

7 ASSESSMENT OF IMPACT OF PROPOSED DEVELOPMENT ON IDENTIFIED HERITAGE SITES

7.1 Introduction

In this section, an assessment will be made of the impact of the proposed development on the identified heritage sites.

The following general observations will apply for this impact assessment:

- The impact assessment methodology utilised in this section is prescribed by SRK Consulting. This impact assessment methodology is outlined and explained in more detail in **Section 3.2** of this report.
- Heritage sites with a Low Significance are not included in these impact risk assessment calculations. The reason for this is that sites of Low Significance will not require mitigation. These sites are DBAP 4, DBAP 14, DBAP 17, DBAP 24, DBAP 46 and DBAP 49.
- A number of identified heritage sites of Medium to High Significance are located far enough from the proposed footprints that no development impacts are expected on these sites. As a result, no impact assessments will be undertaken for these sites and no site-specific mitigation measures compiled. General mitigation measures will still apply. These sites are DBAP 3, DBAP 10, DBAP 12, DBAP 13, DBAP 25, DBAP 26, DBAP 27, DBAP 28, DBAP 29, DBAP 30, DBAP 37, DBAP 56 and DBAP 57.
- By the time of writing of this report, mitigation measures for two identified heritage sites (DBAP 5 & DBAP 16) had already been undertaken. This means that no impact assessments will be undertaken for these two sites. Please note that all the required mitigation measures for DBAP 16 had already been completed some time ago, so no further mitigation is required for this site. However, the mitigation still required for site DBAP 5 is outlined in Chapter 8.
- Two sites recorded during a survey undertaken by Samancor could not be identified in the field using the provided coordinates. These sites appear to comprise a grave site (DBAP 36) and a historic black homestead (DBAP 41) with the potential for graves to be located. As the exact location of these sites are not presently known, no impact assessments can be undertaken for these sites. However, mitigation measures are outlined in Chapter 8.

- In terms of sites located within and near the so-called DMS Complex on the farm Mareesburg, only sites falling within the yellow-lined polygons titled 'DMS Stockpile' and 'DMS PCD's' on the Google Earth imagery were seen as being directly impacted upon by the proposed development. This means that sites located within the purple-lined polygon titled 'DMS Complex – Specialist Investigation Area' but outside the previously mentioned yellow polygons, were not assessed to be directly impacted upon by the proposed development in the impact assessments undertaken in this chapter.

The following development phases and phase-related activities were used for these impact assessment calculations. This section was provided by SRK Consulting.

Pre-Construction Phase

- Planning phase (* for Social component only)
- Site clearing of all footprint areas associated with the proposed project infrastructure
- Stockpiling of topsoil
- Use of existing gravel roads for pre-construction activities

Construction Phase

- Construction of infrastructure (DMS Plant, DMS Stockpile area and associated PCDs, conveyor belt systems, North and South Shafts, Ventilation shafts, staff accommodation and explosive destruction bay)
- Construction of gravel maintenance roads to the proposed ventilation shafts
- Upgrading of existing gravel roads to tar roads to serve as main access roads

Operational Phase

- Underground mechanised mining at North and South Shafts
- Temporary hauling of ore from shafts to Mototolo Concentrator along the corridor associated with the Ore Conveyor System (whilst conveyor system is being constructed)
- Operation of the Conveyor Systems
- Stockpiling of ore material at Mototolo Concentrator
- Operation of the Chrome Recovery Inter-Stage Plant
- Operation of the DMS Plant

- Deposition of DMS material onto the DMS Stockpile area
- Utilisation of storm water management infrastructure at shafts, and PCD's at DMS stockpile
- Utilisation of the Staff Accommodation near the Der Brochen Dam
- Utilisation of tar access roads
- Utilisation of gravel maintenance roads associated with the ventilation shafts
- Dangerous Goods storage (including hydrocarbons/chemicals/explosives)
- Waste management

Decommissioning and Rehabilitation Phase

- Pre-Decommissioning planning (* for Social component only)
- Removal of all plant equipment including conveyor belt systems and staff accommodation
- Rehabilitation of the DMS Stockpile and PCD
- Closure of the Shafts and underground workings

7.2 Assessment of Pre-Mitigation Impact on the identified Heritage Sites

7.2.1 Assessment of the Pre-Mitigated Impact on sites DBAP 33, DBAP 43, DBAP 44, DBAP 51 and DBAP 52

In this section, the unmitigated impact of the proposed development on sites DBAP 33, DBAP 43, DBAP 44, DBAP 51 and DBAP 52 will be assessed.

All five these sites are grouped together in this impact assessment as they are either confirmed graves and cemeteries based on their appearance and characteristics or sites where possible graves are located which had been corroborated by prior stakeholder engagement as graves. Additionally, these sites are also all located within the proposed development footprints.

Without mitigation, all five these sites are expected to be completely destroyed during the Pre-Construction Phase. This is due to the fact that site clearing of all development footprint areas will be undertaken during this first development phase. For the purposes of this report, the term 'site clearing' is taken to mean the clearing of vegetation and removal of topsoil from the development footprints.

With their destruction complete during the Pre-Construction Phase, no impacts are expected during the Construction, Operational and Decommissioning and Rehabilitation Phases.

Table 3 - Assessment of Pre-Mitigated Impact of Proposed Development on sites DBAP 33, DBAP 43, DBAP 44, DBAP 51 and DBAP 52

Nature of the impact	Significance of potential impact BEFORE mitigation						Significance
	Probability	Duration	Extent	Magnitude	Loss of Resources (%)		
Pre-Construction Phase							
<i>Complete destruction of five sites containing graves and cemeteries</i>	-	5	5	3	8	3	80 High
Construction Phase							
<i>No further impacts expected</i>	0	0	0	0	0	0	0 None
Operational Phase							
<i>No further impacts expected</i>	0	0	0	0	0	0	0 None
Decommissioning and Rehabilitation Phase							
<i>No further impacts expected</i>	0	0	0	0	0	0	0 None

The calculation of the assessment of the unmitigated impact of the proposed development on the cemeteries and grave sites located within the development footprints is expected to be of **High Significance**. This means that mitigation measures would be required. See Chapter 8 for required mitigation measures for these sites.

7.2.2 Assessment of the Pre-Mitigated Impact on sites DBAP 11, DBAP 15 and DBAP 21

In this section, the unmitigated impact of the proposed development on sites DBAP 11, DBAP 15 and DBAP 21 will be assessed.

DBAP 11 comprises a cemetery that is located no more than 7m west of the proposed North Pit area. DBAP 15 comprises a historic farmstead where at least two unmarked graves are also buried. While the original farmstead at DBAP 15A is located within the proposed North Pit area and will be destroyed, the unmarked stillborn graves located at DBAP 15B and DBAP 15C are located no more than 6m and 27m from the proposed North Pit area respectively. DBAP 21 comprises a cemetery which is located 32m west of the actual conveyor footprint and 12m from the buffer area around the conveyor footprint.

Please note that the impacts assessed in this section will comprise the pre-mitigation impact, in other words, the impact without any mitigation measures in place.

Although these grave sites are not located within any of the development footprints, their close

proximity to these footprints requires an impact assessment to be undertaken for these sites. Without mitigation, significant impacts are expected on the site during the Pre-Construction Phase, to the extent that a section of the site may be destroyed. Some impacts may still be expected during the Construction, Operational and Decommissioning & Rehabilitation Phases.

Table 4 - Assessment of Pre-Mitigated Impact of Development on DBAP 11, DBAP 15 and DBAP 21

Nature of the impact	Significance of potential impact BEFORE mitigation						
	Probability	Duration	Extent	Magnitude	Loss of Resources (%)	Significance	
Pre-Construction Phase							
<i>A relatively high probability exists for these site to be partially destroyed during this phase</i>	-	4	5	3	8	3	64 High
Construction Phase							
<i>The probability exists for the site to be impacted upon by activities relating to this phase</i>	-	4	4	3	8	3	60 High
Operational Phase							
<i>The possibility exists for the site to be impacted upon by activities relating to this phase</i>	-	3	3	3	8	3	42 Moderate
Decommissioning and Rehabilitation Phase							
<i>The possibility exists for the site to be impacted upon by activities relating to this phase</i>	-	3	3	3	8	3	42 Moderate

The calculation of the assessment of the unmitigated impact of the proposed development on sites DBAP 11, DBAP 15 and DBAP 21 is expected to be of **High Significance** during the Pre-Construction and Construction Phases and **Moderate Significance** during the remaining project phases.

This means that mitigation measures would be required. See Chapter 8 for required mitigation measures for this site.

7.2.3 Assessment of the Pre-Mitigated Impact on sites DBAP 19

In this section, the unmitigated impact of the proposed development on site DBAP 19 will be assessed. DBAP 19 comprises a historic black homestead that is associated with graves which had been confirmed as such by prior stakeholder engagement. Additionally, this site is also all located within the proposed development footprints.

Without mitigation, this site is expected to be completely destroyed during the Pre-Construction Phase. This is due to the fact that site clearing of all development footprint areas will be undertaken

during this first development phase.

With its destruction complete during the Pre-Construction Phase, no further impacts are expected during the Construction, Operational and Decommissioning and Rehabilitation Phases.

