



DANNHAUSER LOCAL MUNICIPALITY

Proposed Establishment of a Cemetery within the Dannhauser Local Municipality, KwaZulu-Natal

Draft Basic Assessment Report

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DRAFT BASIC ASSESSMENT REPORT

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EXECUTIVE SUMMARY

INTRODUCTION AND PROJECT DESCRIPTION

SiVEST SA (Pty) Ltd has been appointed by Dannhauser Local Municipality (DLM) to undertake the Basic Assessment (BA) Process for the establishment of a cemetery within the Dannhauser Local Municipality, KwaZulu-Natal, in line with the National Environmental Management Act, 1998 (Act 107 of 1998).

The Dannhauser cemetery is currently nearing full capacity and the local Municipality have identified an urgent need for the establishment of a 15-hectare cemetery site to service local communities. The Durnacol site is situated approximately 3.5 km south west to the town of Dannhauser and is approximately 41 hectares in extent. Only a 15-hectare section of the site will be required for the cemetery establishment. The Durnacol Massgrave Memorial site is situated on the south west portion on the site, however this is fenced off. The site development plan for the cemetery has been developed so that environmental sensitivities are avoided.

The site will consist of grave sites, parking, internal roads, an office and ablutions. The grave sites will be sectioned in eight blocks as follows:

- Block A – 2456 grave sites
- Block B – 2175 grave sites
- Block C – 2233 grave sites
- Block D – 4725 grave sites
- Block E – 5505 grave sites
- Block F – 2250 grave sites
- Block G – 2153 grave sites
- Block H – 2430 grave sites

The total number of 23 927 grave sites proposed is within the site boundary. The proposed infrastructure required for the cemetery will not be included in this application.

The establishment of the cemetery requires that a Basic Assessment be undertaken as the proposed development triggers a number of activities in terms of the EIA Regulations of 2014 (as amended in 2017). The listed activities triggered are discussed in **Section 7.2** below.

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APPLICABILITY OF NEMA EIA REGULATIONS, 2014 (AS AMENDED IN 2017)

The following activities are applied for:

Listing Notice	Activity	Description
GNR 327, April 2017 (Listing Notice 1)	<u>Activity 23</u> The development of cemeteries of 2 500 square metres or more in size.	This trigger is applicable as the proposed cemetery will be 15 hectares in size.
GNR 327, April 2017 (Listing Notice 1)	<u>Activity 27</u> The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation	This trigger is applicable as the proposed cemetery site is located on land containing indigenous vegetation and the development footprint will be 15 hectares.
GNR 327, April 2017 (Listing Notice 1)	<u>Activity 28</u> Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development: ii. will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;	This trigger is applicable as the proposed cemetery site is located on land utilised for agriculture (Grazing) and the development footprint will be 15 hectares.

DETAILS OF ALTERNATIVES CONSIDERED

Site alternatives

Two sites were proposed for the establishment of the Dannhauser Cemetery. Initially the Try Again Farm site was the preferred site for the cemetery as it is owned by the DLM and the Durnacol site was the alternative as it is owned by EXXARO mining. However, EXXARO Mining indicated to the municipality that they can make the land available to the municipality if deemed suitable for cemetery establishment. SiVEST therefore proceeded with specialist studies to determine the feasibility of the proposed sites. The following specialist studies were undertaken to verify the proposed sites suitability:

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- Heritage Impact Assessment;
- Geotechnical Investigation;
- Hydrogeological Investigation;
- Wetland Assessment; and
- Terrestrial Ecological Assessment.

The approach taken was that the above-mentioned studies will be undertaken prior to the BA process commencing to determine whether any fatal flaws are present which would prevent the project from proceeding further. Based on the findings of the specialist assessments a layout plan of the proposed cemetery was therefore prepared to take forward into the legislated BA process.

Based on the specialist studies undertaken and the results thereof, the Durnacol site is preferable from a heritage, geotechnical, hydrogeological and terrestrial ecological perspective (see **Section 10** for the specialist findings and opinions on the preferred site). The Try Again Farm was preferred from a wetland perspective, however the specialist did confirm that should cemetery establishment proceed on the Durnacol site that the project would not be fatally flawed provided mitigation and buffer measures are implemented. Based on these findings, a meeting was held between DLM, EDTEA and SiVEST in order to confirm the site that would be taken forward for assessment in the Basic Assessment Process. It was agreed at the meeting that the Durnacol site would be assessed.

Technology alternatives

No technology alternatives are being considered for this project.

No-go alternative

In terms of the No-Go Alternative, the establishment of the cemetery would not go ahead and the Durnacol site would remain undeveloped. The existing cemetery in Dannhauser would reach its capacity which would result in an increase informal burials in areas that may be unsuitable for graves or home burials. The no-go option therefore cannot be considered as an alternative, as the DLM is in urgent need of a cemetery.

PUBLIC PARTICIPATION PROCESS UNDERTAKEN

The Public Participation Process has been undertaken in line with Chapter 6 of the EIA Regulations 2014 (as amended 2017).

I&AP's and key stakeholders will be notified via email of the availability of the report. Site notices will be placed around the vicinity of the site as well as at the Dannhauser Public Library. A copy of the report will also be placed at the Dannhauser Public Library for viewing by the public.

Adverts will be placed in the Mercury and the Northern Natal Courier.

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Interested and affected persons (I&AP's) will be afforded a thirty (30) day comment period from the date of availability of the DBAR to provide comment on the DBAR. An I&AP register will be opened and will be attached to this report. A summary of the issues raised during the public participation process will be documented in the Comments and Responses Report. This report will be updated following the comment period and attached to the FBAR.

RECEIVING ENVIRONMENT

The site is located in the south western part of the Dannhauser Local Municipality, approximately 3.5km from the town of Dannhauser. The study area is located in a midway point along a main railway line that provides linkage between Durban and Johannesburg. It is located approximately 8 km off the N11. The site locality is attached in **Appendix B**.

Geographical

The site is located in the south western part of the Dannhauser Local Municipality, approximately 3.5km from the town of Dannhauser. The study area is located in a midway point along a main railway line that provides linkage between Durban and Johannesburg. It is located approximately 8 km off the N11. The site locality is attached in **Appendix B**.

Climate

The Dannhauser area normally receives the highest rainfall in January and lowest in June and July. The average midday temperatures for the area range from 18°C in July to 26°C in February. The region is coldest during July when the mercury drops to 3°C on average during the night.

Geology and Soils

A geotechnical investigation was undertaken by Geotechnical Solutions (Pty) Ltd (dated 18 May 2021). A total of five test pits and five DCP tests were carried out for the Durnacol site. Based on the results of the hydrocensus, the static groundwater level in the area is roughly at 16m below ground level (begl). The depth to potable groundwater is roughly 66m begl which is where the groundwater strikes were encountered.

According to the report, the Durnacol site is underlain by Volksrust Formation Shale intruded by Jurassic dolerite. Based on the positions investigated on this site, the site comprised of clayey colluvial and residual soils that have been derived from the underlying dolerite rock. The weathered dolerite rock encountered is generally impermeable and will form an impermeable layer thereby limiting any contamination to the potable groundwater source. No groundwater was encountered on the Durnacol site at the specific test pits.

Topography and drainage

The north eastern portion of the Durnacol site is very flat with the topography of the rest of the site being fairly flat. Run-off from the site drains along a gentle slope towards the southwest towards the Mfushane River which is located south west to the property. This drainage line drains into three dams downstream of the site.

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Wetlands and watercourses

The NFEPA database indicates the presence of a single wetland area within the 500m radius of the project area, but did not indicate any wetland areas within the property boundary. However the database did identify a wetland within a 500m radius (classified as a Seep Wetland with an area of approximately 3.7ha). The site visit undertaken by the wetland specialist confirmed the presence of these wetlands. In addition, the specialist identified a small seasonal depression which show wetland characteristics, within the property boundary. An additional saturated area was identified immediately to the north of the property within the 500m radius of the site. The saturation in this regard was caused by a leak from a water main that travels in the area.

Vegetation

The Durnacol site contains some species of conservation value, however historical disturbances from mining operations and potential overgrazing in the site area has resulted in a decreased plant diversity. The classification of vegetation on site, is made at a very coarse scale, i.e. low resolution and falls within the Northern KZN Moist Grassland (Gs 4) which is Vulnerable. In this case the KZN Wildlife Vegetation Type, and VegMap 2018 are the same.

IMPACT METHODOLOGY USED

The SiVEST Impact Assessment method, dated 28 July 2017 (attached as **Appendix G**) has been utilised to assess the following potential impacts identified in the assessment phase and presented in the following sections.

The method used in this impact assessment determines significance (can be both positive and negative) of an impact by multiplying the value of the environmental system or component affected by the magnitude of the impact on that system or component (System or Component Value x Impact Magnitude).

In this method, all significant impacts on the natural or biophysical environment are assessed in terms of the overall impacts on the health of ecosystems, habitats, communities, populations and species. Thus, for example, the impact of an increase in stormwater runoff generated by a development can only be assessed in terms of the impact on the health of the affected environmental systems.

Similarly, all significant impacts on the social and socio-economic environment are assessed in terms of the overall impacts to the quality of life, health and safety of the affected population, communities and/or individuals, with the exception of impacts on resources that are assessed on their own.

IMPACTS AND RISKS IDENTIFIED FOR THE PREFERRED ALTERNATIVE

A summary of the key impacts is below. Mitigation measures are detailed in **Section 15**.

Environmental Parameter	Impact	Pre-mitigation	Post-mitigation
Impacts on Biophysical Systems / Components during the planning phase			
None identified.			
Impacts on Biophysical Systems / Components during the construction phase			
Heritage Graves and burial grounds	Potential alteration, damage, and / or destruction of graves during construction / development of proposed cemetery	High Negative Impact	Medium Negative Impact
Aquatic ecology	Potential loss aquatic features that have been identified on the development site	Medium Negative Impact	Low Negative Impact
	Potential loss of aquatic species / habitat as a result of the construction of the cemetery	Medium Negative Impact	Low Negative Impact
	Potential siltation of aquatic features as a result of erosion	Medium Negative Impact	Low Negative Impact
	Contamination of the aquatic features as a result of petrochemical spillages from storage areas, plant and equipment during the construction phase	Medium Negative Impact	Low Negative Impact
	Contamination of the aquatic features on site by construction waste generated during the construction phase	Low Negative Impact	Low Negative Impact
	Contamination of the aquatic features on site by domestic waste generated during the construction phase	Medium Negative Impact	Low Negative Impact
	Contamination of the aquatic features on site by potential leakages from the portable chemical toilets that will be used During the construction phase	Medium Negative Impact	Low Negative Impact
Ecological Indigenous natural vegetation	Loss, degradation or fragmentation of vegetation through direct clearing	Low negative impact	Low negative impact
Ecological Transformation of habitat for flora	Hard transformation of the access road and built infrastructure will result in a marginal reduction in flora. Construction activities will result in the disturbance of the soil surface, and this often leads to the establishment of alien invasive plant species.	Medium Negative Impact	Low negative impact
Ecological Erosion related impacts	Vegetation binds and protects the soil surface, and when removed, increases erosion potential. This may lead to water and wind removing vital topsoil and blocking up drains and eventually clogging roadsides and drainage lines.	Low negative impact	Low negative impact
Ecological Habitat transformation and fragmentation for fauna	Continued transformation of vegetation in the area will result in a marginal reduction in flora and fauna for the area. Disturbance of the soil surface and a leads to the establishment of alien invasive plant species. Continued transformation of the land results in habitat fragmentation, where edge effects decrease suitable habitat for a wide range of fauna in the area. This leads to an overall indirect decline in faunal diversity.	Medium Negative Impact	Low negative impact
Ecological Terrestrial fauna	Displacement of individuals	Medium Negative Impact	Low negative impact

