

**PROPOSED CEMETERY FOR THE DANNHAUSER
LOCAL MUNICIPALITY, KWAZULU-NATAL**

Phase 1 Heritage Impact Assessment

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EXECUTIVE SUMMARY

The Dannhauser cemetery is currently nearing full capacity and the Dannhauser Local Municipality (LM) has identified an urgent need for the establishment of a 10 to 15-hectare cemetery site to service local communities. Two site alternatives have been identified by the Municipality for further investigation to determine their suitability. The preferred site is owned by the Municipality and is known as Try Again Farm. The alternative site is commonly known as the Durnacol mass grave site and is owned by Exxaro Mining who have indicated to the Municipality that they could potentially make the land available if deemed suitable for cemetery establishment.

The cemetery will be between 10 to 15 hectares in size hence the development of the cemetery triggers section 41 (1) (c)(i) of the KwaZulu-Natal Amafa and Research Institute Act, 2018 (Act No 5 of 2018) which lists developments or activities that may require an HIA. The relevant subsection refers to any development or other activity which will change the character of a site- (i) exceeding 5000 m².

The location of the two sites is as follows: Try Again Farm is situated just over 2km east of the town of Dannhauser and east of the R621 road. The Exxaro site is located about 4km south-west of Dannhauser town and close to the town of Durnacol and Tagora Village settlement. An inspection of the two sites took place on 26 April 2021.

Try Again Farm: the site was inspected on foot and a number of heritage sites were found which is attributed to previous habitation of the farm. The 1944 aerial photograph of the farm shows habitation and cultivation of the site. However, the relevant section of the 1959 1:50000 map of the area shows no indication of this habitation. There are some homesteads indicated along and outside its south-eastern boundary. The heritage sites found include graves, piles of rock that could potentially be an indication of grave/s or the remains of stone walling as well as the outline of foundations and floors of structure indicating previous occupation of the site. Several fence posts were found on site as well as two quarries.

Durnacol Exxaro site: The 1944 aerial image of the project site indicates an area virtually uninhabited apart from an area on its western boundary where there is evidence of structures / habitation. The relevant section of the 1959 1:50000 map of the area shows an area that is uninhabited. A number of dwellings are indicated along the foothills of the hill (Kranskop) situated to the south of the site.

The farm was inspected on foot. There is widespread dumping of building rubble on the property as well as furrows that run the length of the site. In the south-west corner of the site is a memorial known as the Durnacoll mass grave. Immediately east of the mass grave memorial, several other graves were found. This area is fenced off together with the mass grave memorial hence it is assumed that the graves are associated with the mass grave. One grave was found on the site. The headstone has fallen over and the grave is outlined with bricks.

A desktop palaeontological study was undertaken of the two sites. The study found that the Try Again Farm site is located on potentially very highly sensitive strata of the Vryheid Formation (Ecca Group, Karoo Supergroup) whereas the study found that the overlying Volksrust Formation is present in the Durnacoll Exxaro site. The Volksrust Formation is unlikely to preserve any recognisable fossil plants because it represents deeper water environments.

Try Again Farm is indicated as very highly sensitive because the Vryheid Formation in other coalfields and regions preserves fossil plant impressions. The Klip River Coalfield, however, is unusual in that there are three extensive dolerite sills within the Coalfield. Dolerite, in both sill and dyke forms, destroys any fossil material in its vicinity. The uppermost seams in the Klip River Coalfield are 60m or more below the ground surface and are overlain by sandstone layers and one of the dolerite sills. Any fossil plant material in the Vryheid Formation would be more than 10m below the ground surface. The study concluded that surface activities are unlikely to impact upon the fossil heritage of the Vryheid Formation that might be preserved below ground within the development footprint on Try Again Farm. The Volksrust Formation is unlikely to preserve any recognisable fossil plants on the Durnacoll Exxaro site. The potential impact of the proposed project to fossil heritage resources was assessed as extremely low.

The Exxaro site is preferred by the heritage specialist because the 1944 historical image of Try Again Farm shows extensive habitation of the farm which could mean that more graves, could be found on the site that were not found during the site inspection due to thick vegetation cover over sections of the site. The 1944 image of the Durnacoll Exxaro site shows little habitation of the area. Currently, this site is also a lot more disturbed than the other site. The assessment of significance of the impact of the proposed cemetery on graves and potential graves is slightly lower at the Exxaro site than at the Try Again Farm site.

If it is decided that the cemetery will be located on the Try Again Farm site, then the specialist would recommend that the cemetery is located parallel and close to the R621 road. The site should be cleared of vegetation prior to any construction so ensure that there are no low-lying sites such as graves and archaeological sites that were not detected during the site inspection.

If it is decided that the cemetery will be located on the Durnacoll Exxaro site, the specialist would recommend that the cemetery is located on the southern boundary of the site and immediately north-east of the mass grave site. The site should be cleared of vegetation prior to any construction so ensure that there are no low-lying sites such as graves and archaeological sites that were not detected during the site inspection.

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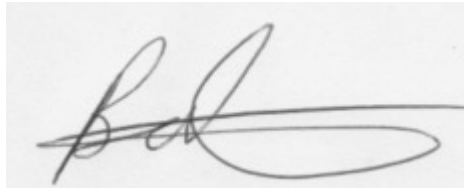
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APPENDIX 1

Desktop Palaeontological Study

I, **Jean Lois Beater**, act as an independent specialist for this project and I do not have any vested interest either business, financial, personal or other, in the proposed activity other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2014.