Table 5 - Assessment of Pre-Mitigated Impact of Proposed Development on site DBAP 19

Nature of the impact	Significance of potential impact BEFORE mitigation							
	Probability	Duration	Extent	Magnitude	Loss of Resources (%)	Significance		
Pre-Construction Phase								
<i>Complete destruction of site containing historic black homestead with confirmed graves</i>	-	5	5	3	8	3	80	High
Construction Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None
Operational Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None
Decommissioning and Rehabilitation Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None

The calculation of the assessment of the unmitigated impact of the proposed development on the cemeteries and grave sites located within the development footprints is expected to be of **High Significance**. This means that mitigation measures would be required. See Chapter 8 for required mitigation measures for these sites.

7.2.4 Assessment of the Pre-Mitigated Impact on site DBAP 9

In this section, the unmitigated impact of the proposed development on site DBAP 9 will be assessed.

DBAP 9 comprises a historic black homestead where graves are also buried. The site is located partially within the footprint of the Explosive Destruction Bay. Please note that the impact assessed in this section will comprise the pre-mitigation impact, in other words, the impact without any mitigation measures in place.

The partial position of the site within the proposed Explosive Destruction Bay, coupled with the position of the remainder of the site in proximity to this and other development activities, requires

an impact assessment to be undertaken for the site. It is important to note, that the section of the site located within the development footprint is not where the confirmed graves are located.

Without mitigation, some impacts are expected on the site during all the project phases. During the Pre-Construction Phase, that section of the site located within the development will be completely destroyed, with no further impacts expected on that component of the site during the remainder of the project phases. However, some impacts are expected on the remainder of the site during the project phases following on the Pre-Construction Phase.

Table 6 - Assessment of Pre-Mitigated Impact of Development on sites DBAP 9

Nature of the impact	Significance of potential impact BEFORE mitigation						Significance
	Probability	Duration	Extent	Magnitude	Loss of Resources (%)		
Pre-Construction Phase							
<i>Destruction of that section of the site located within the development footprint</i>	-	3	5	3	8	3	48 Moderate
Construction Phase							
<i>The possibility exists for the site to be impacted upon by activities relating to this phase</i>	-	3	3	3	8	3	42 Moderate
Operational Phase							
<i>The possibility exists for the site to be impacted upon by activities relating to this phase</i>	-	3	3	3	8	3	42 Moderate
Decommissioning and Rehabilitation Phase							
<i>The possibility exists for the site to be impacted upon by activities relating to this phase</i>	-	3	3	3	8	3	42 Moderate

The calculation of the assessment of the unmitigated impact of the proposed development on site DBAP 9, is expected to be of **Moderate Significance** during all the project phases.

This means that mitigation measures would be required. See Chapter 8 for required mitigation measures for this site.

7.2.5 Assessment of the Pre-Mitigated Impact on sites DBAP 1, DBAP 6, DBAP 8, DBAP 22, DBAP 31, DBAP 32, DBAP 39, DBAP 40, DBAP 42, DBAP 45, DBAP 47, DBAP 54 and DBAP 55

In this section, the unmitigated impact of the proposed development on the above-mentioned sites will be assessed. These sites comprise historic black homesteads located within the proposed development footprint areas. The highest impact risk associated with these sites is that graves, including unmarked stillborn graves, may be buried here.

Without mitigation, all these sites are expected to be completely destroyed during the Pre-Construction Phase. This is due to the fact that all site clearing activities are to take place during this development phase. With their destruction complete during the Pre-Construction Phase, no impacts are expected during the Construction, Operational and the Decommissioning and Rehabilitation Phases.

Please note that in the calculations undertaken below, the level of probability was taken to be the level of probability of unmarked graves to be located within these homestead sites.

Table 7 - Assessment of Pre-Mitigated Impact of Proposed Development on 13 historic black homesteads located within the proposed development footprints

Nature of the impact	Significance of potential impact BEFORE mitigation						Significance	
	Probability	Duration	Extent	Magnitude	Loss of Resources (%)			
Pre-Construction Phase								
<i>Complete destruction of 13 historic black homesteads where the risk exists for unmarked graves to be located</i>	-	3	5	3	8	3	48	Moderate
Construction Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None
Operational Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None
Decommissioning and Rehabilitation Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None

The calculation of the assessment of the unmitigated impact of the proposed development on these 13 homestead sites, has revealed that the impact significance on these sites is expected to be of **Moderate Significance** during the Pre-Construction Phase. This means that mitigation measures would be required. See Chapter 8 for required mitigation measures for this site.

7.2.6 Assessment of the Pre-Mitigated Impact on site DBAP 23

In this section, the unmitigated impact of the proposed development on site DBAP 23 will be assessed. This site comprises a historic black homestead which is partially located within the proposed development footprint areas. In other words, even if this site is not mitigated, the proposed development is not expected to completely destroy the site, however, it will be disturbed. The highest impact risk associated with this site is that graves, including unmarked stillborn graves, may be buried here.

With mitigation, the site is expected to be disturbed during the Pre-Construction Phase. As a result, impacts are also still possible during the remainder of the project phases.

Please note that in the calculations undertaken below, the level of probability was taken to be both the level of probability of unmarked graves to be located within the homestead site as well as the probability of whether this site will be impacted upon by the proposed development.

Table 8 - Assessment of Pre-Mitigated Impact of Development on DBAP 23

Nature of the impact	Significance of potential impact BEFORE mitigation							
	Probability	Duration	Extent	Magnitude	Loss of Resources (%)	Significance		
Pre-Construction Phase								
<i>Some level of disturbance is expected to occur to this site during this phase</i>	-	3	3	3	6	3	36	Moderate
Construction Phase								
<i>Some level of disturbance is expected to occur to this site during this phase</i>	-	3	3	3	6	3	36	Moderate
Operational Phase								
<i>Some level of disturbance is expected to occur to this site during this phase</i>	-	3	3	3	6	3	36	Moderate
Decommissioning and Rehabilitation Phase								
<i>Some level of disturbance is expected to occur to this site during this phase</i>	-	3	3	3	6	3	36	Moderate

The calculation of the assessment of the unmitigated impact of the proposed development on this homestead site has revealed that the impact significance on this site is expected to be of **Moderate Significance** during all the project phases.

This means that mitigation measures would be required. See Chapter 8 for required mitigation measures for this site.

7.2.7 Assessment of the Pre-Mitigated Impact on sites DBAP 48 and DBAP 50

In this section, the unmitigated impact of the proposed development on the above-mentioned sites will be assessed.

Sites DBAP 48 and DBAP 50 comprise Late Iron Age stonewalled settlements located within the proposed development footprint areas.

Without mitigation, both sites are expected to be completely destroyed during the Pre-Construction Phase. With their destruction complete during the Pre-Construction Phase, no impacts are expected during the Construction, Operational and the Decommissioning and Rehabilitation Phases.

Table 9 - Assessment of Pre-Mitigated Impact of Proposed Development on two Late Iron Age stonewalled sites located within the proposed development footprints

Nature of the impact	Significance of potential impact BEFORE mitigation							
	Probability	Duration	Extent	Magnitude	Loss of Resources (%)	Significance		
Pre-Construction Phase								
<i>Complete destruction of two Late Iron Age stonewalled sites</i>	-	4	5	2	6	3	52	Moderate
Construction Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None
Operational Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None
Decommissioning and Rehabilitation Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None

The calculation of the assessment of the unmitigated impact of the proposed development on these two Late Iron Age stonewalled sites has revealed that the impact significance on these sites is expected to be of **Moderate Significance** during the Pre-Construction Phase.

This means that mitigation measures would be required. See Chapter 8 for required mitigation measures for this site.

7.2.8 Assessment of the Pre-Mitigated Impact on sites DBAP 18, DBAP 20, DBAP 34 and DBAP 35

In this section, the unmitigated impact of the proposed development on the above-mentioned sites will be assessed. These sites comprise surface scatters of potsherds which can either be associated with the Late Iron Age or Historic Period. The possibility of such potsherd scatters providing surface indications for the presence of unmarked Pedit graves, is mentioned by H.O. Mönnig (1978).

Without mitigation, these three sites are expected to be completely destroyed during the Pre-Construction Phase. With their destruction complete during the Pre-Construction Phase, no impacts are expected during the Construction, Operational and the Decommissioning and Rehabilitation Phases.

Table 10 - Assessment of Pre-Mitigated Impact of Proposed Development on sites DBAP 18, DBAP 20, DBAP 34 and DBAP 35 located within the proposed development footprints

Nature of the impact	Significance of potential impact BEFORE mitigation							
	Probability	Duration	Extent	Magnitude	Loss of Resources (%)	Significance		
Pre-Construction Phase								
<i>Complete destruction of four sites containing potsherd scatters and which may be surface indications for unmarked graves</i>	-	3	5	3	6	3	42	Moderate
Construction Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None
Operational Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None
Decommissioning and Rehabilitation Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None

The calculation of the assessment of the unmitigated impact of the proposed development on these sites has revealed that the impact significance on these sites is expected to be of **Moderate Significance** during the Pre-Construction Phase.

This means that mitigation measures would be required.

7.2.9 Assessment of the Pre-Mitigated Impact on site DBAP 38

In this section, the unmitigated impact of the proposed development on site DBAP 38 will be assessed.

Site DBAP 38 comprises stonewalling and structures that can in all likelihood be associated with both the Late Iron Age and Historic Period. The possible presence of graves can also not be excluded.

The site is located 27m south-west of one of the Pollution Control Dams. The relative proximity of the site to the proposed development footprints requires an impact assessment to be undertaken for the site.

Without mitigation, some impacts are expected during all the project phases, starting with the Pre-Construction Phase.

