



**THE PROPOSED DEVELOPMENT OF A MEMORIAL PARK IN LA MERCY,
TONGAAT, ETHEKWINI MUNICIPALITY, KWAZULU-NATAL**

DRAFT BASIC ASSESSMENT REPORT

30 - Day Public Review Period:

21 October 2022 to 21 November 2022



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PROJECT DETAILS

Report Title : Basic Assessment Report

Report Status : Draft

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Project Title : The Proposed Development of a Memorial Park In La Mercy, Tongaat, eThekweni Municipality, Kwazulu-Natal

Applicant : Tongaat Hulett Property

Environmental Consultant : NFZ Environmentals

KZN EDTEA Reference No.: New Application

DOCUMENT CONTROL

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PUBLIC REVIEW OF THE DRAFT BASIC ASSESSMENT REPORT

The Draft Basic Assessment Report (BAR) has been prepared by NFZ Environmentals in order to assess the potential environmental impacts associated with the proposed development of a the La Mercy Memorial Park (LMMP), Tongaat, eThekweni Municipality, Kwazulu-Natal. The report is made available for a 30-day public review period from **21 October 2022 to 21 November 2022**.

In order to obtain further information, register on the project database or submit your written comments, the contact details are as follows:

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The due date for comments on the Draft Basic Assessment Report is **Monday, 21 November 2022**.

EXECUTIVE SUMMARY

Tongaat Hulett Property is proposing the development and operation of the La Mercy Memorial Park (LMMP) within the eThekweni Municipality in Kwa-Zulu Natal Province. The LMMP will be privately owned by Tongaat Hulett Property. The 61ha project site will be developed to include a cemetery with 33 838 grave sites categorised into Silver, Gold and Platinum; Chapels; Interfaith Halls; Canteen; Service Buildings; Memorial Trees; Columbarium Terrace; a wall of remembrance; parking; a Low Volume Domestic Sewage Treatment System; Gardens; Ablution facilities; Staff Cottages; Crematoria and An Ash Garden. The proposed LMMP includes the development of bulk services including water, sewer, electrical and storm-water infrastructure to allow for adequate supply of these services to the LMMP.

This basic assessment entails the permitting process for the construction and operation of the cemetery, chapels, interfaith halls, admin building, canteen, service buildings, memorial trees, columbarium terrace, wall of remembrance, parking, garden, ablution facilities, staff cottages, sewer pump station and bulk services; excluding the crematoria and ash garden which will be applied for separately by means of a Full Scoping/EIA process.

The table below provides a brief summary of the proposed alternatives being considered for this application.

Alternative Type	Alternatives Description
1. Site Development Plan (SDP)	SDP Option 1 (Preferred) This layout has a larger development area which maximizes the space for the LMMP. This SDP yields 33 838 graves.
	SDP Option 2 This SDP included all the amenities proposed in SDP Option 1, with some areas refined due to a number of restrictions imposed by various elements which reduced the grave yield of the Memorial Park.
2. Bulk Sewer Infrastructure	Option 1 – Genazzano WWTW This option entails flow of sewer in to the existing conventional gravity sewer system to discharge into the existing Genazzano WWTW. However, the WWTW does not have sufficient capacity for the LMMP.
	Option 2 – Septic Tank and Soakaway System The Septic Tank Size would be 8m wide x 22m long x 2.5m deep and the Soakaway Length would be 140m which is a large extent of land.

	<p>Furthermore, the percolation test indicates that the soils within the site are highly permeable which can result in contamination of the wetland and watercourse located +/- 140m from the site.</p>
	<p>Option 3 – Privately Owned Low Volume Domestic Sewage Treatment System (Preferred)</p> <p>This option is preferred as is it independent from municipal infrastructure, preserves surface and underground water, provides sufficient capacity to cater to the LMMP, it allows the reclamation and treatment of effluent waste to be reused thus saving up to 60%, it is odourless and requires a smaller extent of land.</p>
<p>3. Access Roads</p>	<p>Option 1 – Access Off Park Avenue (Extension) (Preferred)</p> <p>Park Avenue currently intersects with the M4 (P398-2) at a traffic circle. This option is to extend Park Avenue westward to the site.</p>
	<p>Option 2 – New Road Off Watson Highway</p> <p>This option entails the formalization of an existing gravel road that intersects with Watson Highway (P426) to provide access to the site.</p>
	<p>Option 3A – From M4 (P398-2) re-alignment intersection along new route</p> <p>This option will allow for direct access off Watson Highway (P426) at the realigned M4/Watson Highway intersection, along a new route due to inter alia earthworks and cost considerations.</p>
	<p>Option 3B – Along M4 (P398-2) Re-alignment route</p> <p>This option is along the M4 (P398-2) realignment corridor, which in the short-term would consist of constructing one half of the proposed M4 (P398-2) carriageway, viz. two lanes, which would function as a bi-directional two-lane road to serve as access to the development.</p>
<p>4. New Roads and Widening</p>	<p>Option 1 – New Road and Widening (Preferred)</p> <p>In order to service the proposed memorial park site an extension of Park Avenue is required which will extend through to the proposed memorial park site access. The extended Park Avenue requires a configuration such as a two-way two-lane road with 3,65 metres lane widths. The ninety-degree curve should have a minimum radius of twenty metres to accommodate the movement of buses.</p>
	<p>Option 2 – New Road</p> <p>This option requires a configuration that is a two-way two-lane road with</p>

	3,65 metres lane widths including channel.
	<p>Option 3 – New Road</p> <p>This option requires a configuration that is a two-way two-lane road with 3,65 metres lane widths including channel for the internal road network. The configuration along the M4 (P398-2) is such that it is a two-way two-lane road with 3,70 metre lane widths including channel since this is aligned to the standard guidelines.</p>

The impacts associated with the proposed LMMP are potentially moderate to low with the implementation of mitigation measures as outlined in the Environmental Management Programme (EMPr) in **Appendix G**. Additionally, the project will entail the clearing of vegetation and levelling of areas for the construction activities. Wetlands will not be directly impacted by the construction of the Memorial Park due to their location being well outside of the development footprint proposed; and other construction related risks such as erosion and sediment risks related to surface runoff during construction are likely to be low/negligible. Although the environmental impacts may be of higher significance in some cases as discussed above, it will be for a limited duration. Once the construction has been completed, during the operational and maintenance phases, the environmental impacts are considered to be of a lower risk with proper mitigation measures implemented to reduce impacts to the sensitive environmental areas.

This Draft Basic Assessment Report (DBAR) has provided a comprehensive assessment of the potential environmental impacts associated with the proposed development of the LMMP including associated infrastructure and services. These impacts have been identified by the EIA team which is inclusive of specialists. It is the opinion of the specialists that no fatal flaws have been identified for the proposed development of the LMMP. There are no environmental or social impacts of high significance that would prevent the establishment of the proposed project. It is therefore recommended that the project should proceed with adequate mitigation measures implemented to reduce environmental impacts anticipated.

Public participation is being conducted in line with the NEMA requirements, Chapter 6 of EIA Regulations, 2014. This entails engagement through site notices, newspaper advertisements and email correspondence with organs of state, stakeholders and Interested and Affected Parties (I&AP’s) from the community, report review period and a focus group/ public meeting.

ABBREVIATIONS

BAR	Basic Assessment Report
BID	Background Information Document
CBA	Critical Biodiversity Area
CRR	Comments and Response Report
DBAR	Draft Basic Assessment Report
DFFE	Department of Forestry, Fisheries and the Environment
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
ELM	eThekweni Local Municipality
EMPr	Environmental Management Programme
ESA	Ecological Support Areas
FBAR	Final Basic Assessment Report
GN	Government Notice
HGM	Hydrogeomorphic
HIA	Heritage Impact Assessment
I&AP's	Interested and Affected Parties
IDP	Integrated Development Plan
KZN – EDTEA	Kwa-Zulu Natal Department of Economic Development, Tourism and Environmental Affairs
NEMA	National Environmental Management Act (No. 107 of 1998) (as amended)
NHRA	National Heritage Resources Act (No. 25 of 1999)
NWA	National Water Act (No. 36 of 1998)
PES	Present Ecological Status
PHRA (Amafa)	Provincial Heritage Resource Agency (KZN – Amafa)
PIA	Palaeontological Impact Assessment
PPP	Public Participation Process
REC	Recommended Ecological Category
SAHRA	South African Heritage Resources Agency
SDF	Spatial Development Framework
SMP	Stormwater Management Plan
WMA	Water Management Area

WSS	Water Supply Scheme
WTW	Water Treatment Works
WULA	Water Use License Application

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1. INTRODUCTION

1.1 Project Locality

Tongaat Hulett Property proposes the development of La Mercy Memorial Park (LMMP) in La Mercy, Tongaat, eThekweni Municipality, Kwazulu-Natal (Figure 1). The proposed Memorial Park is centrally situated within the La Mercy area with coordinates 29°36'25.92"S; 31°08'20.03"E. It is located to the immediate east of the N2 national freeway which marks the entire western boundary of the site. The site falls within ward 58 of the eThekweni Municipality. The study area and surroundings is currently classified as agriculture but is currently undergoing a rezoning process which will allow for the development of the LMMP on the proposed site.

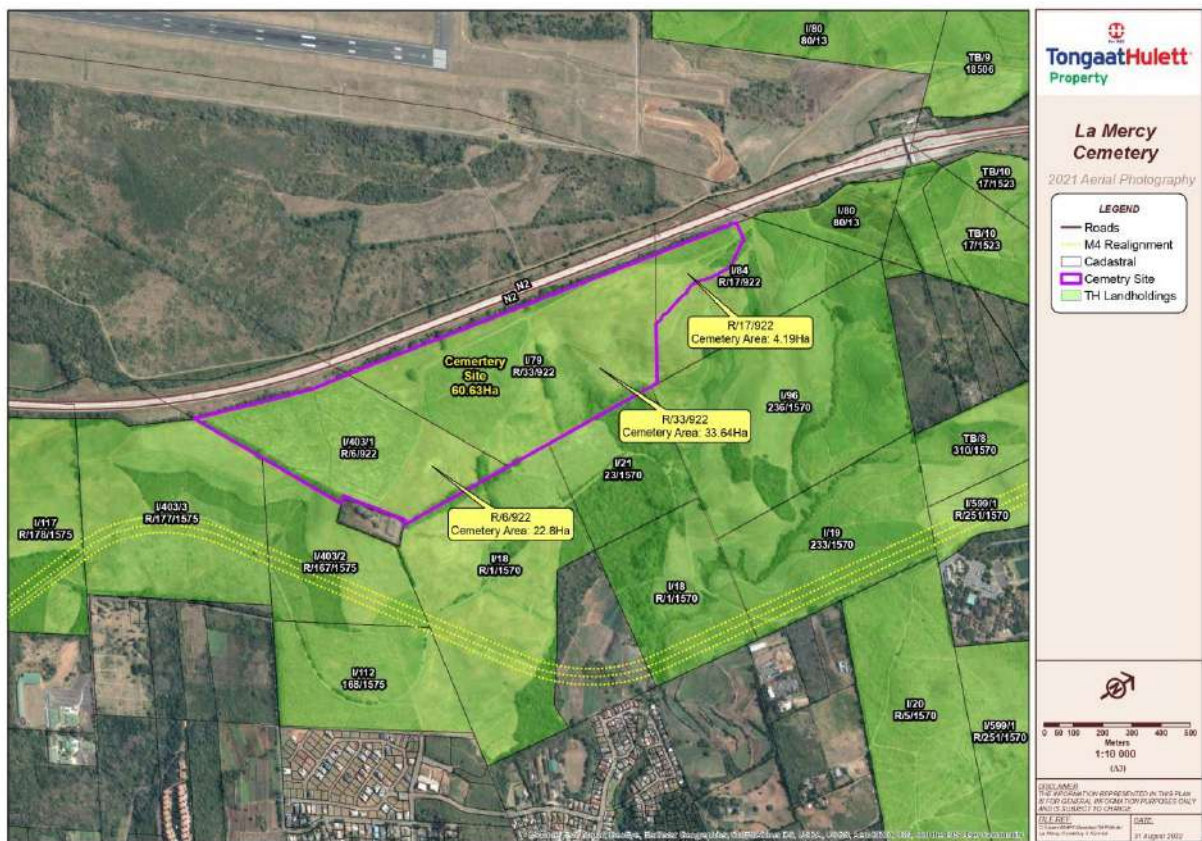


Figure 1: Locality Map (Absolute Location)

The site falls within the following three properties, also depicted in Figure 2 all of which are owned by Tongaat Hulett Property:

Table 1: Properties that the proposed LLMP will be located on

Farm Name	21 Digit Surveyor General Code	Property Size
1. Klipfontein 922 FU, Portion 17	N0FU0000000092200017	4.17ha
2. Klipfontein 922 FU, Portion 33	N0FU0000000092200033	33.66ha
3. Klipfontein 922 FU, Portion 6	N0FU0000000092200006	22.87ha

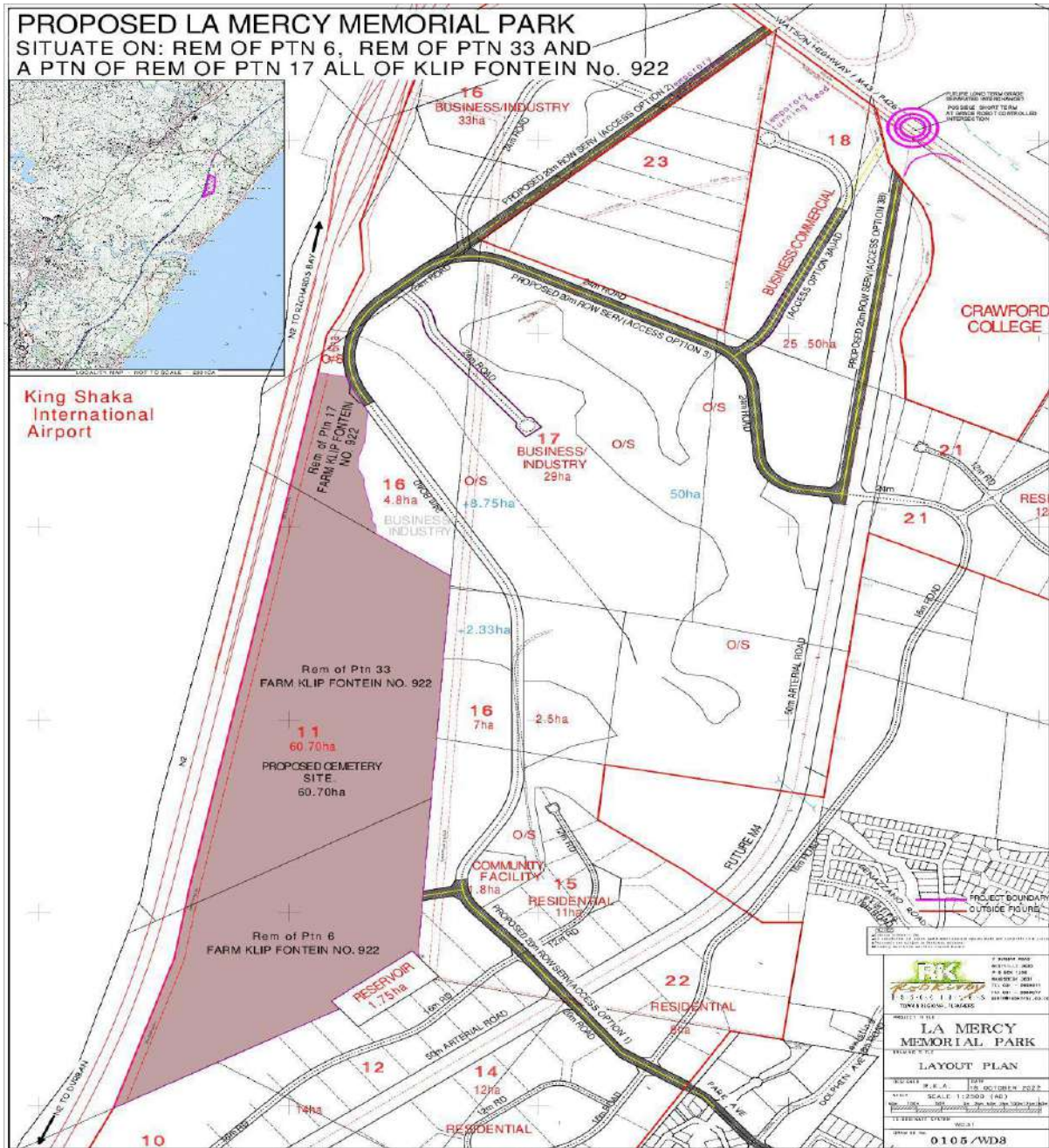


Figure 2: Map indicating the three properties that will be developed for the LLMP

The proposed memorial park is located north of uMhlanga (15km) and within 13km to the King Shaka International Airport as well as residential areas such as La Mercy (12km), Umdloti (2.8km) and Verulam (6km). It is situated on the northern portion of the eThekweni Municipality. Figure 3 below depicts the relative location of the proposed LLMP.

<p>(i) the 21-digit Surveyor General code of each cadastral land parcel;</p> <p>(ii) where available, the physical address and farm name;</p> <p>(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties.</p>	<p>section 1.1 above. The information includes the affected properties and the 21 digit Surveyor General codes thereof (Table 1).</p>
<p>(r) an undertaking under oath or affirmation by the EAP in relation to—</p> <p>(i) the correctness of the information provided in the reports;</p> <p>(ii) the inclusion of comments and inputs from stakeholders and I&APs;</p> <p>(iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and</p> <p>(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; and</p>	<p>The EAP Declaration is included within Appendix I1.</p>

To meet the requirement set out under Appendix 1 of the EIA regulations, Table 3 below illustrated the structure of this Basic Assessment Report (BAR).

Table 3: Structure of the Report

1	Introduction	This section provides background of the proposed LMMP and the BA process.
2	Project Description	This section provides a description of the proposed project scope, need and desirability, and project alternatives.
3	Legislative Framework	This section provides a list of all legislation, policies and/or guidelines of any sphere of government and the applicability to the application as contemplated in the EIA regulation, along with the listed activities triggering licensing requirements.
4	Public Participation Process	This section describes the Public Participation Process (PPP) followed to date and addresses planned PPP.

5	Description of the Site	This section provides an overview of the affected biophysical and social economic environment in the La Mercy area.
6	Environmental Sensitivity – Specialist Recommendations	This section provides a summary of the specialist recommendations on the proposed LMMP.
7	Environmental Impact Assessment	This section describes the impact methodology and the potential positive and negative environmental and social impacts of the proposed LMMP.
8	Conclusions and Recommendations	This section provides the conclusions and recommendations based on the findings of the BAR.

1.3 Applicant Details

Name of applicant:	Tongaat Hulett Property
Applicant representative:	Mr Hlalelo Makwabe
Position:	Planning Manager
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1.4 Environmental Assessment Practitioner (EAP)'S Details

Environmental Assessment Practitioner (EAP):	Samantha Moodley
EAP Qualifications	Bachelor of Social Science (BSocSc) (Geography and Environmental Management) B.Soc. Sc. Honours (Geography and Environmental Management)
EAP Registrations/ Associations	SACNASP (120778) EAPASA (2020/991)
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Samantha Moodley – The Principal EAP of this BAR, is a highly competent Environmental Consultant with more than 15 years’ experience and advanced knowledge in the global environmental and engineering fields, predominantly in oil and gas, infrastructure development, industrial developments, minerals and metals. She has a successful track record in environmental permitting processes, managing specialists, project budgets, project management, conflict resolution, project administration, interfacing with other disciplines, environmental strategy and policy, environmental and related legislation (South African and international) and public participation processes. She has successfully led and contributed to ESIA’s for large multi-disciplinary projects and accomplished in producing sound scientific reports that are understandable to non-technical stakeholders. She is a strong communicator with project and technical teams, client, authorities and public role-players.

Please refer to **Appendix I1** for Curriculum Vitae which contains information on the EAP Expertise.

1.5 Declaration of Independence

NFZ Environmentals was contracted by Tongaat Hulett Property as the independent environmental consultant to undertake the environmental assessment process for the proposed development of a memorial park in La Mercy, Tongaat, eThekweni Municipality, Kwazulu-Natal. NFZ Environmentals is not a subsidiary of, or affiliated to Tongaat Hulett Property. Furthermore, NFZ Environmentals does not have any interests in secondary developments that may arise out of the authorisation of the proposed La Mercy Memorial Park (LMMP).

Please refer to **Appendix I1** for EAP Declaration.

1.6 Specialist’s Details

A whole suite of specialist studies have been commissioned to inform the compilation of the BAR and EMP. **Table Error! No text of specified style in document.4** provides a list of specialist’s studies that have been undertaken.

Table Error! No text of specified style in document.4: Specialist Studies commissioned for LLMP Basic Assessment Process

Specialist	Specialist Report	Date
Eco-Pulse Environmental Consulting Services	Freshwater Impact Assessment	October 2022
SLR Consulting (South Africa) (Pty) Ltd	Aquatic Assessment	August 2022
Kinvig & Associates	Ecological Assessment	March 2018

	Statement of Validity	October 2022
Mottram and Associates cc	Agricultural Potential Assessment	April 2018
Albert van Jaarsveld	Heritage Impact Assessment	June 2015
Umlando: Archaeological Surveys and Heritage Management	Heritage and Palaeontological Exemption Letter	August 2022
Umlando: Archaeological Tourism & Resource Management	Archaeological Statement of Validity	October 2022
Urban Econ	Socio-Economic Impact Assessment	September 2022
Nako Systra	Traffic Impact Assessment	September 2022
EngeoLab	Geohydrology Study	October 2022
Drennan Maud (Pty) Ltd	Geotechnical Assessment	February 2015
Adamastor	Electrical Engineering Report	February 2022
Nako Group	Civil Engineering Services Report	September 2022
Rob Kirby & Associates	Town Planning Assessment	October 2022
Nako Group	Storm-Water Management	September 2022

Please refer to **Appendix E** for the specialist reports listed above.

2. ACTIVITY INFORMATION

2.1 Legal Requirements as per Appendix 1 of EIA Regulations, 2014 (as amended)

This Section of the BAR has been prepared in accordance with Appendix 1 of EIA Regulations of 2014 (as amended) and includes the relevant information for Section 2 as outlined in Table 5 below.

Table 5: Requirements set under Appendix 1 of EIA Regulations of 2014 (as amended) for Section 2

Requirement	Relevant Section
(c) a plan which locates the proposed activity or activities applied for as well as associated structures and infrastructure at an appropriate scale.	The plan which locates the proposed listed activities applied for as well as associated structures and infrastructure at an appropriate scale is included as Figure 10 and attached in A3 as Appendix C1 .
(d) a description of the scope of the proposed activity, including— (ii) a description of the activities to be undertaken including associated structures and infrastructure.	The scope of the proposed LMMP development is outlined within section 2.3.
(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;	The need and desirability of the LMMP development is detailed in section 2.7.
(g) a motivation for the preferred site, activity and technology alternative.	The explanations and motivations for preferred alternatives are included in section 2.6.
(h) (i) details of all the alternatives considered.	The details of all alternatives considered are included in section 2.6.
(h) (ix) the outcome of the site selection matrix.	The reasoning for site selection is included in Table 12 within section 2.6.
(h) (x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such.	A motivation for not considering any alternative development site is included in Table 12 within section 2.6.
(h) (xi) a concluding statement indicating	Concluding statements are mentioned in

the preferred alternatives, including preferred location of the activity	Table 12 within section 2.6.
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2.2 Project Title

The Proposed Development of a Memorial Park in La Mercy, Tongaat, eThekweni Municipality, Kwazulu-Natal.

2.3 Architectural and Design Rationale

The La Mercy Memorial Park is the modern-day burial grounds with a difference. The design of this site is centred on creating an atmosphere that encourages reflection and remembrance. A space of natural beauty, peace for quiet meditation and a sense of dignity and honour to the memory of loved ones and an environment that serves as the backdrop to life celebration services.

The design includes the traditional cemetery ground spaces like delineated rows of burial plots with flat markers or upright monuments, cremation niches and columbaria and in addition, will also include more contemporary options like memorial benches, ash stones and memorial trees.

While the proposed La Mercy Memorial Park is a private development, it still has a vital role in the community and responds to a desperate need for quality facilities for end of life that provide a dignified and personalized final resting spot. As a non-denominational cemetery, the facility will serve families of all religions, cultures and backgrounds.

The architectural language together with the natural beauty of the park will create a distinguished ambience with the aesthetic characterised by simple contemporary shapes and patterns, an abundance of natural light, “truth to materials” and a focus of locally sourced products.

The design offers features like reflection pools, sculpture installations, and centres on the landscape design with a focus on the creation of points of biodiversity and the land being rehabilitated through the introduction of indigenous vegetation and trees. A space for the creation of new traditions, such as small gatherings in the heart of the park.

The proximity of the park to the King Shaka International Airport, the N2 and M4 make for easy access. It is intended that this development will be the catalyst for numerous projects and initiatives that will contribute to the preservation of the park and improvement of the local

community through the improvement of surrounding infrastructure, and encouragement of visitation to the site by locals and tourists alike.

The development of the grave and building platforms across the site has been carefully considered to correspond with the natural existing site topography. The linear shape of the site runs North to South with the N2 adjacent to the length of the Western boundary. Buildings have been concentrated to designated areas to reduce the impact of infrastructure and services provisions across the site while maximising the use of the elevation at the highest points on the site to maximise views to the ocean from the Chapels, Interfaith halls and open park areas.

The grave platforms are designed to a 9% slope throughout the site with the short end of all plots orientated perpendicular to the direction of the slope. The steep existing slope on the Eastern portion of the site will be engineered to balance cut and fill to achieve the required maximum slopes for grave layouts, internal service roads and public gardens and walkways.

Stormwater management interventions include a large natural attenuation pond at the lowest point on the Northeastern corner of the site while the provision of a sewer treatment plant and bulk water storage and pump provisions will ensure that there is no burden imposed on the existing municipal infrastructure or surrounding communities and will ensure sustainable management and operation of services going forward.

2.4 Project Description

2.4.1 Brief overview of Key Project Components

Tongaat Hulett Property is proposing the development and operation of the La Mercy Memorial Park (LMMP) within the eThekweni Municipality in Kwa-Zulu Natal Province. The LMMP will be privately owned by Tongaat Hulett Property. The 61ha project site will be developed to include the following:

- A cemetery with 33 838 grave sites categorised into Silver, Gold and Platinum. The three grave site categorisations (section) are detailed below:
 - Silver Grave Plots – This section comprises of 16 750 grave plots. Each grave plot will be 2.4m in length and 1.1m in width with 0.5m spacing between grave plots and 0.9m spacing between rows. Each grave will have a headstone and some plants just below the headstone. The pathways between the graves will be covered with lawn and be landscaped with trees. The proposed layout and design of the Silver Grave Plots are depicted in Figure 4 and Figure 5 respectively.

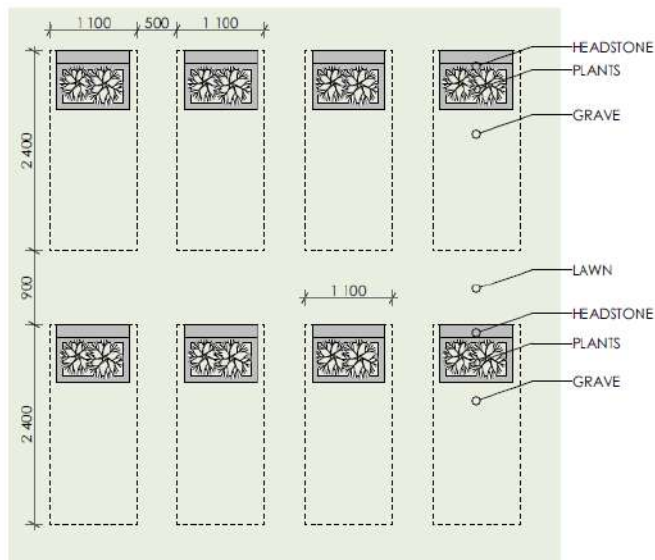


Figure 4: Silver Grave Plots Layout

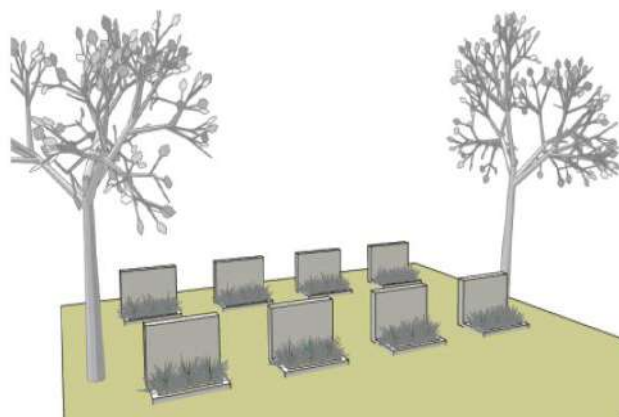


Figure 5: Silver Grave Plots Design

- Gold Grave Plots – This section comprises of 10 920 grave plots. Each grave plot will be 2.4m in length and 1.1m in width with 0.8m spacing between grave plots and 1.3m spacing between rows. Each grave will have a headstone, kerbing and will be covered with lawn. The pathways between the graves will be covered with gravel stones and be landscaped with trees. The proposed layout and design of the Gold Grave Plots are depicted in Figure 6 and Figure 7 respectively.

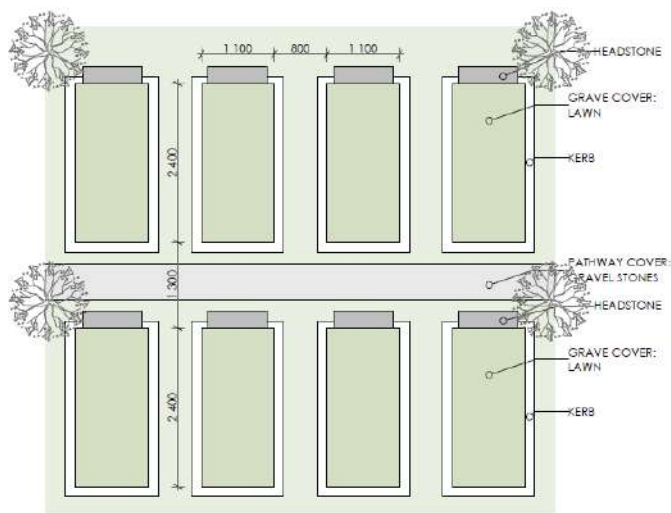


Figure 6: Gold Grave Plots Layout

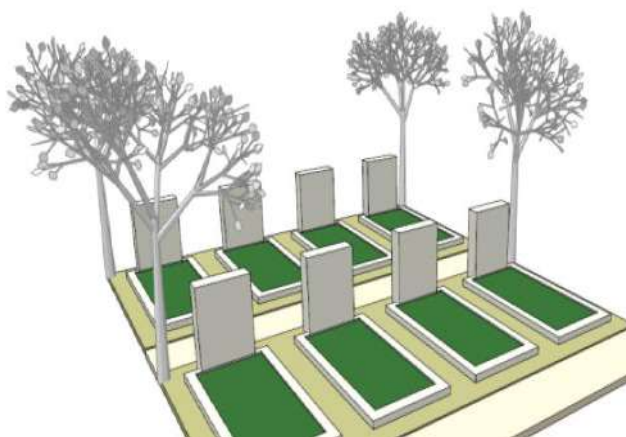


Figure 7: Gold Grave Plots Design

- Platinum Grave Plots – This section comprises of 6 168 grave plots. Each grave plot will be 2.55m in length and 1.1m in width with 1m spacing between grave plots and 1.35m spacing between rows. Each grave will have a headstone, plants and will be covered with a granite top or gravel. The pathways between the graves will be covered with low hedge plants, gravel stones, formalised pathways between rows and benches between graves, and will be landscaped with trees. The proposed layout and design of the Platinum Grave Plots are depicted in Figure 8 and Figure 9 respectively.