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Environmental Parameter	Impact	Pre-mitigation	Post-mitigation
Impacts to Socio-Economic Component during the construction phase			
Air / dust pollution	Dust could become a problem during construction, especially on windy days	Low negative impact	Low negative impact
Noise	Noise generated by delivery vehicles, earth moving machinery and the workforce have the potential to impact negatively on surrounding residents.	Low negative impact	Low negative impact
Job creation	A number of jobs (approximately 10 jobs) will be created during the construction phase of the project.	Low positive impact	No mitigation required
Impacts to Biophysical Systems/components during the operational phase			
Heritage Graves and burial grounds	Mass grave & memorial and single grave may be damaged by visitors to cemetery & during maintenance thereof	Medium Negative Impact	Low negative impact
Aquatic ecology	The change of land use from agricultural fields/open space to a developed cemetery may impact on the natural runoff from the area that would impact the water entering the identified aquatic features.	Medium Negative Impact	Low negative impact
	In the event that stormwater is allowed to flow uncontrollably from the cemetery site, it may result in erosion which may result in siltation of the identified aquatic features.	Medium Negative Impact	Low negative impact
	It is assumed that the grave sites that will be excavated within the cemetery will be done by a - Tractor Loaded Backhoe (TLB) which pose a risk of contamination of the identified aquatic features as a result of potential leakages from the machine(s).	Low negative impact	Low negative impact
	People will frequent the cemetery site, either during funerals or during times of remembrance, the presence of people create a risk for contamination of the identified aquatic features by domestic waste generated by the visitors to the cemetery.	Low negative impact	Low negative impact
Ecological Erosion related impacts for operation phase	Erosion related to access roads within the cemetery and hard transformation of the actual gravesites may increase surface water flow.	Low negative impact	Low negative impact
Ecological Biodiversity loss due to operation phase	Biodiversity is likely to be lost during the operation phase of the cemetery as regular grave sites will be dug.	Medium Negative Impact	Medium Negative Impact
Ecological Vegetation	Establishment and spread of alien invasive plant species due disturbance vectors	Low negative impact	Low negative impact
Geohydrological Ground water	Decomposition of Human Remains	Low negative impact	Low negative impact
Geohydrological Ground water	Embalming Process	Low negative impact	Low negative impact
Geohydrological Ground water	Paints, Metal Corrosion and other chemical	Low negative impact	Low negative impact
Impacts to Socio-Economic component during the operational phase			
Job creation	Approximately 5 jobs will be created during the operational phase of the project.	Low positive impact	No mitigation required
No-go Alternative			
	None	n/a	n/a

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ENVIRONMENTAL IMPACT STATEMENT:

The Dannhauser cemetery is currently nearing full capacity and the local municipality have identified an urgent need for the establishment of a 15 hectare cemetery site to service local communities. Two site alternatives were identified by the municipality for further investigation to determine their suitability for the proposed land use. These sites are commonly known as the Try Again Farm and the Durnacol Massgrave site. The Try Again Farm is owned by the DLM and the Durnacol Massgrave site is owned by EXXARO Mining who have indicated to the Municipality that they can make the land available to the Municipality if deemed suitable for cemetery establishment.

The following specialist studies were undertaken in order to determine the most environmentally feasible site for the cemetery:

- Heritage Impact Assessment;
- Geotechnical Investigation;
- Hydrogeological Investigation;
- Wetland Assessment; and
- Terrestrial Ecological Assessment.

The Phase 1 Heritage Impact Assessment (dated 17th May 2021) was undertaken by JLB Consulting for the Durnacol site. The Durnacol site shows little habitation of the area hence the extent of heritage sites such as graves could be less. Currently, the site is also more disturbed 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 was found to be favourable for the Durnacol site.

The Palaeontological Impact Assessment Phase 1 Desktop Study was undertaken by Professor Marion Bamford for JLB Consulting (dated 4th May 2021) found that the Durnacol site lies on the sandstones and shales of the Volksrust Formation. Coal seams are absent from this formation. The Volksrust Formation is unlikely to preserve any recognisable fossil plants on the Durnacol Exxaro site. The potential impact of the proposed project to fossil heritage resources was assessed as extremely low.

A geotechnical investigation was undertaken by Geotechnical Solutions (Pty) Ltd (dated 18 May 2021). A total of five test pits and five DCP tests were carried out for the Durnacol site. Based on the results of the hydrocensus, the static groundwater level in the area is roughly at 16m below ground level (begl). The depth to potable groundwater is roughly 66m begl which is where the groundwater strikes were encountered. According to the report, the Durnacol site is underlain by Volksrust Formation Shale intruded by Jurassic dolerite. Based on the positions investigated on this site, the site comprised of clayey colluvial and residual soils that have been derived from the underlying dolerite rock. The weathered dolerite rock encountered is generally impermeable and will form an impermeable layer thereby limiting any contamination to the potable groundwater source. No groundwater was encountered on the Durnacol site at the specific test pits. Excavation by hand tools on this site is considered easy down to depths in the range 1.7m to 1.9m below ground level. However, a TLB may be easily used to excavate residual soils unless rock is encountered. The sidewalls are considered relatively stable over

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the short period. Both the Hanbury and Hall, and Council for Geoscience Guidelines cover geotechnical and groundwater stability of the site and found that the Durnacol site is suitable for the establishment of a cemetery. However, this is subject to additional groundwater studies comprising boreholes and following recommendations provided.

A hydrogeological investigation was undertaken by Geotechnical Solutions (Pty) Ltd (dated 18 May 2021). A total of five test pits and five DCP tests were carried out for the Durnacol site. A hydrocensus within a 3km radius the site was assessed, with no boreholes identified. A 4km and 5km was then utilised and 4 boreholes were identified. Five groundwater samples were collected from site was and submitted to Talbot Laboratories in Pietermaritzburg for testing. According to the report, the site is underlain by an Intergranular aquifer systems with approximate yields in the range 0.5 to 2.0 litres/second. Based on the results of the hydrocensus study, the static groundwater level is between depths 0.15m and 60m begl. Based on the drilling data, the groundwater strikes were only encountered between approximate depths 66m and 82m begl. Although the static groundwater level shows groundwater close to the surface, these boreholes are within at least 4km from the site. The specialist confirmed that based on the laboratory results, the groundwater in the area does not appear to be in a pristine condition as there is currently contamination particularly from nitrates/nitrites and microbial organisms. Based on these results, the specialist confirmed that the Durnacol site is acceptable from a hydrogeological perspective for the establishment of a cemetery. However, this is subject to additional groundwater studies comprising boreholes and following recommendations provided.

A Wetland Impact Assessment was undertaken by GCS (dated 21st May 2021). The assessment was undertaken for both sites proposed for the establishment of a cemetery. The specialist identified three wetlands within the two proposed sites. They have been classified as Class C wetlands in accordance with the WET-Health Model which indicated moderate modification of the wetland drivers. This moderate modification will keep decreasing as a result of the impacts in the wetland catchment persisting. The Ecological Importance and Sensitivity of all the wetland areas were classified as being low in nature. The specialist confirmed that no fatal flaws are associated with the establishment of a cemetery on the Durnacol site and recommended a 30m buffer around each of the wetland areas to mitigate any potential impacts that may arise from construction or operation of a cemetery.

A Terrestrial Ecological Assessment was undertaken by Mark Summers of SiVEST SA (Pty) Ltd (dated May 2021). According to the report, the Durnacol site does contain some species of conservation value, however historical disturbances from mining operations and potential overgrazing in the site area has resulted in a decreased plant diversity. The specialist also confirmed that the faunal diversity is lower at the Durnacol site. From a desktop assessment perspective, no Critical Biodiversity Areas or classified NFEPA wetlands occur on this site which reduces the sensitivity of this site. The specialist added that disturbance of the Durnacol site and establishment of a cemetery would not severely impact on the on the biodiversity in the general area.

Based on the specialist studies undertaken and the results thereof, the Durnacol site is acceptable for the establishment of a cemetery from a heritage, geotechnical, hydrogeological, wetland and terrestrial ecological perspective.

In terms of the No-Go Alternative, the establishment of the cemetery would not go ahead and the Durnacol site would remain undeveloped. The existing cemetery in Dannhauser would reach its capacity which would result in an increase informal burials in areas that may be unsuitable for graves or home burials.

The establishment of the Dannhauser Cemetery on the Durnacol site will result in minor biophysical impacts during the construction and operational phase. The negative impacts that are likely to arise from the construction and operational phase will be of low significance provided the recommended mitigation measures are implemented.

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2014 EIA Regulations, as amended.	Requirements for Basic Assessment Reports	Location this Basic Assessment Report
Appendix 1, Section 3 (a)	Details of – (i) The EAP who prepared the report; and the expertise of the EAP; and (ii) The expertise of the EAP, including a curriculum vitae.	Section 4 & Appendix A
Appendix 1, Section 3 (b)	The location of the activity, including – (i) The 21-digit Surveyor General code of each cadastral land parcel; (ii) Where available, the physical address and farm name; (iii) Where the required information in items (i) and (ii) is not available, coordinates of the boundary of the property or properties	Section 5
Appendix 1, Section 3 (c)	A plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is – (i) A linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) On land where the property has not been defined, the coordinates within which the activity is to be undertaken.	Section 5 & Appendix B
Appendix 1, Section 3 (d)	A description of the scope of the proposed activity, including – (i) All listed and specified activities triggered; (ii) A description of the activities to be undertaken, including associated structures and infrastructure.	Section 5
Appendix 1, Section 3 (e)	A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process.	Section 8
Appendix 1, Section 3 (f)	A motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location.	Section 9
Appendix 1, Section 3 (h)	A full description of the process followed to reach the proposed preferred activity, site and location within the site, including- (i) Details of all alternatives considered; (ii) Details of the Public Participation Process undertaken in terms of Regulation 41 of the Regulations, including copies of the supporting documents and inputs; (iii) A summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them; (iv) The environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (v) The impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration, and probability of the impacts, including the degree to which the impacts- (aa) Can be reversed; (bb) May cause irreplaceable loss of resources; and (cc) Can be avoided, managed, or mitigated. (vi) The methodology used in deterring and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives; (vii) Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographic, physical, biological, social, economic, heritage and cultural aspects; (viii) The possible mitigation measures that could be applied and level of residual risk; (ix) The outcome of the site selection matrix; (x) If no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and; (xi) A concluding statement indicating the preferred alternatives, including preferred location of the activity.	Section 11 Section 14 Section 14.4 Section 12 Section 15 Appendix G Section 16 Section 15 Section 15 Section 14
Appendix 1, Section 3 (i)	A full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including-	Section 15

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2014 EIA Regulations, as amended.	Requirements for Basic Assessment Reports	Location this Basic Assessment Report
	(i) A description of all environmental issues and risks that were identified during the environmental impact assessment process; and (ii) An assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.	
Appendix 1, Section 3 (j)	An assessment of each identified potentially significant impact and risk, including- (i) Cumulative impacts; (ii) The nature, significance and consequences of the impact and risk; (iii) The extent and duration of the impact and risk; (iv) The probability of the impact and risk occurring; (v) The degree to which the impact and risk can be reversed; (vi) The degree to which the impact and risk may cause irreplaceable loss of resources; and (vii) The degree to which the impact and risk can be avoided, managed or mitigated.	Section 10
Appendix 1, Section 3 (k)	Where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report.	Section 12
Appendix 1, Section 3 (l)	An environmental impact statement which contains- (i) A summary of the key findings of the environmental impact assessment; (ii) A map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and (iii) A summary of the positive and negative impacts and risks of the proposed activity and identified alternatives.	Section 12 Appendix 3
Appendix 1, Section 3 (m)	Based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr.	Section 11
Appendix 1, Section 3 (n)	Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation.	Section 11
Appendix 1, Section 3 (o)	A description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed;	Section 1
Appendix 1, Section 3 (p)	A reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation.	Section 12
Appendix 1, Section 3 (q)	Where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required, the date on which the activity will be concluded, and the post construction monitoring requirements finalised.	Section 13
Appendix 1, Section 3 (r)	An undertaking under oath or affirmation by the EAP in relation to- (i) The correctness of the information provided in the report; (ii) The inclusion of the comments and inputs from stakeholders and interested and affected parties; (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) Any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties.	Section 12
Appendix 1, Section 3 (s)	Where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts.	-
Appendix 1, Section 3 (t)	Where applicable, any specific information required by the Competent Authority.	-
Appendix 1, Section 3 (u)	Any other matter required in terms of section 24(4) (a) and (b) of the Act.	-

DANNHAUSER LOCAL MUNICIPALITY

EDTEA REF No. DC25/0009/2021 KZN/EIA/0001669/2021 - PROPOSED ESTABLISHMENT OF A CEMETERY WITHIN THE DANNHAUSER LOCAL MUNICIPALITY, KWAZULU-NATAL

DRAFT BASIC ASSESSMENT REPORT

1. INTRODUCTION

SIVEST SA (Pty) Ltd has been appointed by Dannhauser Local Municipality (DLM) to undertake the Basic Assessment (BA) Process for the establishment of a cemetery within the Dannhauser Local Municipality, KwaZulu-Natal, in line with the National Environmental Management Act, 1998 (Act 107 of 1998).

The Dannhauser cemetery is currently nearing full capacity and the local Municipality have identified an urgent need for the establishment of a 15-hectare cemetery site to service local communities. The site identified for the establishment of the Dannhauser Cemetery is commonly known as the Durnacol Mass Grave site,

The establishment of the cemetery requires that a Basic Assessment be undertaken as the proposed development triggers a number of activities in terms of the EIA Regulations of 2014 (as amended in 2017). The listed activities triggered are discussed in Section 7.2 below.

2. PROJECT TITLE

Proposed establishment of a cemetery within the Dannhauser Local Municipality, KwaZulu-Natal.