Table 11 - Assessment of Pre-Mitigated Impact of Proposed Development on site DBAP 38

Nature of the impact	Significance of potential impact BEFORE mitigation							
	Probability	Duration	Extent	Magnitude	Loss of Resources (%)	Significance		
Pre-Construction Phase								
<i>Strong possibility exists for the site to be impacted upon by activities ancillary to the proposed operational work</i>	-	4	4	3	6	3	52	Moderate
Construction Phase								
<i>Strong possibility exists for the site to be impacted upon by activities ancillary to the proposed operational work</i>	-	4	4	3	6	3	52	Moderate
Operational Phase								
<i>Strong possibility exists for the site to be impacted upon by activities ancillary to the proposed operational work</i>	0	4	4	3	6	3	52	Moderate
Decommissioning and Rehabilitation Phase								
<i>Strong possibility exists for the site to be impacted upon by activities ancillary to the proposed operational work</i>	-	4	4	3	6	3	52	Moderate

The calculation of the assessment of the unmitigated impact of the proposed development on site DBAP 38 is expected to be of **Moderate Significance** during all the project phases.

This means that mitigation measures would be required. See Chapter 8.

7.2.10 Assessment of the Pre-Mitigated Impact on site DBAP 7

In this section, the unmitigated impact of the proposed development on the above-mentioned site will be assessed.

Site DBAP 7 comprises a low-density surface scatter of Middle Stone Age lithics and is located within the proposed development footprint areas.

Without mitigation, the site is expected to be destroyed during the Pre-Construction Phase.

With its destruction completed during the Pre-Construction Phase, no impacts are expected during the Construction, Operational and the Decommissioning and Rehabilitation Phases. The impact assessment calculations shown below reflect this.

Table 12 - Assessment of Pre-Mitigated Impact of Proposed Development on site DBAP 7

Nature of the impact	Significance of potential impact BEFORE mitigation						Significance	
	Probability	Duration	Extent	Magnitude	Loss of Resources (%)			
Pre-Construction Phase								
<i>Complete destruction of Middle Stone Age site</i>	-	4	5	2	2	3	36	Moderate
Construction Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None
Operational Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None
Decommissioning and Rehabilitation Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None

The calculation of the assessment of the unmitigated impact of the proposed development on the low-density Middle Stone Age surface scatter at site DBAP 7, has revealed that the impact significance on this sites is expected to be of **Moderate Significance** during the Pre-Construction Phase.

This means that mitigation measures would be required. See Chapter 8 for required mitigation measures for this site.

7.2.11 Assessment of the Pre-Mitigated Impact on site DBAP 2

In this section, the unmitigated impact of the proposed development on site DBAP 2 will be assessed. This site comprises stonewalling which can either be associated with the Late Iron Age or Historic Period as well as possible rock engravings.

The site is located 85m north-east of the center point of a proposed ventilation shaft. With these shafts expected to have a development footprint with a radius of approximately 50m, site DBAP 2 is expected to be located roughly 35m from the edge of the ventilation shaft footprint area.

The relative proximity of the site to the proposed development footprint requires an impact assessment to be undertaken for the site.

Without mitigation, impacts are expected during all the project phases, starting with the Pre-Construction Phase.

Table 13 - Assessment of Pre-Mitigated Impact of Proposed Development on site DBAP 2

Nature of the impact	Significance of potential impact BEFORE mitigation							
	Probability	Duration	Extent	Magnitude	Loss of Resources (%)	Significance		
Pre-Construction Phase								
<i>The possibility exists for the site to be impacted upon by activities ancillary to the proposed construction work</i>	-	3	4	3	6	4	39	Moderate
Construction Phase								
<i>The possibility exists for the site to be impacted upon by activities ancillary to the proposed construction work</i>	-	3	4	3	6	4	39	Moderate
Operational Phase								
<i>The possibility exists for the site to be impacted upon by activities ancillary to the proposed operational work</i>	-	3	4	3	6	4	39	Moderate
Decommissioning and Rehabilitation Phase								
<i>The possibility exists for the site to be impacted upon by activities ancillary to the proposed construction work</i>	-	3	4	3	6	4	39	Moderate

The calculation of the assessment of the unmitigated impact of the proposed development on site DBAP 2 is expected to be of **Moderate Significance** during all the project phases.

This means that mitigation measures would be required. See Chapter 8 for required mitigation measures for this site.

7.2.12 Assessment of the Pre-Mitigated Impact on site DBAP 53

In this section, the unmitigated impact of the proposed development on the above-mentioned site will be assessed.

Site DBAP 53 comprises a stone enclosure which may have had a military association in the past. This is said as a possible loophole was identified in the wall of the structure.

Without mitigation, the site is expected to be destroyed during the Pre-Construction Phase.

With its destruction completed during the Pre-Construction Phase, no impacts are expected during the Construction, Operational and the Decommissioning and Rehabilitation Phases.

Table 14 - Assessment of Pre-Mitigated Impact of Proposed Development on site DBAP 53

Nature of the impact	Significance of potential impact BEFORE mitigation							
	Probability	Duration	Extent	Magnitude	Loss of Resources (%)	Significance		
Pre-Construction Phase								
<i>Complete destruction of a site containing a structure which may have had a military function</i>	-	3	5	3	6	4	42	Moderate
Construction Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None
Operational Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None
Decommissioning and Rehabilitation Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None

The calculation of the assessment of the unmitigated impact of the proposed development on site DBAP 53 has revealed that the impact significance on this site is expected to be of **Moderate Significance** during the Pre-Construction Phase.

This means that mitigation measures would be required. See Chapter 8 for required mitigation measures for this site.

7.3 Assessment of Post-Mitigation Impact on the identified Heritage Sites

7.3.1 Assessment of the Post-Mitigated Impact on sites DBAP 33, DBAP 43, DBAP 44, DBAP 51 and DBAP 52

In this section, the impact of the proposed development on sites DBAP 33, DBAP 43, DBAP 44, DBAP 51 and DBAP 52 will be assessed.

The above-mentioned sites are all graves and burial grounds located within the proposed development footprints areas.

For the impact assessment calculations included in this section, it is assumed that all the mitigation measures as outlined in Chapter 8 have been successfully completed.

Again, the only impacts are expected during the Pre-Construction Phase. With all the mitigation measures completed, the significance of the potential impact of the proposed development on these

graves and cemeteries, are estimated to be **Moderate Significance**.

With the significance of the impact of the development reduced from a pre-mitigation High Significance to a post-mitigation Moderate Significance, the degree to which the potential impact could be reversed and mitigated with the proposed mitigation measures is estimated to be 50%.

Table 15 - Assessment of Post-Mitigated Impact of Proposed Development on sites DBAP 33, DBAP 43, DBAP 44, DBAP 51 and DBAP 52

Nature of the impact	Significance of potential impact AFTER mitigation							
	Probability	Duration	Extent	Magnitude	Loss of Resources (%)	Significance		
Pre-Construction Phase								
<i>Complete destruction of five sites containing graves and cemeteries</i>	-	4	4	2	4	2	40	Moderate
Construction Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None
Operational Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None
Closure/Rehabilitation Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None
Post-Closure Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None

7.3.2 Assessment of the Post-Mitigated Impact on sites DBAP 11, DBAP 15 and DBAP 21

In this section, the impact of the proposed development on sites DBAP 11, DBAP 15 and DBAP 21 will be assessed.

For the impact assessment calculations included in this section, it is assumed that all the mitigation measures as outlined in Chapter 8 have been successfully completed.

The only impacts are expected during the Pre-Construction Phase. With all the mitigation measures completed, the significance of the potential impact of the proposed development on these graves and cemeteries, are estimated to be **Moderate Significance**.

With the significance of the impact of the development reduced from a pre-mitigation Moderate Significance to a post-mitigation Low Significance, the degree to which the potential impact could be

reversed and mitigated with the proposed mitigation measures is estimated to be 53.1%.

Table 16 - Assessment of Post-Mitigated Impact of Development on DBAP 11, DBAP 15 and DBAP 21

Nature of the impact	Significance of potential impact AFTER mitigation							
	Probability	Duration	Extent	Magnitude	Loss of Resources (%)	Significance		
Pre-Construction Phase								
<i>A relatively high probability exists for these site to be partially destroyed during this phase</i>	-	3	4	2	4	2	30	Moderate
Construction Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None
Operational Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None
Decommissioning and Rehabilitation Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None

7.3.3 Assessment of the Post-Mitigated Impact on site DBAP 19

In this section, the impact of the proposed development on sites DBAP 19 will be assessed.

DBAP 19 comprises a historic black homestead that is associated with graves which had been confirmed as such by prior stakeholder engagement. Additionally, this site is also all located within the proposed development footprints.

For the impact assessment calculations included in this section, it is assumed that all the mitigation measures as outlined in Chapter 8 have been successfully completed.

Again, the only impacts are expected during the Pre-Construction Phase. With all the mitigation measures completed, the significance of the potential impact of the proposed development on this historic black homestead with confirmed graves, is estimated to be Moderate.

With the significance of the impact of the development reduced from a pre-mitigation High Significance to a post-mitigation Moderate Significance, the degree to which the potential impact could be reversed and mitigated with the proposed mitigation measures is estimated to be 50%.

Table 17 - Assessment of Post-Mitigated Impact of Proposed Development on site DBAP 19

Nature of the impact	Significance of potential impact AFTER mitigation							
	Probability	Duration	Extent	Magnitude	Loss of Resources (%)	Significance		
Pre-Construction Phase								
<i>Complete destruction of site containing historic black homestead with confirmed graves</i>	-	4	4	2	4	2	40	Moderate
Construction Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None
Operational Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None
Closure/Rehabilitation Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None
Post-Closure Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None

7.3.4 Assessment of the Post-Mitigated Impact on site DBAP 9

In this section, the impact of the proposed development on site DBAP 9 will be assessed.