AUTHOR DETAILS

Name	Qualification	Professional Registration
Jean Beater (JLB Consulting)	MA (Heritage Studies)	Member of Association of South African Professional Archaeologists (No. 349)
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1. INTRODUCTION

The Dannhauser Local Municipality (LM) is located in the northern part of KwaZulu-Natal. The Dannhauser cemetery is currently nearing full capacity and the local Municipality has identified an urgent need for the establishment of a 10 to 15-hectare cemetery site to service local communities. Two site alternatives have been identified by the Municipality for further investigation to determine their suitability for the proposed land use. The preferred site is owned by the Municipality and is commonly known as the Try Again Farm. The alternative site is commonly known as the Durnacol mass grave site and is owned by Exxaro Mining who have indicated to the Municipality that they could potentially make the land available if deemed suitable for cemetery establishment.

The study area is predominantly rural in character and is characterized by mining towns which were established within the jurisdiction prior to 1980s as a result of the numerous mines situated within and around the municipal area. The towns include Dannhauser town, Inverness, Kilegethe, Klipbank, Milford, Normandien and Nyanyadu.

A Phase I Heritage Impact Assessment (HIA) was undertaken to assess the two sites and to establish whether any heritage resources will be impacted by the proposed development of a cemetery on either of the sites.

2. LEGISLATIVE BACKGROUND

The proposed cemetery will be between 10 to 15 hectares in size hence the development of the cemetery triggers section 41 (1) (c)(i) of the KwaZulu-Natal Amafa and Research Institute Act, 2018 (Act No 5 of 2018) which lists developments or activities that may require an HIA. The relevant sub-section refers to: *“any development or other activity which will change the character of a site- (i) exceeding 5000 m²”*.

The proposed development of the cemetery may also impact graves, structures, archaeological and palaeontological resources that are protected in terms of sections 37, 38, 39, and 40 of the KwaZulu-Natal Amafa and Research Institute Act, 2018.

Section 3 of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) lists heritage resources as follows:

(a) places, buildings, structures and equipment of cultural significance;

- (b) places to which oral traditions are attached or which are associated with living heritage;
- (c) historical settlements and townscapes;
- (d) landscapes and natural features of cultural significance;
- (e) geological sites of scientific or cultural importance;
- (f) archaeological and paleontological sites;
- (g) graves and burial grounds, including—
 - (i) ancestral graves;
 - (ii) royal graves and graves of traditional leaders;
 - (iii) graves of victims of conflict;
 - (iv) graves of individuals designated by the Minister by notice in the *Gazette*;
 - (v) historical graves and cemeteries; and
 - (vi) other human remains which are not covered in terms of the Human Tissue Act, 1983 (Act No. 65 of 1983);
- (h) sites of significance relating to the history of slavery in South Africa; and
- (i) movable objects, including:
 - (i) objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens;
 - (ii) objects to which oral traditions are attached or which are associated with living heritage;
 - (iii) ethnographic art and objects;
 - (iv) military objects;
 - (v) objects of decorative or fine art;
 - (vi) objects of scientific or technological interest; and
 - (vii) books, records, documents, photographic positives and negatives, graphic, film or video material 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).

3. LOCATION

The location of the two sites is to the east (Try Again Farm) and south-west of Dannhauser town (Exxaro site) (see **Figure 1**).

Try Again Farm:

This site is located on Try Again Farm 8674 which is situated just over 2km east of the town of Dannhauser and immediately east of the R621 road and its northern border runs parallel to the road to Nguqunguqu (see **Figure 2**).