3. DETAILS OF APPLICANT

3.1 Name and contact details of the Applicant

Table 1: Name and contact details of Applicant:

Business Name of Applicant	Dannhauser Local Municipality
Physical Address	8 Church Street, Dannhauser, KwaZulu-Natal
Postal Address	Private Bag X1011, Dannhauser, KwaZulu-Natal
Postal Code	3080
Telephone	034 621 3114
Fax	n/a
Email	sevan@dannhauser.gov.za

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4. DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER AND SPECIALISTS

4.1 Name and contact details of the Environmental Consultant

The table below provides the name and contact details of the Environmental Consultants who prepared this report:

Table 2: Name and contact details of the Environmental Consultant who prepared the report

Business Name of EAP	SiVEST SA (PTY) Ltd
Physical Address	170 Peter Brown Dr, Town Bush Valley, Pietermaritzburg
Postal Address	P O BOX 707, Msunduzi, 3231
Postal Code	3231
Telephone	033 347 1600
Email	luvanyan@sivest.co.za

4.2 Names and expertise of the Environmental Assessment Practitioner (EAP)

The table below provides the names of the EAP's who prepared this report:

Table 3: Names and details of the expertise of the EAP's involved in the preparation of this report

Name of representative of the EAP	Educational Qualifications	Professional Affiliations	Experience (years)
Michelle Nevette (<i>Cert.Sci.Nat.</i>)	MEnvMgt. (Environmental Management)	SACNASP Registration No. 120356 EAPASA Registration No. 2019/1560 IAIA	19
Luvanya Naidoo (<i>Pr.Sci.Nat.</i>)	BSc (Geography)	SACNASP Registration No. 126107 EAPASA Registration No. 2019/1404 IAIA	11

CV's of SiVEST personnel and EAP declarations are attached in **Appendix A**.

4.3 Names and expertise of the specialists

The table below provides the names of the specialists involved in the Basic Assessment Process:

Table 4: Names of specialists involved in the Basic Assessment Process

Name of the specialist on role on the project	Educational Qualifications	Professional Affiliations	Experience (years)
Mark Summers (<i>Can.Sci.Nat.</i>) - Ecological Specialist (Fauna and Flora) (SiVEST SA (Pty) Ltd)	MSc Ecological Sciences	SACNASP Reg. No. 120309	4

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Magnus van Rooyen (Pr.Sci.Nat.) - Wetland and Riparian Ecologist (GCS)	M Phil Environmental Management	SACNASP Reg. No. 400335/11	18
Jean Beater - Heritage Specialist (JLB Consulting)	MA Heritage Studies	ASAPA Accredited (Reg. No. 349)	18
Nishen Govender (Pr.Sci.Nat.) - Geohydrological Specialist (GeoSolutions-Luhlaza)	MSc Geohydrology	SACNASP Reg. No. 400138/17 (Earth Sciences)	10
Malusi Khumalo (Pr.Plan.) - Professional Town Planner (SIVEST SA (Pty) Ltd)	Master of Town and Regional Planning	SACPLAN Reg. No. A/2338/2016	8

5. LOCATION OF THE ACTIVITY

5.1 21 Digit Surveyor General Code of the site

The Surveyor General code for the Durnacol site is: 772/2005.

5.2 Physical Address of the site

The Durnacol site is located in the south western part of the Dannhauser Local Municipality, approximately 3.5km from the town of Dannhauser. The study area is located in a midway point along a main railway line that provides linkage between Durban and Johannesburg. It is located approximately 8 km off the N11. The site locality is attached in **Appendix B**.

5.3 Coordinates of the site

The coordinates for the site are as follows:

Latitude: 28° 2'39.48"S

Longitude: 30° 2'17.09"E

6. SITE DEVELOPMENT PLAN

The Site Development Plan and sensitivity map is attached in **Appendix C**.

7. ACTIVITY INFORMATION

7.1 Project Description

Dannhauser Local Municipality (DLM) is located in the northern part of KwaZulu-Natal (KZN) province. It is one of the three Local Municipalities (LMs) comprising the Amajuba District, the other two LMs being the Newcastle and eMadlangeni LMs. Dannhauser LM is the smallest of the three LMs with the area coverage of approximately 1516 square kilometres. The study area is predominantly rural in character.

It is characterized by mining towns with some residential areas 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, and other main towns such as Inverness, Kilegethe, Klipbank, Milford, Normandien, Nyanyadu, Rutland, Tendeka and Witteklip.

The Municipality is made-up of 13 wards with combined total of 58 settlement areas. Dannhauser town is the main node within the LM and is currently surrounded by the largest coal producing mines in KZN. The study area is located in a midway point along a main railway line that provides linkage between Durban and Johannesburg. It is located approximately 8 km off the N11. The landscape of the Dannhauser LM is characterized by numerous rivers that flow throughout the LM. The Ngagane and uMzinyathi Rivers are amongst the largest rivers found within the Dannhauser LM.

The Dannhauser cemetery is currently nearing full capacity and the local municipality have identified an urgent need for the establishment of a 15-hectare cemetery site to service local communities.

The Durnacol site is situated approximately 3.5 km south west to the town of Dannhauser and is approximately 41 hectares in extent. Only a 15-hectare section of the site will be required for the cemetery establishment. The Durnacol Massgrave Memorial site is situated on the south west portion on the site, however this is fenced off. The site development plan for the cemetery has been developed so that environmental sensitivities are avoided.

The site will consist of grave sites, parking, internal roads, an office and ablutions. The grave sites will be sectioned in eight blocks as follows:

- Block A – 2456 grave sites
- Block B – 2175 grave sites
- Block C – 2233 grave sites
- Block D – 4725 grave sites
- Block E – 5505 grave sites
- Block F – 2250 grave sites
- Block G – 2153 grave sites
- Block H – 2430 grave sites

A total number of 23 927 grave sites is proposed within the site boundary. The proposed infrastructure required for the cemetery will not be included in this application.

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7.2 NEMA Listed Activities

The amended EIA Regulations promulgated under Section 24(5) of the National Environmental Management Act, Act 107 of 1998 and published in Government Notice No. R. 326 list activities which may not commence without environmental authorization from the Competent Authority. The proposed activity is identified in terms of Government Notice No. R. 327 and 324 for activities which must follow the Basic Assessment Process. The project will trigger the following listed activities:

Table 5: Listed activities in terms of NEMA: EIA Regulations 2014 (as amended in 2017), applicable to the proposed project

Listing Notice	Activity	Description
GNR 327, April 2017 (Listing Notice 1)	<u>Activity 23</u> The development of cemeteries of 2 500 square metres or more in size.	This trigger is applicable as the proposed cemetery will be 15 hectares in size.
GNR 327, April 2017 (Listing Notice 1)	<u>Activity 27</u> The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation	This trigger is applicable as the proposed cemetery site is located on land containing indigenous vegetation and the development footprint will be 15 hectares.
GNR 327, April 2017 (Listing Notice 1)	<u>Activity 28</u> Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development: iii. will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;	This trigger is applicable as the proposed cemetery site is located on land utilised for agriculture (Grazing) and the development footprint will be 15 hectares.

8. POLICY AND LEGISLATIVE CONTEXT

The relationship between the project and certain key pieces of environmental legislation is discussed in the subsections to follow.

8.1 The Constitution

The Constitution of the Republic of South Africa, Act 108 of 1996 sets the legal context in which environmental law in South Africa occurs and was formulated. All environmental aspects should be interpreted within the context of the Constitution, National Environmental Management Act 107 of 1998 and the Environment Conservation Act 73 of 1989.

The Constitution has enhanced the status of the environment by virtue of the fact that an environmental right has been established (Section 24) and because other rights created in the Bill of Rights may impact on environmental management through, for example, access to health care, food and water and social security (Section 27). An objective of local government is to provide a safe and healthy environment (Section 152) and public administration must be accountable, transparent and encourage participation (Section 195(1) (e) to (g)).

8.2 National Environmental Management Act

According to Section 2(3) of the National Environmental Management Act (NEMA) (Act No. 107 of 1998), “development must be socially, environmentally and economically sustainable”, which means the integration of these three factors into planning, implementation and decision-making so as to ensure that development serves present and future generations.

The proposed cemetery requires authorisation in terms of NEMA and the Basic Assessment (BA) Process is being undertaken in accordance the EIA Regulations 2014 (as amended in 2017) that consist of the following:

Listing Notice 1 - GN No. 327 (7 April 2017);

BA procedure - GN No. 326 (7 April 2017);

The project triggers activities under Listing Notice 1 and thus needs to be subjected to a Basic Assessment Process. The listed activities are explained in Section 7.2 above.

8.3 The National Heritage Resources Act 1999 (25 of 1999)

The National Heritage Resources Act promotes good management of the heritage resources of South Africa which are deemed to have cultural significance and to enable and encourage communities to ensure that these resources are maintained for future generations.

The aim of the Act is to introduce an integrated, three-tier system for the identification, assessment and management of national heritage resources (operating at a national, provincial and local level). This legislation makes provision for a grading system for the evaluation of heritage resources on three levels which broadly coincide with their national, provincial and local significance.

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Under the legislation the South African Heritage Resources Agency (SAHRA), was established, which replaced the National Monuments Council. SAHRA is responsible for the preservation of heritage resources with exceptional qualities of special national significance (Grade I sites). A Provincial Heritage Resources Authority, established in each province, will protect Grade II heritage resources which are significance within the context of a province or region. Buildings and sites of local interest (Grade III sites) is the responsibility of local authorities as part of their planning functions.

There is extensive national legislation covering heritage and archaeological sites. Within the scope of this project, Section 38 of the NHRA (25 of 1999), states that an assessment of potential heritage resources in the development area needs to be done.

A Phase 1 Heritage Assessment was undertaken by JLB Consulting for the project. A copy of the report is attached in **Appendix F** and described further in **Section 13.2**.

8.4 National Water Act (Act 36 of 1998)

The National Water Act of 1998 pertains to the country's water resources. Moreover, this Act regulates issues including wastewater, the pollution of water bodies and the extraction and use of water resources.

The purpose of the act is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways which take into account amongst other factors:

- Meeting the basic human needs of present and future generations;
- Promoting equitable access to water;
- Redressing the results of past racial and gender discrimination;
- Promoting the efficient, sustainable and beneficial use of water in the public interest;
- Facilitating social and economic development;
- Providing for growing demand for water use;
- Protecting aquatic and associated ecosystems and their biological diversity;
- Reducing and preventing pollution and degradation of water resources;
- Meeting international obligations;
- Promoting dam safety;
- Managing floods and droughts.

And for achieving this purpose, to establish suitable institutions and to ensure that they have appropriate community, racial and gender representation.

In terms of the Dannhauser Cemetery project, a wetland impact assessment has been undertaken. A copy of the report has been attached in **Appendix F** and described in **Section 10.4**.

8.5 Amajuba District Municipality Integrated Development Plan (2020/2021)

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Reference is made to the Amajuba District Municipality Integrated Development Plan (IDP) 2020/2021. According to the IDP, cemeteries and open spaces are monitored by the respective local municipalities whilst the district municipality assists with maintaining or upgrading services. The IDP further stated that the national Department of Agriculture and Environmental Affairs initiated a study to find suitable sites for burials in order to prevent the unsuitable site and home burials. There was also an initiative to formalize informal cemeteries within the district which identified a site in Durnacol as there was informal burial taking place, however the site did not form part of the study undertaken by the national Department of Agriculture and Environmental Affairs. The study was conducted in several places within the District however many of the sites had geological constraints which delayed the study and is therefore incomplete. The proposed establishment of a cemetery within Dannhauser at the Durnacol site is therefore well aligned with the Amajuba District Municipality IDP (2020/2021).

8.6 Amajuba District Municipality Spatial Development Framework (2017/2018)

Reference is made to the Amajuba District Municipality Draft Spatial Development Framework (SDF) 2017/2018. According to the SDF, open public spaces, community halls, sport fields, cemeteries, etc. are important parts of social infrastructure. However, the district is facing huge service and infrastructure backlogs. The district municipality has therefore prepared a number of sector plans which includes a Cemetery Plan in response to these backlogs. The SDF further stated that the local municipalities have also developed detailed local plans to address these challenges. The proposed establishment of a cemetery within Dannhauser is therefore well aligned with the Amajuba District Municipality SDF (2017/2018).

8.7 Dannhauser Local Municipality Integrated Development Plan (2020/2021)

Reference is made to the Dannhauser Local Municipality Integrated Development Plan (IDP) 2020/2021.

The municipality currently has one official cemetery which is situated in in Dannhauser town. There are other cemeteries around the Dannhauser area (Hattingspruit cemetery located in Dundee and Private Muslim cemeteries) however these are not registered with the Dannhauser Local Municipality and are nearing capacity. As such, the demand for burial plots is increasing and new cemetery sites need to be identified within the municipal area. The SWOT analysis undertaken from a Social Development perspective in the IDP also identified the need for new cemetery sites as an opportunity for the municipality. The proposed establishment of a cemetery within Dannhauser is therefore well aligned with the DLM Integrated Development Plan (2020/2021).