Site DBAP 9 comprises a historic black homestead where graves are also buried. The site is located partially within the footprint of the Explosive Destruction Bay. Please note that the impact assessed in this section will comprise the pre-mitigation impact, in other words, the impact without any mitigation measures in place.

For the impact assessment calculations included in this section, it is assumed that all the mitigation measures as outlined in Chapter 8 have been successfully completed.

Impacts are expected during all the project phases of the proposed development. With all the mitigation measures completed, the significance of the potential impact of the proposed development on site is estimated to be **Low Significance**.

With the significance of the impact of the development reduced from a pre-mitigation Moderate Significance to a post-mitigation Low Significance, the degree to which the potential impact could be reversed and mitigated with the proposed mitigation measures is estimated to be 54.2% during the Pre-Construction Phase and 47.6% during the other project phases.

Table 18 - Assessment of Post-Mitigated Impact of Proposed Development on DBAP 9

Nature of the impact	Significance of potential impact AFTER mitigation							
	Probability	Duration	Extent	Magnitude	Loss of Resources (%)	Significance		
Pre-Construction Phase								
<i>Destruction of that section of the site located within the development footprint</i>	0	2	4	3	4	2	22	Low
Construction Phase								
<i>The possibility exists for the site to be impacted upon by activities relating to this phase</i>	-	2	4	3	4	2	22	Low
Operational Phase								
<i>The possibility exists for the site to be impacted upon by activities relating to this phase</i>	-	2	4	3	4	2	22	Low
Decommissioning and Rehabilitation Phase								
<i>The possibility exists for the site to be impacted upon by activities relating to this phase</i>	0	2	4	3	4	2	22	Low

7.3.5 Assessment of the Post-Mitigated Impact on sites DBAP 1, DBAP 6, DBAP 8, DBAP 22, DBAP 31, DBAP 32, DBAP 39, DBAP 40, DBAP 42, DBAP 45, DBAP 47, DBAP 54 and DBAP 55

In this section, the post-mitigated impact of the proposed development on the above-mentioned sites will be assessed. These sites comprise historic black homesteads located within the proposed development footprint areas. The highest impact risk associated with these sites is that graves, including unmarked stillborn graves, may be buried here.

Impacts are only expected during the Pre-Construction Phase of the proposed development. With all the mitigation measures completed, the significance of the potential impact of the proposed development on site is estimated to be **Low Significance**.

With the significance of the impact of the development reduced from a pre-mitigation Moderate Significance to a post-mitigation Low Significance, the degree to which the potential impact could be reversed and mitigated with the proposed mitigation measures is estimated to be 54.2%.

Please note that in the calculations undertaken below, the level of Probability was taken to be the level of probability of unmarked graves to be located within these homestead sites, and not the probability of whether these sites will be destroyed by the proposed development.

Table 19 - Assessment of Post-Mitigated Impact of Proposed Development on 13 historic black homesteads located within the proposed development footprints

Nature of the impact	Significance of potential impact AFTER mitigation							
	Probability	Duration	Extent	Magnitude	Loss of Resources (%)	Significance		
Pre-Construction Phase								
Complete destruction of 13 historic black homesteads where the risk exists for unmarked graves to be located	-	2	4	3	4	2	22	Low
Construction Phase								
Complete destruction of 18 historic black homesteads where the risk exists for unmarked graves to be located	0	0	0	0	0	0	0	None
Operational Phase								
No further impacts expected	0	0	0	0	0	0	0	None
Decommissioning and Rehabilitation Phase								
No further impacts expected	0	0	0	0	0	0	0	None

7.3.6 Assessment of the Post-Mitigated Impact on site DBAP 23

In this section, the post-mitigated impact of the proposed development on the above-mentioned site will be assessed.

Site DBAP 23 comprises a historic black homestead which is partially located within the proposed development footprint areas. In other words, even if this site is not mitigated, the proposed development is not expected to completely destroy this site, however, it will be disturbed. The highest impact risk associated with this site is that graves, including unmarked stillborn graves, may be buried here.

Impacts are only expected during all the project phases. With all the mitigation measures completed, the significance of the potential impact of the proposed development on the site is estimated to be **Low Significance**.

With the significance of the impact of the development reduced from a pre-mitigation Moderate Significance to a post-mitigation Low Significance, the degree to which the potential impact could be reversed and mitigated with the proposed mitigation measures is estimated to be 44.4%.

Please note that in the calculations undertaken below, the level of Probability was taken to be the

level of probability of unmarked graves to be located within this homestead site, and not the probability of whether the site will be destroyed by the proposed development.

Table 20 - Assessment of Post-Mitigated Impact of Proposed Development on sites DBAP 23

Nature of the impact	Significance of potential impact AFTER mitigation						Significance	
	Probability	Duration	Extent	Magnitude	Loss of Resources (%)			
Pre-Construction Phase								
<i>Some level of disturbance is expected to occur to this site during this phase</i>	-	2	3	3	4	2	20	Low
Construction Phase								
<i>Some level of disturbance is expected to occur to this site during this phase</i>	-	2	3	3	4	2	20	Low
Operational Phase								
<i>Some level of disturbance is expected to occur to this site during this phase</i>	-	2	3	3	4	2	20	Low
Decommissioning and Rehabilitation Phase								
<i>Some level of disturbance is expected to occur to this site during this phase</i>	-	2	3	3	4	2	20	Low

7.3.7 Assessment of the Post-Mitigated Impact on sites DBAP 48 and DBAP 50

In this section, the post-mitigated impact of the proposed development on the above-mentioned sites will be assessed.

These sites comprise Late Iron Age stonewalled sites located within the proposed development footprint areas.

Impacts are only expected during the Pre-Construction Phase of the proposed development. The reason for this is that all site clearing activities of the proposed development footprints will take place during this development phase.

With all the mitigation measures completed, the significance of the potential impact of the proposed development on site is estimated to be **Low Significance**.

With the significance of the impact of the development reduced from a pre-mitigation Moderate Significance to a post-mitigation Low Significance, the degree to which the potential impact could be reversed and mitigated with the proposed mitigation measures is estimated to be 48.1%.

Table 21 - Assessment of Post-Mitigated Impact of Proposed Development on sites DBAP 48 and DBAP 50 located within the proposed development footprints

Nature of the impact	Significance of potential impact AFTER mitigation							
	Probability	Duration	Extent	Magnitude	Loss of Resources (%)	Significance		
Pre-Construction Phase								
<i>Complete destruction of two Late Iron Age stonewalled sites</i>	-	3	4	1	4	2	27	Low
Construction Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None
Operational Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None
Decommissioning and Rehabilitation Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None

7.3.8 Assessment of the Post-Mitigated Impact on sites DBAP 18, DBAP 20, DBAP 34 and DBAP 35

In this section, the post-mitigated impact of the proposed development on the above-mentioned sites will be assessed.

For the impact assessment calculations included in this section, it is assumed that all the mitigation measures as outlined in Chapter 8 have been successfully completed.

Sites DBAP 18, DBAP 20, DBAP 34 and DBAP 35 comprise surface scatters of potsherds which can either be associated with the Late Iron Age or Historic Period. The possibility of such potsherd scatters providing surface indications for the presence of unmarked Pedit graves, is mentioned by H.O. Mönnig (1978).

Impacts are only expected during the Pre- Construction Phase of the proposed development. With all the mitigation measures completed, the significance of the potential impact of the proposed development on site is estimated to be **Low Significance**.

With the significance of the impact of the development reduced from a pre-mitigation Moderate Significance to a post-mitigation Low Significance, the degree to which the potential impact could be reversed and mitigated with the proposed mitigation measures is estimated to be 52.4%.

Table 22 - Assessment of Post-Mitigated Impact of Proposed Development on sites DBAP 18, DBAP 20, DBAP 34 and DBAP 35 located within the proposed development footprints

Nature of the impact	Significance of potential impact AFTER mitigation							
	Probability	Duration	Extent	Magnitude	Loss of Resources (%)	Significance		
Pre-Construction Phase								
<i>Complete destruction of four sites containing potsherd scatters and which may be surface indications for unmarked graves</i>	-	2	4	2	4	2	20	Low
Construction Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None
Operational Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None
Decommissioning and Rehabilitation Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None

7.3.9 Assessment of the Post-Mitigated Impact on site DBAP 38

In this section, the impact of the proposed development on site DBAP 38 will be assessed.

Site DBAP 38 comprises stonewalling which may either be associated with the Late Iron Age or Historic Period. The risk also exists for graves to be located here.

For the impact assessment calculations included in this section, it is assumed that all the mitigation measures as outlined in Chapter 8 have been successfully completed.

Impacts are expected during all the project phases. With all the mitigation measures completed, the significance of the potential impact of the proposed development on site is estimated to be **Low Significance**.

With the significance of the impact of the development reduced from a pre-mitigation High Significance to a post-mitigation Moderate Significance, the degree to which the potential impact could be reversed and mitigated with the mitigation measures proposed in this report, is estimated to be 61.5%.