Figure 1: Overall view of both sites and surroundings

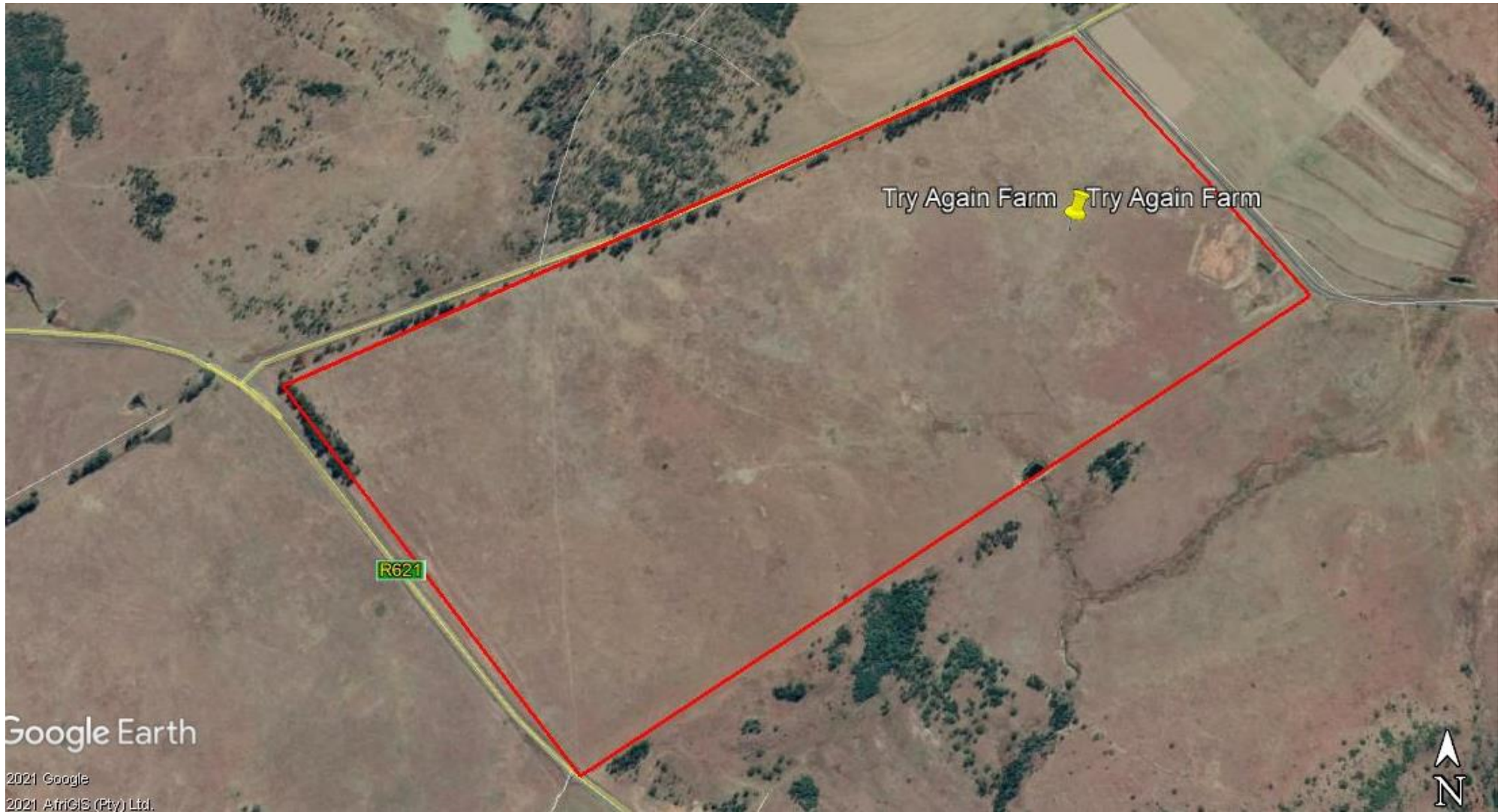


Figure 2: Try Again Farm site

Exxaro site:

This site, Erf 17348, is owned by Exxaro Coastal Coal (Pvt) Ltd and has been donated by Exxaro to the Dannhauser LM for the establishment of a new cemetery. It is located about 4km south-west of Dannhauser town and close to the mining town of Durnacol and Tagora Village settlement (see **Figure 3**).

4. TERMS OF REFERENCE

Undertake a Phase 1 HIA in order to determine the possible existence of heritage resources, as listed above in Chapter 2, that could be impacted by the proposed development of a cemetery on either of the two sites. Provide mitigation measures to limit or avoid the impact of the project on heritage resources (if any).

The heritage specialist will submit the HIA report to the provincial heritage resources authority, namely the KwaZulu-Natal Amafa and Research Institute (hereafter referred to as the Institute), for their consideration and comment.

5. METHODOLOGY

A survey of literature, including other heritage impact assessment (HIA) reports completed for the surrounding area, was undertaken in order to ascertain the history of the area and what type of heritage resources have or may be found in the area.

In addition, historical aerial images and topographic maps of the area were consulted that were retrieved from the Department of Rural Development and Land Reform's CDNGI Geospatial Portal (www.cdngiportal.co.za).

An inspection of the two sites took place on 26 April 2021. The visibility on the preferred site, Try Again Farm, was fair. Where cattle had grazed the grass, visibility was good. However, in some areas the grass cover was thick which restricted visibility. The visibility on the Exxaro site was generally good.



Figure 3: Durnacoll Exarro site

6. HISTORICAL BACKGROUND OF THE STUDY AREA

The earliest Iron Age sites in South Africa, including KwaZulu-Natal, relate to an eastern coastal and lowland cultural tradition with links as far north as the Kwale sites of eastern Kenya. This tradition has been named 'Matola', after a site in southern Mozambique. Most Early Iron Age villages in KwaZulu-Natal were often about eight hectares in size and probably contained a hundred or more people, and were found in the lower-lying and savannah areas, below an altitude of 1 000 metres. The beginning of the Late Iron Age marked a period of significant change in living patterns. Settlements were no longer located in river valleys, but were built on higher ground where homesteads would benefit from cooling breezes and good views for strategic purposes. Settlements appear to have been much smaller, implying that society underwent a change away from the large Early Iron Age villages and towards the individual family homesteads of the historic Nguni-speaking peoples (eThembeni 2008:13 -14).

Around 800 years ago, Bantu-speaking farmers also settled in the greater Newcastle area. Although some of the sites constructed by these African farmers consisted of stone walling not all of them were made from stone. Sites located elsewhere show that many settlements consisted of wattle and daub structures. These Later Iron Age sites were most probably inhabited by Nguni-speaking groups such as the amaBhele. However, by 1820 the original African farmers were dispersed from the area due to the expansionistic policies of King Shaka. African refugee groups and individuals were given permission to settle in the area by the British colonial authorities after 1845 where most became farm labourers (Prins 2019:3).

The numerous coal outcrops in northern Natal make it highly probable that coal was exploited by the Iron Age inhabitants of the region long before the arrival of white settlers. Between the 1850s and 1880s, white farming communities of northern Natal discovered and made domestic use of numerous outcrops (Guest 1989:311-312). There were extensive coalfields in the Dundee, Klip River and Newcastle areas which subsequently led to the formation of towns such as Dannhauser.