9. NEED AND DESIRABILITY

The municipality currently has one registered cemetery in town. The cemetery services predominantly the community of ward 2 and other wards of Dannhauser. The current cemetery site (Cornwell cemetery) was established in the early 19th century. The site is alarmingly reaching its full capacity due to various factors, such as: HIV/Aids, TB and coronavirus. The coronavirus pandemic has contributed significantly in the high number of deaths. The different waves of covid-19 had a negative impact for burial site/cemeteries in all wards of the municipality. Both the registered cemetery in town and other informal cemeteries in out skirting areas are running out of burial space. The majority of the informal cemeteries have reached their full capacity and have closed. The cemetery site in town (ward 2) is estimated to have approximately 150-200 graves for burial. Within the estimated

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150-200 graves, there is an estimated +-50 graves which are reserved by the public to be buried next to their loved ones. It is therefore, in that context that the municipality is undertaking the Environmental Impact Assessment (Basic Assessment) for the establishment of a new cemetery site. The municipality is also looking at ring fencing pockets of land for future cemetery development. The municipality is seeking to curb the spread of unauthorised cemetery development, especially in the out-skirting areas where cemeteries are developed without any form of environmental authorisation as per the NEMA act and the KwaZulu Natal Cemetery and Crematoria Act. The project is also well aligned to the requirements of the following municipal plans and frameworks (further described in **Section 8**):

- Amajuba District Municipality Integrated Development Plan (2020/2021);
- Amajuba District Municipality Spatial Development Framework (2017/2018);
- Dannhauser Local Municipality Integrated Development Plan (2020/2021);

The Dannhauser cemetery is estimated to have approximately 23 927 graves available for burial. This is a low number especially during the midst of the current COVID pandemic. It is difficult to predict the lifespan of the cemetery, as the pandemic is constantly changing. The municipality anticipates that the Dannhauser cemetery may reach its lifespan towards the end of the year 2021 or even sooner depending on death rate.

10. MOTIVATION FOR THE PREFERRED SITE FOR THE DEVELOPMENT OF A CEMETERY

The Dannhauser cemetery is currently nearing full capacity and the local municipality has identified an urgent need for the establishment of a 15-hectare cemetery site to service local communities. Two site alternatives were identified by the municipality for further investigation to determine their suitability for the proposed land use. These sites are commonly known as the Try Again Farm and the Durnacol Massgrave site.

The following specialist studies were undertaken in order to determine the most environmentally feasible site for the cemetery:

- Heritage Impact Assessment;
- Geotechnical Investigation;
- Hydrogeological Investigation;
- Wetland Assessment; and
- Terrestrial Ecological Assessment.

The findings of the abovementioned specialist studies and their preferred sites are discussed below.

10.1 Heritage Impact Assessment

The Phase 1 Heritage Impact Assessment (dated 17th May 2021) was undertaken by JLB Consulting. The assessment was undertaken for both the Try Again Farm and the Durnacol site. The specialist confirmed the presence of heritage sites on both of the proposed sites for the cemetery. Both sites displayed evidence of historical habitation. Grave sites, remains of homestead and remains of foundations of structures were found on

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the Try Again Farm. Historical aerial imagery (1994) of the Try Again Farm also showed extensive historical habitation which could mean that the site could contain more heritage sites such as graves.

The Durnacol site shows little habitation and is also more disturbed than the Try Again Farm (based on aerial imagery - 1994). Widespread dumping of building rubble and furrows across the length of the site were also observed. The Durnacol Mass Grave was found on the south-west corner of the site and several other graves were found immediately east of the mass grave memorial.

It is for these reasons that the Durnacol site is the preferred site for the proposed cemetery from a heritage perspective. The heritage specialist has recommended that the cemetery be located on the southern boundary of the site, immediately north-east of the mass grave site. However, the site should be cleared of vegetation prior to construction to ensure that there are no further low-lying sites such as graves and archaeological sites that were not detected during the site inspection undertaken by the heritage specialist.

10.1.1 Palaeontological Impact Assessment – Phase 1 Desktop Study

The Palaeontological Impact Assessment Phase 1 Desktop Study was undertaken by Professor Marion Bamford for JLB Consulting (dated 4th May 2021). The desktop study was undertaken for both sites. The Try Again Farm lies on the shales on the Vryheid Formation and on Jurassic Dolerite. The Vryheid Formation is potentially very highly sensitive from a palaeontological perspective, however the Vryheid Formation shales and coal seams are far below the surface in the region of the Try Again Farm. Since cemetery excavations do not normally exceed 2-3m depth, it is very unlikely that fossils would be encountered or disturbed.

The Durnacol site lies on the sandstones and shales of the Volkrust Formation. Coal seams are absent from this formation.

10.2 Geotechnical Investigation

A geotechnical investigation was undertaken by Geotechnical Solutions (Pty) Ltd (dated 18 May 2021). The investigation was undertaken for both the Try Again Farm Site and the Durnacol site. A total of five test pits and five DCP tests were carried out for the Durnacol site. Eight test pits and eight DCP tests were carried out for the Try Again Farm Site. Based on the results of the hydrocensus, the static groundwater level in the area is roughly at 16m below ground level (bgl). The depth to potable groundwater is roughly 66m bgl which is where the groundwater strikes were encountered.

Excavatability for the grave sites

Durnacol Site - Based on the site investigation, excavation by hand tools is considered easy down to depths in the range 1.7m to 1.9m bgl. Thereafter, intermediate to hard is anticipated, however, with a TLB it should easily excavate the residual soils unless rock is encountered, which will hinder excavations. The sidewalls are considered relatively stable over the short period.

Try Again Site - Based on the site investigation, excavation by hand tools is considered easy down to depths in the range 1.7m to 1.9m bgl. There are however, certain areas in which test pit refused at 1.4m due to rock being

encountered. This is considered as intermediate to hard excavations. Intermediate to hard is anticipated at depths greater than 1.7m begl, however, with a TLB it should easily excavate the residual soils unless rock is encountered, which will hinder excavations. The sidewalls are considered relatively stable over the short period.

Leachate migration

The soils found on both sites are inferred to have a permeability of approximately 3.30×10^{-5} to 1.89×10^{-4} m/s, which is classified as semi permeable to impermeable soils for both sites.

According to the Council for Geoscience, Cemetery Site Classification (2004), permeabilities between $\times 10^{-4}$ and $\times 10^{-5}$ are classified as partially suitable for the site.

Basal Buffer Zone

Based on the results of the hydrocensus the static groundwater level in the area is roughly at 16m begl. The depth to potable groundwater is roughly 66m begl which is where the groundwater strikes was encountered.

Durnacol Site – No groundwater was encountered in any of the inspection pits on site. However, there are a few water bodies located down gradient from the site. Considering that weathered dolerite rock was encountered at the site, particularly down gradient, and dolerite is generally and impermeable rock. This will form an impermeable layer and limit any contamination to the potable groundwater source.

Try Again Site – Groundwater seepage was encountered in a single test pit on site at a depth of approximately 1.7m begl. This is a concern for the site. Based on this it appears that the north eastern part of this site should be avoided for any cemetery development. Also, considering that weathered dolerite rock was encountered at the site, and dolerite is generally and impermeable rock. This will form an impermeable layer and limit any contamination to the potable groundwater source.

The recommended buffer zone between the base of the grave and the top of the water table should be at least 2.5m for similar environments.

Based on the recommendations of the Department of Environmental Affairs, a grave approximately 1.8m deep with a 2.5m buffer zone should not encounter any groundwater within 4.3m begl of the subsurface profile. The elevated groundwater seepage on site is a concern, however, it should be noted that this is from the perched aquifer and not the potable water aquifer. The potable groundwater source is located at a depth of 66m begl (based on hydrocensus data).

However, there is no conclusive evidence that there is at least a 2.5m buffer zone between the base of the grave and the water table in the area. It is suggested that further investigations be carried out at the site comprising boreholes to determine the actual groundwater depth.

Tentatively, based on the existing data the Durnacol site is the most feasible in terms of buffer zone.

Soil Workability

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Due to the clay content in soils, the materials classify as OL. These are not the best soils in terms of building standards, however, for general backfill for a grave site is considered as acceptable as there are not alternatives in the area with different soils.

There is still the risk of subsidence at both sites and the requirement of releveling before any memorial structure is constructed over the grave.

Based on the results above, the specialist noted that the Durnacol site is acceptable as a cemetery site, provided that further investigations are carried out to confirm the water table and geology down to at least 15m begl. .

10.3 Hydrogeological Investigation

A hydrogeological investigation was undertaken by Geotechnical Solutions (Pty) Ltd (dated 18 May 2021). The investigation was undertaken for both the Try Again Farm Site and the Durnacol site.

A total of five test pits and five DCP tests were carried out for the Durnacol site. Eight test pits and eight DCP tests were carried out for the Try Again Farm Site.

A hydrocensus within a 3km radius of each site was assessed, with no boreholes identified. A 4km and 5km was then utilised and 4 boreholes were identified. Five groundwater samples were collected from site and submitted to Talbot Laboratories in Pietermaritzburg for testing. According to the report, the site is underlain by an Intergranular aquifer systems with approximate yields in the range 0.5 to 2.0 litres/second. Based on the results of the hydrocensus study, the static groundwater level is between depths 0.15m and 60m begl. Based on the drilling data, the groundwater strikes were only encountered between approximate depths 66m and 82m begl. Although the static groundwater level shows groundwater close to the surface, these boreholes are within at least 4km from the site. The specialist confirmed that based on the laboratory results, the groundwater in the area does not appear to be in a pristine condition as there is currently contamination particularly from nitrates/nitrites and microbial organisms.

Based on these results, the specialist confirmed that the Durnacol site is preferable from a hydrogeological perspective.

10.4 Wetland Impact Assessment

A Wetland Impact Assessment was undertaken by GCS (dated 21st May 2021). The assessment was undertaken for both sites proposed for the establishment of a cemetery.

The specialist identified three wetlands within the two proposed sites. They have been classified as Class C wetlands in accordance with the WET-Health Model which indicated moderate modification of the wetland drivers. This moderate modification will keep decreasing as a result of the impacts in the wetland catchment persisting. The Ecological Importance and Sensitivity of all the wetland areas were classified as being low in nature. The specialist recommended a 30m buffer around each of the wetland areas to mitigate any potential impacts that may arise from construction or operation of a cemetery.

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The specialist identified a depression wetland within the property boundary of the Durnacol site, with an unchannelled valley bottom wetland immediately to the west of the property. The topography of the site slopes towards the unchannelled valley bottom wetland which could be at risk from the cemetery as a result of stormwater runoff or groundwater percolation. This risk is considered negligible under specific management and mitigation conditions.

A single unchannelled valley bottom wetland was identified by the specialist within the boundary of the Try Again Farm Site. The wetland is located within a shallow valley that drains the north-eastern part of the property in a south-eastern direction. The Try Again Farm site is considered preferable if the cemetery is located in the north-western corner of the property. This area is relatively flat and falls outside of the drainage catchment of the unchannelled valley bottom wetland on the site.

The specialist added, that considering the above findings and the implementation of the buffer, no fatal flaw is associated with the development of the cemetery on either of the properties. However, based on the location of the wetlands on either site, the Try Again Farm site is the preferred alternative.

10.5 Terrestrial Ecological Assessment

A Terrestrial Ecological Assessment was undertaken by Mark Summers of SiVEST SA (Pty) Ltd (dated May 2021). The assessment was undertaken for both sites proposed for the establishment of a cemetery.

From a desktop assessment perspective, a portion of the Try Again Farm Site is classified as a Critical Biodiversity Area. In addition, the Try Again Farm Site was found to have a medium plant diversity with the vegetation type that is indicative of Northern KZN Moist Grassland which is classified as vulnerable. The specialist also confirmed the presence of protected plant species on this site. NFEPA wetlands are also present on the Try Again Farm Site, which potentially house faunal species of conservation concern.

The Durnacol site does contain some species of conservation value, however historical disturbances from mining operations and potential overgrazing in the site area has resulted in a decreased plant diversity. The specialist also confirmed that the faunal diversity is lower at the Durnacol site. From a desktop assessment perspective, no Critical Biodiversity Areas or classified NFEPA wetlands occur on this site which reduces the sensitivity of this site, however the specialist added that a wetland assessment will need to be undertaken to confirm the presence of wetlands (see **section 10.4** above for findings from the Wetland Assessment). The specialist added that disturbance of the Durnacol site would not severely impact on the on the biodiversity in the general area.

From a faunal perspective, the study area has a medium conservation value. This is based on the potential for the sites to harbour some species of conservation concern, which were not identified during the assessment, potentially as a result of the sampling time of year. Habitat for foraging is present in areas near the site, and so faunal species can move to adjacent areas during construction and operation. This is unlikely to affect the status of species of conservation concern. It is not anticipated that the proposed construction and operation will have a long term negative effect on the fauna of the area. The fauna of the site is directly dependent on the vegetation of the site, and the careful management of the vegetation (and soil) should not result in a reduction of faunal species of conservation concern in the greater area.