Table 23 - Assessment of Post-Mitigated Impact of Proposed Development on DBAP 38

Nature of the impact	Significance of potential impact AFTER mitigation							
	Probability	Duration	Extent	Magnitude	Loss of Resources (%)	Significance		
Pre-Construction Phase								
<i>Strong possibility exists for the site to be impacted upon by activities ancillary to the proposed operational work</i>	-	2	3	3	4	2	20	Low
Construction Phase								
<i>Strong possibility exists for the site to be impacted upon by activities ancillary to the proposed operational work</i>	-	2	3	3	4	2	20	Low
Operational Phase								
<i>Strong possibility exists for the site to be impacted upon by activities ancillary to the proposed operational work</i>	-	2	3	3	4	2	20	Low
Decommissioning and Rehabilitation Phase								
<i>Strong possibility exists for the site to be impacted upon by activities ancillary to the proposed operational work</i>	-	2	3	3	4	2	20	Low

7.3.10 Assessment of the Post-Mitigated Impact on site DBAP 7

In this section, the post-mitigated impact of the proposed development on the above-mentioned site will be assessed.

Site DBAP 7 comprises a low-density surface scatter of Middle Stone Age lithics which is located within the proposed development footprint areas.

It is important to note that for this assessment, it is assumed that the required mitigation measures outlined in Chapter 8 had already been successfully completed.

Impacts are only expected during the Pre-Construction Phase of the proposed development. With all the mitigation measures completed, the significance of the potential impact of the proposed development on site is estimated to be **Low Significance**.

With the significance of the impact of the development reduced from a pre-mitigation Moderate Significance to a post-mitigation Low Significance, the degree to which the potential impact could be reversed and mitigated with the proposed mitigation measures is estimated to be 33.3%.

Table 24 - Assessment of Post-Mitigated Impact of Proposed Development on site DBAP 7 which is located within the proposed development footprints

Nature of the impact	Significance of potential impact AFTER mitigation							
	Probability	Duration	Extent	Magnitude	Loss of Resources (%)	Significance		
Pre-Construction Phase								
<i>No impacts are expected to these sites during this phase</i>	-	3	4	2	2	3	24	Low
Construction Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None
Operational Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None
Decommissioning and Rehabilitation Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None

7.3.11 Assessment of the Post-Mitigated Impact on site DBAP 2

In this section, the impact of the proposed development on sites DBAP 2 will be assessed.

For the impact assessment calculations included in this section, it is assumed that all the mitigation measures as outlined in Chapter 8 have been successfully completed.

Site DBAP 2 comprises stonewalling that can either be associated with the Late Iron Age or Historic Period. Additionally, possible rock engravings were identified a short distance from the site. These rock engravings appear to be associated with the Late Iron Age.

Impacts are expected to take place during all the project phases. With all the mitigation measures outlined in Chapter 8 completed, the significance of the potential impact of the proposed development on site is estimated to be **Low Significance**.

With the significance of the impact of the development reduced from a pre-mitigation High Significance to a post-mitigation Moderate Significance, the degree to which the potential impact could be reversed and mitigated with the mitigation measures proposed in Chapter 8, is estimated to be 53.8%.

Table 25 - Assessment of Post-Mitigated Impact of Proposed Development on site DBAP 2

Nature of the impact	Significance of potential impact AFTER mitigation							
	Probability	Duration	Extent	Magnitude	Loss of Resources (%)	Significance		
Pre-Construction Phase								
<i>The possibility exists for the site to be impacted upon by activities ancillary to the proposed construction work</i>	-	2	3	2	4	2	18	Low
Construction Phase								
<i>The possibility exists for the site to be impacted upon by activities ancillary to the proposed construction work</i>	-	2	3	2	4	2	18	Low
Operational Phase								
<i>The possibility exists for the site to be impacted upon by activities ancillary to the proposed construction work</i>	-	2	3	2	4	2	18	Low
Decommissioning and Rehabilitation Phase								
<i>The possibility exists for the site to be impacted upon by activities ancillary to the proposed construction work</i>	-	2	3	2	4	2	18	Low

7.3.12 Assessment of the Post-Mitigated Impact on site DBAP 53

In this section, the post-mitigated impact of the proposed development on the above-mentioned site will be assessed.

For the impact assessment calculations included in this section, it is assumed that all the mitigation measures as outlined in Chapter 8 have been successfully completed.

Site DBAP 53 comprises a stonewalled enclosure which may have had a historic military association. This assumption is made as a possible loophole was identified in the wall of the enclosure.

Impacts are only expected during the Pre-Construction Phase of the proposed development. With all the mitigation measures outlined in Chapter 8 completed, the significance of the potential impact of the proposed development on site is estimated to be **Low Significance**.

With the significance of the impact of the development reduced from a pre-mitigation High Significance to a post-mitigation Moderate Significance, the degree to which the potential impact could be reversed and mitigated with the mitigation measures proposed in Chapter 8, is estimated to be 52.4%.

Table 26 - Assessment of Post-Mitigated Impact of Proposed Development on site DBAP 53

Nature of the impact	Significance of potential impact AFTER mitigation							
	Probability	Duration	Extent	Magnitude	Loss of Resources (%)	Significance		
Pre-Construction Phase								
<i>Complete destruction of a site containing a structure which may have had a military function</i>	-	2	4	2	4	2	20	Low
Construction Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None
Operational Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None
Closure/Rehabilitation Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None
Post-Closure Phase								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None

8 REQUIRED MITIGATION MEASURES

8.1 Introduction

In this chapter, required mitigation measures for each of the sites affected by the proposed development will be outlined.

As shown in Chapter 7, no mitigation is required for sites with a Low Significance. This means that no mitigation is required for sites DBAP 4, DBAP 14, DBAP 17, DBAP 24, DBAP 46 and DBAP 49.

In terms of the remaining sites for which mitigation is required, site-specific mitigation measures are provided below.

8.2 Required Mitigation Measures for the Identified Sites

8.2.1 Required Mitigation for DBAP 11, DBAP 15, DBAP 21, DBAP 33, DBAP 43, DBAP 44, DBAP 51 and DBAP 52

The impact significance calculations undertaken in Chapter 7 have shown that the significance of the unmitigated impact of the proposed development on these sites is estimated to be of High Significance. As a result, mitigation measures are required for this site.

As cemeteries and graves have Medium to High Heritage Significance, the best option is to change the development footprint to allow for the *in situ* preservation of these sites. However, should it not be possible to preserve these sites *in situ*, the required mitigation measures are outlined below.

- A grave relocation process must be undertaken.
- A detailed social consultation process, at least 60 days in length, comprising the attempted identification of the next-of-kin in order to obtain their consent for the relocation.
- Bilingual site and newspaper notices indicating the intent of the relocation.
- Permits from all the relevant and legally required authorities.
- An exhumation process that keeps the dignity of the remains and family intact.
- An exhumation process that safeguards the legal rights of the families as well as that of the mining company.
- The process must be done by a reputable company well versed in the mitigation of graves.

8.2.2 Required Mitigation for site DBAP 19

The impact significance calculations undertaken in Chapter 7 have shown that the significance of the unmitigated impact of the proposed development on this six sites is estimated to be of High Significance. As a result, mitigation measures are required for this site.

As cemeteries and graves have Medium to High Heritage Significance, the best option is to change the development footprint to allow for the *in situ* preservation of these sites. However, should it not be possible to preserve these sites *in situ*, the required mitigation measures are outlined below.

- A grave relocation process must be undertaken.
- A detailed social consultation process, at least 60 days in length, comprising the attempted identification of the next-of-kin in order to obtain their consent for the relocation.
- Bilingual site and newspaper notices indicating the intent of the relocation.
- Permits from all the relevant and legally required authorities.
- An exhumation process that keeps the dignity of the remains and family intact.
- An exhumation process that safeguards the legal rights of the families as well as that of the mining company.
- The process must be done by a reputable company well versed in the mitigation of graves.

Additionally, should it not be possible to preserve these sites *in situ*, the required mitigation measures as outlined for historic black homesteads regarding unmarked stillborn graves must also be undertaken. See **Section 8.2.5** below.

8.2.3 Required Mitigation Measures for site DBAP 9

The impact significance calculations undertaken in Chapter 7 have shown that the significance of the unmitigated impact of the proposed development on this site is estimated to be of Moderate Significance. As a result, mitigation measures are required for this site.

The following mitigation measure is required:

- A social consultation process to assess whether any local residents or the wider public is aware of the presence of graves here.

- The confirmed positions of all unmarked stillborn graves and graves must be fenced, signposted and plotted on all project and construction maps.
- The required mitigation measures as outlined for historic black homesteads regarding unmarked stillborn graves must also be undertaken. See **Section 8.2.5** below.

8.2.4 Mitigation for DBAP 1, DBAP 6, DBAP 8, DBAP 22, DBAP 31, DBAP 32, DBAP 39, DBAP 40, DBAP 42, DBAP 45, DBAP 47, DBAP 54 & DBAP 55

The impact significance calculations undertaken in Chapter 7 have shown that the significance of the unmitigated impact of the proposed development on these 13 sites is estimated to be of Moderate Significance. As a result, mitigation measures are required for this site.

The following initial mitigation measure is required:

- A social consultation process to assess whether any local residents or the wider public is aware of the presence of graves here.

Depending on the outcome of the social consultation process, three different outcomes would be the result, namely:

- Outcome 1: The social consultation absolutely confirms that no graves are located here.
- Outcome 2: The social consultation absolutely confirms that graves are located here.
- Outcome 3: The social consultation does not yield any confident results.

The following mitigation measures would be required for sites falling under Outcome 1:

- No further mitigation would be required.

The following mitigation measures would be required for sites falling under Outcome 2:

- A grave relocation process must be undertaken.
- A detailed social consultation process, at least 60 days in length, comprising the attempted identification of the next-of-kin in order to obtain their consent for the relocation.
- Bilingual site and newspaper notices indicating the intent of the relocation.