According to Prins (2019:4), Dannhauser town was named after Renier Dannhauser, a German settler, who purchased a farm called Palmietfontein from the Natal Government in 1872.

In the south-west corner of the Durnacol Exxaro site is a memorial known as the Durnacoll mass grave. According to Guest (1988:53), negligence on the part of managers and supervisors played an important part in accidents involving the storage, handling and use of explosives, the careless use of flame safety lamps in the presence of firedamp, and the failure to carry out correct blasting procedures, which was the initial cause of the worst colliery disaster thus far experienced in Natal when an ignition of firedamp and coal dust wiped out an entire night shift of 124 men at the Durban Navigation No. 2 Colliery in October 1926.

7. RESULTS OF SITE INSPECTION

Try Again Farm:

The area was inspected on foot. During the site inspection a number of heritage sites were found which is attributed to previous habitation of the farm. The 1944 aerial photograph of the farm shows clear habitation and cultivation of the site (see **Figure 4** below). However, in contrast, the relevant section of the 1959 1:50000 map of the area (2830AA) shows no indication of this habitation. There are some kraals/homesteads indicated along and outside its south-eastern boundary as well as telephone lines and power lines on its north-western, south-eastern and eastern boundaries (**Figure 5**).

The heritage sites found (see **Table 1** on page 17) include graves, piles of rock that could potentially be an indication of grave/s or the remains of stone walling or merely heaps of rock as well as the outline of foundations and floors of structure indicating previous occupation of the site. Several fence posts were found throughout the site as well. Two shallow quarry sites were found towards the eastern boundary of the site.

The specialist spoke to Sifiso whose cattle were grazing on the farm. He stated that he was unaware of graves on Try Again Farm (contradicted by the site inspection) but that there were many graves across the road on the farm of John Ferreira.



Figure 4: Aerial image of farm in taken in 1944

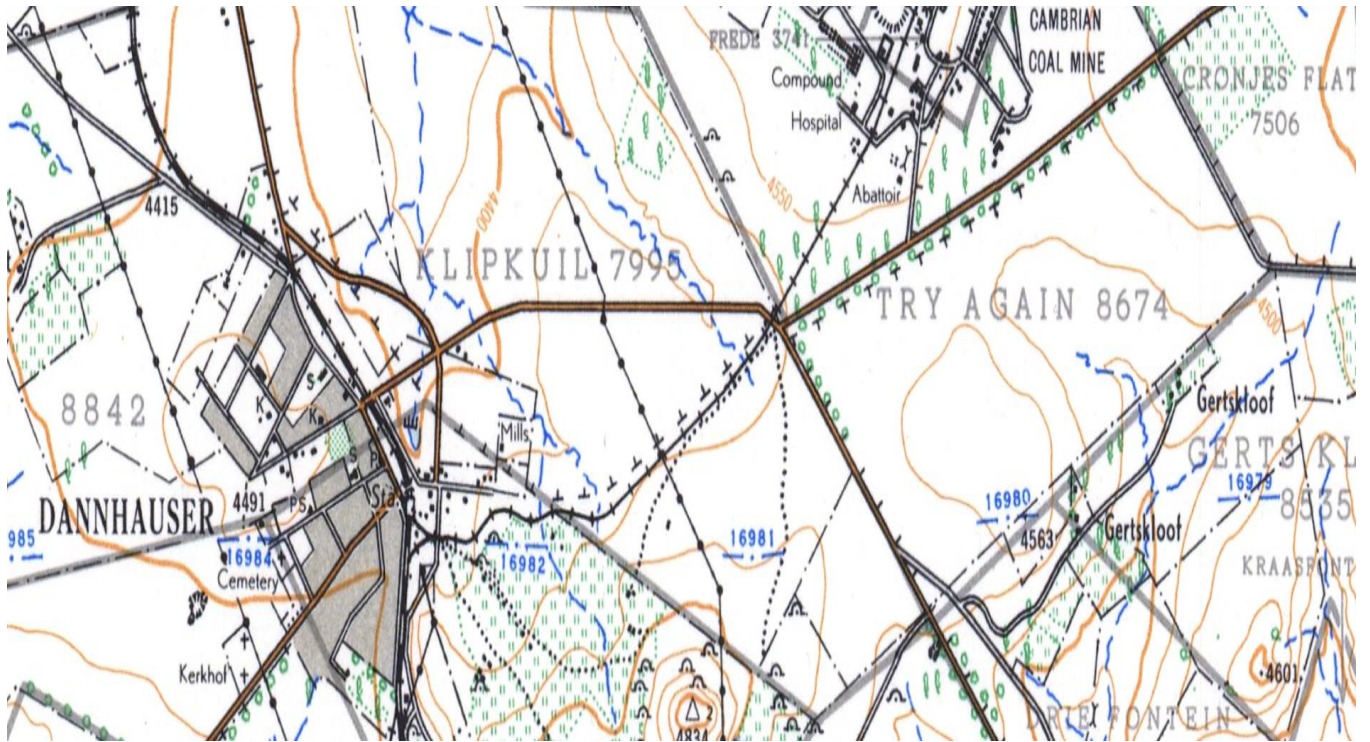


Figure 5: Topographical map (2830AA 1959)