Based on findings from the Terrestrial Ecological Assessment, the Durnacol site is the preferred site for the establishment of a cemetery.

10.6 Summary of preferred sites

Specialist Study	Preferred Site
Heritage Assessment	Durnacol Site
Geotechnical Investigation	Durnacol Site
Hydrogeological Investigation	Durnacol Site
Wetland Impact Assessment	Try Again Farm Site
Terrestrial Ecological Assessment	Durnacol Site

Based on the specialist studies undertaken and the results thereof, The Durnacol site is preferable from a heritage, geotechnical, hydrogeological and terrestrial ecological perspective. The Try Again Farm was preferred from a wetland perspective, however the specialist did confirm that should cemetery establishment proceed on the Durnacol site that the project would not be fatally flawed provided mitigation and buffer measures are implemented. The site development plan for the cemetery has therefore been developed so that environmental sensitivities are avoided.

In addition to the above, the Durnacol site is situated within close proximity to the town (approximately 3.5 km south west to the town of Dannhauser). As such, residents of the town would not have to travel far. Only a 15 hectare section of the site will be required for the cemetery establishment.

11. DETAILS OF ALTERNATIVES CONSIDERED

11.1 Site alternatives

Two sites were proposed for the establishment of the Dannhauser Cemetery. Initially the Try Again Farm site was the preferred site for the cemetery as it is owned by the DLM and the Durnacol site was the alternative as it is owned by EXXARO mining. However, EXXARO Mining indicated to the municipality that they can make the land available to the municipality if deemed suitable for cemetery establishment. SiVEST therefore proceeded with specialist studies to determine the feasibility of the proposed sites. The following specialist studies were undertaken to verify the proposed sites suitability:

- Heritage Impact Assessment;
- Geotechnical Investigation;
- Hydrogeological Investigation;
- Wetland Assessment; and
- Terrestrial Ecological Assessment.

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The approach taken was that the above-mentioned studies will be undertaken prior to the BA process commencing to determine whether any fatal flaws are present which would prevent the project from proceeding further. Based on the findings of the specialist assessments a layout plan of the proposed cemetery was therefore prepared to take forward into the legislated BA process.

Based on the specialist studies undertaken and the results thereof, the Durnacol site is preferable from a heritage, geotechnical, hydrogeological and terrestrial ecological perspective (see **Section 10** for the specialist findings and opinions on the preferred site). The Try Again Farm was preferred from a wetland perspective, however the specialist did confirm that should cemetery establishment proceed on the Durnacol site that the project would not be fatally flawed provided mitigation and buffer measures are implemented. Based on these findings, a meeting was held between DLM, EDTEA and SiVEST in order to confirm the site that would be taken forward for assessment in the Basic Assessment Process. It was agreed at the meeting that the Durnacol site would be assessed.

11.2 Technology alternatives

No technology alternatives are being considered for this project.

11.3 No-go alternative

In terms of the No-Go Alternative, the establishment of the cemetery would not go ahead and the Durnacol site would remain undeveloped. The existing cemetery in Dannhauser would reach its capacity which would result in an increase informal burials in areas that may be unsuitable for graves or home burials. The no-go option therefore cannot be considered as an alternative, as the DLM is in urgent need of a cemetery.

12. DESCRIPTION OF THE PHYSICAL ENVIRONMENT

12.1 Geographical

The site is located in the south western part of the Dannhauser Local Municipality, approximately 3.5km from the town of Dannhauser. The study area is located in a midway point along a main railway line that provides linkage between Durban and Johannesburg. It is located approximately 8 km off the N11. The site locality is attached in **Appendix B**.

12.2 Climate

The Dannhauser area normally receives the highest rainfall in January and lowest in June and July. The average midday temperatures for the area range from 18°C in July to 26°C in February. The region is coldest during July when the mercury drops to 3°C on average during the night.

12.3 Geology and Soils

A geotechnical investigation was undertaken by Geotechnical Solutions (Pty) Ltd (dated 18 May 2021). A total of five test pits and five DCP tests were carried out for the Durnacol site. Based on the results of the hydrocensus,

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the static groundwater level in the area is roughly at 16m below ground level (begl). The depth to potable groundwater is roughly 66m begl which is where the groundwater strikes were encountered.

According to the report, the Durnacol site is underlain by Volksrust Formation Shale intruded by Jurassic dolerite. Based on the positions investigated on this site, the site comprised of clayey colluvial and residual soils that have been derived from the underlying dolerite rock. The weathered dolerite rock encountered is generally impermeable and will form an impermeable layer thereby limiting any contamination to the potable groundwater source. No groundwater was encountered on the Durnacol site at the specific test pits.

12.4 Topography and drainage

The north eastern portion of the Durnacol site is very flat with the topography of the rest of the site being fairly flat. Run-off from the site drains along a gentle slope towards the southwest towards the Mfushane River which is located south west to the property. This drainage line drains into three dams downstream of the site.

12.5 Wetlands and watercourses

The NFEPA database indicates the presence of a single wetland area within the 500m radius of the project area, but did not indicate any wetland areas within the property boundary. However the database did identify a wetland within a 500m radius (classified as a Seep Wetland with an area of approximately 3.7ha). The site visit undertaken by the wetland specialist confirmed the presence of these wetlands. In addition, the specialist identified a small seasonal depression which show wetland characteristics, within the property boundary. An additional saturated area was identified immediately to the north of the property within the 500m radius of the site. The saturation in this regard was caused by a leak from a water main that travels in the area.

12.6 Vegetation

The Durnacol site contains some species of conservation value, however historical disturbances from mining operations and potential overgrazing in the site area has resulted in a decreased plant diversity. The classification of vegetation on site, is made at a very coarse scale, i.e. low resolution and falls within the Northern KZN Moist Grassland (Gs 4) which is Vulnerable. In this case the KZN Wildlife Vegetation Type, and VegMap 2018 are the same.

13. DESCRIPTION OF THE SOCIO- ECONOMIC ENVIRONMENT

13.1 General Socio-Economic Characteristics of the Area

Reference is made to the Dannhauser Local Municipality IDP 2021-2022.

The Dannhauser Local Municipality is located in the northern part of the KwaZulu-Natal Province within the Amajuba District. The municipality is the smallest of three local municipalities within the Amajuba District and covers an area of approximately 1516 square kilometres. The Dannhauser Local Municipality is a predominantly rural municipality which consists thirteen wards with a combined total of 58 settlement areas. The town of

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Dannhauser is the main node within the Dannhauser Local Municipality. It is currently surrounded by some of the largest coal producing mines in KwaZulu-Natal. The population of the Dannhauser Municipality was recorded at 105 341 people in 2016 compared to a total of 102 161 in 2011.

Population densities are highest in the Traditional Council areas in the north-eastern portion of the municipal area and in Dannhauser Town. The town functions as a primary node which provides commercial service facilities, agricultural industries, industrial parks, public social infrastructure, economic infrastructure and government services. According to the IDP, the local economy is largely defined by the agricultural and mining sectors which currently contribute to minimal employment within the jurisdiction. The local residents rely on the larger urban centres of Dundee and Newcastle for employment opportunities and higher order goods and services. The increasing population within the local municipality can be attributed to receiving quality government services, immigration by residents from neighbouring areas, increased housing developments by the Department of Human Settlements, availability of land for agricultural activities amongst other reasons.

According to the IDP, education is recognized in playing an important role in economic development as it provides skilled labour that is key in producing goods and services in an economy. In 2016, of the total population of 105 341, only 1.9% had obtained tertiary educational attainments and only 16.4% had matriculated. People with no schooling increased to 14.7% in 2011. This can be attributed to a lower level of primary school enrolment that was experienced in the municipal area in 2014-2015. Only a handful of those who finish matric pursue further studies.

The town functions as a primary node which provides commercial service facilities, agricultural industries, industrial parks, public social infrastructure, economic infrastructure and government services. According to the IDP, the local economy is largely defined by the agricultural and mining sectors which currently contribute to minimal employment within the jurisdiction. Population densities are highest in the Traditional Council areas in the north-eastern portion of the municipal area and in Dannhauser Town. The local residents rely on the larger urban centres of Dundee and Newcastle for employment opportunities and higher order goods and services. The increasing population within the local municipality can be attributed to receiving quality government services, immigration by residents from neighbouring areas, increased housing developments by the Department of Human Settlements, availability of land for agricultural activities amongst other reasons.

13.2 Cultural / Historical Environment

Prior to the 1980's, mining towns with some residential areas were established within the Dannhauser Local Municipality as a result of the numerous mines situated within and around the municipal area. Currently, a large area of the north eastern portion of the municipality is under administration of traditional councils (Ubuhlebomzinyathi Community Authority and Nyanyadu Traditional Council).

The Durnacol Mass Grave Memorial is located on the south west corner of the Durnacol site. According to the Heritage Impact Assessment (**Appendix F**), several other graves were found immediately east to the mass grave memorial. However, this area is fenced off together with the mass grave memorial. One grave was found on the site outlined with bricks.

14. PUBLIC PARTICIPATION PROCESS

The Public Participation Process is being undertaken in line with Chapter 6 of the EIA Regulations 2014 (as amended 2017).

The following activities are being undertaken as part of the Public Participation Process:

14.1 Notification of Interested and Affected Parties (I&AP's)

I&AP's and key stakeholders will be notified via email of the availability of the report.

14.2 Site Notices

Site notices will be placed around the vicinity of the site as well as at the Dannhauser Public Library. A copy of the report will also be placed at the Dannhauser Public Library for viewing by the public.

14.3 Advertisements

Adverts will be placed in the Mercury and the Northern Natal Courier.

14.4 Summary of the issues raised by Interested and Affected Parties to date

A summary of the issues raised during the public participation process will be documented in the Comments and Responses Report. This report will be updated following the comment period and attached to the FBAR.

14.5 Draft Basic Assessment Report

Interested and affected persons (I&AP's) will be afforded a thirty (30) day comment period from the date of availability of the DBAR to provide comment on the DBAR. An I&AP register will be opened and will be attached to this report. This will include the names, contact details and addresses of all people who submit written comments, all people who request their names be placed on the register as well as all organs of state which have jurisdiction in respect of the activity. A comments and response report will be drafted and attached to this report.

15. IMPACTS AND RISKS IDENTIFIED FOR THE PREFERRED ALTERNATIVE

The SiVEST Impact Assessment method, dated 28 July 2017 (**attached as Appendix G**) has been utilised to assess the following potential impacts identified in the assessment phase and is presented in the following sections.

The method used in this impact assessment determines significance (can be both positive and negative) of an impact by multiplying the value of the environmental system or component affected by the magnitude of the impact on that system or component (System or Component Value x Impact Magnitude).

In this method, all significant impacts on the natural or biophysical environment are assessed in terms of the overall impacts on the health of ecosystems, habitats, communities, populations and species. Thus, for example, the impact of an increase in stormwater runoff generated by a development can only be assessed in terms of the impact on the health of the affected environmental systems.