- Permits from all the relevant and legally required authorities.
- An exhumation process that keeps the dignity of the remains and family intact.
- An exhumation process that safeguards the legal rights of the families as well as that of the mining company.
- The process must be done by a reputable company well versed in the mitigation of graves.

The following mitigation measures would be required for sites falling under Outcome 3:

- Test excavations to physically confirm the presence or absence graves.
- If no evidence for graves is found, the site will fall within Outcome 1 as outlined above. This means that no further mitigation measures would be required.
- If evidence for graves is found, the site will fall within Outcome 2 as outlined above. This means that a full grave relocation process must be implemented.

Additionally, the following mitigation measures must be undertaken for all these sites:

- All structures and site layouts from each site must be recorded using standard survey methods and/or measured drawings. The end result would be a site layout plan.
- A mitigation report must be compiled for these sites within which all the mitigation measures and its findings will be outlined. The recorded drawings from the previous item must also be included in this mitigation report.
- The completed mitigation report must be submitted to the relevant heritage authorities.

8.2.5 Required Mitigation Measures for site DBAP 23

The impact significance calculations undertaken in Chapter 7 have shown that the significance of the unmitigated impact of the proposed development on this site is estimated to be of Moderate Significance. As a result, mitigation measures are required for this site.

The following initial mitigation measure is required:

- A social consultation process to assess whether any local residents or the wider public is aware of the presence of graves here.

Depending on the outcome of the social consultation process, three different outcomes would be the result, namely:

- Outcome 1: The social consultation absolutely confirms that no graves are located here.
- Outcome 2: The social consultation absolutely confirms that graves are located here.
- Outcome 3: The social consultation does not yield any confident results.

The following mitigation measures would be required for sites falling under Outcome 1:

- No further mitigation would be required.

The following mitigation measures would be required for sites falling under Outcome 2:

- A grave relocation process must be undertaken.
- A detailed social consultation process, at least 60 days in length, comprising the attempted identification of the next-of-kin in order to obtain their consent for the relocation.
- Bilingual site and newspaper notices indicating the intent of the relocation.
- Permits from all the relevant and legally required authorities.
- An exhumation process that keeps the dignity of the remains and family intact.
- An exhumation process that safeguards the legal rights of the families as well as that of the mining company.
- The process must be done by a reputable company well versed in the mitigation of graves.

The following mitigation measures would be required for sites falling under Outcome 3:

- Test excavations to physically confirm the presence or absence graves.
- If no evidence for graves is found, the site will fall within Outcome 1 as outlined above. This means that no further mitigation measures would be required.
- If evidence for graves is found, the site will fall within Outcome 2 as outlined above. This means that a full grave relocation process must be implemented.

Additionally, the following mitigation measures must be undertaken for this site:

- All structures and site layouts from each site must be recorded using standard survey

methods and/or measured drawings. The end result would be a site layout plan.

- A mitigation report must be compiled for these sites within which all the mitigation measures and its findings will be outlined. The recorded drawings from the previous item must also be included in this mitigation report.
- The completed mitigation report must be submitted to the relevant heritage authorities.

8.2.6 Required Mitigation Measures for sites DBAP 48 and DBAP 50

The impact significance calculations undertaken in Chapter 7 have shown that the significance of the unmitigated impact of the proposed development on these two sites is estimated to be of Moderate Significance. As a result, mitigation measures are required for this site.

The following mitigation measures are required for the three sites:

- An archaeological site layout plan must be compiled using accepted archaeological techniques.
- During the recording of the archaeological site layout plan, an attempt must be made to identify any archaeological middens associated with these sites. Should such middens be identified, archaeological test excavations would be required. If no such middens are found, the next two mitigation measures comprising an archaeological excavation permit application and archaeological test excavations would not be required.
- A permit application to SAHRA for archaeological test excavations to take place.
- Once the permit is received, limited archaeological test excavations may also be required, should a deposit be identified.
- An archaeological mitigation report must be compiled.
- A destruction permit application must be lodged with (SAHRA) to allow for the destruction of the site.

8.2.7 Required Mitigation Measures for sites DBAP 18, DBAP 20, DBAP 34 and DBAP 35

The impact significance calculations undertaken in Chapter 7 have shown that the significance of the unmitigated impact of the proposed development on these three sites is estimated to be of Moderate Significance. As a result, mitigation measures are required for these sites.

The following initial mitigation measure is required for the four sites:

- A social consultation process to assess whether any local residents or the wider public is aware of the presence of graves here.

Depending on the outcome of the social consultation process, three different outcomes would be the result, namely:

- Outcome 1: The social consultation absolutely confirms that no graves are located here or does not yield any confident results.
- Outcome 2: The social consultation absolutely confirms that graves are located here.

The following mitigation measures would be required for sites falling under Outcomes 1 and 2:

- A permit application to SAHRA for archaeological mitigation to take place.
- Once the permit is received, a surface collection of the potsherds from each site can be made.
- Limited archaeological test excavations may also be required, should a deposit be identified.
- An archaeological mitigation report must be compiled. The completed mitigation report must be submitted to the relevant heritage authorities.

The following mitigation measures would be required for sites falling under Outcome 2:

- A grave relocation process must be undertaken.
- A detailed social consultation process, at least 60 days in length, comprising the attempted identification of the next-of-kin in order to obtain their consent for the relocation.
- Bilingual site and newspaper notices indicating the intent of the relocation.
- Permits from all the relevant and legally required authorities.
- An exhumation process that keeps the dignity of the remains and family intact.
- An exhumation process that safeguards the legal rights of the families as well as that of the mining company.
- The process must be done by a reputable company well versed in the mitigation of graves.

8.2.8 Required Mitigation Measures for site DBAP 38

The impact significance calculations undertaken in Chapter 7 have shown that the significance of the unmitigated impact of the proposed development on this site is estimated to be of Moderate Significance. As a result, mitigation measures are required for this site.

The following initial mitigation measure is required for the three sites:

- A social consultation process to assess whether any local residents or the wider public is aware of the presence of graves here.
- An archaeological site layout plan must be compiled using accepted archaeological techniques.

Depending on the outcome of the social consultation process, three different outcomes would be the result, namely:

- Outcome 1: The social consultation absolutely confirms that no graves are located here or does not yield any confident results.
- Outcome 2: The social consultation absolutely confirms that graves are located here.

The following mitigation measures would be required for sites falling under Outcomes 1 and 2:

- A permit application to SAHRA for archaeological mitigation to take place.
- Once the permit is received, limited archaeological test excavations may be required, should a deposit be identified during the site recording stage.
- An archaeological mitigation report must be compiled. The completed mitigation report must be submitted to the relevant heritage authorities.

The following mitigation measures would be required for sites falling under Outcome 2:

- A grave relocation process must be undertaken.
- A detailed social consultation process, at least 60 days in length, comprising the attempted identification of the next-of-kin in order to obtain their consent for the relocation.
- Bilingual site and newspaper notices indicating the intent of the relocation.
- Permits from all the relevant and legally required authorities.

- An exhumation process that keeps the dignity of the remains and family intact.
- An exhumation process that safeguards the legal rights of the families as well as that of the mining company.
- The process must be done by a reputable company well versed in the mitigation of graves.

8.2.9 Required Mitigation Measures for site DBAP 7

The impact significance calculations undertaken in Chapter 7 have shown that the significance of the unmitigated impact of the proposed development on this site is estimated to be of Moderate Significance. As a result, mitigation measures are required for this site.

The following mitigation measure is required for the three sites:

- The site must be assessed in the field by a suitably qualified and experienced Stone Age specialist.
- The recommendations made by the Stone Age specialist must be adhered to.

8.2.10 Required Mitigation Measures for site DBAP 2

The impact significance calculations undertaken in Chapter 7 have shown that the significance of the unmitigated impact of the proposed development on this site is estimated to be of Moderate Significance. As a result, mitigation measures are required for this site.

The following mitigation measures are required:

- Before construction commences, the site must be archaeologically recorded. Subsequently, the site must be fenced. This fencing must enclose both the walling and possible rock engravings and must be erected in the presence of the project archaeologist.
- Signposts must be erected that clearly indicates the fenced area as a heritage site.
- The position of the site at DBAP 2 must be shown on all the construction and operation maps to ensure that all individuals associated with construction and mining activities are aware of the presence of these sites.

8.2.11 Required Mitigation Measures for site DBAP 53

The impact significance calculations undertaken in Chapter 7 have shown that the significance of the unmitigated impact of the proposed development on site DBAP 53 is estimated to be of Moderate Significance. As a result, mitigation measures are required for this site.

The following mitigation measures are required for the three sites:

- An archaeological site layout plan must be compiled using accepted archaeological techniques. Furthermore, the site must be cleared of vegetation and both recorded and photographed.
- Archival and historical research must be undertaken to attempt to obtain information with which the site can better be interpreted.
- A permit application to SAHRA for archaeological mitigation to take place.
- Once the permit is received, limited archaeological mitigation may be undertaken. This will likely take the form of using a metal detector to screen the site for metal artefacts as well as the excavation and archaeological screening of soil from within the stone enclosure. As no archeological deposit per se is expected to be located here, these measures will be aimed at obtaining information with which the site can be better interpreted.
- An archaeological mitigation report must be compiled.
- A destruction permit application must be lodged with (SAHRA) to allow for the destruction of the site.

