If heritage resources are uncovered during the course of the development, a professional archaeologist or palaeontologist, depending on the nature of the finds, must be contracted as soon as possible to inspect the heritage resource. If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA;</li> <li>• The Final BAR and EMPr must be submitted to SAHRA for record purposes;</li> <li>• The decision regarding the EA Application must be communicated to SAHRA and uploaded to the SAHRIS Case application.</li> </ul>

## **16. THE FINAL MICRO-SITING LAYOUT WHICH IMPLEMENTS AND RESPONDS TO THE IMPACT AVOIDANCE, MITIGATION AND MANAGEMENT MEASURES IDENTIFIED THROUGH THE ASSESSMENT**

Spatial Development Plan attached as Appendix C.

## **17. A DESCRIPTION OF ANY ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE WHICH RELATE TO THE ASSESSMENT AND MITIGATION MEASURES PROPOSED**

**The assumptions, uncertainties and gaps in knowledge from various specialists are presented as follows:**

### **17.1. Terrestrial Compliance Statement**

- Only a single-season one day survey was conducted for the respective studies, this would constitute an early wet season survey; and
- This assessment has not assessed any temporal trends for the project.

### **17.2. Hydrogeology**

- Only the slopes affected by the proposed development have been assessed;
- It has been assumed that the extent of the development area provided by the responsible party is accurate; and
- The GPS used for ground truthing is accurate to within five meters. Therefore, the wetland and the observation site's delineation plotted digitally may be offset by at up to five meters to either side.

### **17.3. Palaeontology**

Based on the geology of the area and the palaeontological record as we know it, it can be assumed that the formation and layout of the dolerites, sandstones, shales and sands are typical for the country and most do not contain fossil plant, insect, invertebrate and vertebrate material. The sands of the Quaternary period would not preserve fossils. It is not known if fossils occur below ground but it is very unlikely,

### **17.4. Pedology**

The handheld GPS used potentially could have inaccuracies up to 5 m. Any and all delineations therefore could be inaccurate within 5 m.

**17.5. Wetland**

- Areas characterised by external wetland indicators have been the focus for this assessment. Areas lacking these characteristics have not been focussed on;
- Multiple small drainage features are present within the 500 m regulated area, these drainage features do not constitute a wetland and thus are not delineated within this report;
- It has been assumed that the extent of the project area provided to the specialist is accurate; and
- The GPS used for water resource delineations is accurate to within five meters. Therefore, the wetland delineation plotted digitally may be offset by a maximum of five meters to either side.

**17.6. Geotechnical**

This report, indicating the geotechnical constraints as well as the expected foundation and other relevant conditions is based on the onsite soil profiles and the results from soil laboratory tests.

While every effort is made during this site appraisal to gather all available information and to deduce the typical soil horizons including areas subject to a perched water table, areas of poor drainage, areas underlain by hard rock and to estimate their distribution, it is impossible to guarantee that variations are excluded over the extent of the site which are the subject of this report.

We have employed accepted engineering geologic procedures, and our opinions and conclusions are made in accordance with generally accepted principles and practices in engineering geology. The contents of this report are valid as of the date of preparation. However, changes in the condition of the site can occur over time as a result of either natural processes or human activity. In addition, advancements in the practice of geotechnical engineering and engineering geology and changes in applicable practice codes may affect the validity of this report. Our investigation did not include the evaluation or assessment of any potential environmental hazards or groundwater contamination that may be present.

If a substantial lapse of time occurs between the submission of our report and the start of work at the site, or if conditions have changed due to natural causes or construction operations at or adjacent to the site, we urge that our report be reviewed to determine the applicability of the conclusions and recommendations considering the changed conditions and time lapse.

This document has been prepared for the exclusive use of Zitholama on the basis of instruction, information and data supplied by them. No warranty or guarantee, whether express or implied, is made by J L van Rooy with respect to the completeness or accuracy of any aspect of this document and no party, other than the abovementioned "Client", is authorised to or should place any responsibility or liability in any way whatsoever to any person or entity in respect of the whole or any part or parts of this document, or errors in or omissions from it, whether arising from negligence or any other basis in law whatsoever. Furthermore, copyright for this technical document vests with "Client" unless otherwise agreed to in writing.

The EAP acts independently and has endeavoured to present all the necessary information that is required to be presented to the Developer (Landowner), Interested and Affected Parties, Stakeholders, Authorities etc. openly.

The public Participation process conducted has been transparent and sought to include everyone. The EAP has acted independently in this project and taken information from the specialist reports and included it in this Basic Assessment Report. It is possible that the gaps in the specialist reports may have affected some of the information presented in this report.