Similarly, all significant impacts on the social and socio-economic environment are assessed in terms of the overall impacts to the quality of life, health and safety of the affected population, communities and/or individuals, with the exception of impacts on resources that are assessed on their own. The following impacts have been identified:

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
Planning / Design Phase																				
None identified.																				
Construction Phase																				
Heritage 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	-	High Negative impact	<ul style="list-style-type: none"> Mass grave memorial & associated graves must remain fenced with a 10m buffer that is visible to worker 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 repair graves by appropriate specialist 	2	2	2	3	3	2	24	-	Medium Negative Impact
Aquatic ecology	Potential loss of aquatic features that have been identified on the development site	1	2	3	3	2	3	33	-	Medium Negative Impact	<ul style="list-style-type: none"> The development layout makes provision for adequate buffers around the identified aquatic features to significantly reduce the risk of this impact occurring. Prior to the commencement of construction, these buffers must be clearly surveyed and demarcated for the duration of the construction phase of the project. 	1	1	1	1	1	1	5	-	Low negative impact
Aquatic ecology	Potential loss of aquatic species / habitat as a result of the construction of the cemetery	1	2	3	3	2	3	33	-	Medium Negative Impact	<ul style="list-style-type: none"> The development layout makes provision for adequate buffers around the identified aquatic features to significantly reduce the risk of this impact occurring. Prior to the commencement of construction, these buffers must be clearly surveyed and demarcated for the duration of the construction phase of the project. 	1	1	1	1	1	1	5	-	Low negative impact
Aquatic ecology	Potential siltation of aquatic features as a result of erosion	1	2	3	3	2	3	33	-	Medium Negative Impact	<ul style="list-style-type: none"> The development layout makes provision for adequate buffers around the identified aquatic features to significantly reduce the risk of this impact occurring. Prior to the commencement of construction, these buffers must be clearly surveyed and demarcated for the duration of the construction phase of the project. 	1	1	1	1	1	1	5	-	Low negative impact

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
Aquatic ecology	Contamination of the aquatic features as a result of petrochemical spillages from storage areas, plant and equipment during the construction phase	1	2	3	2	2	3	30	-	Medium Negative Impact	The following management and mitigation measures must be included into the Environmental Management Programme for the project: <ul style="list-style-type: none"> all plant and equipment that make use of petrochemical substances must be checked for leakages on a daily basis before operations commence, all plant and equipment that are found to be leaking must be removed from site and only allowed to return once the leakages have been addressed, if any petrochemical substances are stored on the property, this storage must be done on an impermeable surface, in a bunded area that makes provision for 110% of the volume of the substances that are stored, all refuelling of plant and equipment must be conducted over a drip tray, If any plant or equipment is to be parked on site, these must be parked within the demarcated construction footprint that has been cleared, if any spillages from plant or equipment occur, the spill must be immediately contained, the contaminated soils must be collected and bagged in impermeable bags and stored on site to be removed and disposed of by a registered service provider. 	1	1	1	2	1	1	6	-	Low negative impact
Aquatic ecology	Contamination of the aquatic features on site by construction waste generated during the construction phase	1	2	1	2	1	1	7	-	Low negative impact	The following waste management activities must be provided for in the Environmental Management Programme for the project: <ul style="list-style-type: none"> skips must be made available on site into which all construction waste can be discarded, all construction waste must be cleared from the site on a daily basis and placed in these skips, the capacity of these skips must be monitored on a daily basis to ensure that a replacement skip can be arranged on the same day as the filled skips are removed, the disposal of the content of these skips must be done at a municipal landfill site, no dumping of construction waste on open areas on the property will be allowed, no burial of construction waste within the project site or in the surrounding areas will be allowed. 	1	1	1	2	1	1	6	-	Low negative impact
Aquatic ecology	Contamination of the aquatic features on site by domestic waste generated during the construction phase	1	2	3	3	2	3	33	-	Medium Negative Impact	The following waste management activities must be provided for in the Environmental Management Programme for the project: <ul style="list-style-type: none"> a designated eating area must be established within the construction site, covered domestic waste bins must be present at the eating area to receive all the domestic waste generated by the labour, the capacity of these domestic waste bins must be monitored on a daily basis to ensure that they are emptied timeously, the domestic waste from these waste bins must be removed off site and disposed of at a municipal landfill site on a weekly basis or more regularly if the bins fill up quicker. 	1	1	1	2	1	1	6	-	Low negative impact
Aquatic ecology	Contamination of the aquatic features on site by potential leakages from the portable chemical toilets that will be used During the construction phase	1	2	3	3	2	3	33	-	Medium Negative impact	The following management and mitigation measures must be included into the Environmental Management Programme for the project: <ul style="list-style-type: none"> only portable chemical toilets with a sealed reservoir will be allowed on site, the capacity of these reservoirs in the portable chemical toilets must be monitored daily to ensure that they can be serviced timeously, all removal of the collected sewage waste from the portable chemical toilets must be conducted by a registered service provider for disposal at a municipal wastewater treatment facility. 	1	1	1	2	1	1	6	-	Low negative impact

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
Ecological Indigenous natural vegetation	Loss, degradation or fragmentation of vegetation through direct clearing	2	3	2	1	3	2	22	-	Low negative impact	<ul style="list-style-type: none"> Footprint of the activity must be strictly adhered to. A site specific Environmental Management Programme must be developed for the construction and operation phases. An Environmental Control Officer (ECO) must be appointed for the duration of construction. Permits for plants collection/removal should be obtained prior to search and rescue operations. Vegetation clearance in the construction phase is to be remove in a phased approach, as and when it becomes necessary as vegetation harbours fauna. Sensitive areas should be demarcated clearly before construction commences. Areas outside of the construction zone are to be designated as "no-go areas." 	2	2	1	1	2	2	16	-	Low negative impact
Ecological Transformation of habitat for flora	Hard transformation of the access road and built infrastructure will result in a marginal reduction in flora. Construction activities will result in the disturbance of the soil surface, and this often leads to the establishment of alien invasive plant species.	1	3	2	2	3	3	33	-	Medium negative impact	<ul style="list-style-type: none"> Footprint must be a strictly adhered to. Where possible, indigenous vegetation must be retained. Clearance for construction should be done in a phased approach, and rehabilitation should be done as soon as work has ceased along the section of routing. Where possible, construction should occur in the dry season to prevent soil loss through stormwater. Where possible, manual clearance of the vegetation should be done so as to prevent the unnecessary movement of machinery in no-go areas. The contractor should implement an alien invasive control programme, particularly in areas where soil disturbance occurs. Soil stockpiles should be grassed with an indigenous mix or covered with shade cloth to prevent soil loss through wind and water erosion. Strictly no trapping or hunting of fauna is allowed. All open excavations should be checked on a daily basis and any fauna that may be stranded will have to be caught and released by a qualified person. Rehabilitation should take place as soon as construction is complete. Strictly no littering. The contractor should highlight this at daily toolbox talks and site clean-ups should occur on a daily basis. A mix of indigenous grass species, should be used for rehabilitation. 	2	2	1	1	2	2	16	-	Low negative impact
Ecological Erosion related impacts	Vegetation binds and protects the soil surface, and when removed, increases erosion potential. This may lead to water and wind removing vital topsoil and blocking up drains and eventually clogging roadsides and drainage lines.	1	3	2	2	2	2	20	-	Low negative impact	<ul style="list-style-type: none"> An approved Stormwater Management Plan should be implemented before construction occurs. Where possible, indigenous vegetation must be retained. Vegetation should be cleared only when construction occurs in that section of the routing. Soil stockpiles should be grassed with an indigenous mix or covered with shade cloth to prevent soil loss through wind and water erosion. Rehabilitation should take place as soon as construction is complete. In areas of steeper gradient, access roads should have erosion berms to prevent soil loss. Construction activities should be limited to the winter months to prevent loss of soil to water runoff. Spraying of the soil surface should occur when working in dusty conditions. 	1	2	1	2	1	2	14	-	Low negative impact

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		
Ecological Habitat transformation and fragmentation for fauna	Continued transformation of vegetation in the area will result in a marginal reduction in flora and fauna for the area. Disturbance of the soil surface and a leads to the establishment of alien invasive plant species. Continued transformation of the land results in habitat fragmentation, where edge effects decrease suitable habitat for a wide range of fauna in the area. This leads to an overall indirect decline in faunal diversity.	2	3	2	2	2	3	33	-	Medium negative impact	<ul style="list-style-type: none"> Construction footprint must be a strictly adhered to. Clearance of land and vegetation is not allowed, unless clearance occurs within the authorised project area. Areas outside of the construction zone must be demarcated as "no-go" areas. Where possible, indigenous vegetation must be retained. Manual clearance of alien and invasive vegetation should be done so as to prevent the unnecessary movement of machinery in no-go areas. An alien and invasive control programme should implemented, particularly in areas where soil disturbance has occurred. Soil stockpiles should be returned to the excavations, with the subsoil being placed first, followed by the topsoil. Monthly ECO auditing should occur during rehabilitation of the site. Once rehabilitation is complete, one three month, and one six month follow up audit should be conducted to assess the state of rehabilitation. 	2	2	1	2	1	2	16	-	Low negative impact		
Ecological Terrestrial fauna	Displacement of individuals	2	3	2	2	2	3	33	-	Medium negative impact	<ul style="list-style-type: none"> The ECO should do a site walk through prior to construction commencing, to identify breeding or nesting fauna. Should these species be identified, permits for the capture and relocation must be applied for and a search and rescue must take place by a qualified Ecologist / Zoologist 	1	1	1	1	1	1	6	-	Low negative impact		
Air / Dust Pollution	Dust could become a problem during construction, especially on windy days. Air pollution may occur in the vicinity of the site and the immediate surrounds during the construction phase as a result of: <ul style="list-style-type: none"> Exhaust fumes from heavy vehicles and machinery, in particular poorly serviced vehicles 	1	3	1	1	1	2	14	-	Low negative impact	<ul style="list-style-type: none"> All exposed stockpiles must be covered with hessian sheeting when not in use or dampened by a watercart at regular interval if in use. The exposed areas must be dampened at regular intervals and more frequently during windy conditions. Dust generating construction activities should be avoided during strong winds. Management (including storage, transport, handling and disposal) of hazardous substances that have the potential to become airborne during construction should be carefully managed. Soil loads in transit should be kept covered or wetted. Servicing of any construction vehicles must occur off site to limit gaseous emissions. Chemical toilets should be placed on site and must be maintained on a daily basis. Burning of waste is forbidden. A dust complaints register must be kept within the site for the entire construction phase. These measures are contained within the EMP and must be monitored to ensure compliance. 	1	2	1	1	1	2	12	-	Low negative impact		

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
	<ul style="list-style-type: none"> Dust from exposed surfaces and soil stockpiles picked up by wind Dust on haulage and access roads emitted into the air by construction vehicles Odours downstream of inappropriate and mismanaged chemical toilets 																			
Noise	<p>The generation of noise (from earth moving machinery, installation of the tanks etc.) during the construction phase may result in the disturbance. Noise generated by delivery vehicles, earth moving machinery and the workforce have the potential to impact negatively on surrounding residents. The negative impacts could result in an increase in stress and frustration and associated health implications. Disturbance may also be caused by construction starting too early or finishing too late. However, these impacts are likely to be sporadic and relatively short.</p>	1	2	2	1	1	1	7	-	Low negative impact	<ul style="list-style-type: none"> Construction activities should only take place within agreed working hours. A complaints register must be kept at all times. Construction staff should be provided with training regarding noise prevention and antisocial behaviour/conduct. 	1	1	2	1	1	1	6	-	Low negative impact

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
Job Creation	Approximately 10 jobs will be created during the construction phase of the project. For those unemployed in the area, the creation of short-term construction jobs would improve their economic well-being for the period of construction and may lead to further employment opportunities through skills enhancement and experience. Economic well-being is generally regarded as an important contributor of individual quality of life, especially for those unemployed and struggling to make ends meet.	1	4	1	3	1	1	10	+	Low positive impact	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Operational Phase																				
Heritage 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	-	Medium Negative 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	-	Low Negative Impact
Aquatic ecology	The change of land use from agricultural fields/open space to a developed cemetery may impact on the natural runoff from the area that would impact the water entering the identified aquatic features.	2	2	3	2	3	3	36	-	Medium Negative impact	A Stormwater Management Plan must be put in place as part of the design of the cemetery site. This plan must make provision for the predevelopment runoff from the area to be equal to the post-development run off in volume and velocity.	2	1	1	1	1	3	18	-	Low Negative Impact

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
Aquatic ecology	In the event that stormwater is allowed to flow uncontrollably from the cemetery site, it may result in erosion which may result in siltation of the identified aquatic features.	2	2	3	2	3	3	36	-	Medium Negative impact	A Stormwater Management Plan must be put in place as part of the design of the cemetery site. This plan must make provision for the predevelopment runoff from the area to be equal to the post-development run off in volume and velocity.	2	1	1	1	1	3	18	-	Low Negative Impact
Aquatic ecology	It is assumed that he grave sites that will be excavated within the cemetery will be done by a - Tractor Loaded Backhoe (TLB) which pose a risk of contamination of the identified aquatic features as a result of potential leakages from the machine(s).	1	2	2	2	3	2	20	-	Low negative impact	The following management and mitigation measures must be included in any operational management plan for the cemetery: <ul style="list-style-type: none"> all plant and equipment that will be used during the operational phase of the cemetery must be checked for leakages before they commence work on site, all plant and equipment that are found to be leaking must be removed from site and only allowed to return once the leakages have been addressed, all refuelling of plant and equipment must be conducted over a drip tray, no plant should be allowed to be stored on the cemetery site, if any spillages from plant or equipment occur, the spill must be immediately contained, the contaminated soils must be collected and bagged in impermeable bags and stored on site to be removed and disposed of by a registered service provider. 	1	1	1	1	1	2	10	-	Low negative impact
Aquatic ecology	People will frequent the cemetery site, either during funerals or during times of remembrance, the presence of people create a risk for contamination of the identified aquatic features by domestic waste generated by the visitors to the cemetery.	1	2	1	1	3	2	16	-	Low negative impact	The following waste management and mitigation measures must be included into any operational management plans for the cemetery: <ul style="list-style-type: none"> covered waste bins must be provided for within the cemetery site, clear signage indicating the presence and location of these must be erected at the entrance of the cemetery, the bins must be emptied on a regular basis as part of the operational procedures of the cemetery, the collected waste must be disposed of at a municipal landfill site 	1	1	1	1	1	2	10	-	Low negative impact
Ecological Erosion related impacts for operation phase	Erosion related to access roads within the cemetery and hard transformation of the actual gravesites may increase surface water flow.	2	2	2	2	3	2	22	-	Low negative impact	<ul style="list-style-type: none"> An approved Stormwater Management Plan should be implemented before operation occurs. Where possible, indigenous vegetation must be returned. Soil stockpiles should be grassed with an indigenous mix and rehabilitated to prevent soil loss through wind and water erosion before operation phase begins. Berms are required in areas where water concentrates. A Six month check of the area should take place for the emergence of erosion gullies, and if gullies emerge, will need to be rehabilitated immediately. 	2	2	1	2	3	2	20	-	Low negative impact