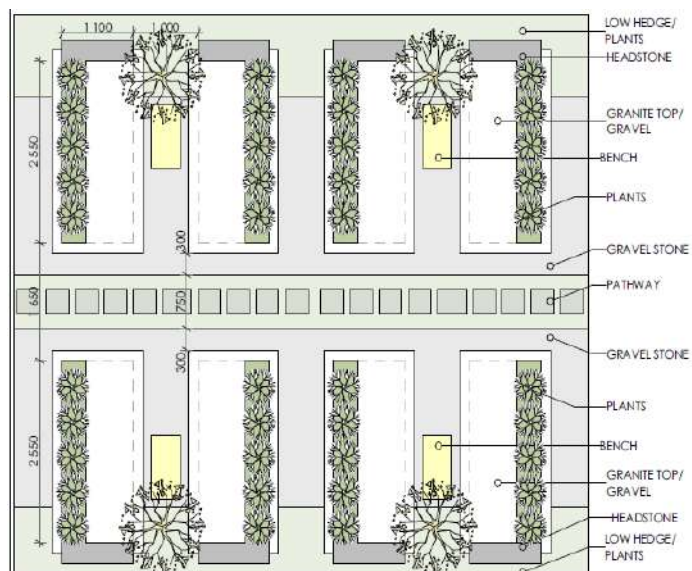


Figure 8: Platinum Grave Plots Layout

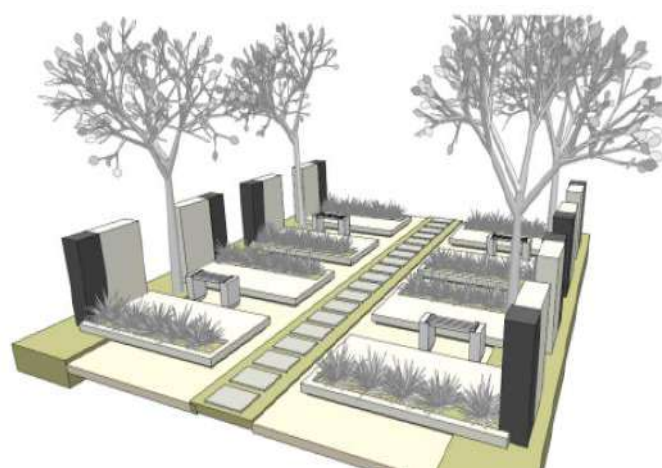


Figure 9: Platinum Grave Plots Design

- 3 Chapels – 1 platinum, 1 gold, 1 silver, 435m² each;
- 3 Interfaith Halls – per grave site categorisation, 740m² each;
- 3 Crematoria comprising of 2 cremation halls each – per section, 640m² each;
- Administration Building – 1176m²;
- Canteen – 297m²;
- Service Buildings – 1380m²;
- Memorial Trees – 430 large trees and a number of smaller trees (yet to be confirmed);
- Columbarium Terrace – four boxes/ linear;
- A wall of remembrance;
- An ashstone garden – 2700 ashstones;
- Parking – 1 334 parking bays (5.5x2.5m each) and 6 bus parking bays (17x4m each);
- Sewer Pump Station – 896m²;
- Gardens;

- Ablution facilities; and
- Staff Cottages.

These are depicted holistically in the Site Development Plan (Figure 10) and attached as **Appendix C1**¹.

This basic assessment entails the permitting process for the construction and operation of the cemetery, chapels, interfaith halls, admin building, canteen, service buildings, memorial trees, columbarium terrace, wall of remembrance, parking, garden, ablution facilities, staff cottages, sewer pump station and bulk services; excluding the crematoria and ash garden which will be applied for separately by means of a Full Scoping/EIA process.

¹ Subject to final design and dimensions/footprints may increase to 10%

2.5 Civil Engineering Services required for the development of the LLMP

2.5.1 Bulk Water Infrastructure

The area surrounding the proposed development is supplied with water by the La Mercy Reservoir which is located adjacent to the proposed development as indicated on Figure 10 above. The La Mercy Reservoir is currently owned and operated by uMgeni water. Through engagement with uMgeni water, the following operational information was obtained.

Table 6: La Mercy Reservoir Capacity

La Mercy Reservoir			
Storage capacity (MI/d)	Current Demand (MI/d)	Available Capacity (MI/d)	TWL
5	4.075	0.925	156m

The existing supply main to the reservoir is a 450mm diameter steel rising main which is routed parallel to the site on the eastern boundary within a pipeline servitude. There are no existing reticulation pipelines within the site boundary.

2.5.1.1 Design Requirements

The Guidelines for the Human Settlement and Planning Design (Red Book) has been used to quantify the design parameters as set out in Table 7.

Table 7: Water Design Parameters

Losses	25%
Peak Factor	3 (Applied to staff living cluster)
Velocity	Average: 0.9m/s
Chapels	2000 litre/d/erf
Shops	400 litre/d/100m ²
Staff Living Clusters	150 litre/occupant/d
Canteen	25litre/patron/d
Admin Reception	400 litre/d/100m ²
Halls	65l/seat/d

2.5.1.2 Assumptions

The design of the fire infrastructure including downstream pipework from the ring mains, hose reels, hydrants and other fire equipment inside and outside the buildings is the responsibility of the appointed Mechanical Engineer. The following criteria were used for fire:

- Two fire hydrants must be able to discharge simultaneously at a flow rate of 20 l/s (1200 litres/ minute) each for 60 minutes.
- Two fire hose reels must be able to discharge simultaneously at a flowrate of 0.5 l/s (30 litres/ minute) each for 60 minutes.

The expected Water demand for this proposed development is shown in Table 8 below.

Table 8: Expected Water Demand

Facilities	Users	Building Area (m ²)	Staff living clusters (Occupant) (l/day)	Stores 100 m ² (l/day)	W/Shops 100 m ² (l/day)	Admin/Reception (100 m ²) (l/day)	Halls (l/seat/day)	Chapels (Erf) (l/day)	Canteen (l/patron)	Proposed Annual Demand (l/day)	Proposed Peak Demand (l/day)	Proposed Peak Demand (25%) Loss (l/day)
			150	400	400	400	65	2000	20			
Staff living cluster	6		1800							1800	19800	23760
Stores		431		1724						1724	1724	2069
W/Shops		431			1724					1724	1724	2069
Admin/ Reception		2035				8139				8139	8129	9767
Inter-Faith Halls	200						39000			39000	39000	46800
Chapels								12000		12000	12000	14400
Canteen	50								1000	1000	1000	1200
Total		2897	1800	1724	1724	8139		12000		65387	83387	98864

Fire Demand		
Hosereels	30	l/min
Hydrant fire flow	1500	l/min
No of hydrants and hoses	2	
Duration of fire flow	60	min
Fireflow	183600	l/d
	0,1836	ML/day

The total annual daily demand (domestic and fire) is 0.248 ML/day and the Storage capacity for 48hrs is **0.5 M**.

2.5.1.3 Proposed Infrastructure

2.5.1.3.1 Bulk Water Infrastructure

The existing 450mm diameter steel supply main to the existing 5ML La Mercy Reservoir is adequately sized to supply the existing demand from the residential area and proposed demand from the memorial park development.

Through engagement with Umgeni Water officials, it was verified that the existing 5ML La Mercy Reservoir does not cater for fire water storage and a storage capacity of 48 hours. Therefore, the existing water storage facility does not comply with the requirements of eThekweni Municipality.

It is recommended the following bulk infrastructure be constructed to provide storage and supply to the proposed memorial park development and meet the requirements of the local authority:

- New 1ML ground water tank adjacent to the existing reservoir to provide supply for firefighting and domestic supply
- Inlet pipeline from the existing 450mm diameter steel rising main to the new 1ML ground water tank.
- Booster Pumpstation – Due to insufficient available static head between the proposed water storage facility and the facilities on the site, a booster pump station is required to ensure sufficient residual pressures in both the domestic and fire water distribution pipe networks.

2.5.1.3.2 Internal Infrastructure

- Construction of a network of rising mains and reticulation pipelines to supply water (domestic and fire) to the various facilities.
- Construction of valves and fire hydrants – All valves, fittings and chambers are designed according to SANS 1200L and all other standards referred to in SANS 1200L. Fire Hydrants will per place at a minimum 180m apart and as per eThekweni Standard details.
- Construction of a water meter.

2.5.2 Bulk Sewer Infrastructure

The site has a natural westward drainage and northwards. The lowest of the site is the north-eastern corner where the sewer from the development can be collected.

The proposed site neighbours the residential area of Desainager, which is currently serviced by a network of sewer pipelines. According to the GIS data, all wastewater from the Desainager area discharges into the Genezzano Wastewater Treatment Works (WWTW). The conveyance and the treatment of wastewater from this area is the responsibility of the eThekwini Municipality.

2.5.2.1 Design Requirements

The Guidelines for the Human Settlement and Planning Design (Red Book) and the eThekwini guidelines for the design of foul – water sewers were used to quantify the design parameters as shown in Table 9.

Table 9: Sewer Design Parameters

Infiltration	15%
Peak Factor	2.5 (Applied to staff living cluster)
Pipe Grade	Minimum Grade: 1:200 (eThekwini Guidelines Pg.5)
Velocity	Minimum Velocity: 0.66m ³ /s
Chapel	1600 litre/d/erf
Staff Living Clusters	120 litre/occupant/d
Shops	320 litre/d/100m ²
Admin Reception	320 litre/d/100m ²
Canteen	20l/patron/day

The expected sewer flows for this proposed development are shown in the Table 10 below.

Table 10: Expected Sewer Flows

Facilities	Users	Building Area (m ²)	Staff living clusters (Occupant) (l/day)	Stores 100 m ² (l/day)	W/Shops 100 m ² (l/day)	Admin/Reception (100 m ²) (l/day)	Halls (l/seat/day)	Chapels (Erf) (l/day)	Canteen (l/patron/day)	Proposed Average Daily Flow (l/day)	Proposed Peak WW Flows (l/day)
			120	320	320	320	52	1600	20		
Staff living cluster	6		1400							1656	4140
Stores		431		1379						1586	1586
W/Shops		431			1379					1586	1586
Admin/ Reception		2035				6511				7488	7488
Inter-Faith Halls	200						31200			35880	35880
Chapels								9600		11040	11040
Canteen	50								1000	1000	1000
Total		2897	1400	1379	1379	6511		9600		60236,48	61720,48

The Proposed Annual Average Flow is 60.23 kl/day and the Proposed Annual Peak Flow is 61.72 kl/day.

2.5.2.2 Recommendation Options

2.5.2.2.1 Bulk Infrastructure

Three options were considered for the treatment of wastewater from the proposed La Mercy Memorial Park:

- Option 1 – Genazzano WWTW
- Option 2 – Septic Tank and Soakaway System
- Option 3 – Privately Owned Low Volume Domestic Sewage Treatment System (Recommended)

These are discussed in detail in the Alternatives section (Section 2.6).

2.5.2.2.2 Internal Infrastructure

It is proposed that a series of UPVC Class 34 gravity sewer pipelines (minimum diameter – 160mm) be constructed to discharge the flows from each facility to the proposed on-site treatment plant.

It is noted that the Northeastern corner, where staff quarters and workshops are located, will require a mini pump station to lift the effluent to an level or elevation over the adjacent ridge, whereby the effluent can drain by gravity to the proposed on-site treatment plant.

Figure 11 depicts the sewer plan layout which shows the location of the Low Volume Domestic Sewage Treatment System. Figure 12 indicates the proposed location of the mini pump station location.

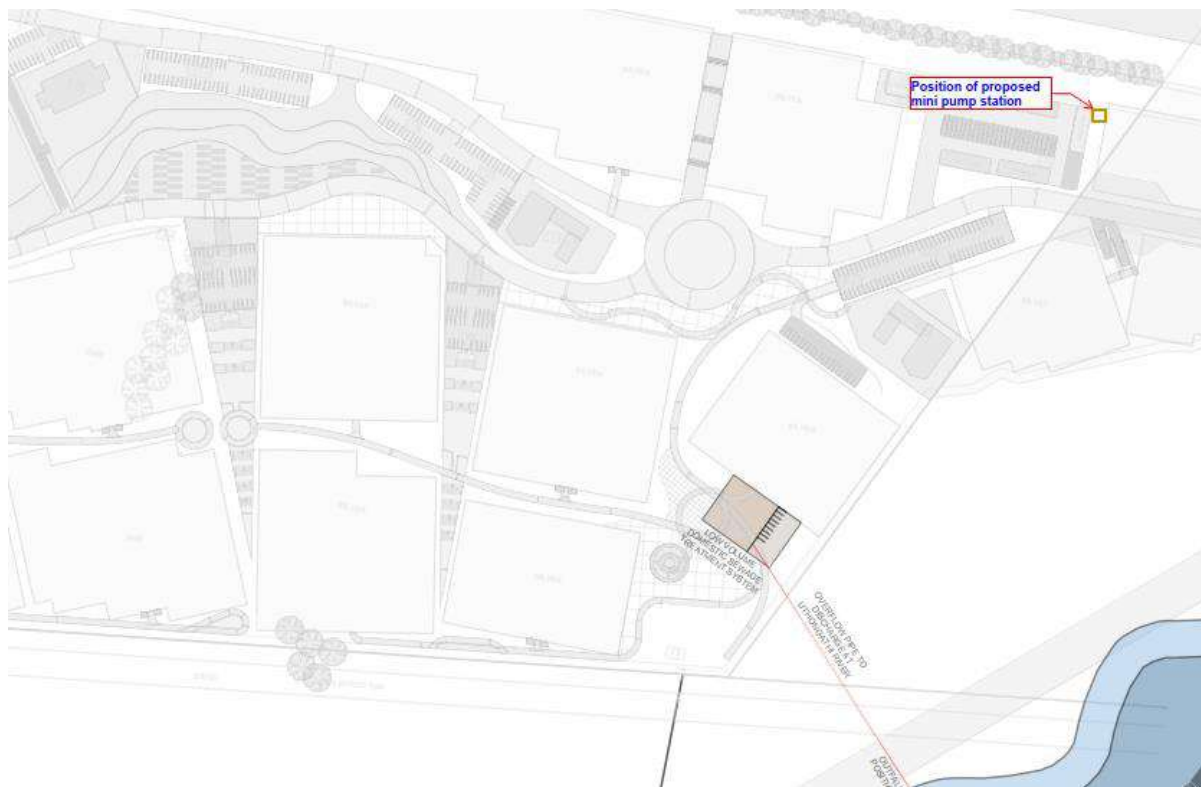


Figure 12: Mini Pump Station Location

2.5.3 Roads

2.5.3.1 Geometric Design Standards

The eThekweni Municipality design standards and UTG3 “Structural Design of Urban Roads – 1998” road classification guidelines have been used for planning purposes. A design speed of 60km/h has been adopted for Option 3B and 40km/h for Option 1, Option 2 and Option 3A.

The applicable standards which were adapted are as follows:

Table 11: Applicable Standards

	Option 1	Option 2	Option 3	
			A	B
Design Speed (km/h)	40	40	40	60
Minimum horizontal design curve radius (m)	75	75	75	150
Superelevation: e _{max} (%)	4	4	4	6
Stopping Sight Distance (m)	45	45	45	85
Minimum (Desirable) Longitudinal Gradient	0.5	0.5	0.5	0.5
K-Vertical Crest (0,66m object height)	3.1	3.1	3.1	5.0
K-Vertical Sag (headlight illumination)	1.85	1.85	1.85	1.85

2.5.3.2 Route Descriptions

Four route options (1, 2, 3A and 3B) were proposed in the Traffic Impact Assessment produced by Nako SYSTRA. All routes have been assessed using the above-mentioned design standards.

These are discussed in detail in the Alternatives section (Section 2.6).

2.5.4 Electrical Infrastructure

2.5.4.1 Current Infrastructure

eThekwini Electricity has an 11kV and 400-volt network in the adjacent area to the proposed cemetery site, i.e., Genazzano and Desainager. These areas are reticulated with either overhead bundle conductors (points A, B and C in Figure 13) or underground cables. These residential areas are not fully developed and as such eThekwini Electricity have indicated that they will have sufficient capacity in the area to supply the cemetery site. The developer of the site would have to apply for a connection to his site through the normal eThekwini Electricity application process. eThekwini Electricity have subsequently identified another point of supply. This point is approximately 850m from the site; however the point of supply is west of the N2.

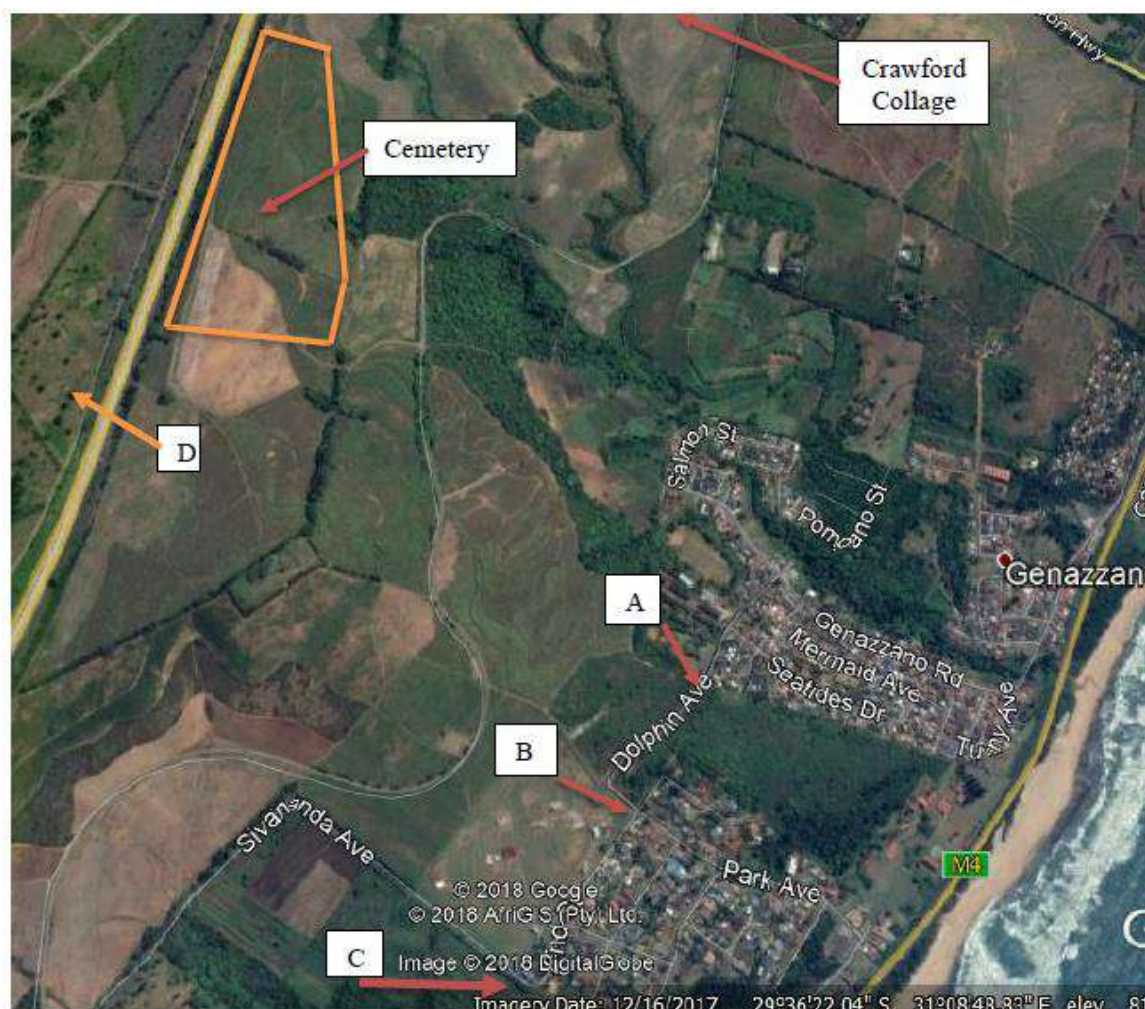


Figure 13: Electrical Infrastructure

2.5.4.2 Infrastructure

In order to provide the proposed cemetery with a point of supply, eThekwini Electricity will either run with and an 11kV bundle conductor from Crawford Collage, position A or position B as indicated in Figure 13. The actual take-off position will be determined by eThekwini Electricity at the time of application, after considering a number of technical factors. The overhead bundle conductor will generally follow road reserves to the proposed cemetery positions.

In terms of the requirements for a basic assessment for environmental approval, an electrical servitude will not be required to be registered, i.e., 275 kV and above.

Due to the position of the proposed cemetery in relation to Crawford Collage and the existing residential areas Genazzano and Desainager, electricity can be supplied to the cemetery site. The existing network can be extended to accommodate this relatively small electrical load without having to upgrade the network capacity.

It is recommended that PV panels be investigated and considered for this project.

2.5.5 Stormwater Management

Due to the close proximity of the site to the wetland along the northern boundary, it is proposed that the stormwater management system for the site consist of a predominantly Sustainable Urban Drainage Solutions (SuDS) approach in combination with conventional (harder engineered) stormwater solutions. In adopting SuDS solutions the impact of the development in terms of runoff to the receiving environment and in particular, to the nearby wetland will be largely mitigated.

The following stormwater infrastructure components are proposed to manage the stormwater runoff generated as a result of the construction of the memorial park.

- Swales

Vegetated swales collect water from hard surfaces and allows it to infiltrate into the ground, thereby attenuating the runoff peak generated on hardened surfaces. Vegetation in the swale also traps sediment generated from the site, and reduces the velocity of post development flows.

It is subsequently proposed that two swales be constructed along the western and eastern boundaries of the site. These will act as the major collectors of the site.

- Cut-off drains, grassed lined channels, grid inlets, subsoil drainages

- Cut-off drains will be placed along the cut banks and grassed lined channels are proposed adjacent to the internal roads.
- Runoff from the parking areas and buildings will be discharged into grid inlets and conveyed into the minor system via pipelines and concrete lined channels.
- Subsoil drainage is proposed along all retaining walls.

- Attenuation

One attenuation pond (45m x 45m x 6m) is proposed on the north-eastern corner of the site. The purpose of this pond, together with the abovementioned SuDS infrastructure (i.e. swale along the western boundary of the site and grass lined channels) is to attenuate the post development runoff peak of the site to that of the pre-development condition. It is proposed that a SuDS philosophy be applied to this pond such that it mimics a wetland in which water quality is maintained and ecological enhancements can be achieved. Flow from this pond will be discharged, at a pre-development rate, into the existing wetlands outside the site boundaries.

The purpose of the attenuation is to ensure that the runoff from the developed site is no larger than that of the site in its current undeveloped state, and therefore any runoff impact on the receiving environment due to the development is mitigated.

The purpose of the attenuation is to ensure that the runoff from the developed site is no larger than that of the site in its current undeveloped state, and therefore any runoff impact on the receiving environment due to the development is mitigated.

The stormwater management layout plan is depicted in Figure 14 below.

2.6 Description of Alternatives

Alternatives should include a consideration of all possible means by which the purpose and need of the proposed activity could be accomplished. The determination of whether the site or activity (including different processes etc.) or both is appropriate needs to be informed by the specific circumstances of the activity and its environment. The no-go option must in all cases be included in the assessment phase as the baseline against which the impacts of the other alternatives are assessed. A number of alternatives have been considered for the proposed LMMP. These are discussed in Table 12.

The following fundamental aspects were considered for the alternatives:

- Extent
- Capacity
- Durability, Serviceability and Sustainability
- Economy
- Constructability
- Aesthetics
- Environmentally sensitive area i.e. the wetland area to the north

Table 12: Alternatives Description

Alternative Type	Alternatives Description
1. Site	The LMMP as the proposed site is owned by Tongaat Hulett Property and thus does not have to be acquired. It is for this reason that no site alternatives were considered.
2. Site Development Plan	The following layout alternatives were considered: <ul style="list-style-type: none"> • SDP Option 1 (Preferred)

	<p>This option refers to the Site Development Plan in Figure 10 above. This layout has a larger development area which maximizes the space for the LMMP. It has the proposed wastewater treatment works located within the development area. To mitigate the loss of graves in the initial SDP, a 4ha site was added to the site to the north of the development. This latest development therefore yields 33 838.</p> <ul style="list-style-type: none"> • SDP Option 2 <p>The initial Memorial Park Site Development Plan (SDP) was a high-level design which catered for similar categories of graves, being Silver, Gold and Platinum. It included all the amenities proposed in this final preferred SDP with some areas refined due to a number of restrictions imposed by various elements. These elements include:</p> <ul style="list-style-type: none"> • The N2 Freeway has a 20m Building along each side of the road reserve and this affected the configuration and yield of the Memorial Park. • The topography on the north-eastern portion of the site required retention walls and a Waste Water Treatment Plan incorporated for the park to be feasible. <p>The primary objective of the preferred SDP (Option 1) versus Option 2 was to revise the design to address the additional development constraints (20m sanral servitude), stormwater attenuation pond and sewer treatment plant, ensure that the proposal could actually work with the steep slopes of the existing typography and soil conditions, while ensuring the overall yield could still render the project financially feasible, detail for which Option 2 had not fully progressed to.</p>
<p>3. Bulk Sewer Infrastructure</p>	<p>The following options were considered for the treatment of wastewater from the proposed La Mercy Memorial Park:</p>

	<ul style="list-style-type: none">• Option 1 – Genazzano WWTW<p>Treatment by means of conveyance of the proposed flows by the existing conventional gravity sewer system on the east of the development to discharge into the existing Genazzano WWTW would have been the most cost effective and least challenging option. However, the eThekwini Municipality has confirmed that existing Genazzano WWTW currently does not have available treatment capacity to accept flows from the proposed development until such time that the Genazzano WWTW is upgraded. The completion date is currently unknown.</p> • Option 2 – Septic Tank and Soakaway System<p>The use of a septic tank and soakaway system was investigated as an alternative to treat the wastewater flows from the development.</p><p>The system would be required to be constructed on the south-east boundary of the site (lowest elevation in relation to the facilities) to allow for the flows from the various facilities to gravitate to the septic tank.</p><p>The Septic Tank Size would be 8m wide x 22m long x 2.5m deep and the Soakaway Length would be 140m.</p><p>According to various national guidelines, the requirements of a soakaway are as follows:</p><ul style="list-style-type: none">• A soakaway shall be so constructed and located as not to cause the pollution of any spring, stream, well or other source of water which is used for drinking, domestic or kitchen purposes.• No soakaway shall be less than 3m from any boundary or building of the site on which it is situated.• The soakaway shall have a level base throughout its length.
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	<p>Apart from the large area required for the septic tank and soakaway to satisfy the above requirements, the percolation test carried out as part of the geotechnical investigation has indicated that the soils within the site are highly permeable which can result in contamination of the wetland and watercourse which is located approximately 140m away from the site.</p> <p>Option 3 – Privately Owned Low Volume Domestic Sewage Treatment System (Preferred)</p> <p>The construction and installation of a Privately Owned Low Volume Domestic Sewage Treatment System is seen as a viable and sustainable sanitation solution for the La Mercy Memorial Park for the following reasons:</p> <ul style="list-style-type: none"> • No requirement of municipal infrastructure • Preservation of surface and underground water • Provides capacity to cater for the average and peak flows from the site • The system allows the reclamation and treatment of effluent waste to be reused and as a result a water saving of up to 60% • No odours • Requires a footprint of approximately 30m x 30m. <p>Following the investigation of the above options for the treatment of the wastewater flows from the development, it is recommended that Option 3 – Privately Owned Low Volume Domestic Sewage Treatment System be considered to service the development.</p>
<p>4. Access Roads²</p>	<p>Option 1 – Access Off Park Avenue (Extension) (Preferred)</p>

² It must be stressed that these access proposals are of an interim nature and are superseded upon implementation of the M4 (P398-2) realignment.



Figure 15: Access Option 1 (Access off Park Avenue)

Park Avenue currently intersects with the M4 (P398-2) at a traffic circle. Access to the proposed development is by means of the extension of Park Avenue westward to the development site, as depicted in Figure 15.

Option 2 – New Road Off Watson Highway



Figure 16: Access Option 2 (New Access Off Watson Highway)

The formalization of an existing gravel road that intersects with Watson Highway (P426) to provide access to the development site. This road is approximately 2km in length to the development site and is located approximately 520m east from the N2/Watson Highway (P426) Eastern Ramp Terminal, as depicted in Figure 16.

Option 3 – New Road Off Watson Highway (P426) Along Proposed M4 (P398-2) Realignment

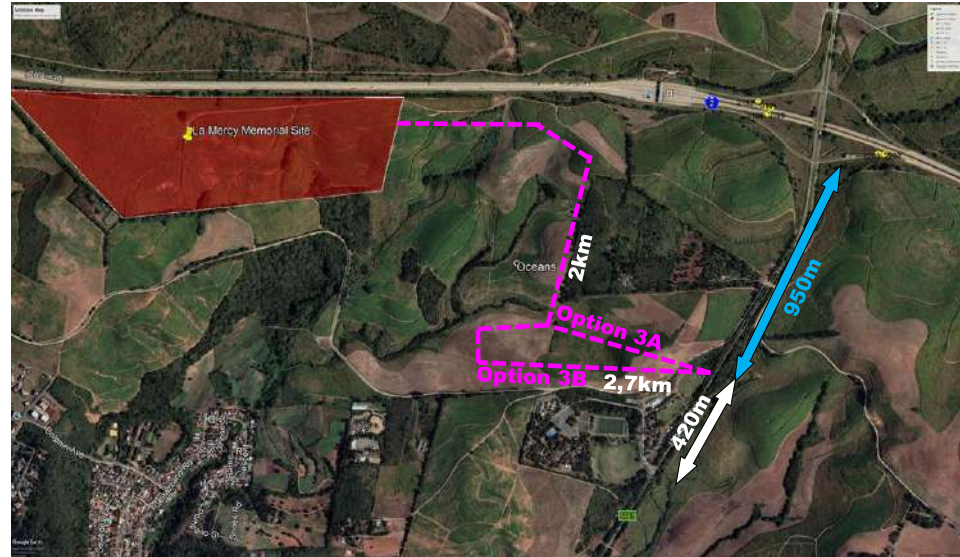


Figure 17: Access Option 3 (New Access off Watson Highway (P426) along M4 (P398-2) Re-alignment)

The creation of a new access utilising the route of the proposed M4 (P398-2) realignment, which intersects Watson Highway (P426) approximately 950m east of the N2/Watson Highway (P426) East Ramp Terminal and 420m West from Crawford School Access, as depicted in Figure 17.

This option has been considered with 2 minor variations within the development area for practical reasons, viz :

- **Option 3A – From M4 (P398-2) re-alignment intersection along new route**

This road is proposed to take direct access off Watson Highway (P426) at the realigned M4/Watson Highway intersection, along a new route due to inter alia earthworks and cost considerations.

- **Option 3B – Along M4 (P398-2) Re-alignment route**

This road is along the M4 (P398-2) realignment corridor, which in the short-term would consist of constructing one half of the proposed M4 (P398-2) carriageway, viz. two lanes, which would function as a bi-directional two-lane road to serve as access to the development.