8.2.12 Mitigation Measures Required for sites DBAP 36 and DBAP 41

The following mitigation measures are required for sites DBAP 36 and DBAP 41:

- The author of the report dealing with the Samancor survey must be asked to confirm the positions of these two sites, and preferably point them out on site.
- Should these site positions be confirmed in localities not yet identified as such sites, and without the possibility for *in situ* preservation, the mitigation measures outlined elsewhere for grave sites (DBAP 36) and historic black homesteads (DBAP 41) must be undertaken.

8.2.13 Mitigation Measures Required for site DBAP 5

The following mitigation measures are still required for site DBAP 5

- All structures and site layouts from each site must be recorded using standard survey methods and/or measured drawings. The end result would be a site layout plan.
- A mitigation report must be compiled for these sites within which all the mitigation measures and its findings will be outlined. The recorded drawings from the previous item must also be included in this mitigation report.
- The completed mitigation report must be submitted to the relevant heritage authorities.

8.2.14 Mitigation Measures Required for the Historic Farmstead at site DBAP 15

The following mitigation measures are still required for the historic farmstead at site DBAP 15:

- Recording of the buildings i.e. (a) map indicating the position and footprint of all the buildings and structures (b) photographic recording of all the buildings and structures (c) measured drawings of the floor plans of the three principal buildings.
- A mitigation report must be compiled for the site within which the recorded drawings from the previous item as well as all existing information on the farmstead can be included.
- The completed mitigation report must be submitted to the relevant heritage authorities with a permit application to allow for the destruction of the site.

9 CONCLUSIONS AND RECOMMENDATIONS

Introduction

PGS Heritage (Pty) Ltd was appointed by SRK Consulting (South Africa) Pty Ltd to undertake a Heritage Impact Assessment (HIA), which forms part of the environmental process for the proposed Der Brochen Amendment Project, located south of Steelpoort, Greater Tubatse Local Municipality, Greater Sekhukhune District Council, Limpopo Province.

General Desktop Study

An archaeological and historical desktop study was undertaken to provide a historical framework for the project area and surrounding landscape. This was augmented by an assessment of previous archaeological and heritage studies completed for the study area and surrounding landscape as well as an assessment of old aerial photographs. The desktop study revealed that the study area is located in surroundings characterised by a long and significant history.

Palaeontology

Ms. Elize Butler of Banzai Environmental (Pty) Ltd was commissioned to undertake a desktop Palaeontological Impact Assessment. Her report and findings are attached in full in **Appendix C**.

Ms. Butler found that the proposed development area is *“...is completely underlain by the Dwars River and Dsjate Subsuite, Rustenburg layered Suite, Bushveld Complex. These malific rocks of the Bushveld Complex is igneous in origin and thus unfossiliferous. The Palaeomap of SAHRIS also indicates that these rocks have a palaeontological significance of zero.”*

The palaeontological report concludes that it is *“...therefore considered that the construction and operation of the proposed Der Brochen Amendment Project near Lydenburg, Limpopo Province is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area. Thus, the construction and operation of the facility may be authorised as the whole extent of the development footprint is not considered sensitive in terms of palaeontological resources.”*

Fieldwork

The study area was assessed in the field by way of intensive walkthroughs of the proposed development footprint areas. The fieldwork was undertaken by an experienced team comprising one archaeologist/heritage specialist (Polke Birkholtz) and one fieldwork assistant (Derrick James). The fieldwork resulted in the identification of 57 archaeological and heritage sites. These identified archaeological and heritage sites comprise the following:

- Nine sites where graves and cemeteries were identified (DBAP 11, DBAP 16, DBAP 21, DBAP 25, DBAP 33, DBAP 43, DBAP 44, DBAP 51 & DBAP 52)
- A total of 25 sites comprising historic black homesteads where the risk for unmarked graves exist (DBAP 1, DBAP 3, DBAP 5, DBAP 6, DBAP 8, DBAP 10, DBAP 22, DBAP 23, DBAP 26, DBAP 27, DBAP 28, DBAP 29, DBAP 30, DBAP 31, DBAP 32, DBAP 37, DBAP 39, DBAP 40, DBAP 42, DBAP 45, DBAP 47, DBAP 54, DBAP 55, DBAP 56 & DBAP 57)
- Two sites comprising historic black homesteads (where the risk for unmarked graves exist) associated with confirmed graves and cemeteries (DBAP 9 & DBAP 19).
- Five sites comprising surface occurrences of Iron Age or historic potsherds (DBAP 17, DBAP 18, DBAP 20, DBAP 34 & DBAP 35)
- Two Iron Age stonewalled sites (DBAP 48 & DBAP 50)
- A multi-component site comprising Iron Age stonewalling as well as what appears to be a historic black homestead (DBAP 38)
- A multi-component site comprising a historic farmstead associated with two unmarked stillborn graves (DBAP 15)
- One Iron Age stonewalled site and/or historic black homestead associated with possible rock engravings (DBAP 2)
- One Stone Age site (DBAP 7)
- Two sites where adits, shafts, and workings relating to historic mining activities were identified (DBAP 12 & DBAP 13)

- Three sites where grinding surfaces with little associated cultural material or features were identified (DBAP 4, DBAP 24 & DBAP 46)
- One historic structure which may have been associated with the historic farmstead at DBAP 15 (DBAP 14)
- One site comprising a single stonewalled enclosure which may have been associated with the nearby Iron Age stonewalled sites (DBAP 49)
- One site comprising a single stonewalled enclosure which may have had a military association (DBAP 53)
- Two sites identified during a previous study undertaken by Samancor that could not be located during the present fieldwork. These sites appear to comprise a grave (DBAP 36) and a historic black homestead (DBAP 41)

Impact Assessment and Mitigation

An overlay of the identified archaeological and heritage sites over the proposed development footprint areas was made, which was used to assess the impact of the proposed development on these identified archaeological and heritage sites. Both pre-mitigation and post-mitigation impact assessments were undertaken. Please refer Chapter 7 for the impact assessment calculations. A series of site-specific mitigation measures are outlined in Chapter 8 of this report.

General Recommendations

The following general recommendations are made:

- All sites of Medium to High Significance not located close enough to the present development footprints to warrant site-specific mitigation, must be included in an overall conservation management plan.
- Should the development footprints change or be altered in any way, these changes must be assessed in the field by a heritage specialist/archaeologist before construction commences.

Conclusions

While the unmitigated impact of the proposed development is expected to result in a high negative impact in terms of the identified archaeological and heritage sites located here, these impacts can be suitably mitigated to acceptable levels by way of a range of mitigation measures outlined in this report. As a result, on the condition that the recommendations made in this report are adhered to, no heritage reasons can be given for the development not to continue.

10 PREPARERS

This Heritage Impact Assessment was written by the following preparers:

- Polke Birkholtz – Project Manager / Archaeologist / Author

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Historic Aerial Photographs and Topographic Maps

All the historic aerial photographs and early topographic maps used in this report were obtained

from the Directorate: National Geo-spatial Information of the Department of Rural Development and Land Reform in Cape Town.

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Google Earth

All the aerial depictions and overlays used in this report are from Google Earth.

Appendix A

LEGISLATIVE REQUIREMENTS – TERMINOLOGY AND ASSESSMENT CRITERIA

General principles

In areas where there has not yet been a systematic survey to identify conservation worthy places, a permit is required to alter or demolish any structure older than 60 years. This will apply until a survey has been done and identified heritage resources are formally protected.

Archaeological and palaeontological sites, materials, and meteorites are the source of our understanding of the evolution of the earth, life on earth and the history of people. In terms of the heritage legislation, permits are required to damage, destroy, alter, or disturb them. Furthermore, individuals who already possess heritage material, are required to register it. The management of heritage resources is integrated with environmental resources and this means that, before development takes place, heritage resources are assessed and, if necessary, rescued.

In addition to the formal protection of culturally significant graves, all graves which are older than 60 years and are not located in a cemetery (such as ancestral graves in rural areas), are protected. The legislation also protects the interests of communities that have an interest in the graves: they should be consulted before any disturbance takes place. The graves of victims of conflict and those associated with the liberation struggle are to be identified, cared for, protected and memorials erected in their honour.

Anyone who intends to undertake a development must notify the heritage resources authority and, if there is a reason to believe that heritage resources will be affected, an impact assessment report must be compiled at the construction company's cost. Thus, the construction company will be able to proceed without uncertainty about whether work will have to be stopped if an archaeological or heritage resource is discovered.

According to the National Heritage Act (Act 25 of 1999 section 32) it is stated that:

An object or collection of objects, or a type of object or a list of objects, whether specific or generic, that is part of the national estate and the export of which SAHRA deems it necessary to control, may be declared a heritage object, including –

- Objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects, meteorites and rare geological specimens;
- visual art objects;
- military objects;
- numismatic objects;

- objects of cultural and historical significance;
- objects to which oral traditions are attached and which are associated with living heritage;
- objects of scientific or technological interest;
- books, records, documents, photographic positives and negatives, graphic material, film or video or sound recordings, excluding those that are public records as defined in section 1 (xiv) of the National Archives of South Africa Act, 1996 (Act No. 43 of 1996), or in a provincial law pertaining to records or archives; and
- any other prescribed category.

Under the National Heritage Resources Act (Act No. 25 of 1999), provisions are made that deal with and offer protection to, all historic and prehistoric cultural remains, including graves and human remains.