Figure 6: View across farm looking towards north-west corner of site



Figure 7: View across Try Again Farm



Figure 8: Remains of foundations



Figure 9: Outline of circular structure



Figure 10: Fence post

Table 1: Farm Try Again: heritage resources found during site inspection

COORDINATES	HERITAGE RESOURCE	SIGNIFICANCE + MITIGATION MEASURES
28°00'30.20" S 30°06'10.30" E	Remains of homestead	Low heritage significance
28°00'44.45" S 30°05'57.06" E	Grave site with ± 5 graves	High heritage significance; no development activity to take place within 10 m of the cemetery
28°00'35.20" S 30°05'22.10" E	Grave/s or pile of rocks	If a grave site, then high heritage significance; no development activity to take place within 10 m of grave
28°00'35.90" S 30°05'21.80" E	Remains of foundation of structure/s	Low heritage significance; however, it may be associated to the above potential grave site

Durnacol Exxaro site

The 1944 aerial image of the project site indicates an area virtually uninhabited apart from an area on its western boundary where there is evidence of structures / habitation (see **Figure 11 below**). The Durban Navigation Collieries (Durnacoll) is visible north of the boundary of the property. Durban Navigation Collieries started as a coal mine providing coal for steam ships in the port of Durban but then later mined high quality coking coal for the South Iron and Steel Corp., Iscor (AditNow 2021:1).

The relevant section of the 1959 1:50000 map of the area (2830AA) shows an area uninhabited. A number of dwellings are indicated along the foothills of the hill (Kranskop) situated to the south of the site (**Figure 12**). The 2009 1:50000 map of the area shows cultivation of much of the site.

The farm was inspected on foot. There is widespread dumping of building rubble on the property as well as furrows that run the length of the site presumably for the transfer of water some time back as they appear not to have been used in a long time. In the south-west corner of the site is a memorial known as the Durnacoll mass grave. Immediately east of the mass grave memorial, several other graves were found. Some are marked with crosses and headstones. This area is fenced off together with the above-mentioned memorial hence it is assumed that the graves are associated with the mass grave.

In addition, one grave was found on the site over 300m north of the mass grave site. The grave stone has fallen over and the grave is outlined with bricks (**Figure 17**).

The heritage sites found on site are listed in **Table 2** below.

Table 2: Exxaro site: heritage sites found during site inspection

COORDINATES	HERITAGE RESOURCE	SIGNIFICANCE + MITIGATION MEASURES
28°02'47.41" S 30°02'06.40" E	Mass grave memorial	High heritage significance; no development activity to take place within 10 m of the cemetery and site must remain fenced
28°02'46.08" S 30°02'08.18" E	Centre of grave site; graves possibly associated with mass grave memorial	High heritage significance; no construction activity to take place within 10 m of the graves and cemetery must remain fenced at all times
28°02'37.60" S 30°02'02.30" E	Single grave	High heritage significance; no construction activity should take place within 10 m of grave; grave should be fenced if construction to take place on the site
28°02'32.10" S 30°02'00.30" E	Remains of structure?	Low heritage significance; can be demolished