These variations of Option 3A & 3B do not impact the intersection analysis in the TIA as the intersection point remains the same. In addition, Option 3B has the potential to consolidate the Crawford School Access into Option 3B, thus reducing the number of intersections on Watson Highway.

It must be stressed that these access proposals are of an interim nature and are superseded upon implementation of the M4 (P398-2) realignment.

Figure 18 depicts all access route options for a comparative view.

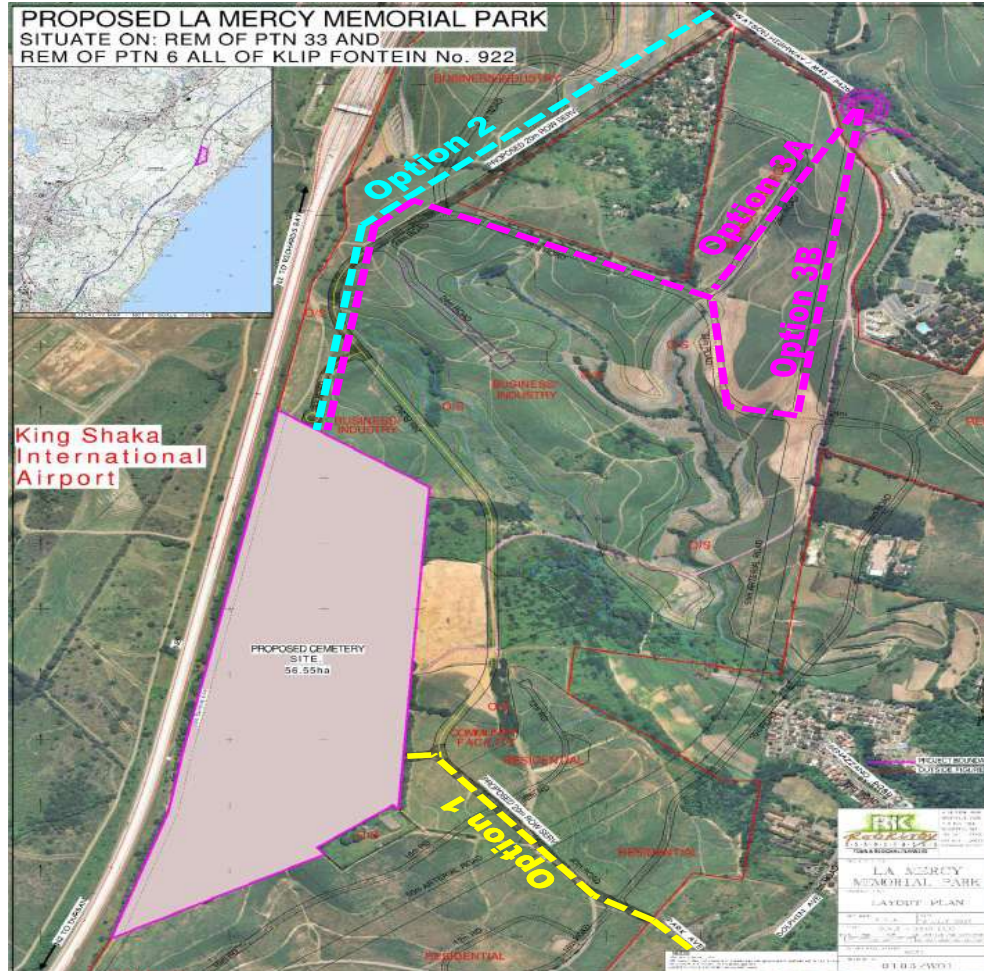


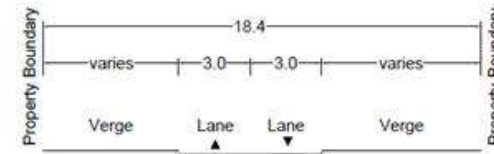
Figure 18: Comparison Map

Table 13: Access Route Comparative Analysis
La Mercy Traffic Assessment – Stage 1

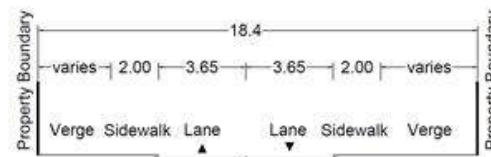
Indicator	Option 1	Option 2	Option 3a	Option 3b	Comments
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	Capacity					Capacity is not a constraint, but geometry may be
	Road Class	CI 4	CI 4	CI 4	CI 4	Required class relating to the network
	Access Management	Community consultation	Requires a new intersection location onto Watson	Nil	Nil	Function related to need for access. Should not to be an issue for an existing road
	Cost	New – 0.8km Upgrade – 1.5km	New – 1.6km	New – 2km	New – 2.7km	Upgrade of existing roads may attract hidden costs
	Abortive Costs	Nil	0.3km + main intersection	02.km	Nil	Where construction is outside planned road reserves
	Approval Time	Residential Appeals	Intersection approval from KZN DOT and SANRAL	Nil	Nil	Perceived resistance to proposed intervention
	Option 1 is considered to be appropriate from transportation perspective as there are no critical					

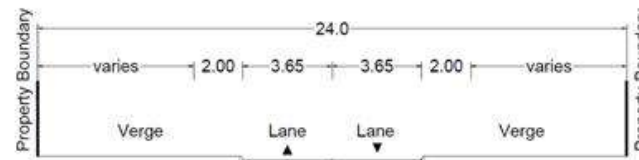
	<p>implications in terms of the alignment and accessibility point as these are established criteria. Option 1 has minimal costs in comparison to the other options.</p>
<p>5. New Roads and Widening</p>	<p>Option 1 – New Road and Widening (Preferred)</p> <p>In order to service the proposed memorial park site an extension of Park Avenue is required which will extend through to the proposed memorial park site access. The extended Park Avenue requires a configuration such as a two-way two-lane road with 3,65 metres lane widths. The ninety-degree curve should have a minimum radius of twenty metres to accommodate the movement of buses. The typical cross sections are shown in Figure 19.</p>



Typical Existing Cross Section
Option 1



Typical Upgraded Cross Section A- A
Option 1

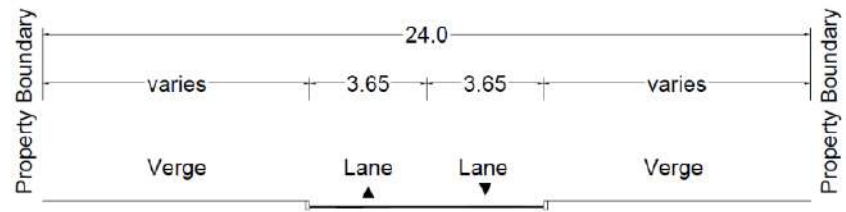


Typical New Cross Section B - B
Option 1

Figure 19: Option 1 – Typical Cross Sections

Option 2 – New Road

This option requires a configuration that is a two-way two-lane road with 3,65 metres lane widths including channel. The typical cross section is shown in Figure 20.



Typical New Cross Section
Option 2

Figure 20: Option 2 – Typical Cross Sections

Option 3 – New Road

This option requires a configuration that is a two-way two-lane road with 3,65 metres lane widths including channel for the internal road network. The configuration along the M4 (P398-2) is such that it is a two-way two-lane road with 3,70 metre lane widths including channel since this is aligned to the standard guidelines. The typical cross sections are shown in Figure 21.

	<p style="text-align: center;"> Typical New Cross Section Option 3A </p> <p style="text-align: center;"> Typical New Cross Section Option 3B </p> <p style="text-align: center;"> Typical New Cross Section Option 3B - Along New M4 Alignment </p> <p style="text-align: center;"> Figure 21: Option 3 – Typical Cross Sections </p>
<p>6. No-Go</p>	<p>This is the alternative of not developing the LMMP. This alternative will result in limited construction impacts already occurring in the study area. However, should the LMMP not be developed as proposed, the issue of overcrowded graveyards will not be resolved within the municipality as the need for additional burial space is a necessity. A service to the communities within the region will not be met. This is an undesirable alternative for the project as it will pose negative impacts on the social and economic perspective and is not considered desirable. The negative impacts of the no-go</p>

	alternative are considered to outweigh the positive impacts. The no go alternative is therefore not preferred.
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The impacts identified by the specialists are assessed (Section 7) against each option outlined above.

2.7 Need and Desirability

There has been a dire need for additional cemetery development for several years in Durban and the surrounding areas. Within the eThekweni Metropolitan region, there are 65 graveyards with a total of 550 000 sites for interment. Many of these are close to reaching full capacity, despite the fact that up to three bodies are buried in the same site³. The Queensburgh Cemetery located 16.5 kilometres from the city and the three cemeteries located within St Wendolins Mission are all full and cannot accept any more burials. The demand for graves was exacerbated by the impact of the Covid 19 pandemic when the rate of monthly burials increased from 700 to 3 000 people in 2021. Whereas in eThekweni, there were 5, 648 Covid deaths recorded⁴. The rate of death increased by 40% per month within eThekweni Metropolitan Municipality resulting in the need to bury up to three corpses in one grave. This shortage of grave sites became so dire, that relatives resorted to burying bodies within roadways in existing but full cemeteries or attempting to have their loved ones transported for burial to rural areas. Public cemeteries have also become synonymous with being unsafe spaces or social facilities in part due to a lack of maintenance, but also due to opportunists' criminals choosing to attack and rob visitors to the graves. At that time, the Head of the Department of Parks, Recreation and Culture in eThekweni appealed to residents who had lost family and friends to consider other alternatives to burial since the pandemic placed the public cemetery system under severe strain. However, for many, cultural and religious belief systems do not allow for alternative methods e.g., cremation or biological disposal. During this time, eThekweni Municipality raised the provision of burial sites as a critical service for which provision must be made. Thus, the need for the development of new cemeteries is an urgent requirement for the city.

The proposed LMMP will address part of this need and allows the private sector to engage with development processes to supplement other initiatives launched by the city. The new cemetery will provide ±34 000 new burial plots together with family graves, memorial gardens, and walls. Three new crematoria will increase the capacity of the city to dispose of bodies and supplement the aging infrastructure for this purpose (excluded from this application).

Tongaat Hulett, through its engagements with the eThekweni Municipality identified the need for burial space was becoming a challenge for the City and it was agreed for Tongaat Hulett to identify suitable sites within its portfolio. This led to broad investigation that resulted in this

³ <https://mg.co.za/news/2021-11-16-a-grave-situation-in-ethekweni/>, accessed 18 October 2022

⁴ <https://www.fast-trackcities.org/data-visualization/ethekweni-covid>

particular site being identified as the most preferred. The series of studies conducted included the identification of suitable soils, terrain, accessibility and compatibility of land use mix. A Market Study was also conducted to determine the type of burial will be in demand for this area given the demographics and current trends in the region.

The motivation for the proposed memorial park development is to relieve pressure on the city to provide cemetery space and burial sites for the increased population in the region. The eThekweni municipality population between the years 2020 and 2024 has been estimated to rise from about 4.07 million people to approximately 4 164 503 million people, respectively (eThekweni IDP, 2020). With this increase in population comes with it an extreme increase of deaths as well as an increase in the demand for grave sites; especially now more than ever due to the global pandemic. This project aims to provide the local community access to cemeteries, as well as ease the municipality's increasing struggle to meet these grave site demands.

Through the Kwa-Zulu Natal Cemeteries and Crematoria Act, No. 12 of 1996 the eThekweni Municipality reserved suitable municipality land for establishing and managing cemeteries and crematoriums. However, the reality of the city's cemeteries is that they are overcrowded, full or close to reaching their capacity. The need for additional burial space has become a necessity. Over the years, finding burial land has proved to be a difficult task for the eThekweni's local community, which is why the eThekweni Municipality has outlined the growing need for the city to identify land that can be reserved and used for cemeteries in the city's future development. As such, the eThekweni Municipality's 2017 SDP made plans to re-engage with stakeholders to tackle the burial space shortage and considers applications for the establishments of public and private cemeteries under special conditions and by-laws. With this, the proposed development sets out to ease some of the municipal's burial space concerns and will provide a service especially to the communities within the region. However, both public and private cemeteries need to comply with the cemeteries, crematoria and undertakers' by-laws in terms of section 156(2) of the Constitution of the Republic of South Africa, 1996, read with section 11(3)(m) of the Local Government: Municipal Systems Act, No. 32 of 2000. The 61-hectar memorial park will provide 33 838 grave sites which all comply with the requirements of the eThekweni Municipality of 2.4m x 1.1m dimensions and 21 hectar.

Furthermore, the National Spatial Development Framework (NSDF) of 2020 addresses the national concern in inequality of access to social infrastructure to all South Africans. As such, the NSDF outlines the importance to providing accessibility of well planned, well-functioning and

well managed urban and rural social amenities. This project aids this as it aims to provide burial land for South Africans as well as provide job opportunities to the locals.

The desirability of the site is that it is located within the proposed La Mercy Spatial Development Plan and forms part of the provision of social services needed together with the planned future residential areas outlined in the municipality's Spatial Development Framework (SDF). The topography of the site and its location allow it to be screened from the surrounding existing current and future residential development, road system, and the King Shaka International Airport. There are minimal environmental impacts related to the proposed cemetery use of the site which will be developed as a 'greenfield site' allowing the optimal use of landscaping and terracing in its design. Negative visual impacts will also be greatly reduced because of developing the site as a Memorial Park with extensive indigenous landscaping and special architectural "green" aesthetically pleasing architecture being applied to all buildings and aesthetic features not normally found or provided in a public cemetery.

The ability of the cemetery to utilise existing electricity, water provision and road network to their full extent and provide a private sewage package plant results in an excellent mix of private and public resources with the developers bearing the cost of all cost in constructing new infrastructure or upgrading the existing infrastructure.

2.8 Closure

The closure phase has not been considered as part of this application. The current environmental baseline conditions may change overtime; it is therefore not possible to predict the potential environmental impacts. When the graveyard reaches capacity, Tongaat Hulett Property will lodge a formal application with the Department of Arts and Culture to list the LMMP as a tourist attraction for KZN. It is envisaged that the park will remain open thus the LLMP will still be maintained in terms of landscaping, and infrastructure. However, if closure is considered in future, the developer/ license holder will undertake the required actions by applying for closure (separate EIA process).

3. LEGISLATIVE FRAMEWORK

3.1 Legal Requirements as per Appendix 1 of EIA Regulations, 2014 (as amended)

This Section of the BAR has been prepared in accordance with Appendix 1 of EIA Regulations of 2014 (as amended) and includes the relevant information for Section 3 as outlined in Table 14 below.

Table 14: Requirements set under Appendix 1 of EIA Regulations of 2014 (as amended) for Section 3

Requirement	Relevant Section
(d) a description of the scope of the proposed activity, including— (i) all listed and specified activities triggered and being applied for.	The applicable listed activities are included in Table 15 within section 3.2.
(e) a description of the policy and legislative context within which the development is proposed including— (i) an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and (ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments.	The policy and legislative context is included in Table 16 within section 3.3.

All legislation, policies and/or guidelines of any sphere of government that are applicable to the application as contemplated in the EIA Regulations are discussed below.

3.2 Applicable Listed Activities for Basic Assessment Process

In terms of sections 24(2) and 24D of the National Environmental Management Act (Act No. 107 of 1998), as read with the Environmental Impact Assessment (EIA) Regulations of GNR 982 to R985 (as amended by 07 April 2017 (GNR 326)), a Basic Assessment process is required for

the proposed project. Table 15 contains the listed activities in terms of the EIA Regulations and includes a description of those project activities which relate to the applicable listed activities.

Table 15: Applicable Listed Activities to be authorized

Listed activities	Description of project activity that triggers listed activity
<p>GNR 327, Listing Notice 1, Activity 23</p> <p>The cemetery will be more than 2500 square metres.</p>	<p>The proposed LMMP will be 61 ha.</p>
<p>GNR 324, Listing Notice 3, Activity 4</p> <p>The development of a road wider than 4 metres with a reserve less than 13,5 metres.</p> <p>d. KwaZulu-Natal</p> <p>viii. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.</p>	<p>The development does entail a road network. The access route entails 0.8km of new road and 1.5km of road upgrades. A section of the site falls within an Irreplaceable Area.</p>
<p>GNR 324, Listing Notice 3, Activity 12</p> <p>The clearance of an area of 300 square metres or more of indigenous vegetation.</p> <p>d. KwaZulu-Natal</p> <p>v. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.</p>	<p>A section of the site falls within an Irreplaceable Area and clearance of more than 300m² is anticipated.</p>
<p>GNR 324, Listing Notice 3, Activity 18</p> <p>The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.</p> <p>d. KwaZulu-Natal</p>	<p>The development does entail a road network. The access route entails 0.8km of new road and 1.5km of road upgrades. A section of the site falls within an Irreplaceable Area.</p>

viii. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.	
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The above listed activities have triggered a Basic Assessment Process, these activities may not commence without an Environmental Authorisation from the Competent Authority, i.e. the KZN EDTEA.

3.3 Legislation and Guidelines that have informed the preparation of this EIA Report

Several other Acts, standards or guidelines have also informed the project process and the scope of issues assessed in this report. A listing of relevant legislation is provided in Table 17, where the level of applicability of the legislation or policy to the activity/project is detailed.

Table 16: Applicable Legislation, Policies and/or Guidelines

Title of legislation, policy or guideline (Promulgation Date)	Applicable Requirements	Administering Authority	Applicability to LMMP
National Environmental Management Act (Act No. 107 of 1998)	<p>NEMA requires, inter alia, that:</p> <ul style="list-style-type: none"> ○ Development must be socially, environmentally, and economically sustainable. ○ Disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied. ○ A risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions. <p>EIA Regulations have been promulgated in terms of Chapter 5. Activities which may not commence without an environmental authorisation are</p>	<p>National Department of Forestry, Fisheries and the Environment (DFFE)</p> <p>KZN Department of Economic Development, Tourism and Environmental Affairs (EDTEA)</p>	<p>The Basic Assessment is undertaken in accordance with the requirements of Government Notice R326 of April 2017, as required in terms of the National Environmental Management, 1998 (Act No. 107 of 1998).</p>

Title of legislation, policy or guideline (Promulgation Date)	Applicable Requirements	Administering Authority	Applicability to LMMP
	<p>identified within these Regulations.</p> <p>In terms of S24(1) of NEMA, the potential impact on the environment associated with these listed activities must be considered, investigated, assessed and reported on to the competent authority charged by NEMA with granting of the relevant environmental authorisation.</p>		
<p>National Environmental Management Act (Act No. 107 of 1998)</p>	<p>A project proponent is required to consider a project holistically and to consider the cumulative effect of potential impacts.</p> <p>In terms of the Duty of Care provision in S28(1) the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to ensure that any pollution or degradation of the environment associated with a project is avoided, stopped or minimised.</p>	<p>National Department of Forestry, Fisheries and the Environment (DFFE)</p> <p>KZN Department of Economic Development, Tourism and Environmental Affairs (EDTEA)</p>	<p>While no permitting or licensing requirements arise directly, the holistic consideration of the potential impacts of the proposed project has found application in the impact assessment phase.</p> <p>The implementation of mitigation measures is included as part of the Project EMPr and will continue to apply throughout the life cycle of the project.</p>

Title of legislation, policy or guideline (Promulgation Date)	Applicable Requirements	Administering Authority	Applicability to LMMP
National Water Act (Act No. 36 of 1998)	Section 21 water uses as per the NWA includes: 21(a): Taking water from a water resource; 21(b): Storing water; 21(c): Impeding or diverting the flow of water in a watercourse; 21(d): Engaging in a stream flow reduction activity; 21(e): Engaging in a controlled activity; 21(f): Discharging waste or water containing waste into a water resource through a pipe, canal, sewer or other conduit; 21(g): Disposing of waste in a manner which may detrimentally impact on a water resource; 21(h): Disposing in any manner of water which contains waste from, or which has been heated in any industrial or power generation process; 21(i): Altering the bed, banks, course or characteristics of a watercourse; 21(j): Removing, discharging or disposing of water found underground if it is necessary for the	Department of Water and Sanitation (DWS)	The proposed development requires a Water Use License as Section 21 c and i of the NWA are triggered as a result of the proximity to the wetland area. A Water Use License Application will be undertaken prior to the commencement of construction.

Title of legislation, policy or guideline (Promulgation Date)	Applicable Requirements	Administering Authority	Applicability to LMMP
	<p>efficient continuation of an activity or for the safety of people; and</p> <p>21(k): Using water for recreational purposes.</p> <p>For wetland areas, development within a 500m buffer triggers the act. For rivers, development within a 100m buffer triggers the act. Any activity that triggers any of the above water uses will require a Water Use License.</p> <p>Given the sensitivity associated with a project, DWS will determine whether the project will follow a General Authorisation process or a Water Use License Application process.</p>		
<p>National Environmental Management: Biodiversity Act 2004 (Act No. 10 of 2004)</p>	<p>This Act provides management and conservation of South Africa’s biodiversity within the framework of the National Environmental Management Act (Act No. 107 of 1998); the protection of species and ecosystems that warrant national protection and the sustainable use of indigenous biological resources.</p>	<p>National Department of Forestry, Fisheries and the Environment (DFFE)</p>	<p>While no permitting or licensing requirements arise from this legislation, this Act will find application during the construction phase of the project in proper management of the sensitive area (wetland) identified on site.</p>

Title of legislation, policy or guideline (Promulgation Date)	Applicable Requirements	Administering Authority	Applicability to LMMP
<p>National Environmental Management: Waste Act (Act No. 59 of 2008)</p>	<p>The NEMA: WA came into effect on the on 1st July 2009. Section 20 of the Environment Conservation Act (Act No. 73 of 1989), under which waste management was previously governed, was repealed. In general, the act seeks to ensure that people are aware of the impact of waste on their health wellbeing and the environment, and in the process giving effect to Section 24 of the constitution, in ensuring an environment that is not harmful to health and wellbeing.</p>	<p>National Department of Forestry, Fisheries and the Environment (DFFE)</p> <p>National Department of Forestry, Fisheries and the Environment (DFFE) – lead authority for regulating hazardous waste.</p> <p>KZN Department of Economic Development, Tourism and Environmental Affairs (EDTEA) – for regulating general waste</p>	<p>No waste license activities are applicable to this project. The developer will however be required to store and manage waste in accordance with the requirements of this Act and associated Standards.</p>

Title of legislation, policy or guideline (Promulgation Date)	Applicable Requirements	Administering Authority	Applicability to LMMP
National Environmental Management: Air Quality Act (Act No. 39 of 2004)	<p>Section 18, 19 and 20 of the Act allow certain areas to be declared and managed as “priority areas”.</p> <p>The Act provides that an air quality officer may require any person to submit an atmospheric impact report if there is reasonable suspicion that the person has failed to comply with the Act.</p> <p>Dust Control Regulation Control Regulations, R. No. 827 of 1 November 2013.</p>	<p>National Department of Forestry, Fisheries and the Environment (DFFE)</p> <p>eThekwini Local Municipality</p>	<p>This Act will find application during the construction of Phase 2 of the project; the crematoria and ash garden. This triggers the need for an Air Emissions License. This will be undertaken as a separate application as discussed with EDTEA in the pre-application meeting.</p> <p>The implementation of dust mitigation measures are included as part of the project EMPr and will continue to apply throughout the life cycle of the project.</p> <p>Dust control regulations promulgated in November 2013 may require the implementation of a dust management plan.</p>
National Heritage	Section 38 states that Heritage Impact	South African	Should any heritage sites be

Title of legislation, policy or guideline (Promulgation Date)	Applicable Requirements	Administering Authority	Applicability to LMMP
Resource Act, 1999 (Act No. 25 of 1999)	<p>Assessments (HIAs) are required for certain kinds of development including the construction of a road, exceeding 300m in length.</p> <p>In accordance with the NHRA, an independent heritage consultant is to conduct a cultural heritage assessment to determine any impact on any sites, features or objects of cultural heritage significance. If none are identified, any archaeological sites or graves to be exposed during construction work must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.</p> <p>If a permit is required as per section 34 of the NHRA, no works are to commence before the permit is obtained.</p>	Heritage Resources Association (SAHRA) Provincial Heritage Resource Agency (KZN – Amafa)	unearthed during excavations, a permit would be required to be obtained from SAHRA/ Amafa.
Promotion of Access to Information Act,	Legislation that allows the public access to information about activities that influence their well-being and to make contributions to decision	National Department of Forestry, Fisheries and the Environment	No permitting is required. The act finds applicability during the public participation process

Title of legislation, policy or guideline (Promulgation Date)	Applicable Requirements	Administering Authority	Applicability to LMMP
2000 (Act No. 2 of 2000)	making.	(DFFE)	phase of the Basic Assessment process.
Occupational Health and Safety Act (Act No. 85 of 1993)	The Occupational Health and Safety Act provides for the health and safety of persons at work and for the health and safety of persons in connection with the use of plant and machinery; the protection of persons other than persons at work, against hazards to health and safety arising out of or in connection with the activities of persons at work.	Department of Labour	While no permitting or licensing requirements arise from this legislation, this Act will find application during the construction phase of the project. Health and safety precautions measures must be put in place for the construction crew and the general public. E.g. Protection of workers on site through provision of Personal Protective Equipment's; Training and other health and safety amenities.
<p>Other:</p> <ul style="list-style-type: none"> ➤ National Development Plan – Vision 2030 <p>The National Development Plan (NDP) 2030 aims to address South Africa's developmental challenges of poverty and inequality by</p>			

Title of legislation, policy or guideline (Promulgation Date)	Applicable Requirements	Administering Authority	Applicability to LMMP
<p>2030. Key aspects deemed necessary to enhance social cohesion, reduce poverty and raise living standards include:</p> <ul style="list-style-type: none"> • Creating jobs and livelihoods • Expanding infrastructure • Transforming urban and rural spaces • Transitioning to a low-carbon economy • Improving education and training • Providing quality health care • Building a capable state • Fighting corruption and enhancing accountability • Transforming society and uniting the nation <p>The proposed LMMP is in alignment with the NDP through its potential to create employment and its plans to develop infrastructure.</p> <p>➤ New Growth Path Framework (NGPF), 2010</p> <p>The New Growth Path Framework (NGPF) aims to ensure that jobs and decent work are at the centre of economic policy. The NGPF has identified several job drivers and priority sectors that should be focused on over the coming years. These include:</p> <ul style="list-style-type: none"> • Infrastructure investment • Prioritising efforts to support employment in the main economic sectors • Seizing the potential of new economies 			

Title of legislation, policy or guideline (Promulgation Date)	Applicable Requirements	Administering Authority	Applicability to LMMP
	<ul style="list-style-type: none"> • Investing in social capital and public services • Spatial development • Fostering rural development and regional integration <p>The proposed LMMP shows alignment to the New Growth Path regarding its aim to invest in infrastructure and its potential to increase employment.</p> <p>➤ KwaZulu-Natal Provincial Growth and Development Strategy (PDGS) (2021 Draft for public consultation)</p> <p>The Provincial Growth Development Strategy (PGDS) provides KwaZulu-Natal with a reasoned strategic framework for accelerated and shared economic growth through catalytic and developmental interventions, within a coherent equitable spatial development architecture, putting people first, particularly the poor and vulnerable, and building sustainable communities, livelihoods and living environments (KwaZulu-Natal Provincial Planning Commission, 2021). The strategic pillars of the KZN PDGS are:</p> <ul style="list-style-type: none"> • Building a capable, ethical, and developmental state. • Economic transformation and job creation. • Education, skills, and health. • Consolidating the social wage through reliable and quality basic services. • Spatial integration, human settlements, and local government. • Social cohesion and safe communities. • Better Africa and Better world. 		

Title of legislation, policy or guideline (Promulgation Date)	Applicable Requirements	Administering Authority	Applicability to LMMP
	<p>The proposed development aligns with the PDGS through its potential of enhancing the economic transformation and creating job opportunities.</p> <p>➤ KwaZulu-Natal Provincial Growth and Development Plan (PDGP) (2019)</p> <p>The main purpose of the Provincial Growth and Development Plan (PGDP) is to translate the PGDS into an implementation plan which will provide a sound platform for departmental, sectoral, and stakeholder annual performance planning and therefore to guide resource allocation. Its strategic objectives include:</p> <ul style="list-style-type: none"> • Develop and promote agricultural potential in KZN • Promote SMME and entrepreneurial development. • Support skills development to economic growth. • Advance social cohesion and social capital. • Enhance the resilience of new and existing cities, towns, and rural nodes, ensuring equitable access to resources, and social and economic opportunities. • Enhance resilience of ecosystem services • Expand application of green technologies <p>The proposed LMMP aligns with the PDGP through its potential to promote SMME development and enhances the resilience of new and existing cities, towns, and rural nodes, ensuring equitable access to resources, and social and economic opportunities through</p>		

Title of legislation, policy or guideline (Promulgation Date)	Applicable Requirements	Administering Authority	Applicability to LMMP
<p>the provision of additional burial space.</p> <p>➤ KwaZulu-Natal Provincial Spatial Development Framework (PSDF) (2021)</p> <p>The KZN Provincial Spatial Development Framework (PSDF) vision is to utilise physical and environmental resources toward greater spatial integration and sustainability. In order to realize its vision, it has set out strategic goals which include:</p> <ul style="list-style-type: none"> • Improved integration between urban/ rural opportunities and needs • Sustainable use and protection of critical natural resources needed as basis for health and development • Sustainable land use management and spatial planning towards sustainable settlements • Reduce environmental degradation and loss which increases human vulnerability. • Create social, economic, and ecological resilience in spatial planning and land use management. • Develop and promote the agricultural potential of KZN. • Develop and promote the biodiversity economy in KZN. • Focus spatial economic development in strategic areas <p>The proposed LMMP is aligned with the PSDF since it will promote sustainable land use management and spatial planning towards sustainable settlements through the provision of additional burial space which will in turn create social, economic, and ecological resilience in spatial planning and land use management.</p> <p>➤ eThekweni Municipality Integrated Development Plan (2022/23)</p>			

Title of legislation, policy or guideline (Promulgation Date)	Applicable Requirements	Administering Authority	Applicability to LMMP
<p>The intention of integrated development planning is to provide a framework for social and economic development in a municipality while also facilitating faster and more suitable service delivery. In order to achieve this, eThekweni aims:</p> <ul style="list-style-type: none"> • To provide growth and development opportunities to employees • To enable a performance driven environment • Enable provision of infrastructure and basic services delivery • To provide municipal Health Services in an effective and equitable manner • To enhance sustainable coastal & environmental management <p>The proposed LMMP is aligned the eThekweni IDP through its potential to provide employment opportunities and enable the provision of infrastructure.</p> <p>➤ eThekweni Municipality Spatial Development Framework(2021/2022) (SDF)</p> <p>The Spatial Development Framework for the eThekweni (2019) guides and informs all decision of the municipality relating to land use development and land planning. The key strategic goals and objectives which have been identified in line with the key issues include:</p> <ul style="list-style-type: none"> • Promote a uniform land use management system, • Promote economic and social development, • Promote accessibility to sustainable services and facilities, • Promote sustainable human settlements and safer communities 			

Title of legislation, policy or guideline (Promulgation Date)	Applicable Requirements	Administering Authority	Applicability to LMMP
<p>The proposed LMMP is aligned to the objectives of the SDF as the development will contribute to promoting sustainable human settlements and safer communities, and creating jobs through economic and social development.</p>			

3.4 Applicable Water Uses for Basic Assessment Process

Chapter 4 and Section 21 of the National Water Act (No. 36 of 1998) lists certain activities for which water uses must be licensed, unless its use is excluded. There are several reasons why water users are required to register and license their water uses with the Department of Water & Sanitation (DWS). The most important reasons being: (i) to manage and control water resources for planning and development; (ii) to protect water resources against over-use, damage and impacts and (iii) to ensure fair allocation of water among users. The water uses described in Table 15 (below) have been identified as being associated with the proposed development.