Graves and cemeteries

Graves younger than 60 years fall under Section 2(1) of the Removal of Graves and Dead Bodies Ordinance (Ordinance no. 7 of 1925) as well as the Human Tissues Act (Act 65 of 1983) and are under the jurisdiction of the National Department of Health and the relevant Provincial Department of Health and must be submitted for final approval to the Office of the relevant Provincial Premier. This function is usually delegated to the Provincial MEC for Local Government and Planning, or in some cases the MEC for Housing and Welfare. Authorisation for exhumation and reinternment must also be obtained from the relevant local or regional council where the grave is situated, as well as the relevant local or regional council to where the grave is being relocated. All local and regional provisions, laws, and by-laws must also be adhered to. In order to handle and transport human remains, the institution conducting the relocation should be authorised under Section 24 of Act 65 of 1983 (Human Tissues Act).

Graves older than 60 years, but younger than 100 years, fall under Section 36 of Act 25 of 1999 (National Heritage Resources Act) as well as the Human Tissues Act (Act 65 of 1983) and are under the jurisdiction of the South African Heritage Resources Agency (SAHRA). The procedure for Consultation Regarding Burial Grounds and Graves (Section 36(5) of Act 25 of 1999) is applicable to graves older than 60 years that are situated outside a formal cemetery administered by a local authority. Graves in the category located inside a formal cemetery administered by a local authority will also require the same authorisation as set out for graves younger than 60 years, over and above SAHRA authorisation.

If the grave is not situated inside a formal cemetery but is to be relocated to one, permission from the local authority is required and all regulations, laws, and by-laws set by the cemetery authority must be adhered to.

Appendix B
CURRICULUM VITAE

**PROFESSIONAL CURRICULUM
FOR POLKE DOUSSY BIRKHOLTZ**

Name: Polke Doussy Birkholtz

Date & Place of Birth: 9 February 1975 – Klerksdorp, North West Province, South Africa

Place of Tertiary Education & Dates Associated:

Institution: University of Pretoria

Qualification: BA (Cum Laude) - Bachelor of Arts Specializing in Archaeology, History & Anthropology

Date: 1996

Institution: University of Pretoria

Qualification: BA Hons (Cum Laude) - Bachelor of Arts with Honours Degree Specializing in Archaeology

Date: 1997

Qualifications:

BA - Degree specialising in Archaeology, History and Anthropology

BA Hons - Professional Archaeologist

Memberships:

Association of Southern African Professional Archaeologists (ASAPA)

Professional Member of the CRM Section of ASAPA

Overview of Post Graduate Experience:

1997 – 2000 – Member/Archaeologist – Archaeo-Info

2001 – 2003 – Archaeologist/Heritage Specialist – Helio Alliance

2000 – 2008 – Member/Archaeologist/Heritage Specialist – Archaeology Africa

2003 - Present – Director / Archaeologist / Heritage Specialist – PGS Heritage

Languages: English: Speak, Read & Write & Afrikaans: Speak, Read & Write

Total Years' Experience: 19 Years

Experience Related to the Scope of Work:

- Polke has worked as a **HERITAGE SPECIALIST / ARCHAEOLOGIST / HISTORIAN** on more than 300 projects, and acted as **PROJECT MANAGER** on almost all of these projects. His experience includes the following:
 - Development of New Sedimentation and Flocculation Tanks at Rand Water's Vereeniging Pumping Station, Vereeniging, Gauteng Province. Heritage Impact Assessment for *Greenline*.

- EThekweni Northern Aqueduct Project, Durban, KwaZulu-Natal. Heritage Impact Assessment for *Strategic Environmental Focus*.
- Johannesburg Union Observatory, Johannesburg, Gauteng Province. Heritage Inventory for *Holm Jordaan*.
- Development at Rand Water's Vereeniging Pumping Station, Vereeniging, Gauteng Province. Heritage Impact Assessment for *Aurecon*.
- Comet Ext. 8 Development, Boksburg, Gauteng Province. Phase 2 Heritage Impact Assessment for *Urban Dynamics*.
- Randjesfontein Homestead, Midrand, Gauteng Province. Baseline Heritage Assessment with Nkosinathi Tomose for Johannesburg City Parks.
- Rand Leases Ext. 13 Development, Roodepoort, Gauteng Province. Heritage Impact Assessment for *Marsh*.
- Proposed Relocation of the Hillendale Heavy Minerals Plant (HHMP) from Hillendale to Fairbreeze, KwaZulu-Natal. Heritage Impact Assessment for *Goslar Environmental*.
- Portion 80 of the farm Eikenhof 323 IQ, Johannesburg, Gauteng Province. Heritage Inventory for *Khare Incorporated*.
- Comet Ext. 14 Development, Boksburg, Gauteng Province. Heritage Impact Assessment for *Marsh*.
- Rand Steam Laundries, Johannesburg, Gauteng Province. Archival and Historical Study for *Impendulo and Imperial Properties*.
- Mine Waste Solutions, near Klerksdorp, North West Province. Heritage Inventory for *AngloGold Ashanti*.
- Consolidated EIA and EMP for the Kroondal and Marikana Mining Right Areas, North West Province. Heritage Impact Assessment for *Aquarius Platinum*.
- Wilkoppies Shopping Mall, Klerksdorp, North West Province. Heritage Impact Assessment for *Center for Environmental Management*.
- Proposed Vosloorus Ext. 24, Vosloorus Ext. 41 and Vosloorus Ext. 43 Developments, Ekurhuleni District Municipality, Gauteng Province. Heritage Impact Assessment for *Enkanyini Projects*.
- Proposed Development of Portions 3, 6, 7 and 9 of the farm Olievenhoutbosch 389 JR, City of Tshwane Metropolitan Municipality, Gauteng Province. Heritage Impact Assessment for *Marsh*.
- Proposed Development of Lotus Gardens Ext. 18 to 27, City of Tshwane Metropolitan Municipality, Gauteng Province. Heritage Impact Assessment for *Pierre Joubert*.
- Proposed Development of the site of the old Vereeniging Hospital, Vereeniging, Gauteng Province. Heritage Scoping Assessment for *Lekwa*.
- Proposed Demolition of an Old Building, Kroonstad, Free State Province. Phase 2 Heritage Impact Assessment for *De Beers Consolidated Mines*.
- Proposed Development at Westdene Dam, Johannesburg, Gauteng Province. Heritage Impact Assessment for *Newtown*.
- West End, Central Johannesburg, Gauteng Province. Phase 1 Heritage Impact Assessment for the *Johannesburg Land Company*.
- Kathu Supplier Park, Kathu, Northern Cape Province. Heritage Impact Assessment for *Synergistics*.
- Matlosana 132 kV Line and Substation, Stilfontein, North West Province. Heritage

- Impact Assessment for *Anglo Saxon Group* and *Eskom*.
 - Marakele National Park, Thabazimbi, Limpopo Province. Cultural Resources Management Plan for *SANParks*.
 - Cullinan Diamond Mine, Cullinan, Gauteng Province. Heritage Inventory for *Petra Diamonds*.
 - Highveld Mushrooms Project, Pretoria, Gauteng Province. Heritage Impact Assessment for *Mills & Otten*.
 - Development at the Reserve Bank Governor's Residence, Pretoria, Gauteng Province. Archaeological Excavations and Mitigation for the *South African Reserve Bank*.
 - Proposed Stones & Stones Recycling Plant, Johannesburg, Gauteng Province. Heritage Scoping Report for *KV3*.
 - South East Vertical Shaft Section of ERPM, Boksburg, Gauteng Province. Heritage Scoping Report for *East Rand Proprietary Mines*.
 - Proposed Development of the Top Star Mine Dump, Johannesburg, Gauteng Province. Detailed Archival and Historical Study for *Matakoma*.
 - Soshanguve Bulk Water Replacement Project, Soshanguve, Gauteng Province. Heritage Impact Assessment for *KWP*.
 - Biodiversity, Conservation and Participatory Development Project, Swaziland. Archaeological Component for *Africon*.
 - Camdeboo National Park, Graaff-Reinet, Eastern Cape Province. Cultural Resources Management Plan for *SANParks*.
 - Main Place, Central Johannesburg, Gauteng Province. Phase 1 Heritage Impact Assessment for the *Johannesburg Land Company*.
 - Modderfontein Mine, Springs, Gauteng Province. Detailed Archival and Historical Study for *Consolidated Modderfontein Mines*.
 - Proposed New Head Office for the Department of Foreign Affairs, Pretoria, Gauteng Province. Heritage Impact Assessment for *Holm Jordaan Group*.
 - Proposed Modification of the Lukasrand Tower, Pretoria, Gauteng Province. Heritage Assessment for IEPM.
 - Proposed Road between the Noupoort CBD and Kwazamukolo, Northern Cape Province. Heritage Impact Assessment for *Gill & Associates*.
 - Proposed Development at the Johannesburg Zoological Gardens, Johannesburg, Gauteng Province. Detailed Archival and Historical Study for *Matakoma*.
- Polke's **KEY QUALIFICATIONS:**
 - Project Management
 - Archaeological and Heritage Management
 - Archaeological and Heritage Impact Assessment
 - Archaeological and Heritage Fieldwork
 - Archival and Historical Research
 - Report Writing
 - Polke's **INFORMATION TECHNOLOGY EXPERIENCE:**
 - *MS Office – Word, Excel, & Powerpoint*

- *Google Earth*
- *Garmin Mapsource*
- *Adobe Photoshop*
- *Corel Draw*

I, Polke Doussy Birkholtz, hereby confirm that the above information contained in my CV is true and correct.



PD Birkholtz

5 January 2019
Date

Appendix C

PALAEONTOLOGICAL REPORT