Figure 11: Aerial image of site as indicated

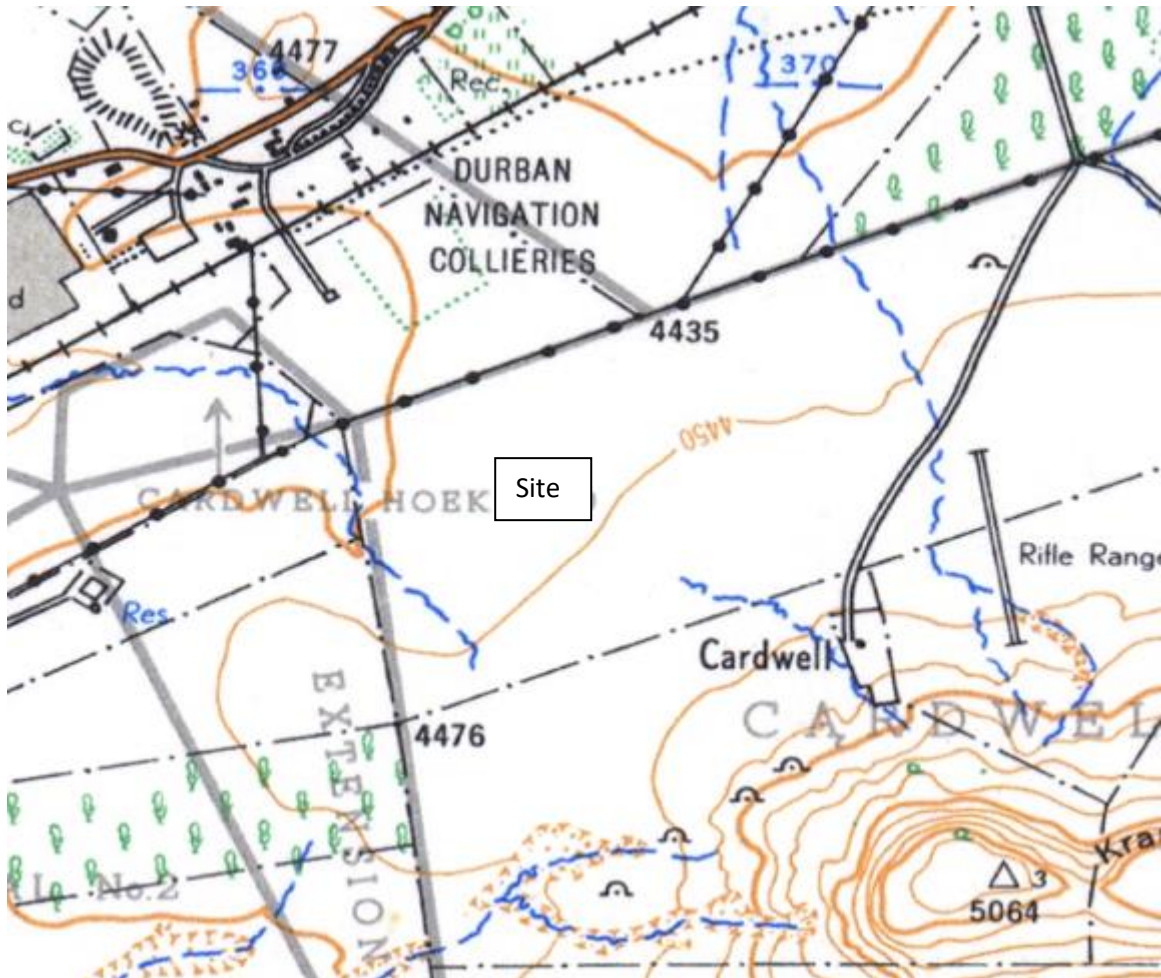


Figure 12: Section of 1:50 000 map of site



Figure 13: View over Exxaro site looking southwards towards Kranskop hills



Figure 14: View towards Tagora Village showing dumping of rubble



Figure 15: View of mass grave memorial and fenced area with graves



Figure 16: Furrow running through property



Figure 17: Grave outlined with bricks

The South African fossil sensitivity map indicates that the Try Again Farm falls into an area of very high fossil sensitivity indicated by the red colour in **Figure 18** and that the Durnacol Exxaro site falls into an area of high fossil sensitivity as indicated by the orange colour in the same figure.

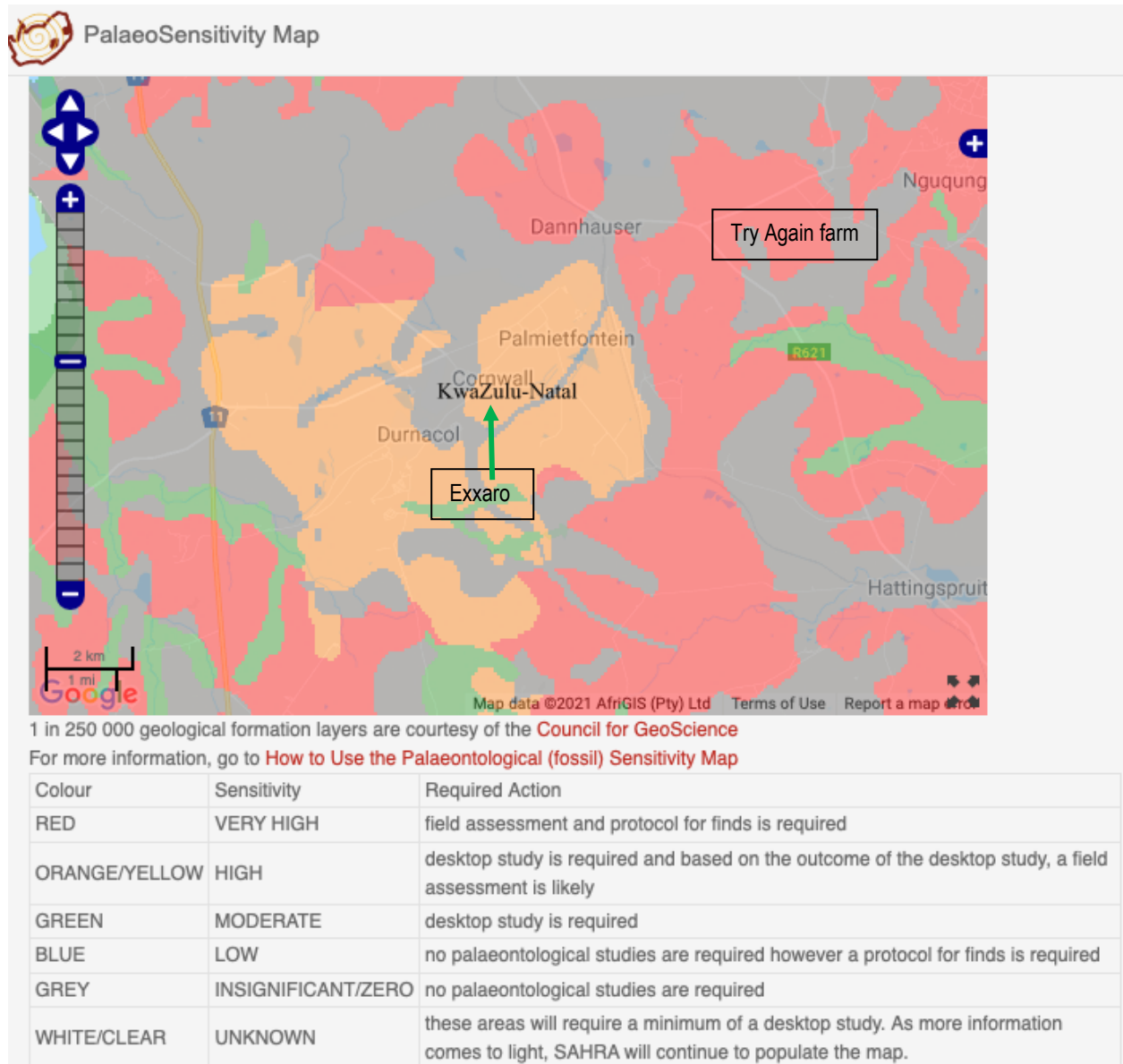


Figure 18: Fossil sensitivity of both sites

A desktop palaeontological assessment that was undertaken for the project (see **Appendix 1** attached to this report), found that the Try Again Farm site is located on potentially very highly sensitive strata of the Vryheid Formation (Ecca Group, Karoo Supergroup). Fossil plants are known from this formation and comprise the Glossopteris flora, namely Glossopteris leaves, seeds and reproductive organs, lycopods, sphenophytes, ferns and early gymnosperms. Occasionally insect wings occur with the plants. No vertebrates are known.