Section 21 (c) and (i) water use (described in Table 17) have been identified as being associated with the La Mercy Memorial Park and WWTW. There is no abstraction from wetland or storage of water within the wetland at the site, hence Section 21 (a) and (b) water uses do not apply. Since domestic wastewater will be treated and discharged from the existing WWTW into the downstream watercourse, Section 21 (g) water use (disposing of waste) and Section 21 (f) water use (discharging waste or water containing waste) does apply to the project.

Table 17: Applicable Water Uses

NWA Section 21 Water Use	Description (DWAf, 2009)	Development activities constituting the water use
Section 21 (c): Impeding or diverting the flow of water in a watercourse	This water use relates to impeding or diverting flows but does not normally cause any loss of water, but rather influences the flow regime in a watercourse.	<ul style="list-style-type: none"> Proposed La Mercy Memorial Park and WWTW located within 500m of a watercourse.
Section 21 (i): Altering the bed, banks, course or characteristics of a watercourse	This water use relates to any change affecting the resource quality of the watercourse (the area within the riparian habitat or 1:100-year floodline, whichever is the greatest).	<ul style="list-style-type: none"> Proposed La Mercy Memorial Park and WWTW located within 500m of a watercourse.
Section 21	This water use relates to the	<ul style="list-style-type: none"> The development of a new

<p>(g): Disposing of waste in a manner which may detrimentally impact on a water resource</p>	<p>disposing of waste in a manner which may detrimentally impact on a water resource.</p>	<p>cemetery (i.e., LMMP)</p> <ul style="list-style-type: none"> • Disposing of treated domestic wastewater effluent into the downstream wetland.
<p>Section 21 (f): Discharging waste or water containing waste into a water resource through a pipe, canal, sewer or other conduit</p>	<p>This water use relates to the discharging waste or water containing waste into a water resource through a pipe, canal, sewer or other conduit.</p>	<ul style="list-style-type: none"> • Direct discharge of treated domestic wastewater to the downstream wetland via a conduit (i.e., piped outlet from the WWTW).

The WULA Process is as follows:

- Link client phase – This is the initiation of the project. The project is loaded on the Department of Water and Sanitation’s (DWS) eWULAAS portal. During this phase, the EAP uploads the Appointment Letter which gives the EAP permission to upload on the applicants behalf.
- Pre-application Phase – Once the above is approved, the pre-application phase is opened on the eWULAAS portal. During this phase, basic information on the project is uploaded (including location and proposed scope).
- Pre-application Meeting – Once submitted, a case officer is assigned to the application and requests a pre-application meeting to discuss the project and advise whether a General Authorisation (GA) or a full WULA process will be followed.

- Phase 1 – During this phase, each proposed activity is uploaded with associated coordinates and dimensions. Property details are also to be uploaded during this phase. In addition, administrative documents are required to be uploaded. If a GA process is followed, the application forms must also be completed in this phase. Thereafter DWS will process the GA.
- Phase 2 – If a full WULA process is followed, Phase 2 will open. During this phase, the case officer requests a site visit.
- Phase 3 – Technical documents are requested during this phase and application forms must be completed. Once submitted, the WULA is reviewed.
- C & I DWS Presentation – The water uses in relation to the watercourse is presented to the DWS c&I team. They provide comments on the project and what additional input is required.
- Civil Meeting – Once the additional requirements as per above have been submitted, a civil meeting is scheduled to present the civil designs to the DWS civil team. They provide comments on the civil designs and what additional civil input is required.
- Water Use License – Once the above is submitted, DWS then processes the WUL.

The WULA consultant appointment process is currently underway.

DWS has been listed as an Interested and/ Affected Party/ Stakeholder on the projects database. The DBAR will also be submitted to DWS for the 30 days legislated period for comment. The Department will be kept informed of this project throughout the process.

4. PUBLIC PARTICIPATION PROCESS

4.1 Legal Requirements as per Appendix 1 of EIA Regulations, 2014 (as amended)

This Section of the BAR has been prepared in accordance with Appendix 1 of EIA Regulations of 2014 (as amended) and includes the relevant information for Section 4 as outlined in Table 18 below.

Table 18: Requirements set under Appendix 1 of EIA Regulations of 2014 (as amended) for Section 4

Requirement	Relevant Section
<p>(h) a full description of the process followed to reach the proposed preferred alternative within the site, including—</p> <p>(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs.</p>	<p>The entire Section 4 describes and outlines the processes followed in terms of the PPP and what is yet to be undertaken.</p>

4.2 Aim of the Public Participation Process

The aim of the Public Participation Process (PPP) is to allow Interested and Affected Parties (I&APs) the opportunity to gain an understanding of the project and consider all facets of the proposed activities. The Public Participation Process will:

- Provide I&APs with information about the proposed Bergville WTW upgrade activities and associated potential impacts;
- Allow I&APs the opportunity to provide input, such as concerns or queries, on the proposed project; and
- Incorporate the input raised by I&APs in the study and ultimate decision-making process.

4.3 The following activities will take place as part of the public participation process:

- **Identification of Key Stakeholders**

As required by Chapter 6 of the EIA Regulations of 2014, relevant local, provincial and national authorities, local forums and representatives as well as surrounding land owners and occupants have been notified of the environmental process.

Relevant government authorities (organs of state) have been automatically registered as IAPs. In accordance with the EIA Regulations of 2014, all other persons must request in writing to be placed on the register, submit written comments or attend meetings in order to be registered as stakeholders and included in future communication regarding the project; the advertisement and notifications advise that IAPs register as such. All respondents are then to be placed on the project database. This database is supplemented by IAPs who contacts the project manager to be included on the database. The database is used throughout the process to inform the stakeholders of the project. The stakeholder database will be updated throughout the process.

Table 19 below depicts a summary of I&APs that have been identified for the project. A comprehensive list is attached as **Appendix D4**.

Table 19: Identified I&APs

Category	Department / Section	Contact Person
Provincial Department of Economic Development, Tourism and Environmental Affairs	KZN EDTEA	Natasha Brijlal Ndumiso Masuku
Local Municipality	eThekweni Municipality Development Planning, Environment & Management Unit Environmental Planning & Climate Protection	Bathabile Msomi Michelle Lotz Geoff Tooley Bhavna Soni Alex Mahlambi Greg Mullins Shonisani Makhwedzha Gugu Kuzwayo Mbali Msomi Thenjiwe Msani
Department of Water and Sanitation	Licensing	Renelle Pillay
Department of Transport	DoT – Regional Chief Director	Thembinkosi Sithomo

Ward Councilor	Ward 58 of eThekweni Local Municipality	Councilor Geoff Pullan
SAHRA	Case Officer	Andrew Solomon
KZN Heritage	Amafa – Impact Assessment Department	Bernadet Pawandiwa

- **Background Information Document (BID)**

A Background Information Document (BID) has been prepared for release on Friday, 21 October 2022 along with the release of the DBAR for the 30-day public review period. Refer to **Appendix D2** for the BID along with proof of distribution. The BID includes a brief introduction to the proposed project, the environmental process as well as the availability of the DBAR for public review. Key stakeholders will be directly notified of the proposed development along with the availability of the DBAR by email/ hand-deliveries.

- **Newspaper Advertisement**

An advertisement, notifying the public of the availability of the Draft Basic Assessment process and/ or requesting I&APs to register with, and/ or submit their comments to NFZ Environmentals will run in the North coast Rising Sun (local press) on Wednesday, 19 October 2022; however, public participation commences on Friday, 21 October 2022.

Refer to **Appendix D3** for proof of newspaper advert.

- **Site notices**

Five site notices were erected on site and at visible and accessible locations close to the site as depicted in Figure 22 in order to inform surrounding communities and immediately adjacent landowners of the proposed development and the availability of the DBAR for a 30-day public review period for commenting purposes.

Refer to **Appendix D1** for proof of site notices which also identifies the coordinates where each site notice was placed.

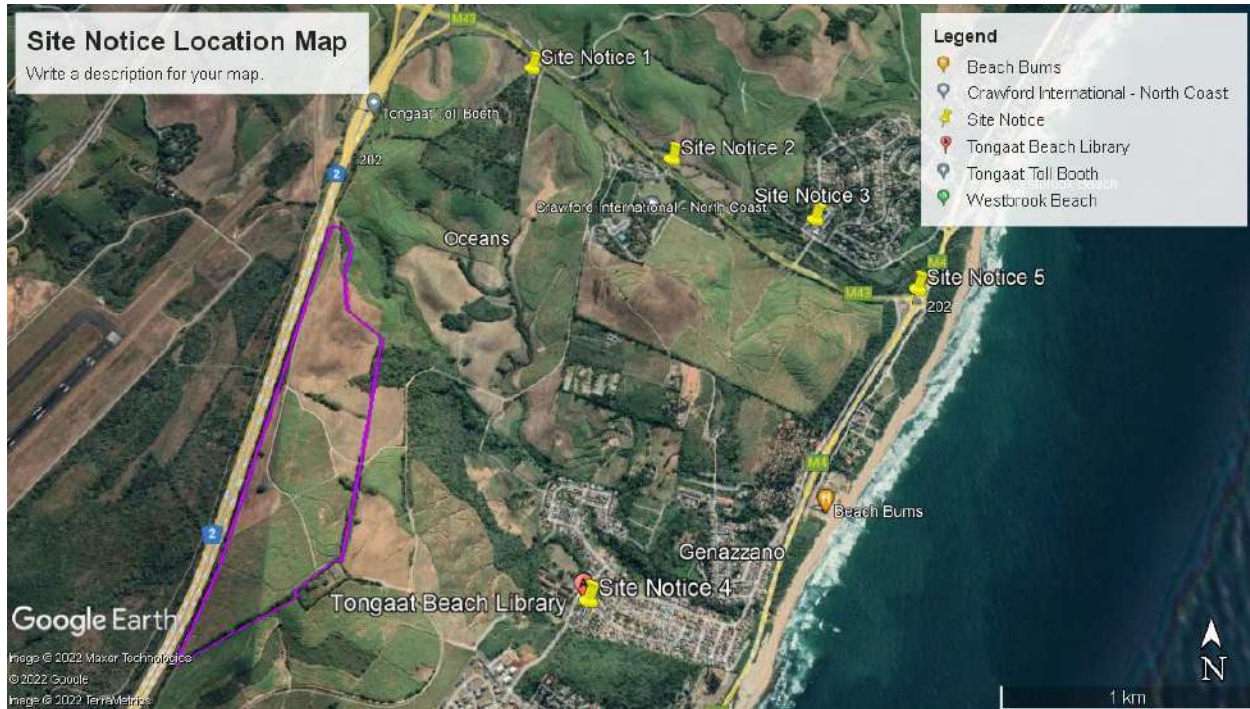


Figure 22: Site Notice Locations

- **SAHRIS Upload**

The project details will also be uploaded onto the SAHRIS portal which will allow for more awareness as well as more I&AP participation. Proof will be included in the FBAR.

- **Pre-application Meeting with EDTEA**

A pre-application meeting was held with the KZN Department of EDTEA for the proposed project on 21 July 2022 at EDTEA offices at Marine Building, 22 Dorothy Nyembe Street Marine Building. In this meeting, the EAP discussed the following aspects related to the project:

- Background and Scope
- Locality
- Rationale
- Concept Design
- Environmental Sensitivities
- Environmental Triggers
- DFFE Screening Report
- Proposed Specialist studies
- NEMA BAR Process

- Public Participation Process
- Key Stakeholders

Refer to **Appendix D6** for comprehensive presentation and meeting minutes.

- **Availability of Draft Basic Assessment Report for public review**

The DBAR will be released for a 30-day public review period from 21 October 2022 until 21 November 2022. Organs of state, I&AP's and stakeholders will be notified by email and/ or post of the availability of the report along with all appendices including the EMPr and specialist studies for public review and comment. Hard copies of the report will be delivered to the Competent Authority (EDTEA). A hard copy of the report will be available for review and at the Tongaat Beach Library: Sea Tides, 51 Dolphin Ave, Genazzano, Tongaat, 4400. Proof will be attached to the FBAR. The report is also available via the following dropbox link:

<https://www.dropbox.com/sh/54xqlu82fazwy3y/AABcS2fcMQad1M19bmFqm0Dsa?dl=0>

During this period, comments/ concerns are expected from organs of state, stakeholders and I&APs. All comments received during the DBAR review period will be adequately addressed and incorporated into the FBAR.

- **Submission of FBAR**

Following the DBAR review period, all issues raised by authorities, stakeholders and the public will be summarised and responded to and included in the Comments and Response Report (CRR) which will be included in the FBAR. The FBAR will be updated (where necessary), taking stakeholder input into account. The FBAR will then be submitted to EDTEA for the 107 day decision making period to issue an Environmental Authorisation (EA).

- **Notifying I&APs of EA**

Once the EA is received, I&APs will be notified of the outcome within 14 days of having received the EA and granted a 20 day period to lodge an appeal.

5. DESCRIPTION OF THE SITE

The following chapter presents an overview of the biophysical and socio-economic environment in which the proposed project is located to:

- Understand the general sensitivity of and pressures on the affected environment;
- Inform the identification of potential issues and impacts associated with the proposed project; and
- Inform the identification of practical mitigation measures.

5.1 Legal Requirements as per Appendix 1 of EIA Regulations, 2014 (as amended)

This Section of the BAR has been prepared in accordance with Appendix 1 of EIA Regulations of 2014 (as amended) and includes the relevant information for Section 5 as outlined in Table 20 below.

Table 20: Requirements set under Appendix 1 of EIA Regulations of 2014 (as amended) for Section 5

Requirement	Relevant Section
(i) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects.	The entire Section 5 describes and outlines the biophysical and human characteristics of the study site and surrounding areas.

5.2 Biophysical Characteristics of the Study Area and Surrounds

5.2.1 Landscape Features, Land Use and Zoning

The topography of the study area consists of undulating hills which are used for sugar cane cultivation and is zoned Land Use Management Holding Area. The site will have to be rezoned to Cemetery/Crematorium in terms of the eThekweni North Sub Scheme which makes provision for a Cemetery Zone including Ancillary Uses that are proposed in the SDP (Figure 10).

The surrounding land uses consist of the N2 highway as the western boundary of the site with King Shaka International Airport lying further west. The residential area of Tongaat Beach is situated to the east of the coastline.

The study area is located within the Indian Ocean Coastal Belt Biome. The vegetation type associated with the study site is KwaZulu-Natal Coastal Belt Grassland and is listed as Critically Endangered in terms of provincial vegetation threat status assessment.

However, it should be noted that the vegetation unit identified within the study area is for reference purposes as the study area has been significantly transformed as a result of agricultural activities and is unlikely to be representative of this vegetation type.

5.2.2 Topography and Drainage

On a regional level, the site appears to be relatively well drained as no ground water seepage or ponding water, or vegetation that would suggest the seasonal presence of which, was noted across the assessed area. The drainage follows the topography in that all drainage is from the slopes of the higher lying north-western section towards the north-east and south-east towards the Indian Ocean. Refer to Figure 23 for the Drainage Map and Flow Direction and Figure 24 for the Local drainage, quaternary catchment, and NFEPA context of the study area. The majority of the site has a gentle slope ranging between between 3 – 5° in a northwesterly to westerly direction with a planar to concave and convex conformation in places. The lower lying north western portion of the site slopes at approximately 2° with a concave conformation whilst the slightly more steeply sloping north eastern corner of the site slopes in a north-to-north easterly direction at approximately 8° with a concave conformation. Apart from minor slope depression which may act as ephemeral drainage paths, no major drainage lines exist within the confines of the site or abut along its boundaries.

The slopes that range between 3 – 5° can be considered to be ideal in terms of topography. However, where the gradient approaches 2° along the lower north western portion of the site surface drainage may be insufficient and thus must be suitably catered for or the area avoided. Where the gradient is in the order of 8° towards the south eastern corner of the site, graves should be staggered on a diagonal grid system with their long axis orientated perpendicular to the slope direction and surface drainage measures incorporated across the area.

According to Drennan Maud (Pty) Ltd, 2017 & 2021 No clear evidence of any ongoing or previous instability was noted on site. Moreover, given the prevailing sandy sediments and gently slope gradient the site is considered stable in its current conformation.

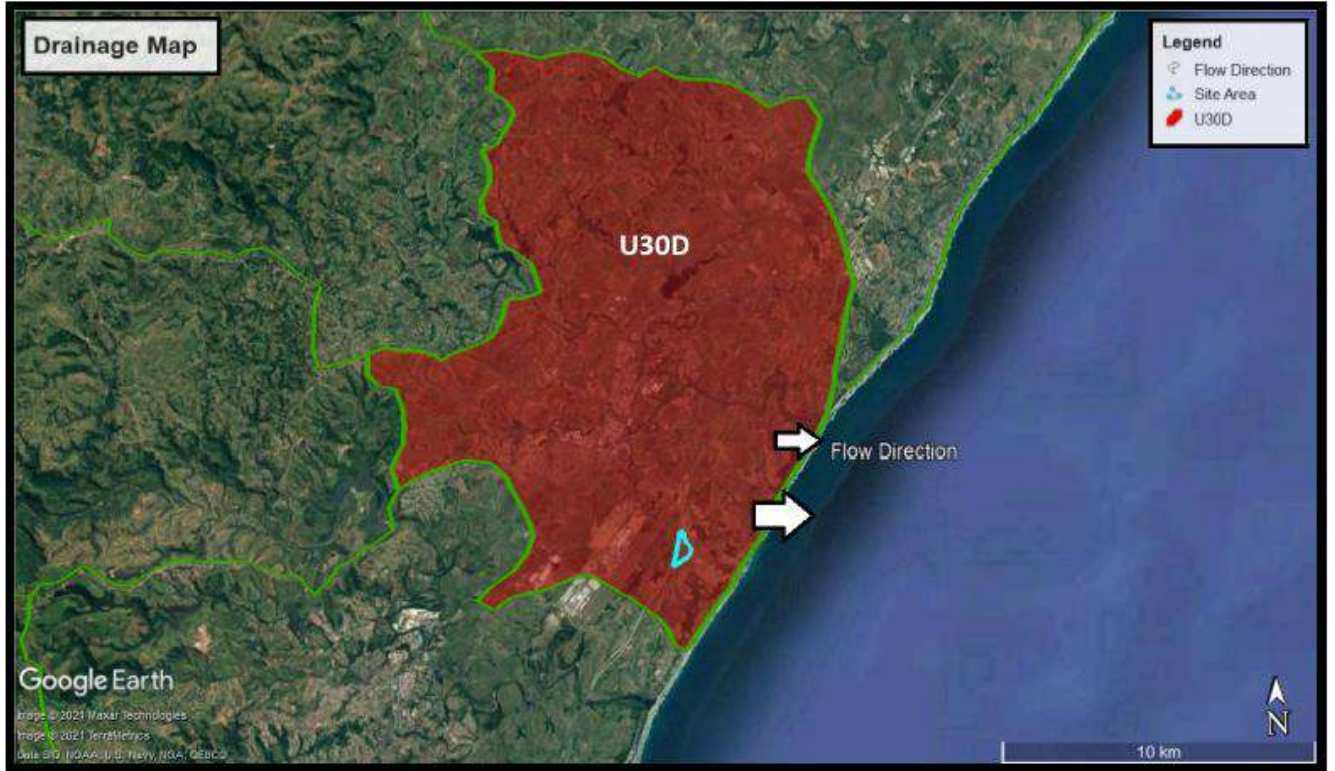


Figure 23: Drainage Map and Flow Direction



Figure 24: Local drainage, quaternary catchment, and NFEPA context of the study area

The average elevation of the area is approximately 104m as depicted in Figure 25.

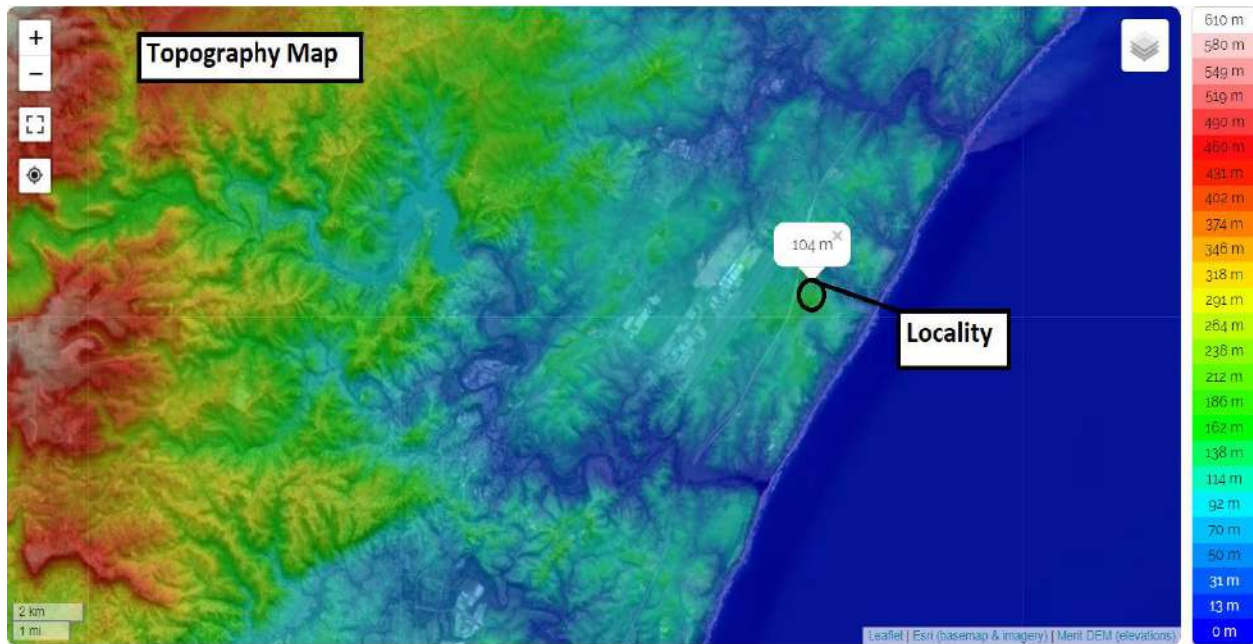


Figure 25: Topography Map

Some of the slope in the north eastern corner of the proposed cemetery site are steeper than 9° (1:6 or 18%) which means that there will need to be terracing and the construction of retaining walls to allow the development of stable burial platforms. The rest of the site approximately 75% is suitable for the development of land for a cemetery with maximum slope of 1° (1:10 or 10%).

Cross sections of the slope of the site are depicted in Figure 26 and Figure 27 as well as **Appendix C5**.

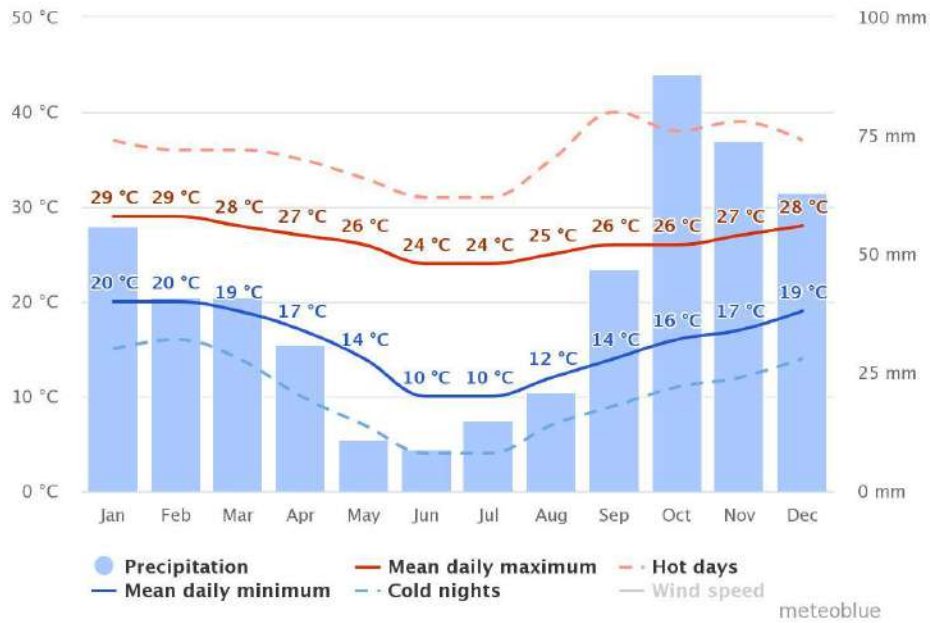


Figure 28: Average Temperatures and Precipitation

The average cloudy, sunny and precipitation days for the La Mercy area are indicated in Figure 29. The sunniest days are experienced during the winter months, with more cloud cover during the warmer months, which aligns with the precipitation periods.

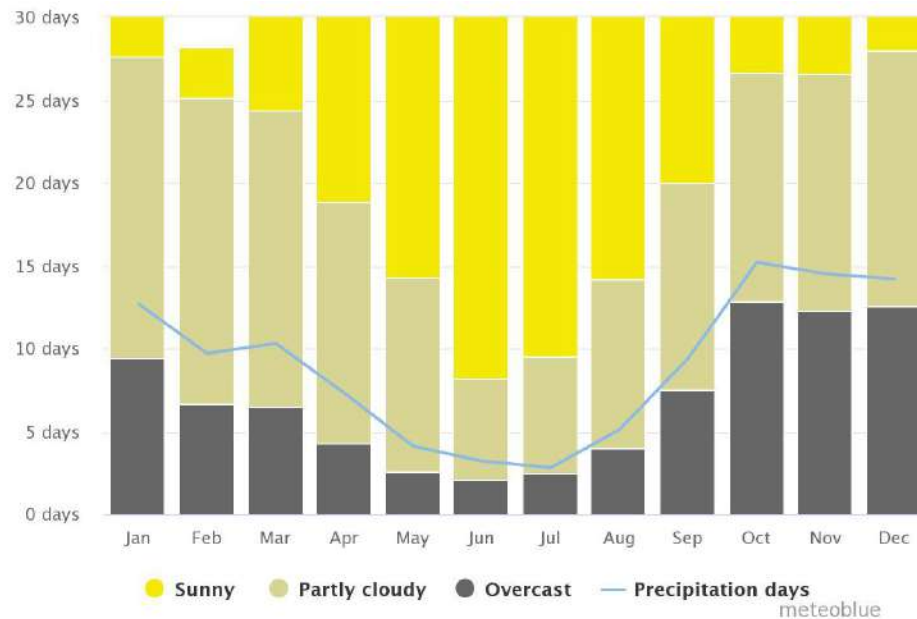


Figure 29: Cloudy, sunny, and precipitation days

The maximum temperature figure (Figure 30) for La Mercy displays how many days per month reach certain temperatures, with a peak between 20 to 25°C.

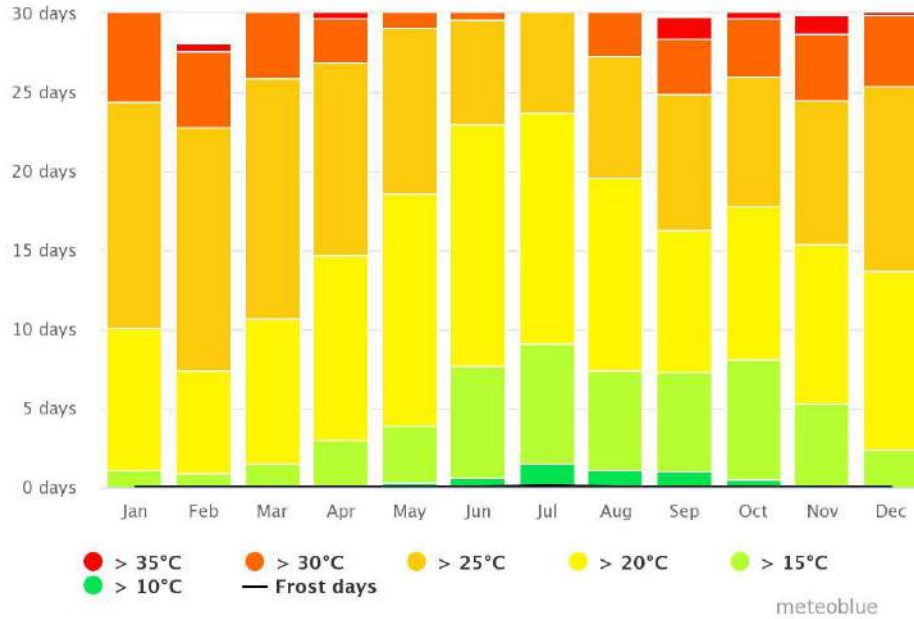


Figure 30: Maximum Temperatures

The precipitation figure (Figure 31) for La Mercy shows on how many days per month, certain precipitation amounts are reached, which aligns with the warmer months experiencing more rainfall than the colder months.

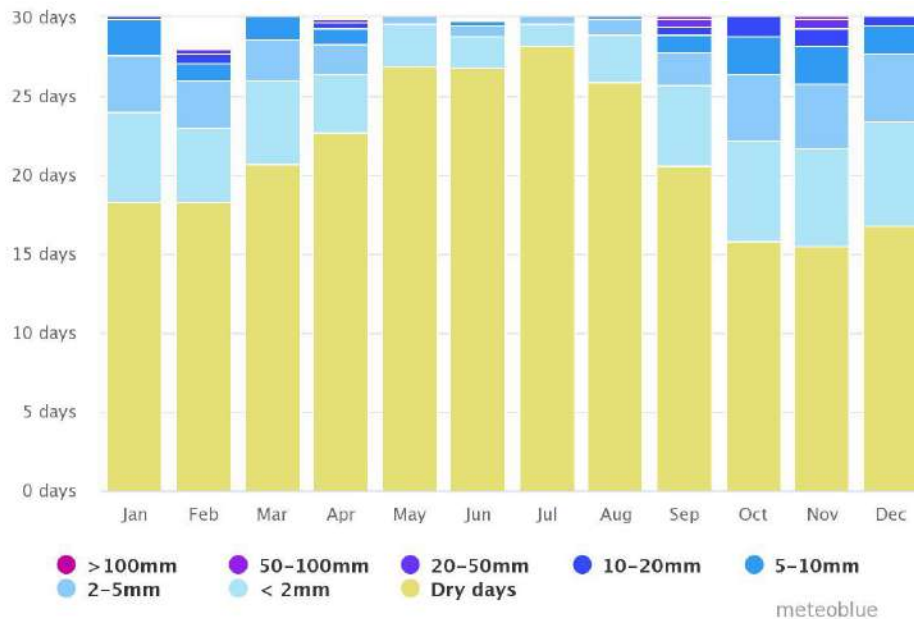


Figure 31: Precipitation amounts

Figure 32 shows the days per month, during which the wind reaches a certain speed. The wind speed average is between 12 and 19kmph.