**18. A REASONED OPINION AS TO WHETHER THE PROPOSED ACTIVITY SHOULD OR SHOULD NOT BE AUTHORISED, AND IF THE OPINION IS THAT IT SHOULD BE AUTHORISED, ANY CONDITIONS THAT SHOULD BE MADE IN RESPECT OF THAT AUTHORISATION**

The proposed site is disturbed by agricultural activities that have been taking place over time. Positive and negative impacts have been identified and mitigation measures have been put in place. There are no fatal flaws that have been identified. Suitable mitigation measures have been provided for each negative impact identified. The impact assessment done revealed no fatal flaws. Interested and Affected parties have been involved in the project and their comments were addressed. Based on the specialist findings and recommendations, and the feedback from the Authorities and Interested and Affected Parties, the EAP is of the opinion that the proposed project should be authorised.

**19. WHERE THE PROPOSED ACTIVITY DOES NOT INCLUDE OPERATIONAL ASPECTS, THE PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED, THE DATE ON WHICH THE ACTIVITY WILL BE CONCLUDED, AND THE POST CONSTRUCTION MONITORING REQUIREMENTS FINALISED;**

The Environmental Authorisation will be required for about five (5) years. The post monitoring requirements have been indicated above. The Post construction monitoring requirements may be completed in approximately 5 years, that is probably in 2029. In addition, there is a Water Use Licence Application process currently being undertaken. Its conditions will also be complied with.

**20. AN UNDERTAKING UNDER OATH OR AFFIRMATION BY THE EAP IN RELATION TO:**

I Johana Masala Mahumela, declare that:

- The information provided in this Final Basic Assessment Report is correct;
- I have included the comments and inputs from stakeholders and I&APs;
- I have included the inputs and recommendations from the specialist reports where relevant; and
- the acceptability of the project in relation to the finding of the assessment and level of mitigation proposed.

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**Masala Mahumela**

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**Date**

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**Commissioner of Oath**

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**Date**

## **21. ANY SPECIFIC INFORMATION THAT MAY BE REQUIRED BY THE COMPETENT AUTHORITY**

The EAP is not aware of any specific information that may be required by the Competent Authority.

## **22. ANY OTHER MATTERS REQUIRED IN TERMS OF SECTIONS 24(4)(A) AND (B) OF THE ACT**

None.

## **23. CONCLUSION**

The proposed site is disturbed by agricultural activities that have been taking place over time. Positive and negative impacts have been identified and mitigation measures have been put in place. There are no fatal flaws that have been identified. Suitable mitigation measures have been provided for each negative impact identified. The geotechnical Report indicated various zones and their workability. Interested and Affected parties have been involved in the project and their comments were addressed. Based on the specialist findings and recommendations, and the feedback from the Authorities and Interested and Affected Parties, the EAP is of the opinion that the proposed project should be authorised. The EMPr indicates mitigation measures that should be implemented.

## **24. REFERENCES**

Peter Rosewarne. 2022. Proposed Su Casa Burial Estate Development Tier 1 Groundwater Risk Assessment  
The Biodiversity Company. 2022. The Terrestrial Ecology Compliance Statement for the proposed Su Casa Burial Estate. Farm Doornrug 302 JS Portion 10, Emalahleni, Nkangala District Municipality, Mpumalanga.



- Xander Antonites (With contributions by S. Sutherland and M. Mouton). 2022. Heritage Impact Assessment Report: Proposed Cemetery On Doornrug 302, Portion 10, Emalahleni, Mpumalanga Province.
- The Biodiversity Company. 2022. Hydropedological Assessment for the proposed Su Casa Burial Estate, Doornrug Cemetery Project. Emalahleni Mpumalanga.
- Marion Bamford. 2022. Palaeontological Impact Assessment for the proposed Sukasa Cemetery, Witbank area, Mpumalanga Province.
- The Biodiversity Company. 2022. Agricultural Compliance Statement for the proposed Su Casa Burial Estate on Farm Doornrug 302 JS Portion 10.
- Nyamoki Consulting Pty Ltd. 2023. Groundwater Investigations for the proposed abstraction boreholes on the Portion 22 of the Farm Kromdraai 302 in the Mpumalanga Province of South Africa.
- The Biodiversity Company. 2022. Wetland Baseline and Risk Assessment for the proposed Doornrug Cemetery. 2022/23 – 2026/27 IDP. Emalahleni Local Municipality.
- Golder and Associates Africa (Pty) Ltd. 2022. Draft Basic Assessment Report and Environmental Management Programme for additional infrastructure for the Gamsberg Zinc Mine near Aggenys, Northern Cape.
- Myezo Environmental Management Services. 2022. Environmental Management Act (No. 107 Of 1998), As Amended, For The Proposed Deviation Of An Existing Gilead Powerline At Gilead Substation Located Within Mogalakwena Local Municipality Of The Waterberg District Municipality Within Limpopo Province
- J. Louis Van Rooy. 2002. Report on a Geotechnical Site Investigation for the establishment of a cemetery on Portion 22 of the farm Doornrug 302-JS Emalahleni, Mpumalanga Province.