The desktop study found that the overlying Vryheid Formation is present in the Durnacoll Exxaro site. Only very rare fragments of Glossopteris flora plants are known from this formation because it represents deeper water environments (Bamford 2021:9).

Try Again Farm is indicated as very highly sensitive because the Vryheid Formation in other coalfields and regions preserves fossil plant impressions. The Klip River Coalfield, however, is unusual in that there are three extensive dolerite sills within the Coalfield. A sill is horizontal dolerite that does not reach the surface. Dolerite, in both sill and dyke forms, destroys any fossil material in its vicinity. The uppermost seams in the Klip River Coalfield are 60m or more below the ground surface and are overlain by sandstone layers and one of the dolerite sills. Fossil plants originally formed the peats that were buried and transformed by heat and pressure to form coal seams, but no plant matter is visible in coal. Therefore, any fossil plant material in the Vryheid Formation would be more than 10m below the ground surface (Bamford 2021:10).

The desktop study concluded that based on the nature of the project, surface activities are unlikely to impact upon the fossil heritage of the Vryheid Formation that might be preserved below ground within the development footprint on Try Again Farm. The Volksrust Formation is unlikely to preserve any recognisable fossil plants on the Durnacoll Exxaro site. Since there is an extremely small chance that fossils from the Vryheid Formation shales that are more than 10m below ground may be disturbed a Fossil Chance Find Protocol has been added to this report. Taking account of the defined criteria, the potential impact of the proposed project to fossil heritage resources is extremely low.

8. ASSESSMENT OF SIGNIFICANCE

The SiVEST EIA methodology assists in evaluating the overall effect of a proposed activity on the environment. Determining of the significance of an environmental impact on an environmental parameter is determined through a system analysis.

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale (i.e., site, local, national or global), whereas intensity is defined by the severity of the impact e.g., the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in **Table 3**.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

The impact assessment takes into account the nature, scale and duration of effects on the environment and whether such effects are positive (beneficial) or negative (detrimental). Each issue / impact is also assessed according to the various project stages, as follows: planning; construction; operation; and decommissioning.

The rating system is applied to the potential impact on the receiving environment and includes an objective evaluation of the possible mitigation of the impact. Impacts have been consolidated into one (1) rating. In assessing the significance of each issue, the following criteria (including an allocated point system) is used:

Table 3: Rating of impacts criteria

ENVIRONMENTAL PARAMETER		
A brief description of the environmental aspect likely to be affected by the proposed activity (e.g. surface water).		
ISSUE / IMPACT / ENVIRONMENTAL EFFECT / NATURE		
Includes a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity (e.g. oil spill in surface water).		
EXTENT (E)		
This is defined as the area over which the impact will be expressed. Typically, the severity and significance of an impact has different scales and as such bracketing ranges are often required.		
1	Site	The impact will only affect the site
2	Local/district	Will affect the local area or district
3	Province/region	Will affect the entire province or region
4	International and National	Will affect the entire country
PROBABILITY (P)		
This describes the chance of occurrence of an impact		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).

REVERSIBILITY (R)		
This describes the degree to which an impact on an environmental parameter can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES (L)		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource.	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
DURATION (D)		
This describes the duration of the impacts on the environmental parameter. Duration indicates the lifetime of the impact as a result of the proposed activity.		
1	Short term	The impact and its effects will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase (0 – 1 years), or the impact and its effects will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact and its effects will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered transient (Indefinite).
INTENSITY / MAGNITUDE (I / M)		
Describes the severity of an impact (i.e. whether the impact has the ability to alter the functionality or quality of a system permanently or temporarily).		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/ component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).

3	High	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired (system collapse). Rehabilitation and remediation often impossible. If possible, rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
SIGNIFICANCE (S)		
<p>Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. This describes the significance of the impact on the environmental parameter. The calculation of the significance of an impact uses the following formula:</p> <p>Significance = (Extent + probability + reversibility + irreplaceability + duration) x magnitude/intensity.</p>		
<p>The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.</p>		
Points	Impact Significance Rating	Description
5 to 23	Negative Low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
5 to 23	Positive Low impact	The anticipated impact will have minor positive effects.
24 to 42	Negative Medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
24 to 42	Positive Medium impact	The anticipated impact will have moderate positive effects.
43 to 61	Negative High impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
43 to 61	Positive High impact	The anticipated impact will have significant positive effects.
62 to 80	Negative Very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
62 to 80	Positive Very high impact	The anticipated impact will have highly significant positive effects.