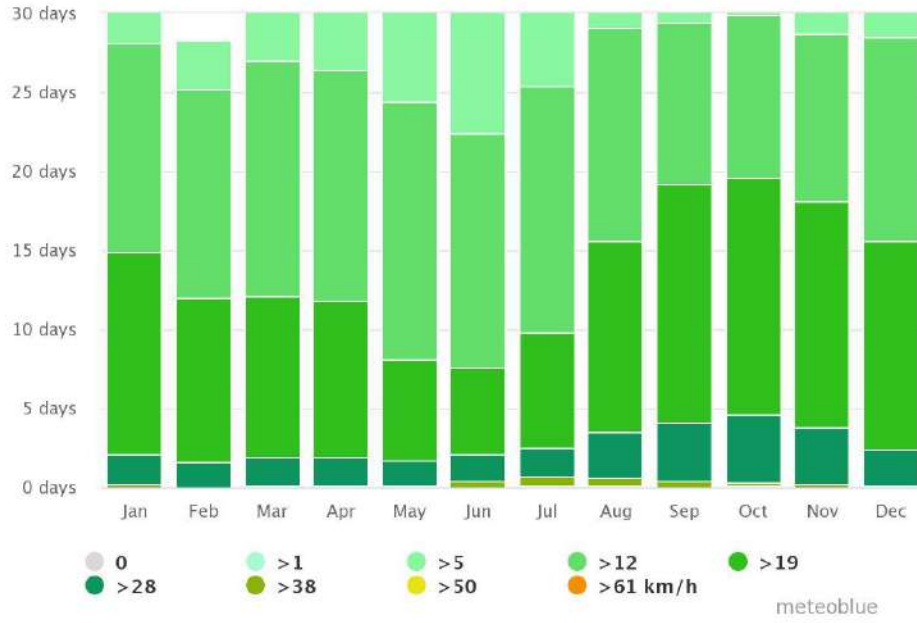


Figure 32: Wind Speed

The wind rose (Figure 33) for La Mercy shows how many hours per year the wind blows from the indicated direction, which is mostly towards the north-north-east and the south-south-west.

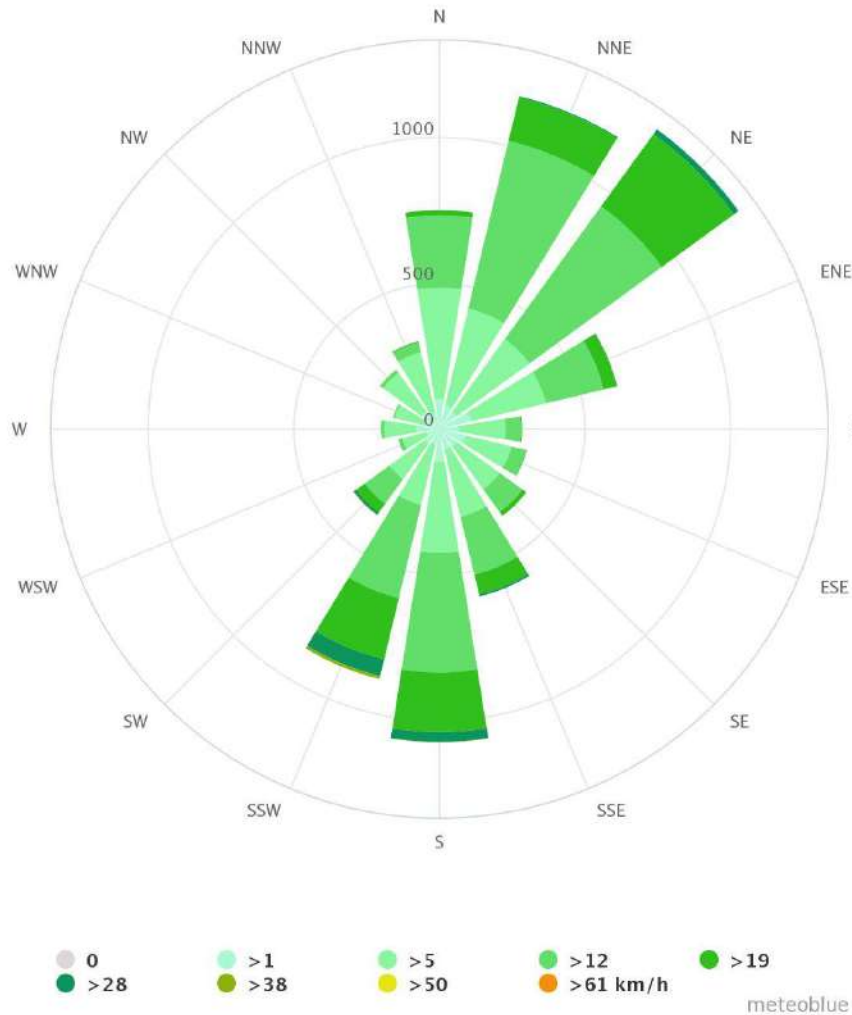


Figure 33: Wind Rose

5.2.4 Regional Soil and Geology

According to the published 1:250 000 Durban geological sheet (2930), the site is underlain at inferred considerable depth below existing ground level (+/-30m) by the Ecca Group in particular medium- to coarse-grained sandstone with grit beds, subordinate grey shale and siltstone with sporadic coal from the Vryheid formation (Pv).

Overlying these formations are red sand, subordinate white, yellow, brown and purple sand with basal conglomerate from the Berea Formation (Qb) which is in turn overlain by a mantle of Recent Aeolian dune sand. By and large the site and immediate surroundings is devoid of major faults or fault related intrusions. An extract of the geology map is shown in Figure 23, while the

soil profiles appended to the Geohydrology Assessment give a better understanding of the site-specific soil conditions.

The Berea Formation, which comprises orange, brown to red brown, loose, intact, fine to medium sand in places becoming slightly clayey to clayey sand with depth. The depth at which sandy Berea Formation was intersected ranged from 0.5 to >2.8m in places whilst the reddish-brown clayey sand where encountered across the site was generally intersected at depths ranging between 1.8 - 2.5m.

The Berea formation is built up by Cenozoic sand dunes underlying the Recent dune sands and has no planar contact. Therefore, a drop of several meters of the contact between the sandy clays and clayey sands of the Berea Formation and the loose, in general, collapsible Recent dune sands may occur within a few meters distance.

The Berea Formation material is overlain by light yellow brown to brown, very loose to loose, intact fine to medium sand which occurs to depths of ranging between 2.0 - >3.0m below existing ground level in places. Excavation in the sandy Berea Formation or sandy Dune sand was plagued by continual, collapse of the excavation sidewalls which often halted further excavation. Collapse often occurred once the excavation in the loose sandy material exceeded a depth of approximately 2.0m (the approximate depth of a single tier grave).

Refer to Figure 34 which depicts the geology of the site and surroundings.



Figure 34: Regional Geology Map⁶

5.2.5 Hydrology

According to the wetland assessment, the proposed site is located in Quaternary Catchment U30D which falls within the Pongola-Mtamvuna Water Management Area (WMA). The study area is drained by small streams which do not connect with the main Tongati River and discharge directly into the Indian Ocean.

According to the National Freshwater Ecosystem Priority Area (NFEPA), project, the sub-quaternary catchment within which the project area is located is not classified as a River FEPA. However, three wetland units all located outside of the 500m buffer zone of the project area have been classified as Wetland FEPAs, as depicted in Figure 35. In terms of the freshwater vegetation component, the 'Indian Ocean Coastal Belt Group 2' wetland vegetation type for the study area is classified as 'Critically Endangered' and generally 'Moderately protected' at a national level.

In terms of Strategic Water Source Areas (SWSAs), the study area falls within the Zulu Coast surface water SWSA.

⁶ 2930 Durban Geological series

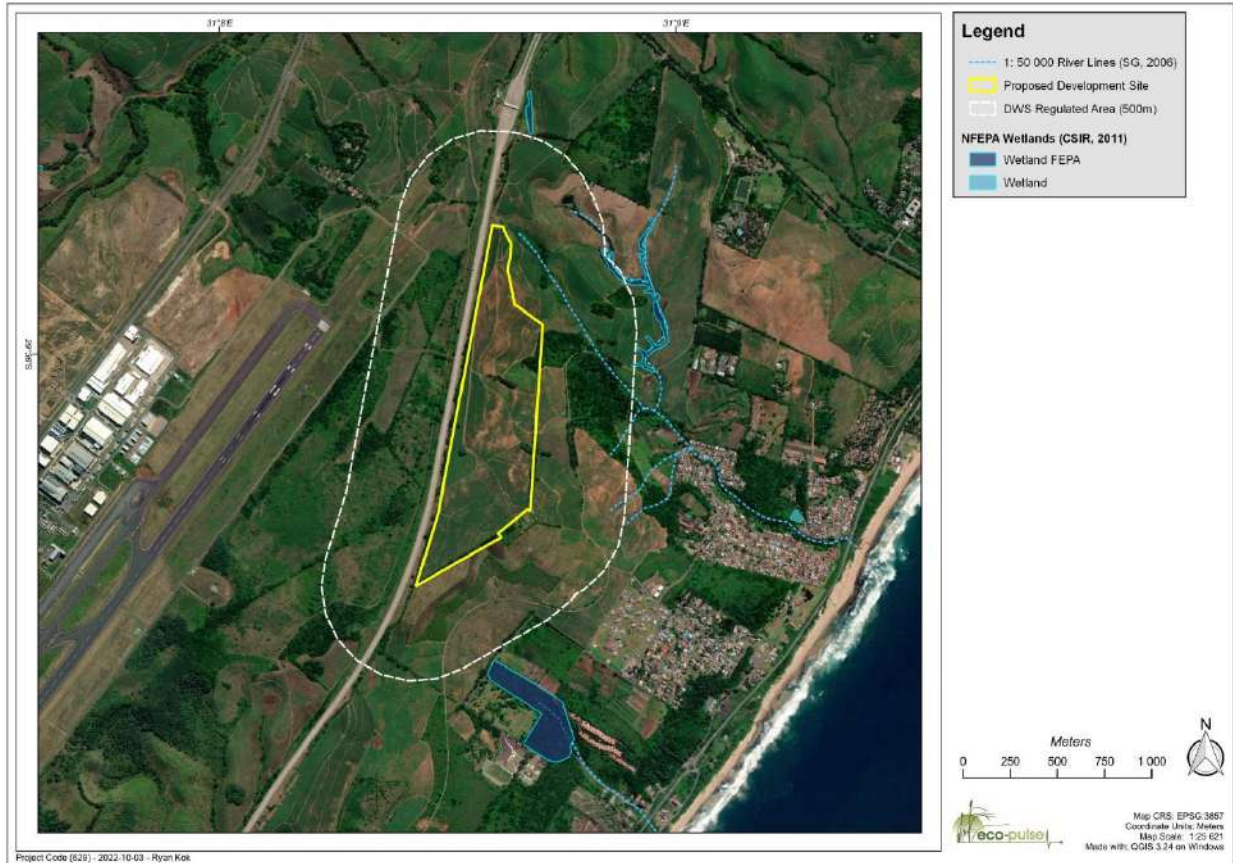


Figure 35: Location and extent of wetland 'FEPAs' in relation to the focal area of study

Figure 36 depicts the hydrology map of the area in relation to the proposed development area.

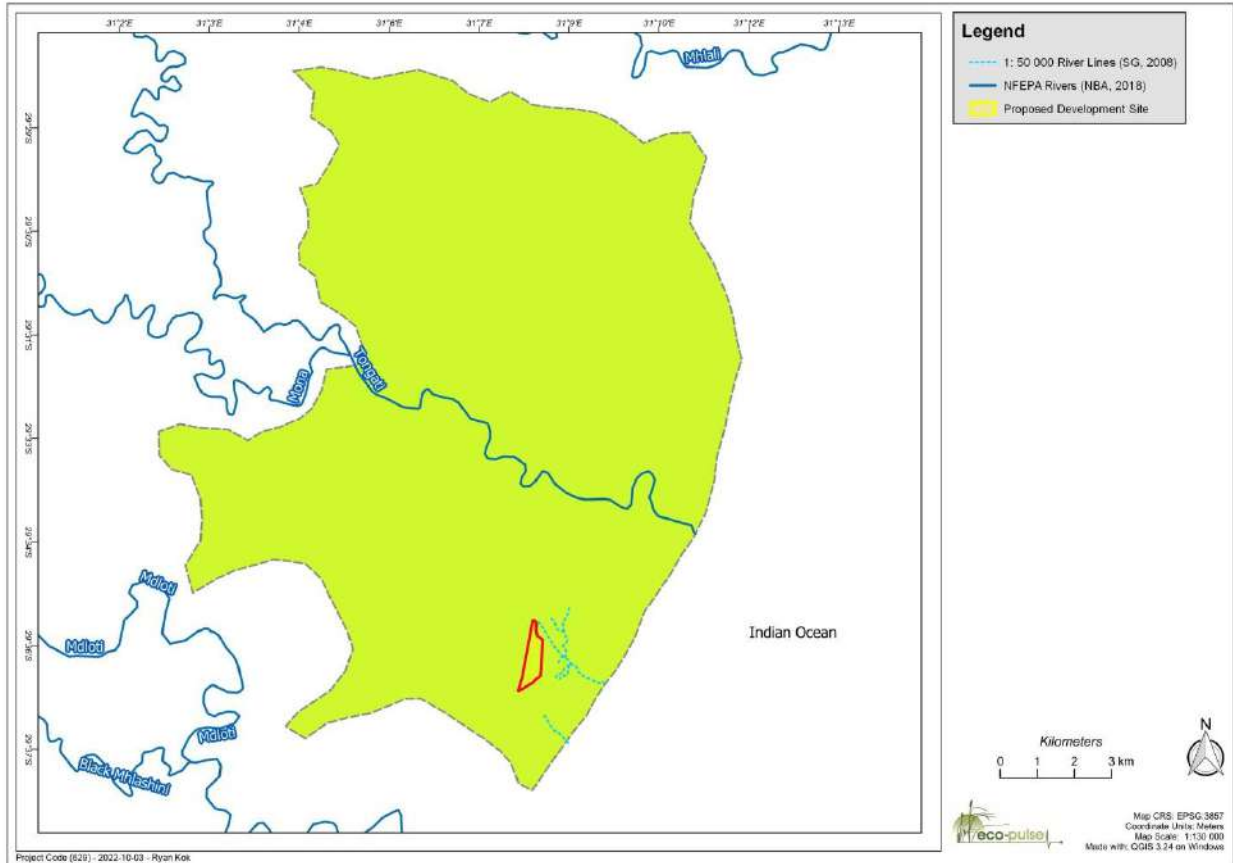


Figure 36: Hydrology Map

5.2.6 Wetland Delineation and Functional Assessment

Seven desktop wetland units and one riparian unit were delineated within the regulated area for wetlands (500m buffer of the proposed Memorial Park). The following desktop watercourses units were identified for infield verification (Refer to Figure 37):

- Wetland Unit W01: Channelled valley bottom wetland
- Wetland Unit W02: Seepage wetland
- Wetland Unit W03: Seepage wetland
- Wetland Unit W04: Seepage wetland
- Wetland Unit W05: Unchannelled valley bottom wetland
- Riparian Unit R01: Ephemeral Stream

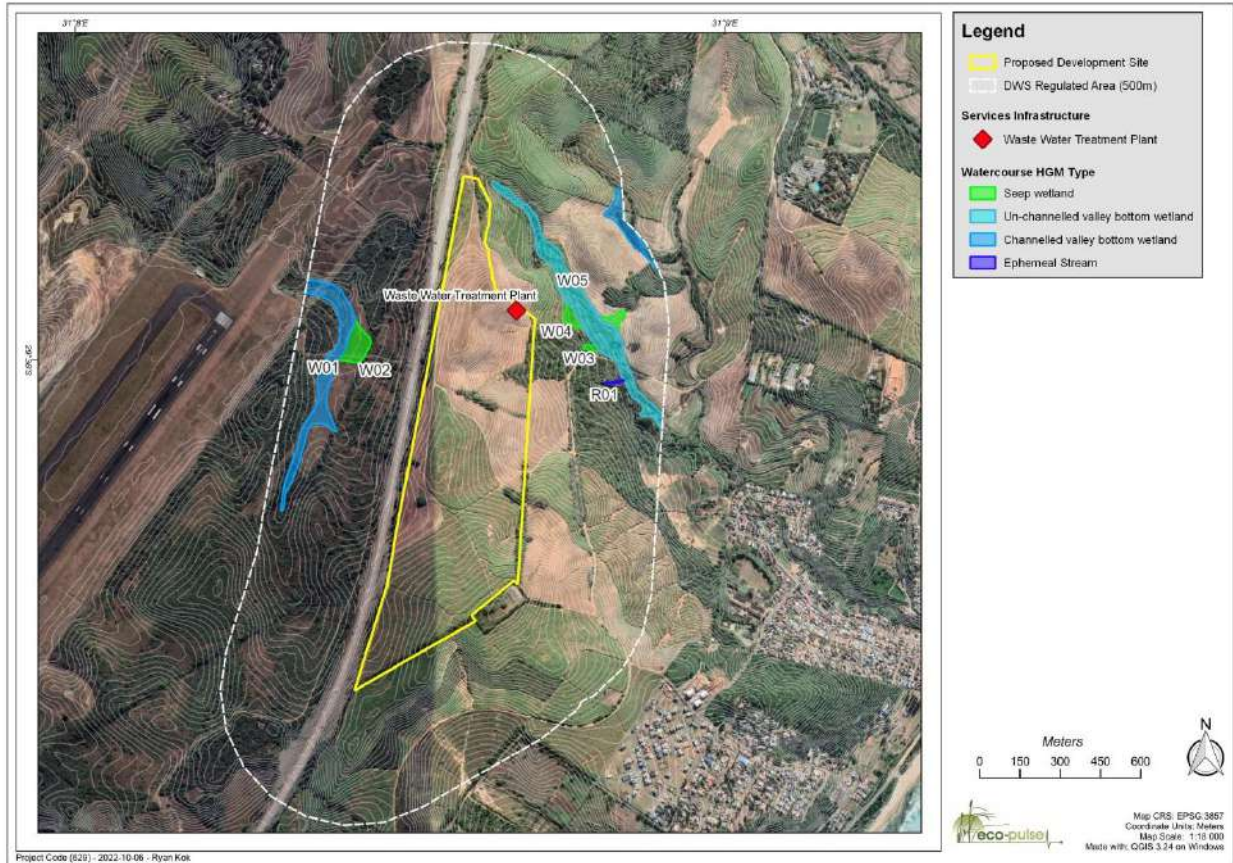


Figure 37: Map showing the location and extent of desktop mapped watercourses classified according to hydro-geomorphic (HGM) type

Watercourses within a 500m radius of the property (i.e. the DWS regulated area for Section 21 (c) & (i) water uses) were identified, mapped and classified at a desktop level using GIS. Refer to Figure 38. Following the desktop identification and mapping exercise, watercourses were assigned preliminary ‘impact potential⁷’ ratings based largely on their location relative to any impact causing activities. The ratings were then refined in the field where necessary and used to inform the need for detailed assessments and potential Section 21 water use licensing requirements. The main aquatic ecological risks associated with the proposed construction and operation of the proposed LMMP include:

- Alteration of catchment surface water processes/ hydrological inputs and associated erosion and sedimentation impacts;

⁷ The impact potential ratings provided relates to the likelihood that a water resources unit may be measurably negatively affected and thus constitute Section 21 Water Use. This was used to inform the Water Use License process. Thus, this is essentially screening, not a risk assessment as ratings are not a representation of risk or impact intensity or magnitude.

- Surface runoff contamination and water quality impacts (Waste Water Treatment Plant); and
- Groundwater pollution – This component is covered in the Geohydrological Assessment Report (Engeolab, 2022).

Construction related risks such as erosion and sediment risks related to surface runoff during construction are likely to be low/negligible.

However, operationally there is the potential risk of the LMMP contaminating surface and sub-surface water (ground water) and where this occurs within the shallow aquifer and where subsurface flows are confined, there is a risk that contaminated but shallow sub-surface flows could indirectly affect wetlands some distance from the site, hence two wetland units (W01 - W05 and R01) were assessed as being 'potentially' at risk of being measurably impacted ecologically by the operation of the proposed LMMP and Waste Water Treatment Plant (WWTW) and require further detailed investigation as part of this freshwater study, as indicated by a 'Likely and 'Possible' impact potential rating in Figure 27.

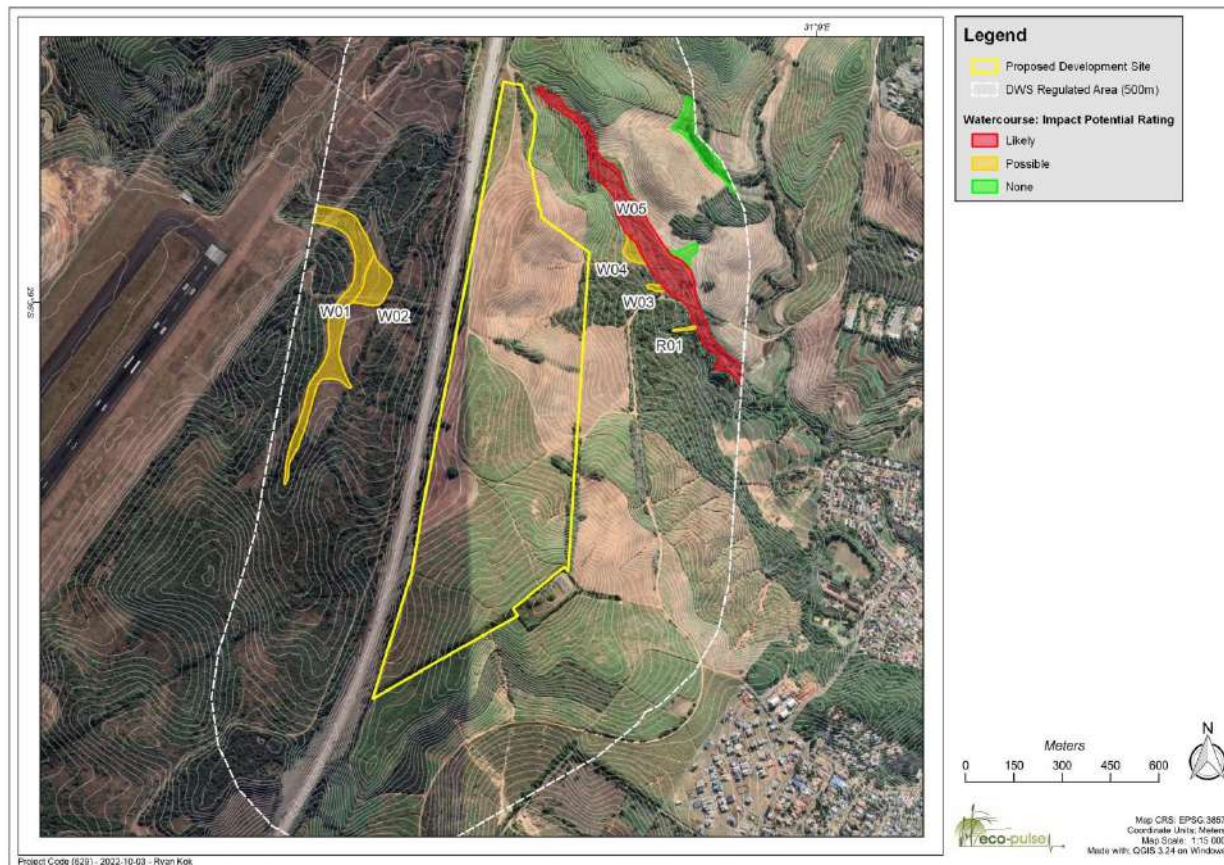


Figure 38: Map showing desktop 'impact potential' ratings for desktop mapped watercourses

Sampling of soils and vegetation in conjunction with the recording of diagnostic topographical / terrain indicators and features was undertaken in focal areas. This enabled the delineation of the outer boundaries of five wetland units and one riparian unit. Two of the wetland units (W01 and W02) are located west of the property and across the N2 Highway. Refer to Figure 28. The remainder of the watercourses are located north-east of the property approximately 100m to 200m downstream.

Soil texture was generally sandy / sandy clay (mineral soils). In most cases, the soils provided a good indication of the level of wetness of the soils (permanent, seasonal and temporary), with low matrix chroma and soil mottling present in most instances. Soils sampled within all wetlands were generally seasonally saturated hydric soils characterised by light grey colours with low soil matrix values and chromas (i.e., 7.5YR 3 / 1). The soil samples extracted using a manual soil auger revealed clear redoximorphic features in the form of orange soil mottling. A high abundance of orange soil mottling within the seasonal zone of wetness was apparent, where frequent wetting and drying of the soil that accompanies seasonal fluctuations in water levels

exposes the minerals and metals within the soil to both anaerobic (oxygen deficient) and aerobic conditions, with accompanying processes of oxidation.

Due to historic cultivation of the wetland habitat (sugarcane production), large-scale transformation of the wetland vegetation was apparent, and as such less emphasis was placed on vegetation in terms of delineating the wetland areas. Temporary saturated areas were noted to be dominated by tufted grasses such *Panicum maximum*, *Pycnus polystachyos* and *Sporobolus africana*, whilst seasonally saturated areas were dominated by *Cyperus dives*, *Paspalum urvillei*, *Commelina erecta*, *Isolepis sp.* and *Kyllinga melanospermum*. Permanently saturated areas were almost exclusively vegetated with *Typha capensis* (Common bulrush) along with patches of *Phragmites australis* reeds.

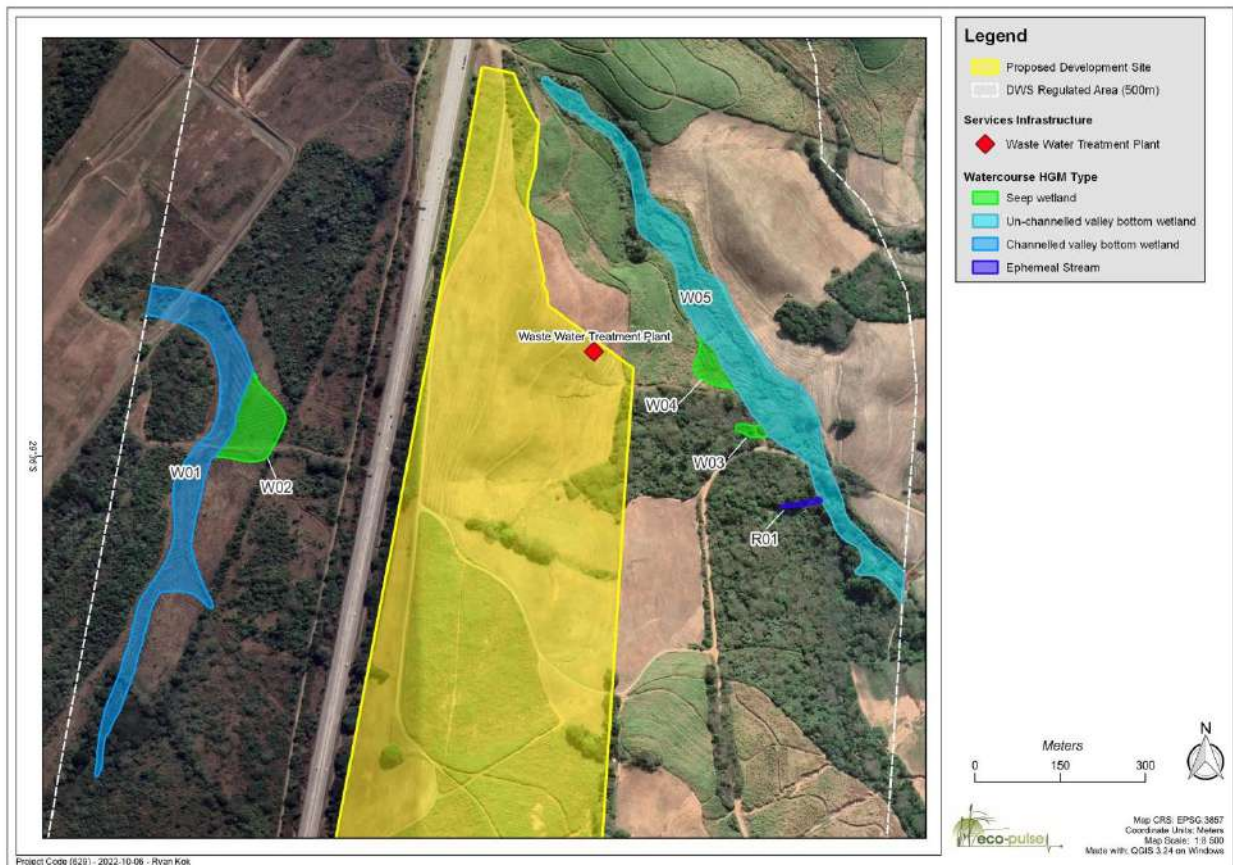


Figure 39: Map showing the location and extent of delineated wetlands

A summary of watercourse habitat characteristics and recorded anthropogenic impacts to watercourses is presented below in Table 21.

Table 21: Summary of the key hydro-geomorphic and biophysical characteristics of the delineated watercourses

Unit ID	HGM Classification	Channel and Flow Characteristics	Dominant Wetness and Soil Characteristics	Broad Vegetation Communities	Existing Impacts
W01	<p>Channelled Valley Bottom Wetland</p> <p>Extent: 3.7ha</p>	<p>Dominant water input: Subsurface flow from valley sides</p> <p>Low flow pattern: Diffuse & concentrated surface flow</p> <p>High flow pattern: Concentrated surface flow</p>	<p>Dominant wetness zone: Seasonal</p> <p>Signs of wetness: Grey sandy soil with distinct orange mottles.</p>	<p>Three vegetation communities were recorded including:</p> <p>(i) Secondary grassland dominated by tufted grasses and common forbs including <i>Paspalum urvillei</i>, <i>Pycreus polystachyos</i>, <i>Digitaria</i> sp. <i>Sporobolus africana</i> & <i>Panicum maximum</i></p> <p>(ii) emergent wetland vegetation comprising mainly <i>Typha capensis</i> and <i>Phragmites australis</i>, and</p> <p>(iii) sugarcane plantation.</p>	<ul style="list-style-type: none"> • Intensive and extensive artificial drainage. • Sedimentation of low-lying areas. • High weed and Invasive Alien Plant (IAP) infestation. • Habitat transformation caused by road infrastructure crossing wetland. • Limited water impoundment at the toe of the wetland. • Concentration of flows by an existing road culvert.

<p>W02</p>	<p>Seep Wetland Extent: 1ha</p>	<p>Dominant water input: Subsurface flow from upslope</p> <p>Low flow pattern: Diffuse subsurface flow with limited concentrated flow paths</p> <p>High flow pattern: Diffuse & concentrated surface flow</p>	<p>Dominant wetness zone: Seasonal</p> <p>Signs of wetness: Grey sandy soil with distinct orange mottles.</p>	<p>Two vegetation communities were recorded:</p> <p>(i) a secondary grassland community dominated by tufted grasses and a few sedges including <i>Paspalum urvillei</i>, <i>Panicum maximum</i>, <i>Pycreus polystachyos</i> & <i>Sporobolus africana</i> and</p> <p>(ii) a thicket dominated by weeds and IAPs.</p>	<ul style="list-style-type: none"> • Artificial drainage of the wetland. • Sedimentation of low-lying areas. • High weed and IAPs infestation. • Habitat transformation by existing road infrastructure.
<p>W03</p>	<p>Seep Wetland Extent: 0.1ha</p>	<p>Dominant water input: Subsurface flow from upslope</p> <p>Low flow pattern: Diffuse subsurface flow with limited concentrated flow</p>	<p>Dominant wetness zone: Temporary</p> <p>Signs of wetness: Grey brown sandy soil with faint orange mottles.</p>	<p>Dominated by IAPs: <i>Tagetes minuta</i>, <i>Chrysanthemoides monilifera</i>, <i>Chromolaena odorata</i>, <i>Paspalum urvilli</i></p>	<ul style="list-style-type: none"> • Sedimentation of low-lying areas. • Moderate weed and Invasive Alien Plant (IAP) infestation.

		paths High flow pattern: Diffuse & concentrated surface flow			
W04	Seep Wetland Extent: 0.3ha	Dominant water input: Subsurface flow from upslope Low flow pattern: Diffuse subsurface flow with limited concentrated flow paths High flow pattern: Diffuse & concentrated surface flow	Dominant wetness zone: Seasonal Signs of wetness: Grey sandy soil with distinct orange mottles.	Dominant vegetation community: primarily sugarcane and alien plants with patches of Typha capensis, Paspalum urvillei, Pycnus polystachyos, Stenotaphrum secundatum and Cynodon dactylon on roads and in drains.	<ul style="list-style-type: none"> • Intensive and extensive artificial drainage. • Sedimentation of low-lying areas. • High weed and Invasive Alien Plant (IAP) infestation. • Habitat transformation caused by sugar cane plantations.
W05	Un-channelled Valley Bottom Wetland Extent: 5.9ha	Dominant water input: Subsurface flow from valley sides Low flow pattern: Diffuse & limited	Dominant wetness zone: Seasonal Signs of wetness: Grey sandy soil with distinct orange	Four vegetation communities were recorded including: (i) Secondary grassland dominated by tufted	<ul style="list-style-type: none"> • Intensive and extensive artificial drainage. • Sedimentation of low-lying areas.