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		
Ecological Biodiversity loss due to operation phase	Biodiversity is likely to be lost during the operation phase of the cemetery as regular grave sites will be dug.	2	3	3	2	3	2	26	-	Medium negative impact	<ul style="list-style-type: none"> A post construction monitoring programme to ensure that rehabilitation efforts are successful and that edge effects are reduced. Monthly monitoring of these sensitive areas should take place during the first year after construction to ensure that rehabilitation is successful. Six monthly checks of the area should take place for the emergence of invader species. 	2	2	1	2	1	2	16	-	Medium negative impact		
Ecological Vegetation	Establishment and spread of alien invasive plant species due disturbance vectors	2	3	3	2	2	2	24	-	Medium negative impact	<ul style="list-style-type: none"> Compile and implement Alien Invasive Management Plan. Rehabilitate disturbed areas. 	1	2	2	2	3	1	10	-	Low negative impact		
Geohydrological Ground water	Decomposition of Human Remains	2	2	1	2	1	1	8	-	Low negative impact	<ul style="list-style-type: none"> Burial to be above water table Make sure at least 3m between water table and base of burial pit Avoid groundwater supply boreholes down gradient of cemetery site within at least 100m Monitoring boreholes recommended for site, at least 2 down gradient from site. 	1	1	1	1	1	1	5	-	Low negative impact		
Geohydrological Ground water	Embalming Process	2	2	1	2	1	1	8	-	Low negative impact	<ul style="list-style-type: none"> Formaldehyde is the chemical used in embalming and can breakdown to form methanol, amino acids and several other chemical. Monitor chemicals in boreholes 	1	1	1	1	1	1	5	-	Low negative impact		
Geohydrological Ground water	Paints, Metal Corrosion and other chemical	2	2	2	3	1	2	20	-	Low negative impact	<ul style="list-style-type: none"> Coffin materials should be made of wood or biodegradable material. Avoid excessive metals, plastics and paints Jewellery, dentures, batteries, etc. should be removed prior to burial. 	2	1	1	1	1	1	6	-	Low negative impact		

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		
Job Creation	Approximately 5 jobs will be created during the construction phase of the project. For those unemployed in the area, the creation of jobs would improve their economic well-being. Economic well-being is generally regarded as an important contributor of individual quality of life, especially for those unemployed and struggling to make ends meet.	1	4	1	3	4	1	13	+	Low positive impact	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
Decommissioning Phase																						
All	It is anticipated that decommissioning phase impacts will mirror the construction and operation phase impacts. As such, construction and operation phase impacts must be implemented should the Dannhauser Cemetery be decommissioned.																					
Cumulative																						
None identified																						

16. POSITIVE AND NEGATIVE IMPACTS OF THE PROPOSED DANNHAUSER CEMETERY

A summary of the impacts pre-mitigation and post-mitigation are provided below:

Environmental Parameter	Impact	Pre-mitigation	Post-mitigation
Impacts on Biophysical Systems / Components during the planning phase			
None identified.			
Impacts on Biophysical Systems / Components during the construction phase			
Heritage Graves and burial grounds	Potential alteration, damage, and / or destruction of graves during construction / development of proposed cemetery	High Negative impact	Medium Negative Impact
Aquatic ecology	Potential loss aquatic features that have been identified on the development site	Medium Negative Impact	Low Negative Impact
	Potential loss of aquatic species / habitat as a result of the construction of the cemetery	Medium Negative Impact	Low Negative Impact
	Potential siltation of aquatic features as a result of erosion	Medium Negative Impact	Low Negative Impact
	Contamination of the aquatic features as a result of petrochemical spillages from storage areas, plant and equipment during the construction phase	Medium Negative Impact	Low Negative Impact
	Contamination of the aquatic features on site by construction waste generated during the construction phase	Low Negative Impact	Low Negative Impact
	Contamination of the aquatic features on site by domestic waste generated during the construction phase	Medium Negative Impact	Low Negative Impact
	Contamination of the aquatic features on site by potential leakages from the portable chemical toilets that will be used During the construction phase	Medium Negative Impact	Low Negative Impact
Ecological Indigenous natural vegetation	Loss, degradation or fragmentation of vegetation through direct clearing	Low negative impact	Low negative impact
Ecological Transformation of habitat for flora	Hard transformation of the access road and built infrastructure will result in a marginal reduction in flora. Construction activities will result in the disturbance of the soil surface, and this often leads to the establishment of alien invasive plant species.	Medium Negative Impact	Low negative impact
Ecological Erosion related impacts	Vegetation binds and protects the soil surface, and when removed, increases erosion potential. This may lead to water and wind removing vital topsoil and blocking up drains and eventually clogging roadsides and drainage lines.	Low negative impact	Low negative impact

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Environmental Parameter	Impact	Pre-mitigation	Post-mitigation
Ecological Habitat transformation and fragmentation for fauna	Continued transformation of vegetation in the area will result in a marginal reduction in flora and fauna for the area. Disturbance of the soil surface and a leads to the establishment of alien invasive plant species. Continued transformation of the land results in habitat fragmentation, where edge effects decrease suitable habitat for a wide range of fauna in the area. This leads to an overall indirect decline in faunal diversity.	Medium Negative Impact	Low negative impact
Ecological Terrestrial fauna	Displacement of individuals	Medium Negative Impact	Low negative impact
Impacts to Socio-Economic Component during the construction phase			
Air / dust pollution	Dust could become a problem during construction, especially on windy days	Low negative impact	Low negative impact
Noise	Noise generated by delivery vehicles, earth moving machinery and the workforce have the potential to impact negatively on surrounding residents.	Low negative impact	Low negative impact
Job creation	A number of jobs (approximately 10 jobs) will be created during the construction phase of the project.	Low positive impact	No mitigation required
Impacts to Biophysical Systems/components during the operational phase			
Heritage Graves and burial grounds	Mass grave & memorial and single grave may be damaged by visitors to cemetery & during maintenance thereof	Medium Negative Impact	Low negative impact
Aquatic ecology	The change of land use from agricultural fields/open space to a developed cemetery may impact on the natural runoff from the area that would impact the water entering the identified aquatic features.	Medium Negative Impact	Low negative impact
	In the event that stormwater is allowed to flow uncontrollably from the cemetery site, it may result in erosion which may result in siltation of the identified aquatic features.	Medium Negative Impact	Low negative impact
	It is assumed that he grave sites that will be excavated within the cemetery will be done by a - Tractor Loaded Backhoe (TLB) which pose a risk of contamination of the identified aquatic features as a result of potential leakages from the machine(s).	Low negative impact	Low negative impact
	People will frequent the cemetery site, either during funerals or during times of remembrance, the presence of people create a risk for contamination of the identified aquatic features by domestic waste generated by the visitors to the cemetery.	Low negative impact	Low negative impact
Ecological Erosion related impacts for operation phase	Erosion related to access roads within the cemetery and hard transformation of the actual gravesites may increase surface water flow.	Low negative impact	Low negative impact
Ecological Biodiversity loss due to operation phase	Biodiversity is likely to be lost during the operation phase of the cemetery as regular grave sites will be dug.	Medium Negative Impact	Medium Negative Impact
Ecological Vegetation	Establishment and spread of alien invasive plant species due disturbance vectors	Low negative impact	Low negative impact

Environmental Parameter	Impact	Pre-mitigation	Post-mitigation
Geohydrological Ground water	Decomposition of Human Remains	Low negative impact	Low negative impact
Geohydrological Ground water	Embalming Process	Low negative impact	Low negative impact
Geohydrological Ground water	Paints, Metal Corrosion and other chemical	Low negative impact	Low negative impact
Impacts to Socio-Economic component during the operational phase			
Job creation	Approximately 5 jobs will be created during the operational phase of the project.	Low positive impact	No mitigation required
No-go Alternative			
	None	n/a	n/a

16.1 Mitigation measures

Refer to section 15 above. The assessment of each issue is included in Section 15 above and mitigation measures are provided for each impact identified.

17. SUMMARY OF SPECIALIST REPORTS

17.1 Heritage Impact Assessment

A Phase 1 Heritage Impact Assessment (dated 17th May 2021) was undertaken by JLB Consulting. The specialist confirmed the presence of heritage sites on the Durnacol site. The site shows little habitation and was found to be disturbed (based on aerial imagery - 1994). Widespread dumping of building rubble and furrows across the length of the site were also observed. The Durnacol Mass Grave was found on the south-west corner of the site and several other graves were found immediately east of the mass grave memorial.

The heritage specialist has recommended that the cemetery be located on the southern boundary of the site, immediately north-east of the mass grave site. However, the site should be cleared of vegetation prior to construction to ensure that there are no further low-lying sites such as graves and archaeological sites that were not detected during the site inspection undertaken by the heritage specialist.

17.1.1 Palaeontological Impact Assessment – Phase 1 Desktop Study

A Palaeontological Impact Assessment - Phase 1 Desktop Study was undertaken by Professor Marion Bamford for JLB Consulting (dated 4th May 2021). According to the report, the site lies on the sandstones and shales of the Volksrust Formation. Coal seams are absent from this formation. The Volksrust Formation is unlikely to preserve any recognisable fossil plants on the Durnacol Exxaro site. The potential impact of the proposed project to fossil heritage resources was assessed as extremely low.

17.2 Geotechnical Investigation

A geotechnical investigation was undertaken by Geotechnical Solutions (Pty) Ltd (dated 18 May 2021). A total of five test pits and five DCP tests were carried out for the Durnacol site. Based on the results of the hydrocensus, the static groundwater level in the area is roughly at 16m below ground level (begl). The depth to potable groundwater is roughly 66m begl which is where the groundwater strikes were encountered.

Excavatability for the grave sites

Durnacol Site - Based on the site investigation, excavation by hand tools is considered easy down to depths in the range 1.7m to 1.9m begl. Thereafter, intermediate to hard is anticipated, however, with a TLB it should easily excavate the residual soils unless rock is encountered, which will hinder excavations. The sidewalls are considered relatively stable over the short period.

Leachate migration

The soils found on the site is inferred to have a permeability of approximately 3.30×10^{-5} to 1.89×10^{-4} m/s, which is classified as semi permeable to impermeable soils for both sites.

According to the Council for Geoscience, Cemetery Site Classification (2004), permeabilities between $\times 10^{-4}$ and $\times 10^{-5}$ are classified as partially suitable for the site.

Basal Buffer Zone

Based on the results of the hydrocensus the static groundwater level in the area is roughly at 16m begl. The depth to potable groundwater is roughly 66m begl which is where the groundwater strikes was encountered.

Durnacol Site – No groundwater was encountered in any of the inspection pits on site. However, there are a few water bodies located down gradient from the site. Considering that weathered dolerite rock was encountered at the site, particularly down gradient, and dolerite is generally and impermeable rock. This will form an impermeable layer and limit any contamination to the potable groundwater source.

The recommended buffer zone between the base of the grave and the top of the water table should be at least 2.5m for similar environments.

Based on the recommendations of the Department of Environmental Affairs, a grave approximately 1.8m deep with a 2.5m buffer zone should not encounter any groundwater within 4.3m begl of the subsurface profile. The elevated groundwater seepage on site is a concern, however, it should be noted that this is from the perched aquifer and not the potable water aquifer. The potable groundwater source is located at a depth of 66m begl (based on hydrocensus data).

However, there is no conclusive evidence that there is at least a 2.5m buffer zone between the base of the grave and the water table in the area. It is suggested that further investigations be carried out at the site comprising boreholes to determine the actual groundwater depth.

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Tentatively, based on the existing data the Durnacol site is the most feasible in terms of buffer zone.

Soil Workability

Due to the clay content in soils, the materials classify as OL. These are not the best soils in terms of building standards, however, for general backfill for a grave site is considered as acceptable as there are not alternatives in the area with different soils.

There is still the risk of subsidence at both sites and the requirement of releveling before any memorial structure is constructed over the grave.

Based on the results above, the specialist noted that the Durnacol site is acceptable as a cemetery site, provided that further investigations are carried out to confirm the water table and geology down to at least 15m begl.