Table 4: Try Again Farm: impact on graves/burial grounds

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Construction Phase																				
Graves and burial grounds	Potential alteration, damage, and / or destruction of graves during construction / development of proposed cemetery	2	3	3	4	3	4	60	-	Negative high impact	<ul style="list-style-type: none"> Once location of cemetery is determined, the site must be cleared of vegetation to ensure that no other graves are present; Graves sites to be demarcated with 10m buffer that is visible to construction workers; If graves damaged during development activity, all work to stop in immediate vicinity of find. Written application 	2	2	2	3	3	2	24	-	Negative medium impact

												must be made to Amafa for permission to repair graves by appropriate specialist								
Operational Phase																				
Graves and burial grounds	Graves may be damaged by visitors to cemetery & when cemetery is maintained	2	2	2	3	3	2	24	-	Negative Medium impact	<ul style="list-style-type: none"> Ensure that buffer around graves is made from sturdy material and is maintained; Ensure that family members are allowed access to graves outside formal cemetery 	2	1	2	3	3	2	22	-	Negative Low impact
Decommissioning Phase																				
Not applicable																				

Table 5: Exxaro site: impact on graves and memorials

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Construction Phase																				
Graves and burial grounds	Potential alteration, damage, and / or destruction of graves during construction / development of proposed cemetery	2	2	3	4	3	4	56	-	Negative high impact	<ul style="list-style-type: none"> Mass grave memorial & associated graves must remain fenced with a 10m buffer that is visible to workers The single grave found during the inspection must be fenced with a 10m buffer If graves damaged during development activity, all work to stop in immediate vicinity of find. Written application must be made to Amafa for permission to 	2	2	2	3	3	2	24	-	Negative medium impact

												repair graves by appropriate specialist								
Operational Phase																				
Graves and burial grounds	Mass grave & memorial and single grave may be damaged by visitors to cemetery & during maintenance thereof	2	2	2	3	3	2	24	-	Negative Medium impact	<ul style="list-style-type: none"> Ensure that fence around mass grave is maintained & repaired / replaced if damaged Ensure that family members are allowed access to the mass grave and single grave located outside formal cemetery 	2	1	2	3	3	2	22	-	Negative Low impact
Decommissioning Phase																				
Not applicable																				

8.1 COMPARATIVE ASSESSMENT OF ALTERNATIVES

Table 6: Comparative assessment of alternatives

PREFERRED	The alternative will result in a low impact / reduce the impact / result in a positive impact	
FAVOURABLE	The impact will be relatively insignificant	
LEAST PREFERRED	The alternative will result in a high impact / increase the impact	
NO PREFERENCE	The alternative will result in equal impacts	
Alternative	Preference	Reasons (incl. potential issues)
Try Again Farm	Least preferred	<ul style="list-style-type: none"> • Extensive early habitation of the site could indicate that more graves could be found on the site due to traditional methods of burying the dead at homesteads as discussed below. • Grave sites as well as outlines of housing found on the site
Durnacoll/Exxaro site	Favourable	<ul style="list-style-type: none"> • Limited previous habitation of the site. • Single grave found on site. • Other graves found on site already fenced off with mass grave memorial • The site is disturbed through farming activities such as furrows that could have impacted on heritage resources

9. DISCUSSION AND RECOMMENDATIONS

Heritage sites were found on both sites proposed for the cemetery. The Exxaro site is preferred by the heritage specialist because the 1944 historical image of Try Again Farm (**Figure 4**) shows extensive habitation of the farm which could mean that more heritage sites, such as graves, could be found on the site that were not found during the site inspection due to the thick vegetation cover of sections of the site. It is possible that those living on the site may have used traditional burial practices where the dead were buried either in front of / in the homesteads or close to the homesteads.

The 1944 image of the Durnacoll Exxaro site shows little habitation of the area hence the extent of heritage sites such as graves could be less. Currently, this site is also more disturbed than the other site due to farming activities (furrows), the dumping of rubble, etc. The farming activities could have led to the destruction of heritage resources such as archaeological sites. The assessment of significance of the impact of the proposed cemetery on graves and potential graves is also slightly lower at the Exxaro site.

If it is decided that the cemetery will be located on the Try Again Farm site, then the specialist would recommend that the cemetery is located parallel and close to the R621 road. The site should be cleared of vegetation prior to any construction so ensure that there are no low-lying sites such as graves and archaeological sites that were not detected during the site inspection.

If it is decided that the cemetery will be located on the Exxaro site, the specialist would recommend that the cemetery is located on the southern boundary of the site and immediately north-east of the mass grave site. The site should be cleared of vegetation prior to any construction so ensure that there are no low-lying sites such as graves and archaeological sites that were not detected during the site inspection.

The Chance Find Protocol for fossils as provided in the desktop palaeontological report, must be included in the Environmental Management Programme for the development / construction of the proposed cemetery.

10. MITIGATION MEASURES

- For any chance heritage finds (such as graves), all work must cease in the area affected and the Contractor must immediately inform the Project Manager in charge of the project. A heritage specialist must be called to site to inspect the finding/s. The provincial heritage resource agency, the Institute, must be informed about the finding/s.
- The heritage specialist will assess the significance of the resource and provide guidance on the way forward.
- Permits must be obtained from the Institute if heritage resources are to be removed, destroyed or altered.
- All heritage resources found in close proximity to the construction area must be protected by a 7 m buffer in which no construction can take place. The buffer material (danger tape, fencing, etc.) must be highly visible to construction crews.
- Under no circumstances may any heritage material be destroyed or removed from site unless under direction of a heritage specialist.
- Should any recent remains be found on site that could potentially be human remains, the South African Police Service (SAPS) as well as the Institute must be informed. No SAPS official may remove remains until the correct permit/s have been obtained.
- The Chance Find Protocol for fossils must be included in the Environmental Management Programme for the development / construction of the proposed cemetery.

11. REFERENCES

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