		<p>concentrated surface flow</p> <p>High flow pattern: Diffuse & limited concentrated surface flow</p>	<p>mottles.</p>	<p>grasses and common forbs including Paspalum urvillei, Digitaria sp. Sporobolus africana & Panicum maximum</p> <p>(ii) emergent wetland vegetation comprising mainly Cyperus latifolius and Phragmites australis</p> <p>(iii) sugarcane plantation and (iv) a thicket dominated by weeds and IAPs: Melia Azedarach, Schinus terebinthifolius, Chromolaena odorata</p>	<ul style="list-style-type: none"> • High weed and Invasive Alien Plant (IAP) infestation. • Habitat transformation caused by road infrastructure crossing wetland. • Limited water impoundment at the toe of the wetland. • Concentration of flows by an existing road culvert in the lower reaches.
R01	<p>Longitudinal zone:</p> <p>Mountain headwater stream</p>	<p>Incised stream channel with intermittent flow</p>	<p>Perenniality: Ephemeral</p>	<p>Woody riparian vegetation with IAPs: Trema orientalis, Ficus sur, Solanum mauritianum, Asystasia</p>	<ul style="list-style-type: none"> • Incised channel from road run-off. • Invasive alien plants. • Sedimentation of

				gangetica, Lantana camara, Albizia adianthifolia, Ipomoea purpurea, Melia azedarach, Commelina Africana, Commelina bengalensis	instream habitat from upslope roads and cultivation.
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- **Hypothetical Reference State**

When assessing the Present Ecological State (PES) of wetlands, it is important to first establish their hypothetical 'reference state' (prior to any anthropogenic impacts) which essentially provides a 'benchmark' against which deviations or changes in condition can be evaluated. This is typically achieved by reviewing and interpreting available historical aerial photography, a knowledge of local reference wetland sites (where available) and professional experience working in the area.

There is currently a lack of comprehensive guidelines relating specifically to the determination of hypothetical natural reference state for wetlands in the South African context and in cases where there are no relatively pristine reference wetlands in a similar setting to compare with (i.e. transformed landscapes) or where the characteristic features of some wetlands are naturally highly variable, determining natural reference state can be particularly challenging. The assessor's knowledge of the vegetation and habitat characteristics of some of the more intact/natural wetlands in similar settings was used in this instance. The anticipated reference state has been defined for each wetland HGM type encountered onsite and is summarised in Table 22.

Table 22: Hypothetical reference state of the various wetland and river types assessed

Unit No.	Reference HGM	Reference Flow / Wetness Regime	Reference Vegetation Communities
W01	Unchannelled valley-bottom wetland	Largely seasonal with limited and isolated permanently saturated soils. Flows within the valley floor setting are likely to have been diffuse. The wetland would have been fed by a combination surface water inputs and interflow from adjacent hillslopes.	Temporary to seasonal wetland areas would have been characterised by hygrophilous grassland dominated by grasses and forbs. Permanently saturated wetland areas would have been dominated by emergent plants namely reeds, sedges, rushes and other forbs.
W02	Seep wetland	Mix of temporary and seasonal saturation characterised shallow	Hygrophilous grassland dominated by a mix of coastal wetland grasses and sedges.
W03			
W04			

		subsurface interflow and diffuse surface flow during high flow periods.	
W05	Unchannelled valley-bottom wetland	Largely seasonal with areas of permanently saturated soils. Flows within the valley floor setting are likely to have been diffuse. The wetland would have been fed by a combination surface water inputs and interflow from adjacent hillslopes.	Temporary to seasonal wetland areas would have been characterised by a hygrophilous grassland dominated by grasses and forbs. Permanently saturated wetland areas would have been dominated by emergent plants namely reeds, sedges, rushes and other forbs.

- **Wetland PES Assessment**

The results of the PES assessed are presented in Table 23. Based on the outcomes of the WET-Health PES assessment, ‘W03’ which is considered ‘Moderately Modified’ (‘C’ PES category) whilst all other wetlands are considered ‘Largely Modified’ (‘D’ PES Category). Key drivers of wetland degradation can be attributed to historic and current cultivation activities and discharge of stormwater into the wetland units.

- Hydrologically, the wetlands have been significantly affected, primarily by the effects of artificial drainage, which has lowered the water table within the wetlands as well as catchment impacts (sugarcane cultivation reducing flows) and discharge of stormwater into the wetlands from the N2 highway and farm roads.
- The geomorphological template of the wetlands has been moderately impacted and affected as a result of soil loss through artificial drainage of the wetland and flow concentration impacts as a result of road culverts and road stormwater discharge.
- Vegetation has responded to the altered hydrology, as well as the effect of transformation caused by road construction across the wetlands. As a result of disturbance caused by sugarcane cultivation, the vegetation of the wetlands reflects a more secondary hydric grassland community with high levels of weeds and alien plants.

Table 23: Summary of the WET-Health PES assessment results for all wetlands assessed

Category	PES Score and Rating				
	W01: CVB	W02: seep	W03: seep	W04: seep	W05: UCVB
Hydrology	6.0 'E' PES	5.0 'D' PES	3.5 'C' PES	5.0 'D' PES	6.0 'E' PES
Geomorphology	2.7 'C' PES	2.1 'C' PES	1.2 'B' PES	2.1 'C' PES	3.5 'C' PES
Vegetation	6.1 'E' PES	7.2 'E' PES	5.2 'D' PES	7.2 'E' PES	6.5 'E' PES
Overall	5.1 'D' PES: Largely modified	4.8 'D' PES: Largely modified	3.3 'C' PES: Moderately modified	4.8 'D' PES: Largely modified	5.4 'D' PES: Largely modified

- **Wetland Ecosystem Services**

The predicted level of importance of ecosystem services provided by wetlands has been included in summary Table 24:

- Wetlands W01, W02, W04 & W05, in their degraded (artificially drained) state and location are considered of 'low' to 'moderately-low' importance in providing key regulating & supporting services such as stream flow regulation and sediment trapping;
- The wetlands are not considered particularly important in terms of enhancing water quality in their current degraded state (limited functioning in drained state). However, W05 is considered of 'moderate' importance for water quality enhancement and is driven by the retention times of water moving through the wetland that is in turn is driven by the moderate longitudinal gradient, the spreading out of flows, the seasonally saturated conditions, and the dense and robust wetland vegetation;
- The biodiversity maintenance for all wetlands is considered of 'very-low' to 'low' importance due to the degraded wetland habitat which is not considered important in terms of supporting biodiversity (unlikely to harbour key species); and
- The provisioning and cultural services provided by the wetlands were assessed as being of very-low importance due to the wetland being located on private property (no community access) and the limited occurrence of natural resources of direct and indirect use value for communities.

Table 24: Importance of wetlands in providing key ecosystem services provided for the various wetland units assessed

ECOSYSTEM SERVICE		W01: CVB		W02: Seep		W03: Seep		W04: Seep		W05: UCVB	
		Importance Score	Importance	Importance Score	Importance	Importance Score	Importance	Importance Score	Importance	Importance Score	Importance
REGULATING AND SUPPORTING SERVICES	Flood attenuation	0.6	Very Low	0.6	Very Low	0.3	Very Low	0.6	Very Low	0.6	Very Low
	Stream flow regulation	0.9	Low	0.9	Low	0.2	Very Low	0.9	Low	1.3	Moderately Low
	Sediment trapping	1.3	Moderately Low	0.9	Low	0.6	Very Low	0.9	Low	1.6	Moderately Low
	Erosion control	1.5	Moderately Low	1.2	Moderately Low	0.8	Low	1.3	Moderately Low	1.7	Moderate
	Phosphate assimilation	1.5	Moderately Low	1.3	Moderately Low	1.0	Low	1.3	Moderately Low	1.6	Moderately Low
	Nitrate assimilation	1.1	Moderately Low	1.4	Moderately Low	1.0	Low	1.4	Moderately Low	1.3	Moderately Low
	Toxicant assimilation	1.5	Moderately Low	1.5	Moderately Low	1.0	Low	1.5	Moderately Low	1.6	Moderately Low
	Carbon storage	0.9	Low	0.5	Very Low	0.9	Low	0.5	Very Low	1.0	Low
	Biodiversity maintenance	0.9	Low	0.7	Very Low	0.3	Very Low	0.7	Very Low	1.0	Low
PROVISIONING SERVICES	Water for human use	0.3	Very Low	0.0	Very Low	0.0	Very Low	0.0	Very Low	0.4	Very Low
	Harvestable resources	0.4	Very Low	0.2	Very Low	0.2	Very Low	0.2	Very Low	0.4	Very Low
	Food for livestock	0.6	Very Low	0.6	Very Low	0.0	Very Low	0.0	Very Low	0.0	Very Low
	Cultivated foods	1.0	Low	0.9	Low	0.0	Very Low	1.0	Very Low	1.0	Low
CULTURAL SERVICES	Tourism and Recreation	0.0	Very Low	0.0	Very Low	0.0	Very Low	0.0	Very Low	0.0	Very Low
	Education and Research	0.6	Very Low	0.6	Very Low	0.0	Very Low	0.0	Very Low	0.6	Very Low
	Cultural and Spiritual	0.6	Very Low	0.6	Very Low	0.0	Very Low	0.0	Very Low	0.6	Very Low

- **Wetland Ecological Importance and Sensitivity (EIS) Assessment**

Based on the importance of wetlands at providing wetland goods and services and the sensitivity of each wetland unit, the Ecological Importance and Sensitivity (EIS) for all wetlands were rated using the Wetland EIS tool developed by Eco-Pulse (2017). Refer to Table 25. In their current degraded state, with reduced ecological importance, functional value and sensitivity, wetlands were rated as 'Low' to 'Moderate' in terms of EIS.

Table 25: Summary results of the wetland EIS assessment

Unit	Ecological Importance	Ecological Sensitivity	Overall EIS Score	EIS Rating
W01	1.5	0.6	1.5	Moderately Low
W02	1.4	0.5	1.4	Moderately Low
W03	1.0	0.5	1.0	Low
W04	1.4	0.5	1.4	Moderately Low
W05	1.7	0.7	1.7	Moderate

- **River/Stream PES Assessment**

The results of the river IHI assessment are summarised in Table 26. River Unit R01 was rated as 'Moderately Modified' ('C' PES category) due to channel erosion, sedimentation and moderate levels of alien plant infestation. The main impacts observed were:

- Channel erosion linked with road run-off from the unpaved road upslope which directs flows into the unit.
- Sedimentation of instream habitat from road run-off containing high sediment loads.
- Degradation of natural indigenous riparian vegetation communities from alien invasive alien plants.

Table 26: Summary of the PES assessment for stream unit R01

Type	Instream Habitat PES	Impact Descriptions	Riparian Habitat PES	Impact Descriptions	Overall PES
R01 'Ephemeral Stream'	B Class: 'Largely natural / Low impact'	<ul style="list-style-type: none"> • Channel erosion / incision. • Sedimentation of instream habitat. 	C Class: 'Fair / Moderately modified'	A moderate abundance of alien invasive plants throughout	C Class: 'Fair'

				riparian zone.	
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- River/Stream Ecological Importance and Sensitivity (EIS) Assessment**

For the purposes of this assessment, river EIS was based on rating the importance and sensitivity of riparian and in-stream biota and habitat, using both desktop and on-site indicators. A breakdown of the EIS score and ratings is provided in Table 27. The results indicate that Unit R01 is of ‘Low’ EIS. The ‘low’ rating is driven primarily by the fact that there are no noteworthy biodiversity attributes, the degraded condition and is not considered important in terms of provincial conservation planning.

Table 27: Summary of the EIS assessment for the river/stream

River/ Stream Unit	Median Score (0-4)	EIS	Description
R01	1.0	Low	Regarded as somewhat ecologically important and sensitive but only at a local scale. The functioning and/or biodiversity features have a low-medium sensitivity to anthropogenic disturbances. They typically play a very small role in providing ecological services at the local scale.

- Recommended Ecological Category (REC) & Management Objectives (RMOs)**

The future management of the freshwater ecosystems identified for the project area should be informed by recommended management objectives for the water resource which, in the absence of classification, is generally based on the current ecological state or PES (Present Ecological State) and the EIS (Ecological Importance and Sensitivity) of water resources. Refer to Table 28.

Table 28: Management measures for water resources

			EIS			
			Very High	High	Moderate	Low
PES	A	Pristine/ Natural	A Maintain	A Maintain	A Maintain	A Maintain
	B	Largely	A	A/B	B	B

		Natural	Improve	Improve	Maintain	Maintain
	C	Good – Fair	B Improve	B/C Improve	C Maintain	C Maintain
	D	Poor	C Improve	C/D Improve	D Maintain	D Maintain
	E/F	Very Poor	D Improve	E/F Improve	E/F Maintain	E/F Maintain

The recommended management objective for all watercourses assessed should be, at a minimum, to ‘maintain the current status quo of aquatic ecosystems without any further loss of integrity (PES) or functioning (EIS)’. This is depicted in Table 29.

Table 29: Summary of the assessment of the Resources Management Objectives based on PES and EIS ratings

Watercourse Units	PES	EIS	RMO
Wetland W01	D: Largely Modified	Moderately-Low	Maintain PES/EIS
Wetland W02	D: Largely Modified	Moderately-Low	
Wetland W03	C: Moderately Modified	Low	
Wetland W04	D: Largely Modified	Moderately-Low	
Wetland W05	D: Largely Modified	Moderate	
Stream R01	C: Moderately Modified	Low	

Refer to **Appendix E2** for the comprehensive Fresh Water Assessment.

5.2.7 Aquatic

The small non-perennial stream (unnamed) situated northeast of the site, which discharges directly into the Indian Ocean was sampled to establish river health conditions as there are no other streams or rivers traversing the study area.

As per the Screening Report attached as **Appendix E1**, the Aquatic Biodiversity Theme has a low sensitivity as depicted in Figure 40.



Figure 40: Aquatic Sensitivity Map

The Aquatic Assessment confirmed this as no watercourses are present within the boundaries of the proposed project site. Furthermore, it was found that the surrounding watercourses consisted of non-perennial streams which displayed impaired ecological categories that can mainly be contributed to the associated river characteristics which include limited habitat and are not a reflection on water quality.

Four aquatic assessment sites associated with the proposed cemetery were identified. A description and photographs of the prevailing conditions for each aquatic assessment site, as well as the rating of the Integrated Habitat Assessment System Version 2 (IHAS V2), are provided in Table 30 to Table 33. The IHAS provides the suitability of the habitat of each site which influences the survival of aquatic macro-invertebrates and aid in the interpretation of the SASS5 results.

Where there was an absence of flowing water, IHAS and SASS5 results could not be obtained. Notwithstanding, in situ water quality was measured where possible and it was possible to perform the IHI assessment to indicate the impacts on the riparian and the instream habitats, which would impact the residing macroinvertebrate communities should they be present.

Table 30: Assessment site LM01



Assessment Site LM01	
	
Location	Assessment site LM01 is located on the unnamed non-perennial stream, downstream of the proposed cemetery. The surrounding land use consisted of vegetable crops, a coastal forest within the riparian boundary, and residential areas.
Depth Profile	Water was absent but a defined river channel was present.
Flow condition	No water flow.
Riparian zone characteristics	The riparian zone is dominated by large woody forms and dense undergrowth. Both banks are well covered with vegetation and there is no evidence of erosion.
Water clarity and odour	N/A
IHAS	N/A

Table 31: Assessment site LM02

Assessment Site LM02	
	
Location	Assessment site LM02 is located upstream of the proposed cemetery, on an unnamed non-perennial stream which forms part of a delineated unchannelled bottom valley wetland system. The surrounding land use consists of sugarcane fields.
Depth Profile	The site consists of a shallow run with a depth of 0.25 m.

Flow condition	Under the present flow conditions, the flow can generally be considered as slow flowing runs. The width of the stream is approximately 1 m.
Riparian zone characteristics	The riparian zone is dominated by grasses and reed beds. Both banks are completely covered with vegetation and there is no evidence of erosion.
Water clarity and odour	The water was clear with no odour present.
IHAS	Inadequate

Table 32: Assessment site LM03



Assessment Site LM03	
	
Location	Assessment site LM03 is located on an unnamed non-perennial stream, downstream of Site LM2 and the unchanneled bottom valley wetland system. The site is bisected by a recently repaired sand road and evidence of recent flooding was visible, where large sand deposits are present within the river channel. The surrounding land use consists of sugarcane fields and coastal forests within the riparian boundary.
Depth Profile	The assessment site is mainly characterised by very shallow flowing runs.
Flow condition	Under the present flow conditions flow was considered as slow. The width of the stream was 1-2m.
Riparian zone characteristics	The riparian zone consists of grasses and large woody forms. Both banks are well covered with vegetation. Although there is no evidence of erosion at this point there are large sand deposits within the river channel indicative of recent flooding.
Water clarity and odour	The water appeared slightly silty. No odours present.
IHAS	Inadequate

Table 33: Assessment site LM04

Assessment Site LM04	
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Location	Assessment site LM04 is the furthest downstream site on the northerly unnamed non-perennial stream. The surrounding land use consists of residential houses as part of the Tongaat Beach suburb. Piles of dead plant debris provided evidence of recent flooding.
Depth Profile	The stream channel had a depth of less than 30cm.
Flow condition	Under the present flow conditions, the flow can generally be considered as slow flowing runs. The width of the river was approximately 2m.
Riparian characteristics	zone The riparian zone is vegetated by grasses, and reeds, with some larger trees visible upstream. Even though both banks are generally well covered with vegetation, erosion was visible on the right bank and sand deposition on the left bank.
Water clarity and odour	The water was clear. No odours evident.
IHAS	Inadequate

In situ water quality measurements are provided in Table 34. Water flow was absent at site LM01.

Table 34: In situ water quality measurements

Parameter	Guidelines	MG01	MG02	MG03
pH	6-9	7.1	7.4	7.6
Temp (oC)	5-30	15.1	15.8	16.5
Total Dissolved solids and Electrical Conductivity (EC) (mS/m)	<70	56	52	48
Dissolved	80-120%	80	97,8	102,4

Oxygen (DO) %				
TDS	<520	270	250	230

Habitat Characterisation

- **Index of Habitat Integrity (IHI)**

It was found that the non-perennial stream was rated as Ecological Category C, which indicates that it is moderately modified with some loss or change of natural habitat. This has resulted in lower diversity and abundance of macroinvertebrates but basic ecosystem functions are still intact. A summary of the results of the habitat integrity assessment for the non-perennial stream is provided in Table 35.

Table 35: Results of the IHI Assessment

River /Reach	Component	Threads/Impacts	IHI value %	Ecological Category
La Mercy Unnamed non-perennial stream	Instream Habitat	<ul style="list-style-type: none"> • Abstraction of water. • Informal road crossings impacting on water flow and sedimentation transport within the river system. • Seasonal flooding. 	67	C
La Mercy Unnamed perennial stream	Riparian Habitat	<ul style="list-style-type: none"> • Exotic vegetation. • Seasonal flooding. • Agricultural practices-sugarcane. 	65	C

- **Vegetation Response Assessment Index**

The marginal and non-marginal vegetation associated with the assessment sites are displayed in Table 36.

Table 36: Results of the VEGRAI Assessment

Assessment site	VEGRAI Category
Unnamed tributary (LM02, LM03, and LM04)	D – Largely Modified

The marginal and non-marginal vegetation associated with assessment points LM02, LM03, and LM04 on the unnamed tributary near the project site was classed Largely Modified (Category D) indicating that a large loss of natural vegetation and basic ecosystem function has taken place. This is predominantly due to extensive clearing of non-marginal vegetation for sugarcane fields and widespread alien invasive proliferation was observed within the reach due to agricultural practice.

Aquatic Macroinvertebrates

The results of the assessment of the aquatic macroinvertebrate assemblages are summarised in Table 37.

Table 37: Aquatic Macroinvertebrate Community Analysis

Assessment Point	SASS5 Score	Number of Taxa	ASPT	SASS5 Category	MIRAI	Variation from SQR (%) ⁸
LM02	33	9	3.7	E/F	D	-86%
LM03	33	8	4.1	E/F	D	-88%
LM04	23	6	3.8	E/F	D	-91%

- ***Assessment Site LM02***

The ecological category at this assessment site was determined to be Seriously Modified (Category E/F). A total of nine macroinvertebrate taxa were sampled with an ASPT of 3.7. The majority of taxa (77%) showed low sensitivity ranges, which is indicative of species that are tolerant to more adverse environmental conditions such as Turbellaria (Flatworms), Coenagrionidae (Sprites and blues), and Chironomidae (Midges). Limited species with a moderate requirement for good water quality were present such as Atyidae (Freshwater shrimps). The MIRAI assessment regarded conditions as being Largely Modified (Category D). The impaired ecological category is primarily due to seasonal changes within the reach, as indicated by the MIRAI assessment.

- ***Assessment Site LM03***

⁸ Variance calculations were determined using the data set out for the SQR expected invertebrate taxa (U30D-04315): 67.

A total of eight taxa with a SASS5 score of 33 and ASPT of 4.1 was recorded at this site. The ecological category at this assessment site was determined to be Seriously Modified (Category E/F). The macroinvertebrate assemblage was equally divided by the number of taxa that are very tolerant to adverse environmental conditions such as Chironomidae (Midges) and Muscidae (House flies, Stable flies), and taxa that have a moderate requirement for good water quality such as two species of Baetidae (Mayflies). Habitat biotopes were restricted to stones and GSM, limiting the diversity of macroinvertebrate communities. The aquatic macro-invertebrate community diversity and sensitivity were classified as a Category D (Largely Modified) condition according to the MIRAI Ecostatus tool. The MIRAI assessment indicated that with sufficient flow, a higher macroinvertebrate assemblage may be observed.

- **Assessment Site LM04**

The aquatic macroinvertebrate community assessment revealed that the ecological category at this site is Seriously Modified (Category E/F). The low ecological category is primarily due to the limited available biotopes present within the reach. The Gravel, Sand and Mud biotope under low flowing conditions generally promote an assemblage comprising semi-intolerant and tolerant taxa with lower sensitivities. The MIRAI assessment regarded conditions as being Largely Modified (Category D) and indicated that with sufficient flow, a higher macroinvertebrate assemblage may be observed.

It was found that the impaired ecological category for all of the above sites is primarily due to seasonal changes within the reach, as indicated by the MIRAI assessment. The deviation from the reference ecoregion conditions observed is not an indication of impaired water quality but rather the impact of seasonal change which has promoted low water levels and slow flow within the reach resultant in a more tolerant macroinvertebrate assemblage.

Ecological Importance and Sensitivity Assessment

An EIS category was determined for the unnamed tributary northeast of the study area. The category of this system (Table 38) was calculated to be Low: Quaternaries/delineations that are not unique on any scale. The biota and habitat of these rivers are generally not very sensitive to flow modifications and usually have substantial capacity for use.

Table 38: EIS category scoring summary for the Unnamed Tributary

Component	Score (0-5)	Comments/Description
Channel Type	0	Non-perennial stream
Conservation Context	0	No Context

Vegetation and Habitat Integrity	2	Modified
Connectivity	1	Low
Threat Status of Vegetation Type	3	Critically Endangered
EIS Rating	1.2	Low

Refer to **Appendix E3** for the comprehensive Aquatic Report.

5.2.8 Groundwater

The Geohydrological Report by GCS recommends that based on the generic requirements for siting cemeteries (internationally and in South Africa), graves should be at least 50m from a watercourse and 100m from the 1: 50 Floodline (Engeolab, 2022). Figure 41 shows the recommended 20m and 32m watercourse buffer zone relative to the proposed LMMP and WWTW located upslope of the wetlands and rivers.

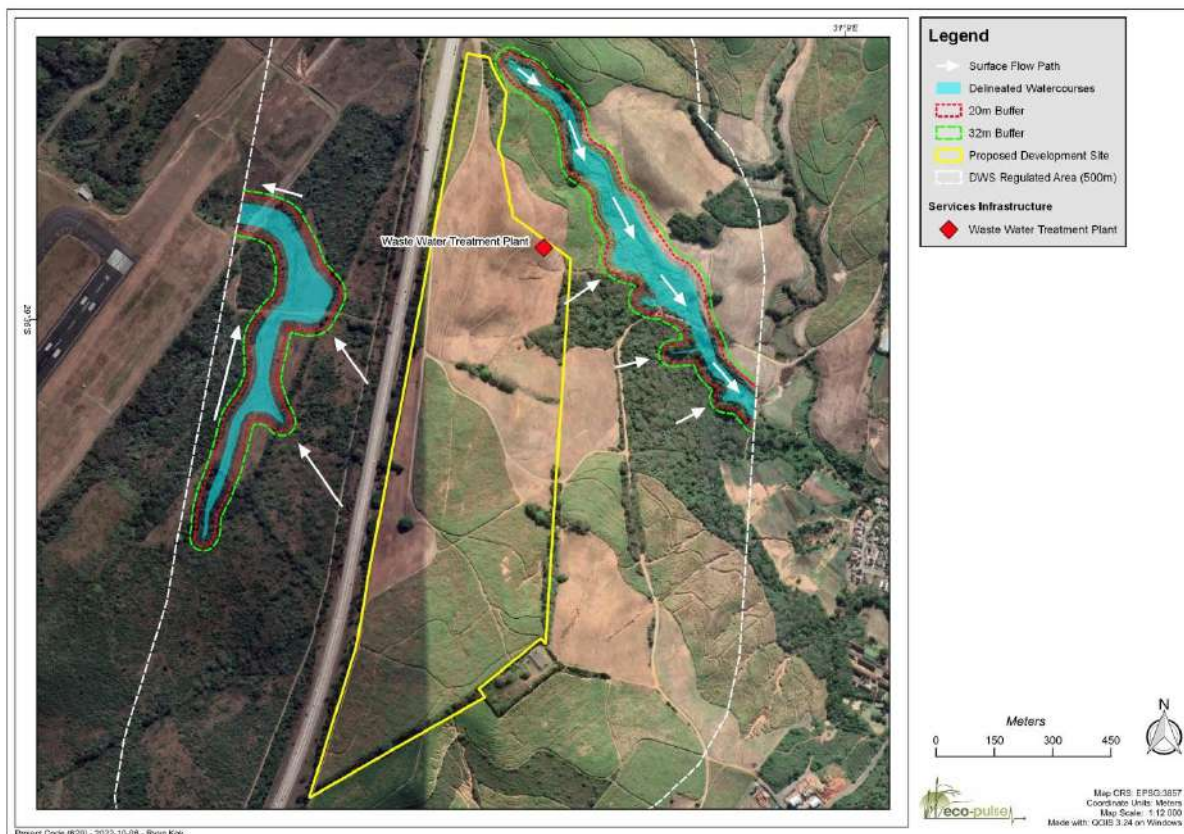


Figure 41: Recommended 20m and 32m watercourse buffer Map

Refer to **Appendix E3** for the comprehensive Aquatic Report.

5.2.9 Geohydrology

Risk Associated With Cemeteries

Cemeteries do pose risk. Decay of organic material will inevitably result in some form of contamination of the subsurface; whether this reaches receptors (through for instance groundwater, surface water or the biosphere) is subject to the quality of the land use investigation, the ability of the vadose zone to protect groundwater and the practices employed in interments. According to the Department of Water Affairs (DWA 2010), the risk of pollution to water resources posed by cemeteries is acceptable and mostly negligible.

Reasons stipulated include the slow process associated with the decay of human bodies and the short lifespan of bacteria outside of the human body, reticulated water supply which ensures good quality drinking water, more significant contamination emanating from other sources (e.g., waste disposal sites and sewage), and the fact that other uses – such as irrigation – exist for slightly contaminated water.

According to Section 21 of the Environmental Conservation Act (DEAT 1989), the “... change of land use to that of a cemetery is subject to a mandatory Environmental Impact Assessment (EIA)”. Poorly sited cemeteries can pose a pollution threat to the environment, including short-term impacts such as noise, flies and air pollution, as well as long-term impacts such as pollution to the water regime. Decomposition of buried human corpses results in groundwater contamination due to, for instance, residues or particulates and pathogens that are generated during the decomposition process (Fisher & Croucamp 1993).

Vulnerability is accentuated in areas with high rainfall, shallow water tables, fractured rocks and any other high permeability areas. The risk of water contamination is, furthermore, increased where burial is near the water table or next to groundwater abstraction points as this reduces the time needed for mobile waste production to degrade completely and for the geological subsurface material to purify the potential pathogens. Additionally, contamination can be increased where corpses are buried in direct contact with the groundwater, causing reduction in the time taken for mobile degradation to reach the subsurface, or with an increase in number of burials (Engelbrecht 2000).

For this reason, some sources (e.g. NIEA 2012) stipulate criteria for safe siting of burial sites with the purpose of protecting water resources. Intrusive investigation should be at least 2.8 m deep to account for a 1.8 m deep grave and to prove 1.0 m of additional subsoil below the base of the burial pit. At least 1 m of soil should cover the coffin. The grave pit should be at least 10 m from any field drain, 50 m from any watercourse, spring, well or borehole

(although WHO 1996, EA 2004 and Young 2002 stipulate 30 m), and at least 250 m from any drinking water source.

Backfill material in graves may be less compacted than the in-situ material and may, therefore, act as preferential pathways. Resulting from this, the graves may be near water saturation, resulting in anaerobic conditions for the breakdown of the organic matter. Interaction and interflow may occur between proximate graves, and/ or contaminated water may enter the vadose zone below the grave bottom if the water table is sufficiently deep. Natural attenuation of contaminants may occur in the vadose zone due to possible aerobic conditions in this aerated zone. Shallower groundwater should be more vulnerable to contamination due to the thinner vadose zone decreasing natural attenuation and possible mounding of the water table, which can even result in a periodical contact between the grave bottom and the groundwater table.

Risk is, furthermore, exacerbated by the proximity of surface water drainage features and, notably, streams in direct interaction with the regional groundwater whereas losing streams are possibly more protected as the groundwater flow may be in an opposite direction at a local scale. Deep groundwater systems are likely most protected due to the thick vadose zone enhancing natural attenuation.

Sorption and intense chemical and biochemical degradation predominate in the soil zone in which the grave is located. The vadose zone is governed by continued sorption with reduced chemical and biochemical degradation. The phreatic zone is characterized by distinct dispersion and dilution of contaminants and processes are a function of the aquifer material and groundwater chemistry (EA 2004). Adsorption results in attenuation and capture of particulates, whereas filtration (due to water flow) results in, for instance, straining or retention due to changing pore geometry.