17.3 Hydrogeological Investigation

A hydrogeological investigation was undertaken by Geotechnical Solutions (Pty) Ltd (dated 18 May 2021). A total of five test pits and five DCP tests were carried out for the Durnacol site. A hydrocensus within a 3km radius of each site was assessed, with no boreholes identified. A 4km and 5km was then utilised and 4 boreholes were identified. Five groundwater samples were collected from site and submitted to Talbot Laboratories in Pietermaritzburg for testing. According to the report, the site is underlain by an Intergranular aquifer systems with approximate yields in the range 0.5 to 2.0 litres/second. Based on the results of the hydrocensus study, the static groundwater level is between depths 0.15m and 60m begl. Based on the drilling data, the groundwater strikes were only encountered between approximate depths 66m and 82m begl. Although the static groundwater level shows groundwater close to the surface, these boreholes are within at least 4km from the site. The specialist confirmed that based on the laboratory results, the groundwater in the area does not appear to be in a pristine condition as there is currently contamination particularly from nitrates/nitrites and microbial organisms.

Based on these results, the specialist confirmed that the Durnacol site is acceptable for a cemetery from a hydrogeological perspective, provided that further investigations are carried out to confirm groundwater levels.

17.4 Wetland Impact Assessment

A Wetland Impact Assessment was undertaken by GCS (dated 21st May 2021).. The specialist identified a depression wetland within the property boundary of the Durnacol site, with an unchannelled valley bottom wetland immediately to the west of the property. The topography of the site slopes towards the unchannelled valley bottom wetland which could be at risk from the cemetery as a result of stormwater runoff or groundwater percolation. This risk is considered negligible under specific management and mitigation conditions. The Ecological Importance and Sensitivity of all the wetland areas were classified as being low in nature. The specialist recommended a 30m buffer around each of the wetland areas to mitigate any potential impacts that may arise from construction or operation of a cemetery.

17.5 Terrestrial Ecological Assessment

A Terrestrial Ecological Assessment was undertaken by Mark Summers of SiVEST SA (Pty) Ltd (dated May 2021). The Durnacol site contains some species of conservation value, however historical disturbances from mining operations and potential overgrazing in the site area has resulted in a decreased plant diversity. The specialist also confirmed that the faunal diversity is lower at the Durnacol site. From a desktop assessment perspective, no Critical Biodiversity Areas or classified NFEPA wetlands occur on this site which reduces the sensitivity of this site, however the specialist added that a wetland assessment will need to be undertaken to confirm the presence of wetlands (see **section 2.4** above for findings from the Wetland Assessment). The specialist added that disturbance of the Durnacol site would not severely impact on the on the biodiversity in the general area.

From a faunal perspective, the study area has a medium conservation value. This is based on the potential for the sites to harbour some species of conservation concern, which were not identified during the assessment, potentially as a result of the sampling time of year. Habitat for foraging is present in areas near the site, and so faunal species can move to adjacent areas during construction and operation. This is unlikely to affect the status of species of conservation concern. It is not anticipated that the proposed construction and operation will have a long term negative effect on the fauna of the area. The fauna of the site is directly dependent on the vegetation of the site, and the careful management of the vegetation (and soil) should not result in a reduction of faunal species of conservation concern in the greater area.

Based on findings from the Terrestrial Ecological Assessment, the Durnacol site is acceptable for the establishment of a cemetery.

18. ENVIRONMENTAL IMPACT STATEMENT

The Dannhauser cemetery is currently nearing full capacity and the local municipality have identified an urgent need for the establishment of a 15 hectare cemetery site to service local communities. Two site alternatives were identified by the municipality for further investigation to determine their suitability for the proposed land use. These sites are commonly known as the Try Again Farm and the Durnacol Massgrave site. The Try Again Farm is owned by the DLM and the Durnacol Massgrave site is owned by EXXARO Mining who have indicated to the Municipality that they can make the land available to the Municipality if deemed suitable for cemetery establishment.

The following specialist studies were undertaken in order to determine the most environmentally feasible site for the cemetery:

- Heritage Impact Assessment;
- Geotechnical Investigation;
- Hydrogeological Investigation;
- Wetland Assessment; and
- Terrestrial Ecological Assessment.

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The Phase 1 Heritage Impact Assessment (dated 17th May 2021) was undertaken by JLB Consulting for the Durnacol site. The Durnacol site shows little habitation of the area hence the extent of heritage sites such as graves could be less. Currently, the site is also more disturbed 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 was found to be favourable for the Durnacol site.

The Palaeontological Impact Assessment Phase 1 Desktop Study was undertaken by Professor Marion Bamford for JLB Consulting (dated 4th May 2021) found that the Durnacol site lies on the sandstones and shales of the Volksrust Formation. Coal seams are absent from this formation. The Volksrust Formation is unlikely to preserve any recognisable fossil plants on the Durnacol site. The potential impact of the proposed project to fossil heritage resources was assessed as extremely low.

A geotechnical investigation was undertaken by Geotechnical Solutions (Pty) Ltd (dated 18 May 2021). A total of five test pits and five DCP tests were carried out for the Durnacol site. Based on the results of the hydrocensus, the static groundwater level in the area is roughly at 16m below ground level (bgl). The depth to potable groundwater is roughly 66m bgl which is where the groundwater strikes were encountered. According to the report, the Durnacol site is underlain by Volksrust Formation Shale intruded by Jurassic dolerite. Based on the positions investigated on this site, the site comprised of clayey colluvial and residual soils that have been derived from the underlying dolerite rock. The weathered dolerite rock encountered is generally impermeable and will form an impermeable layer thereby limiting any contamination to the potable groundwater source. No groundwater was encountered on the Durnacol site at the specific test pits. Excavation by hand tools on this site is considered easy down to depths in the range 1.7m to 1.9m below ground level. However, a TLB may be easily used to excavate residual soils unless rock is encountered. The sidewalls are considered relatively stable over the short period. Both the Hanbury and Hall, and Council for Geoscience Guidelines cover geotechnical and groundwater stability of the site and found that the Durnacol site is suitable for the establishment of a cemetery. However, this is subject to additional groundwater studies comprising boreholes and following recommendations provided.

A hydrogeological investigation was undertaken by Geotechnical Solutions (Pty) Ltd (dated 18 May 2021). A total of five test pits and five DCP tests were carried out for the Durnacol site. A hydrocensus within a 3km radius the site was assessed, with no boreholes identified. A 4km and 5km was then utilised and 4 boreholes were identified. Five groundwater samples were collected from site and submitted to Talbot Laboratories in Pietermaritzburg for testing. According to the report, the site is underlain by an Intergranular aquifer systems with approximate yields in the range 0.5 to 2.0 litres/second. Based on the results of the hydrocensus study, the static groundwater level is between depths 0.15m and 60m bgl. Based on the drilling data, the groundwater strikes were only encountered between approximate depths 66m and 82m bgl. Although the static groundwater level shows groundwater close to the surface, these boreholes are within at least 4km from the site. The specialist confirmed that based on the laboratory results, the groundwater in the area does not appear to be in a pristine condition as there is currently contamination particularly from nitrates/nitrites and microbial organisms. Based on these results, the specialist confirmed that the Durnacol site is acceptable from a hydrogeological perspective for the establishment of a cemetery. However, this is subject to additional groundwater studies comprising boreholes and following recommendations provided.

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A Wetland Impact Assessment was undertaken by GCS (dated 21st May 2021). The assessment was undertaken for both sites proposed for the establishment of a cemetery. The specialist identified three wetlands within the two proposed sites. They have been classified as Class C wetlands in accordance with the WET-Health Model which indicated moderate modification of the wetland drivers. This moderate modification will keep decreasing as a result of the impacts in the wetland catchment persisting. The Ecological Importance and Sensitivity of all the wetland areas were classified as being low in nature. The specialist confirmed that no fatal flaws are associated with the establishment of a cemetery on the Durnacol site and recommended a 30m buffer around each of the wetland areas to mitigate any potential impacts that may arise from construction or operation of a cemetery.

A Terrestrial Ecological Assessment was undertaken by Mark Summers of SiVEST SA (Pty) Ltd (dated May 2021). According to the report, the Durnacol site does contain some species of conservation value, however historical disturbances from mining operations and potential overgrazing in the site area has resulted in a decreased plant diversity. The specialist also confirmed that the faunal diversity is lower at the Durnacol site. From a desktop assessment perspective, no Critical Biodiversity Areas or classified NFEPA wetlands occur on this site which reduces the sensitivity of this site. The specialist added that disturbance of the Durnacol site and establishment of a cemetery would not severely impact on the on the biodiversity in the general area.

Based on the specialist studies undertaken and the results thereof, the Durnacol site is acceptable for the establishment of a cemetery from a heritage, geotechnical, hydrogeological, wetland and terrestrial ecological perspective.

In terms of the No-Go Alternative, the establishment of the cemetery would not go ahead and the Durnacol site would remain undeveloped. The existing cemetery in Dannhauser would reach its capacity which would result in an increase informal burials in areas that may be unsuitable for graves or home burials.

The establishment of the Dannhauser Cemetery on the Durnacol site will result in minor biophysical impacts during the construction and operational phase. The negative impacts that are likely to arise from the construction and operational phase will be of low significance provided the recommended mitigation measures are implemented.

A summary of the positive and negative impacts associated with the proposed project is provided in Section 16.

19. ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPR) AND CONDITIONS TO BE INCLUDED IN ENVIRONMENTAL AUTHORISATION (EA)

An EMPr has been prepared for the proposed Dannhauser Cemetery has been attached in **Appendix H**.

Taking into account the potential negative and significant positive impacts that the proposed development could have on the social and biophysical environment, it is the opinion of the EAP that the proposed development should be authorised subject to the following conditions of authorisation:

- All of the mitigation measures identified in this BA Report must be made conditions of the authorisation.

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- It is important that all of the listed mitigation measures are costed for in the construction phase financial planning and budget so that the contractor and/or developer cannot give financial budget constraints as reasons for non-compliance.
- The activity-specific construction EMP must be adhered to.
- The mitigation measures for the operational phase (**Section 15**) must be adhered to.
- An independent Environmental Control Officer (ECO) must be appointed by the applicant to monitor the implementation of the construction EMP. The ECO should undertake regular site inspections and compile an environmental audit report.

The mitigation measures that are applicable are based on the impacts identified are listed in Section 15 of this report.

19.1 Geohydrological conditions

In addition to the above, groundwater monitoring should be carried out on a quarterly basis and the upgradient borehole should be used as a general indicative marker. Contamination occur, the downgradient boreholes in theory should reflect this in their results whilst the upgradient borehole has a baseline of the area. The boreholes should be drilled by a reputable contractor and designed according to the current groundwater standards by the regulatory authority in the area. A hydrogeologist is recommended to supervise the drilling activity, such that, adequate information about, geology, groundwater strikes, groundwater levels, and water samples are collected. The borehole design should comprise the following:

- Borehole adequately drilled.
- PVC Casing needs to be installed within the borehole.
- Perforated PVC Casing will need to be installed from at least 3m begl.
- The space between the PVC casing and borehole side walls need to be filled with a gravel pack.
- A bentonite seal will need to be placed on the top 3m.
- A concrete plinth at the top with a borehole marker.
- The boreholes need to be adequate diameter to allow for easy sampling.

The following parameters are recommended for testing, pH, conductivity, Potassium (K), Chloride (Cl), Nitrate (NO₃), Ammonia (NH₄), Phosphorus (P), Sodium (Na), Calcium (Ca), Carbonates (HCO₃), Iron (Fe), Manganese (Mn), Titanium (Ti), Chrome (Cr), Cadmium (Cd), Lead (Pb), Nickel (Ni), Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Total Coliforms, and E. Coli.

20. UNCERTAINTIES, ASSUMPTIONS AND GAPS IN KNOWLEDGE

The assessment has been based by SiVEST on information sourced and provided by the Applicant, site visits conducted, specialist findings and the application of the SiVEST assessment criteria. The EAP is of the opinion that the assessment method applied is acceptable. SiVEST assumes that:

- All the information provided by the Applicant is accurate and unbiased.

- The available data, including Topocadastral maps, Orthophotographs, geological maps and Google Earth images, are reasonably accurate.
- It is not always possible to involve all Interested and/or Affected Parties (I&APs) individually, however, every effort has/will be made to involve as many interested parties as possible. It is also assumed that individuals representing various associations or parties convey the necessary information to these associations / parties.
- It is not possible to determine the actual degree of the impact that the development will have on the immediate environment without some level of uncertainties. Actual impacts can only be determined following construction and/or operation commences.

21. AUTHORISATION OF THE PROPOSED ESTABLISHMENT OF A CEMETERY WITHIN THE DANNHAUSER LOCAL MUNICIPALITY

We request that the Department authorizes the development. The Dannhauser Cemetery has been designed to avoid environmentally sensitive features on the Durnacol site. The establishment of the Dannhauser Cemetery on the Durnacol site will result in minor biophysical impacts during the construction and operational phase. The negative impacts that are likely to arise from the construction and operational phase will be of low significance if the recommended mitigation measures are implemented.

Conditions to be included in the Environmental Authorisation for the construction phase are listed in Section 19 above.

The environmental authorization should be valid for a period of 5 years. It is anticipated that the construction period will however commence shortly after authorization.

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