A lean 70 kg adult male human body is composed of approximately 16 000 g C, 1 800 g N, 1 100 g Ca, 500 g P, 140 g S, 140 g K, 100 g Na, 95 g Cl, 19 g Mg, 4.2 g Fe and 70 – 74% water by weight. Females are generally two thirds to three quarters of this and other elements occur in millimole and micromole amounts (Dent and Knight 1998; Forbes 1987). A human corpse decays in 10 – 12 years and comprises matter of which 60% is readily degradable, 15% moderately degradable, 20% slowly degradable and 5% inert. Half the pollutant load can leach within the first year with less than 0.1% of the contaminant load remaining after 10 years. Influences on decay include climate and soil lithology where warmer temperatures and well-drained soils will accelerate decomposition, as well as burial practice, which includes the depth of burial and coffin construction.

The WHO (1996) addresses factors affecting the survival of bacteria and viruses from burial sites. Increasing the temperature between 5°C and 30°C, microorganisms die off at a rapidly increasing rate. Optimal pH is around 6 – 7 and beyond either extreme their possible survival decreases significantly. Soil pH, cations and soil texture all contribute to possible water retention and adsorption of viruses to soils. Importantly, bulk of the pathogens is adsorbed to the soil, but increasing water velocity decreases this adsorption.

All in all, even though the risk posed by cemeteries is possibly lower than other sources of contamination, a risk still does exist. This risk is increased by the typical location of these sites within developed residential areas and peri-urban nodes where groundwater and surface water are often used for domestic purposes. Proper site investigation will result in proper siting and proper management of burial sites, thereby lowering the risk further.

Site Investigation for Cemeteries

Although considered low risk, the Department of Water Affairs (DWA) acknowledges the potential risk through certain guidelines. Cemeteries implemented after 1998 constitute a water use according to section 21(g) of the National Water Act (NWA in DWA 1998) and new cemeteries following the implementation of this act needs to be authorised. Section 21(g) states that licensing is required when "... disposing of waste in a manner which may detrimentally impact on a water resource." They continue to state that poor siting of cemeteries leading to increased risk is due to poor land use planning from the local government and detection of pollution due to cemeteries will be enforced according to the act. Finally, local authorities manage the implementation, legislation and land use planning and should govern the location according to the NWA that cemeteries should not be located:

- Within the 1 in 50-year flood line of a river
- Near water bodies such as wetlands, pans, vleis, estuaries and floodplains
- Near unstable areas such as fault zones and karst areas
- Near ecologically sensitive areas
- In areas with shallow gradients or shallow or emergent groundwater
- In areas with steep gradients, shallow bedrock, or areas prone to slope failure
- In areas of groundwater recharge due to topography or soil permeability
- Overlying or adjacent to (potentially) important water supply aquifers.

Hall and Hanbury (1990) recommend a six-fold investigation based on physical aspects (excavatability, stability of sidewalls and workability through replacement of removed soil back into the grave) and sanitary aspects (position of the water table, subsoil permeability

and the presence of attenuation or aeration zones, and drainage as the risk of water draining through the backfill material into the grave).

Fisher (1992) recommends investigation of geological factors influencing soil conditions, underlying rock, groundwater conditions and surface water. Soil conditions include soil type, structure, density, permeability, and moisture content whereas underlying rock comprise bedrock, paedogenic material, joint and discontinuity frequency, joint condition, joint fill material and degree of weathering. Groundwater conditions relate to the depth of the permanent water table, frequency of perched water tables, prevailing hydraulic gradient, as well as the relationship between topography and groundwater table. Surface water occurring in drainage features refers to perennial or non-perennial streams, as well as the frequency of flow of the latter, stream order, storage dams, topographical and climatic influences, slope shape and gradient, and the incised nature of the landscape.

Following on the abovementioned, Fisher (1994) also recommends the following requirements for a site to serve as a cemetery:

- The surface gradient should be between 2° and 6° (up to 9° in extreme cases) to ensure adequate drainage of the site, to minimise erosion and to promote mobility on site.
- The soil profile depth should be at least 1.80 m for ease of excavation.
- The soil consistency should be such that it ensures the stability of the grave walls for a few days.
- The underlying site soils should have a low permeability (10⁻⁵ to 10⁻⁶cm/s) to prevent groundwater contamination.
- The site should be located at least 100 m from the 50-year flood line.
- The groundwater depth should exceed 4 m.
- A buffer zone of at least 2.5 m should be present between the bottom of the grave and the top of the groundwater table.
- No drainage channels should intersect the proposed cemetery area.
- The site should not be underlain by dolomitic material.
- No borehole drinking water should be located closer than 500 m of the proposed cemetery.
- The cemetery should be large enough for future expansions at an estimated 3 000 graves per hectare.

Croucamp and Richards (2002) recommend ten selection criteria based on engineering and hydrological conditions. Based on all the following factors, a cemetery can be considered suitable or unsuitable:

- Soil excavatability, pertaining to the ease of grave excavation without any mechanical aid, to a minimum depth of 1.80 m, is addressed according to soil consistency. Very loose to loose (very soft to soft) material is readily excavated by means of a spade and will be suitable, provided that grave stability is not a problem. Medium dense (or firm) material requires picks and spades and is considered ideal. Exceeding this will require back actors, jack hammers or blasting which may not always be affordable and the shallow bedrock leading to harder excavation conditions may not be suitable for grave sites.
- Soil permeability relates to the rate of fluid movement through the soil and must be between 1×10^{-7} cm/s and 5×10^{-5} cm/s. Where the cemeteries are located further from water sources than recommended, the upper limit can be extended to 1×10^{-4} cm/s.
- The position with respect to domestic water sources depends on the soil permeability range and the maximum survival times of several bacteria and viruses.
- The position with respect to drainage features (including lakes, dams, rivers, streams and gully heads) is important to ensure that these features are not affected in any way by pollutants from the cemetery sites.
- Site drainage should ensure minimal ingress of surface water into the graves and storm water run-off should be implemented to ensure this.
- Site topography should ideally have a gradient between 2° and 6° with a maximum gradient of 9° being considered acceptable.
- The basal buffer zone refers to the vertical soil succession between the base of the deepest grave and the water table, forming a barrier between the source of pollution (the grave) and the groundwater.
- Grave stability is required to ensure competency in the excavated graves.
- Soil workability entails the ease of manipulation of soil from and into the grave.
- Cemetery size, finally, is often limited by the lack of suitable conditions due to, for instance, dense drainage networks and the required capacity for the intended community.

For all practical purposes, investigations are twofold and include (1) geotechnical or engineering geological aspects regarding stability and workability, and (2) environmental,

hydrological, or sanitary aspects regarding potential contamination of proximate water sources.

Rating Summary and Site Suitability

With regards to the above criteria marked with an asterisk, the area was rated⁹. The suitability of the site is based on the sum of the ratings given for the various criteria. Sites scoring more than 60 out of 100 are considered suitable whilst sites scoring 60 or less or having a Fatal Flaw (F designation) associated therewith are considered unsuitable.

According to the site suitability rating as per geotechnical investigation done by (Drennan Maud (Pty) Ltd, 2017 & 2021) the sandy material has a 'F' designation and a score below 60 therefore it is considered unsuitable for cemetery development due to unfavorable permeability and lack of grave side stability. Conversely, the clayey sand Berea Formation material scores a favorable 78 out of 100 and is therefore considered suitable for cemetery development.

However, the Berea Formation clayey sand is overlain by variable amounts of the unfavorable Dune sand material. Based on the subsoil excavations across the site, the site has been delineated into areas where favorable clayey sand is expected at depths of <1m, >1<2m and >2m, represented by areas marked in 'green', 'yellow' and 'red' respectively on the accompanying geotechnical plan, drawing 2 of this report. In this regard approximately 58% of the site is classified as 'red' (unfavorable), 16% 'yellow' (moderate) and the remaining 26% 'green' (favorable).

However, it should be noted that given the nature in which the Berea Formation material and overlying dune sand was deposited there exists the potential for abrupt changes in the inferred extent and relative depth to the clayey sand over short distances.

Cemetery Site Suitability Rating Evaluation

In terms of the geotechnical rating system of Hall and Hanbury, 1990, and the geotechnical study conducted by (Drennan Maud (Pty) Ltd, 2017 & 2021), the majority of the site, which is underlain by >2m of Recent dune sand rates at 50 (F) out of 100 which means these portions of the site are considered unsuitable for a cemetery site in its current conformation. The rating is negatively affected by the high permeability of the sandy materials and poor grave stability in the collapsible, loose sandy material.

⁹ based on a rating system out of 100 devised and discussed in a paper compiled by Brian Hall and Rob Hanbury of Knight Hall Hanbury and Associates, IMIESA - 1990, titled "Some Geotechnical Considerations in the Selection of Cemetery Sites". Ref. 31854-1 THD - La Mercy Cemetery Site Assessment Page 15

With regards to the Berea Formation clayey sand underlying the upper sandy material a rating of 78 out of 100 is obtained and therefore the cemetery development in this material is considered ideal. It is recommended that the site be developed in stages, commencing with areas where Berea Formation clayey sand material naturally occurs at shallow depth below the surface (<1m) demarcated as 'green' zones on the geotechnical plan.

'Yellow' and 'red' zones (where depth to Berea Formation material increases) can be developed at a later stage through favorable cut and fill earthworks or the removal of the overlying sandy material, this material having been mined in the general area and sold commercially as plaster/mortar sand in the past. Alternatively, these zones can be utilized partially for parking areas. It should be noted that the inferred extent of the various zones may be subject to some change given the erratic and abrupt transition between the prevailing materials associated with the way the clayey sand and covering dune sand were deposited.

Despite the above, the development of the site as a cemetery is considered feasible from a geotechnical perspective provided the recommendations supplied in this report are adhered to during the planning and development phases of the site.

Due to the uneven distribution of suitable and unsuitable areas, it is recommended that the areas that are unsuitable be used for the following appurtenant cemetery infrastructure, provided that environmental, hydrological, wetland and hydrogeological factors are taken into consideration:

- Crematoriums.
- Internal roads and parking facilities.
- Light canopy structures.
- Funeral halls.

5.2.10 Fauna

As per the Screening Report, the Animal Species Sensitivity on the proposed development area is considered High as a result of the *Aves-Polemaetus bellicosus* and the *Aves-Stephanoaetus coronatus* species. Refer to Figure 42.

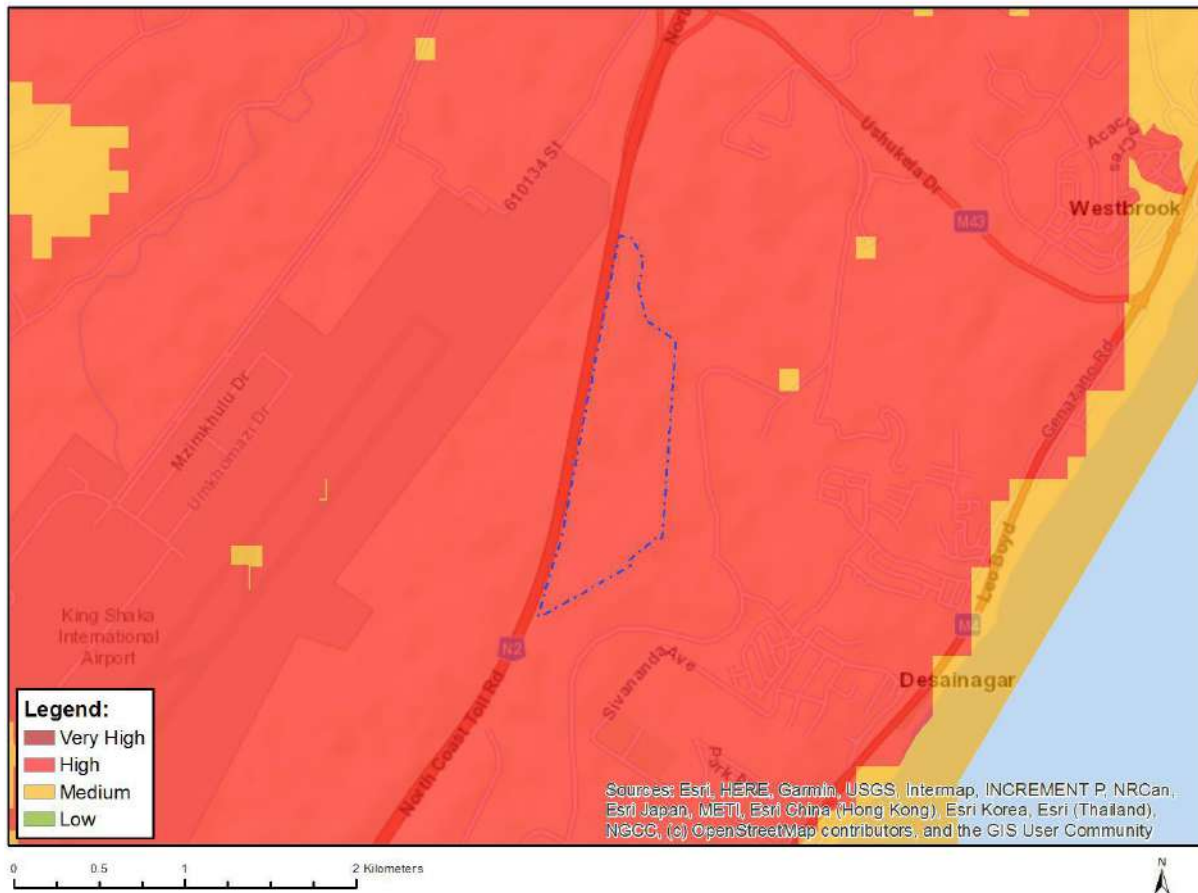


Figure 42: Animal Species Sensitivity Map

According to the Ecological Assessment, the data that has been compiled by Ezemvelo KZN Wildlife was assessed and the species mentioned therein and predicted to occur on the site were actively searched for.

- **Millipedes**

Given the presence of significant woody vegetation on site, the author suspected that species of *Centrobolus* and *Doratogonus* would be evident. Thus during the field survey active searching was undertaken. Loose bark was removed where possible, the detritus layer (decomposing layer) where present was actively searched for, for signs of these species.

The lack of observations alludes to one of two factors. Firstly, the vegetation is not suitable for these species to occur and the disturbance thereof has resulted in these species from falling out of the species assemblage, which we would question. The second alternative is that these species are less active and have become exceedingly well hidden and thus were not encountered.

In previous assessments done in similar areas and conditions, *Centrobolus sp.* were usually encountered. No small pill millipedes were seen either.

- ***Butterflies***

The butterfly assemblage was highly reduced due to the time of year that the assessment was conducted, however there was a significant abundance of the species that were seen. i.e. most species were not seen as singletons. Table 39 below has a record of the species that were encountered during the field survey.

Table 39: Butterfly Species identified

Butterfly Species	Butterfly Species
<i>Acraea horta</i>	<i>Danaus chrysippus</i>
<i>Acraea natalica</i>	<i>Eurema sp.</i>
<i>Acraea petraea</i>	<i>Eurytela dryope</i>
<i>Amauris ochlea</i>	<i>Eurythela hiarbas</i>
<i>Artitropa errynis</i>	<i>Gegenes niso</i>
<i>Belenois aurota</i>	<i>Hyalites cabira</i>
<i>Belenois thysa</i>	<i>Hyalites encedon</i>
<i>Bematistes aganice</i>	<i>Hyalites eponina</i>
<i>Bicyclus safitza</i>	<i>Hypolimnas anthedon</i>
<i>Borbo lugens</i>	<i>Hypolimnas missippus</i>
<i>Cassionympha cassius</i>	<i>Hypolycaena phillippus</i>
<i>Catacroptera cloanthe</i>	<i>Junonia hierta</i>
<i>Catopsilia florella</i>	<i>Junonia natalica</i>
<i>Charaxes brutus</i>	<i>Junonia oenone</i>
<i>Charaxes cithaeron</i>	<i>Melanitis leda</i>
<i>Charaxes ethalion</i>	<i>Moltena fiara</i>
<i>Charaxes varanes</i>	<i>Mylothris sp.</i>
<i>Charaxes zoolina</i>	<i>Precis archesia</i>
<i>Colotis erone</i>	<i>Precis octavia</i>
<i>Colotis euipe</i>	<i>Zophopetes dysmaphila</i>

- **Odonata**

The following Odonata were seen during the field survey; *Phaon iridipennis*, *Platycypha caligata*, *Lestes plagiata*, *Ceragrion glabrum*, *Pseudagrion salisburyense*, *Pseudagrion massaicum*, *Ischnura senegalensis*, *Anax imperator*, *Trithemis stictica*, *Urothemis edwardsii* and *Orthetrum julia*.

Please note that many species are only usually evident in summer from October through to May so many species had probably already disappeared from the species assemblage and will only reappear in summer. It must also be noted that the habitat was not that diverse and therefore we would not expect significantly more species or any rare or threatened species.

- **Avifauna**

The 2931 CA has a total species count of 346 species that have been recorded within it. The number of species that were recorded during the field survey was significantly less. The most common species that were encountered during the field survey were as follows: White-eared Barbet, Black-eyed Bulbul, Cape Glossy Starling, Little Bee-eater, Common Quail, Common waxbill, Weaver Cape, Red-collared Widowbird, Amethyst Sunbird, African Stonechat, Natal

Spurfowl, Streaky-headed Seedeater, Neddicky, Bronze Mannikin, Speckled Mousebird, Sombre Greenbul, African Dusky Flycatcher, Cape Turtle Dove and Terrestrial Brownbul.

- ***Gastropods***

Usually snails are seen moving within the vegetation or signs of their presence are noted through old shells and / or presence within faeces of mongoose and other small mammalian predators. There was no evidence of any shells seen during the entire 2.5 days of field survey.

- ***Mammals***

The mammals on site were not seen however, there was evidence of Bushpig, Vervet Monkeys (seen), Bushbuck, Grey Duiker and Water Mongoose. As the site is highly transformed and the proximity of the site to local communities, it is unlikely that significant faunal species persist on the site. It must be noted that during the field survey on 29th May 2015 dogs were heard barking in the remnant Coastal Forest patch.

- ***Reptiles***

In terms of reptiles seen and / or heard there were only three species, namely, Boomslang (Coastal Forest), Painted Reed Frog (Mdloti River) and a species of lizard that is common to the area, which was not identified to Genus or species level.

Refer to **Appendix E6** for the comprehensive Ecological Assessment, along with **Appendix E6** (i) for the Statement of Validity Letter for the Ecological Assessment.

5.2.11 Vegetation

As per the Screening Report, the Relative Plant Species on the proposed development area is of medium sensitivity as a result of the following species: *Aspalathus gerrardii*, *Tephrosia inandensis*, *Lotononis dichiloides*, *Thesium polygaloides*, *Oxygonum dregeanum subsp. Streyi*, *Pavonia dregei*, *Disperis woodii*, *Senecio dregeanus* as well as Sensitive Species 191, 649 and 1221. SANBI has withheld the name of the species as it may be prone to illegal harvesting and must be protected. This is depicted in Figure 43.

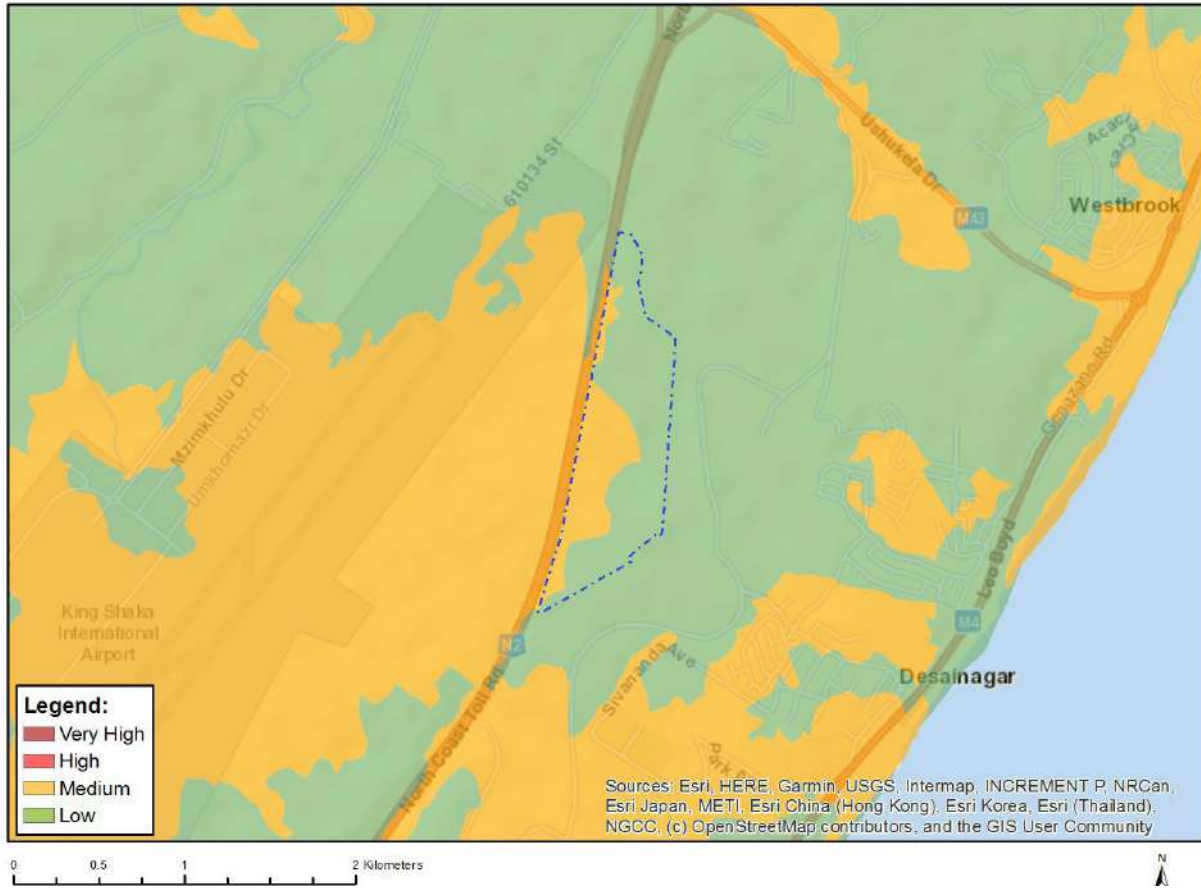


Figure 43: Plant Species Sensitivity

According to the Ecological Assessment, the vegetation that was recorded on site are categorized as follows and depicted in Figure 44:

- ***Cultivation Areas***

The majority of the site is under sugar cane cultivation and has been intensively cultivated over time (more than 15 years). The only natural vegetation on the site is located between the cultivated areas, or in narrow corridors along the periphery of the site. Portions of the sugar cane cultivated areas on the site are not well tended and have been observed to be patchily converting to very early secondary grassland.

- ***Northern Coastal Forest***

There are patches and narrow corridors of woody vegetation approaching the Northern Coastal Forest vegetation type. These corridors are located along the southern and south-eastern boundary of the site. There is a narrow patch centrally located within the site.

These narrow woody patches and corridors are not likely long-standing, although do likely originate from remnants which persisted beyond the edges of cultivation, possibly from bird- or bat-distributed fruit. These patches mainly comprise common, pioneer indigenous species. There are some ecologically valuable species which occur, such as *Ficus lutea*; however, there are also invasive alien plant species present.

- ***Early Successional Forest, Woodland and Alien Vegetation***

There are small segments along the western periphery (mainly outside the development boundary), and on the north eastern corner of the site, which comprise early successional forest, woodland and alien vegetation. These specific areas comprise a community of indigenous trees, with mostly contiguous crowns, and are thus considered a 'forest' in terms of the National Forests Act. Whilst there are a number of indigenous species, the majority of the vegetation is comprised of significant invasive alien plant species.

- ***Pioneer Indigenous Trees and Alien Vegetation***

Some parts of the site, particularly along the south western periphery, have succeeded to pioneer indigenous trees comprising *Albizia adianthifolia* and *Brachylaena discolor*, with many openings in between. More than half of this vegetation is comprised of invasive alien plant species, with *Schinus terebinthifolius* and *Chromolaena odorata* being dominant.

- ***Schinus Hedge and Few Indigenous Pioneer Trees***

Along the north western periphery is a predominantly *Schinus terebinthifolius* hedge. This was very likely planted as windbreak to protect cultivation areas. This is mixed with other alien and pioneer indigenous species.

- ***Drainage Line***

An indistinct drainage line has succeeded to secondary and alien vegetation. None of this is of conservation importance; however, this does not speak to ecological importance or contribution to wetland functioning.

- **Secondary Grassland**

The northern most corner of the site illustrates cultivation has receded and resulted in the progression of a mix of secondary grassland. This mix of secondary grassland comprises mostly of weedy or common grasses, some more ruderal herbaceous species, shrubby species requiring full sun exposure, woody succession mainly comprises of alien invasive plant species and a few smaller indigenous woody pioneers. This secondary grassland is not sensitive and would, without extensive and adaptive management, result in a thicket of alien invasive plant species.

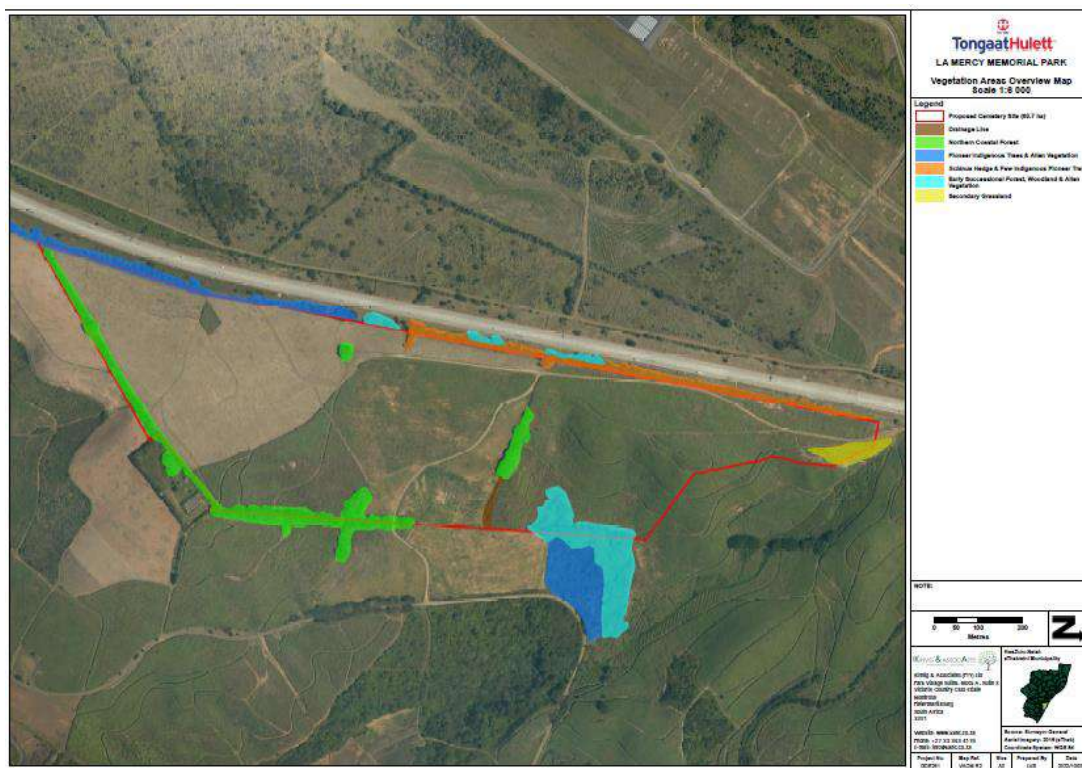


Figure 44: Vegetation Areas Map

Refer to **Appendix E6** for the comprehensive Ecological Assessment, along with **Appendix E6 (i)** for the Statement of Validity Letter for the Ecological Assessment.

5.2.12 Agriculture

According to the Screening Report, with regards to Agriculture in the development area, the sensitivity is considered Very High as per the sensitive features depicted in Table 32 below and as depicted in Figure 45.

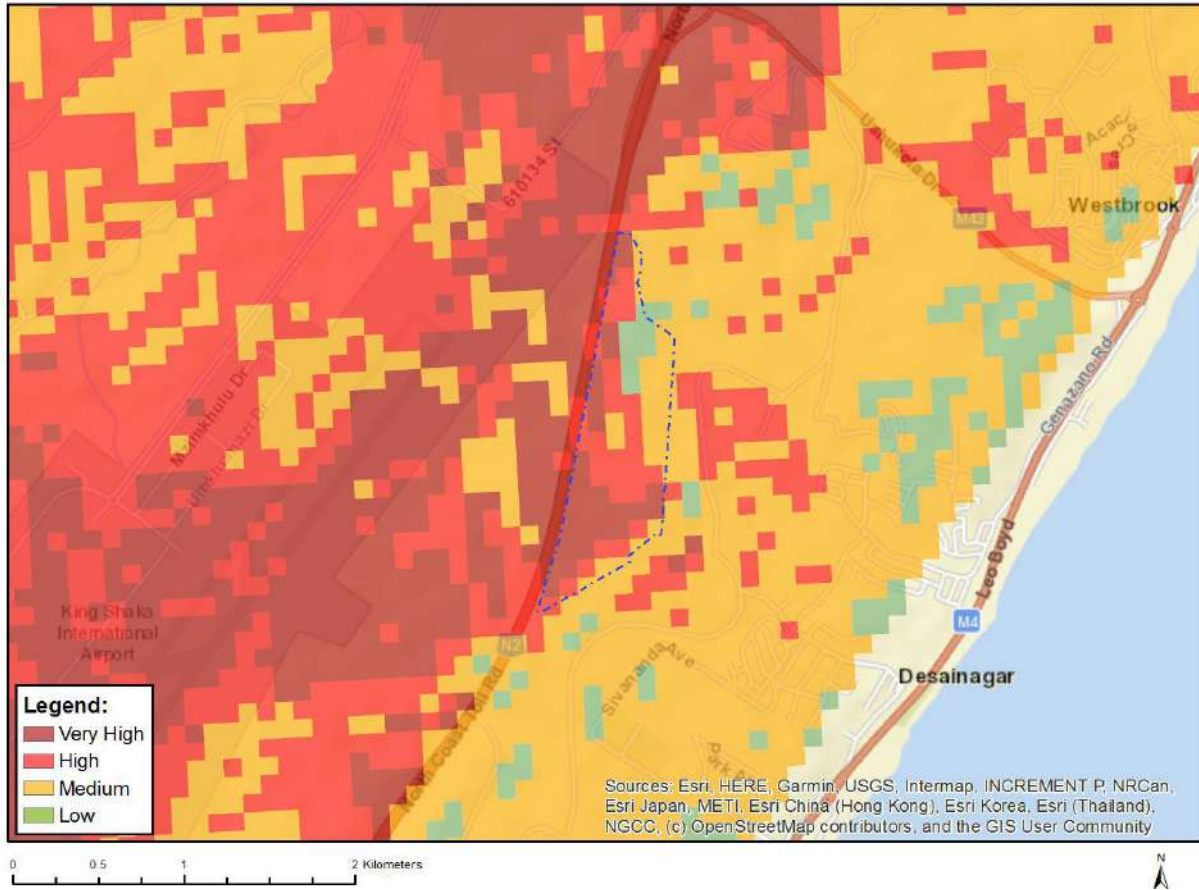


Figure 45: Agriculture Sensitivity Map
Table 40: Agricultural Sensitivity Features

Sensitivity	Features
Low	Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low
Medium	Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate
High	Land capability;09. Moderate-High/10. Moderate-High
Very High	Land capability;11. High/12. High-Very high/13. High-Very high/14. Very high/15. Very high

In terms of land cover, the site and surroundings is currently classified as agriculture but will be rezoned to cemeteries.

According to the Agricultural Potential Study, Tongaat Hulett Property is fortunate to be directly involved in both rural and agriculture development as well as urban development and is required to balance these two objectives. Tongaat Hulett’s approach is aligned with the PGDS and PGDP and revolves around a strategic focus on agricultural and rural development based upon the extensive planting of new sugar cane as an anchoring, market guaranteed product. This

focus is therefore around the rural hinterland where there has been a major disinvestment in agriculture over the past 2 decades. This approach thereby enables the potential to release appropriate land for urban growth pressures for uses such as housing, industrial, tourism, and commercial at the appropriate time whilst at the same increasing the land under sugar cane.

In terms of the KZN Provincial Spatial Economic Development Strategy (PSEDS) these properties are located in the eThekweni – Umhlatuze Corridor (Provincial Corridor PC1). This PSEDS has been adopted by the KwaZulu Natal Cabinet. The potential for industrial development in the province is anchored in the nodes of eThekweni and Umhlatuze. This will be west of, and north along the N2. This development will require corresponding development and intensive agriculture in the short and medium term and, commercial mixed use, namely retail, office and tourist in the long term. These medium and long term developments will require a cemetery with the precincts of the developments.

The Northern Urban Development Corridor Plan (NUDC) presents an ultimate land use plan for the inland portion of the corridor to be developed over a long period of time into the future. This northern region represents the primary area for the growth of the city and the land use plan clearly indicates the desired future uses but also, significantly, indicates the Urban Development Line wherein development has to occur. To the west of this line the remainder of the municipality is reserved for existing agricultural and related uses. This plan clearly demonstrates the strategic future direction of the municipality within the Province's primary growth corridor.

The land surrounding these properties is either under urban development, part of Tongaat Hulett's ownership or is privately owned and also under commercial sugar cane. In regard to the former, there is no impact apart from positive due to security and nuisance issues. In regard to adjacent Tongaat Hulett owned agricultural land, there is no major impact as this will continue to be farmed until actual conversion to new development. Portions of farm estates that are left over are merely incorporated into adjacent estates or continued to be managed centrally. In regard to adjacent agricultural land owned by other parties there will be no impact as they are not part of this land and are managed separately. If they are under sugarcane they will continue to deliver to the appropriate sugar mill.

Refer to **Appendix E7** for comprehensive Agricultural Potential Study.

5.2.13 Terrestrial Biodiversity

According to the Screening Report, Terrestrial Biodiversity Sensitivity on the proposed site is considered Very High as the site falls within Critical Biodiversity Area 1, Protected Areas Expansion Strategy and a Critically Endangered Ecosystem as depicted in Figure 46.

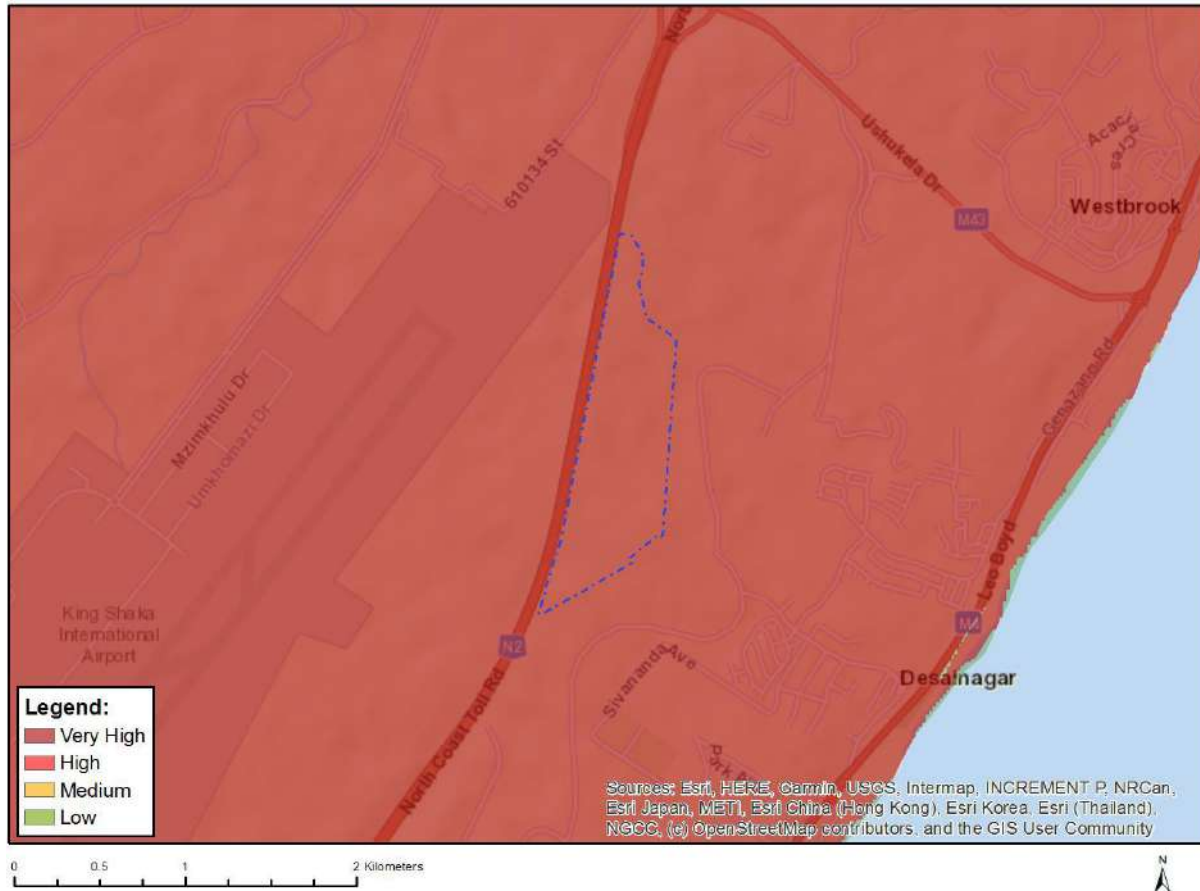


Figure 46: Terrestrial Biodiversity Sensitivity Map

5.2.14 KwaZulu-Natal Biodiversity Sector Plan

The KwaZulu Natal Biodiversity Sector Plan includes reference to Critical Biodiversity Areas (CBA’s) which are terrestrial and aquatic features in the landscape that are critical for retaining biodiversity and supporting continued ecosystem functioning and services. These form the key output of a systematic conservation assessment and are the biodiversity sectors inputs into multi-sectoral planning and decision making. CBA’s are therefore areas of the landscape that need to be maintained in a natural or near-natural state to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. In other words, if these areas are not maintained in a natural or near-natural state then biodiversity conservation targets cannot be met. Maintaining an area in a natural state can include a variety of

biodiversity-compatible land uses and resource uses. In addition, the conservation assessment also made provision for Ecological Support Areas (ESA's), which are areas that are not essential for meeting biodiversity representation targets/thresholds but which nevertheless play an important role in supporting the ecological functioning of critical biodiversity areas and/or in delivering ecosystem services that support socio-economic development, such as water provision, flood mitigation or carbon sequestration.

In terms of the provincial vegetation threat status assessment, the KwaZulu-Natal Coastal Belt Vegetation Type is listed as Critically Endangered, however, the vegetation type is no longer represented at the site due to historic land transformation over the past decades to support sugarcane cultivation.

According to the KwaZulu-Natal Freshwater Systematic Conservation Plan (EKZNW 2007), the sub-catchment planning U30D which covers the entire study area has been classified as 'Available'. The status implies that the planning unit has not been earmarked for conservation but is available to meet provincial conservation targets should earmarked catchments become 'unavailable' to meet targets.

The KwaZulu-Natal Terrestrial Systematic Conservation Plan (TSCP) (EKZNW, 2016) has not prioritised the development site in terms of Provincial conservation planning. However, the dataset did confirm the presence of a Critical Biodiversity Areas (CBA): Irreplaceable in the north eastern portion of the property and within a 500m buffer of the site, located on the western, north-eastern and southern edges of the 500m buffer. Figure 5 shows the area classified as CBA: Irreplaceable within the study area. The reason for these areas being classified as a CBAs is due to the potential presence of 'North Coast Grassland' and other terrestrial biodiversity features including a range of endemic and conservation important millipedes and molluscs: *Centrobolus anulatus*, *Scelotes inornatus*, *Doratogonus falcatus*, *Euonyma lymnaeaeformis*, *Gnomeskelus spectabilis*, *Gulella separate*, *Edouardia conulus*, *Doratogonus natalensis*, *Doratogonus cristulatus*, and *Doratogonus peregrinus*. These are typically terrestrial species occurring in coastal forest and well-wooded coastal bush/woodland and are not typically associated with freshwater wetland environments.

A small portion to the north-east of the site is located on an Irreplaceable Area as depicted in Figure 47.



Figure 47: KwaZulu-Natal Biodiversity Sector Plan Map

5.3 Human Environment

5.3.1 Archaeological and Cultural Heritage

As per the Screening Report, the Archaeological and Cultural Heritage Sensitivity on the proposed development area is considered low sensitive as depicted in Figure 48.

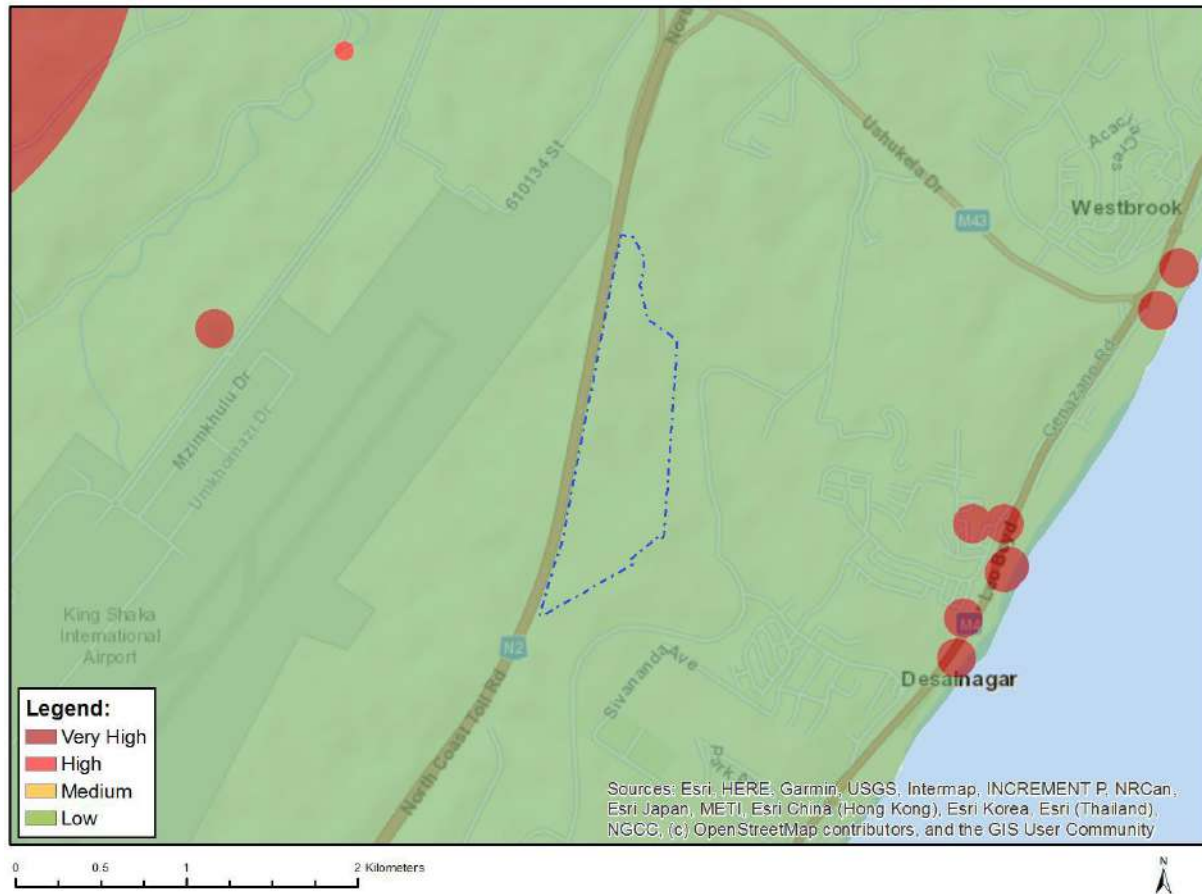


Figure 48: Archaeological and Cultural Heritage Sensitivity

As per the HIA (dated June 2015), The land, which has been farmed extensively since the late 19th century, is covered by sugar cane while weeds have taken over areas to the south where farming activities have been abandoned. Farm roads were accessed by vehicle and areas which had been harvested were covered on foot. Ground visibility was in general good enough to make defensible judgments regarding the archaeology of the area.

A single Later Iron Age site was located on a hilltop in the northern part of the study area. Undecorated potsherds indicate that the site probably dates back to Nguni (Zulu) people during historical times. Farming activities would have destroyed any other features such as hut floors or pits. The shards occur on the surface – the site is not stratified. Mitigation activities will include the appointment of an AMAFA accredited Iron Age archaeologist to establish the exact extent of the site, to map it and to remove all visible archaeological materials following a successful application for a permit. This will only be possible once the entire area has been cleared of sugar cane.

The developers are also reminded that more archaeological materials could surface during the construction phase. Should this happen, all construction activities are to be immediately halted and AMAFA alerted.

No buildings occur on the land and the adjacent La Mercy townscape, religious and educational facilities will be unaffected. The proposed development will not threaten KZN’s cultural heritage, provided that recommendations as contained in Section 8 of the HIA, are adhered to.

This was confirmed within the exemption letter which states that the archaeological sites recorded in the HIA were recorded in areas where they would be expected to occur and that no known heritage sites were missed. This is depicted in Figure 49. Therefore, the HIA is still valid.

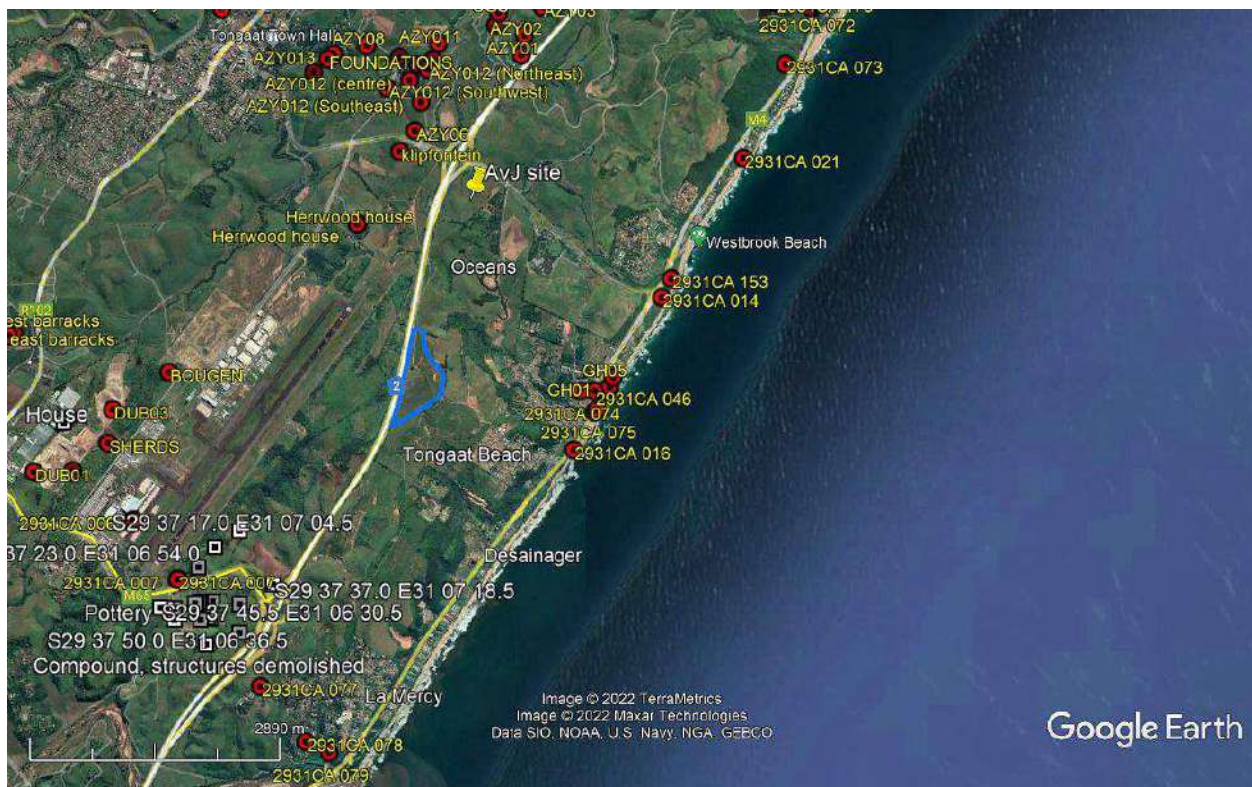


Figure 49: Known Heritage Sites in and around the Study Area

Refer to **Appendix E8 (i)** for the comprehensive Heritage Impact Assessment, **Appendix E8 (i)** for the Heritage and Palaeontological Exemption Letter and **Appendix E8 (ii)** for the Archaeological Statement of Validity.

5.3.2 Palaeontological Assessment

In terms of Palaeontology, the Screening Report indicates that the palaeontology sensitivity of the area is high as depicted in Figure 50.

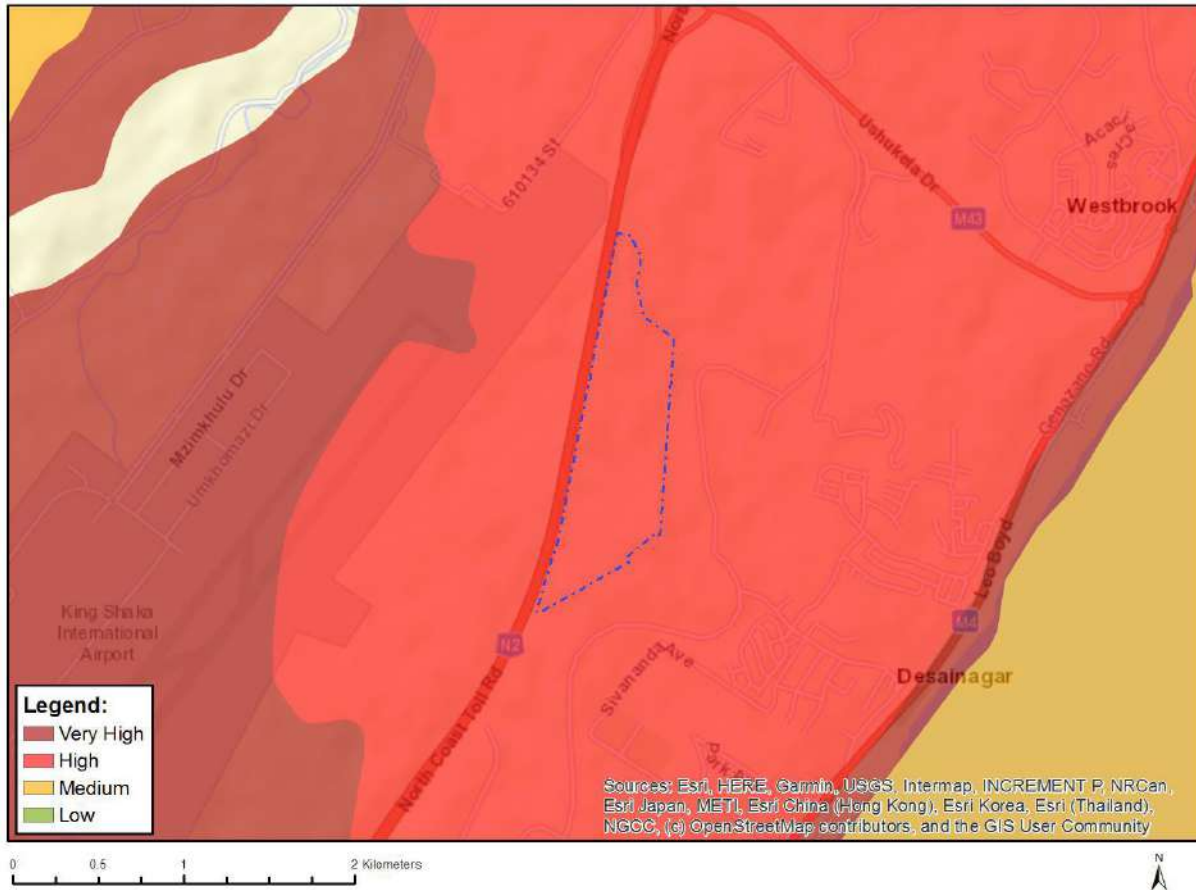


Figure 50: Palaeontological Sensitivity Map

As per the Exemption Letter, the proposed LMMP development will take place in sediment coloured yellow on the SAHRIS Palaeosensitivity Map. This sediment is part of the Umkwelane Formation (previously known as the Berea Red Sandstone). No palaeontological material of any significance has been found in this sediment. Theoretically, palaeontological material could be found so a “Chance Find Protocol” must be in place. This has been included in the Environmental Management Programme (EMPr). Furthermore, this site is within agricultural land and has been historically disturbed. Consequently, there is no reason to undertake a Palaeontological Impact Assessment (PIA) for this project.

Refer to **Appendix E8 (i)** for the comprehensive Heritage Impact Assessment, **Appendix E8 (i)** for the Heritage and Palaeontological Exemption Letter and **Appendix E8 (ii)** for the Archaeological Statement of Validity.

5.3.3 Visual

The site is well-screened from the surrounding development due to the following factors:

5.3.3.1 West

The site is adjacent to the main freeway the N2 which connects eThekweni to Richards Bay. Across the freeway on the western boundary is King Shaka Airport and Dube Tradeport. Neither the airport or Dube Tradeport have views of the site and therefore will not be affected by the development of a cemetery in this location. Similarly, the potential negative impacts emanating from the location of the airport on the western side are diminished by the distance from the site to the two developments, the intervening freeway, and the fact that the use of the land for a cemetery will not be affected by the noise of the planes.

Traffic traveling on the N2 will not notice the cemetery because there is a 5-meter cut along the cemetery boundary with a 4-5-meter-high embankment which is densely planted with trees. This will screen the cemetery from the view of the passing traffic.

5.3.3.2 North

On the northern boundary, the land adjacent to the proposed cemetery site falls within the 55-decibel noise level contour associated with the airport which limits development to industrial uses not impacted by these noise levels. If the land adjacent to the northern boundary is developed in the future for the industry, it will not be affected by the cemetery they are compatible land uses.

5.3.3.3 South

There is a ridge that runs in an east-to-west direction which screens the views of the cemetery in the south. The south-eastern ridge forms a distinct physical feature that will screen all future residential development adjacent to the site on the southern and southern eastern boundaries of the site.

5.3.3.4 East

The eastern leg of the “dog leg ridge” and the realigned M4 highway will screen $\pm 80\%$ of future residential development. These neighbourhoods will also be built so that they face toward the sea in an easterly direction. In contrast, the cemetery has a westerly-facing viewpoint which means that it will have no visual impact on future residents in the area.

From the forgoing analysis, it can be stated that the cemetery will create minimal or no visual impact on the surrounding land uses.

Figure 51 depicts a viewshed analysis.

The total population recorded for KwaZulu Natal in 2011 was 11.06 million, an increase from the population of 10.2 million in 2011, making it the second largest province in the country in terms of population size. 52% of the population in the province is female and 48% are male. Majority of the population are black (87%), followed 8% indian, 4% white, and 1% coloured. The predominant language within the province is Zulu (81%), followed by English (12%). The number of households increased from 2 539 429 in 2011 to 2 875 843 in 2016.

The eThekweni Municipality in the KwaZulu-Natal province and covers an area of 2,291.31km², with a total population of 3 442 361 individuals within 956,713 households. In terms of the gender, 51% of the population in the province are female and 49% are male. Majority of the population are black (73.80%), followed by 16.66% indian, 6.64% white, 2.50% coloured and 0.41% other. The predominant language within the Municipality is Zulu (62.82%).

According to Census 2011, La Mercy covers an area of 27.73 km² and has a total population of 2779 individuals within 985 households. In terms of the gender, 52% are male and 48% are female. Majority of the population are indian (48.24%), followed by black (41.61%), white (7.38%), 1.84% coloured and 0.94% other. The predominant languages are English (57.01%), followed by Zulu (23.25%) and Xhosa (12.84%).

In terms of age profiles, the region has a relatively young population with 34% of the population falling between the ages of 0 and 19 and a further 40% between the ages of 20-39. This illustrates that approximately 74% (27 576 people) of the population in La Mercy comprises individuals who are under the age of 40years. About 20% of the population is between the age of 40-59 (7 512 people) and people over 60 years account for just over 6% (2 578 people).

- **Economic Profile**

KwaZulu-Natal plays a significant role in South Africa's economy and is the second largest contributor to the country's economy. The province contributes 16% to the national GDP after Gauteng's share of 34%.

The diversified nature of the KwaZulu-Natal economy is a key strength and has enabled a resilient response to the economic instability experienced. The lead economic sectors are industrial development and manufacturing, finance, real estate and business services, infrastructure development and construction, transport storage and communications, tourism, mining and beneficiation as well as wholesale and retail trade.

In terms of contribution to GDP, these are:

- Manufacturing 22%
- Finance, Real Estate and Business Services 20%
- Wholesale and Retail Trade, Catering and Accommodation 15%
- Transport, Storage and Communications 14%
- Agriculture sector 4%

The provincial economy is driven mainly by the eThekweni Metropolitan Municipality and other district municipalities especially those dominated by urban areas. eThekweni contributes the most, 61%, which is attributable to economic activities such as tourism, harbour ports, and sugar refinery, among others.

- Agriculture

At 4%, the agriculture sector has a relatively low direct contribution to the provincial GDP. However, KwaZulu-Natal produces almost 30% of national agricultural output and hence contributes significantly to food security in South Africa. Although the province covers a small portion of South Africa's land area, a significant percentage of the country's small-scale farmers are based here. The sector is slowly recovering from the severe droughts experienced over the period 2015 through 2016.

Forestry in the areas around Vryheid, Eshowe, Richmond, Harding and Ngome is one of the major sources of income, the largest forest owners being Sappi and Mondi. The KwaZulu-Natal sugar industry is an important contributor to the economy, which is characterised by high employment and linkages with major suppliers, support industries and customers.

Inputs into the agricultural production chain that contribute to economic growth include the local procurement of capital equipment, consumables and services required by the sector. Agriculture also offers potential for renewable energy projects, notably those that use biomass (sugar and forestry industries).

- Mining and Beneficiation

The mining sector is a small economic sector which contributes less than 2% to KwaZulu-Natal's GDP and employs approximately 4000 direct employees, rising to more than 15000 indirectly. The industry is concentrated around the mining of coal, titanium dioxide, zircon,

aggregate and other minerals in lesser quantities. Richards Bay Minerals (RBM) and Tronox are key companies in this sector.

The increased beneficiation of minerals especially in aluminium, coal, iron and steel, phosphates and mineral sands is being promoted.

- Transport, Storage and Communication

Transport continues to be a catalyst of economic growth in the country in general as well as in KwaZulu-Natal.

To meet the growing demands of a global world, flagship projects in the province include the Dube TradePort, which has been constructed north of the city. Special Economic Zones (SEZ) are one of the Government's strategic instruments implemented to drive an inclusive economic growth, deepen industrialisation and industrial rebalancing.

Richards Bay Industrial Development Zone (RBIDZ) provides the province with an ideal platform to maximise opportunities related to the ocean economy, manufacturing, beneficiation, as well as new and innovative oil and gas energy options.

- Blue Economy

Africa's busiest and largest ports, Durban and Richards Bay handle 78% of South the continent's cargo tonnage, so KwaZulu-Natal as a province is very reliant economically on the maritime sector.

The Blue economy is underpinned by Operation Phakisa Oceans Economy, which aims to unlock the economic potential of South Africa's ocean economy and fast track the achievement of the National Development Plan 2030 goals. The KwaZulu-Natal Provincial Integrated Maritime Strategy goal is to direct the province with respect to the priorities to broaden the developmental scope of the ocean economy. This refers to large scale ship repair and maintenance works.

- Manufacturing

After Gauteng, KwaZulu-Natal's diversified manufacturing sector is the second largest in the country with almost 30% of the country's manufactured exports produced in the province.

Industrial development is the anchor of the KwaZulu-Natal economy and its growth is fundamental to the creation of employment opportunities that will contribute to inclusive economic growth in the province. The top five manufacturing industries in the province, in terms of employment, are clothing, textiles and footwear; food and beverages; basic iron, steel and metal products; chemicals and plastic; and paper and publishing. Major players in the KwaZulu-Natal manufacturing sector include: Unilever, Engen, Sapref, Mondi, Sappi, Aspen Pharmacare, Corobrik, Constantia Afripack and Hulamin to name a few. KwaZulu-Natal is a significant producer of vehicles and components (e.g. Toyota, Volvo, Desmond Equipment, MAN, Bell).

- Infrastructure, Development and Construction

Development succeeds where there is good infrastructure. The KwaZulu-Natal government recently announced that it will spend more than R13 billion on infrastructure projects to stimulate growth and create jobs. In addition, several catalytic construction projects are underway in the province, many because of significant partnerships between the private and public sectors. These partnerships have resulted in local and international property developers investing billions of rands in new mixed-use developments across KwaZulu-Natal.

- Tourism

The province is one of the country's prime tourist destinations for both domestic and international tourists. The contribution of tourism to the provincial GDP grew from R9bn in 2014 to more than R10 billion in 2018.

Owing to its strategic location along the east coast, the province has a competitive advantage in so far as tourism is concerned. KwaZulu-Natal's tourism assets include great accommodation facilities, excellent beaches, two World Heritage sites, the iSimangaliso Wetland Park and the uKhahlamba Drakensberg Mountains Park, private and public game reserves where one can spot the Big Five, the battlefields, numerous golf courses as well as cultural and heritage sites.

The excellent climate allows many sport and leisure opportunities and a range of business opportunities has grown to meet the demand of these markets. In line with the above, the province hosts several international events that bring people from around the world.

- Tertiary Sector

The tertiary sector namely retail trade; transport/logistics; finance/business services and community/social services sectors accounts for close to 70% of the provincial GDP.

Business process outsourcing (BPO) is a major market sector within the province. The province is home to more than 60 BPO centres and accounts for almost 50% of the country's financial services call centres. KwaZulu-Natal boasts a strong finance, real estate and business services sector which is growing fast. Many domestic and foreign institutions already provide a full range of services from commercial and retail, to merchant banking, mortgage lending and insurance, as well as investments. KwaZulu-Natal has been ramping up its capabilities in the technology and innovation sphere with the development of Techno Hubs, a project which the provincial government, led by the KwaZulu-Natal Treasury, adopted as part of its Provincial Growth Development Plan.

- **Informal economy**

South Africa's informal business sector serves a burgeoning consumer market worth more than R100 billion in the country's rural areas, townships and cities, presenting opportunities for corporates and traditional small businesses.

Durban is credited as being the first city in South Africa to develop a policy for street traders. eThekweni currently has more than 197 000 people employed in the informal sector with each person supporting another three people on average.

KwaZulu-Natal is currently aspiring to be South Africa's biggest economic contributor. Currently massive opportunities exist across the value chain of the economy to contribute significantly to economic development. However, opportunities for the youth and people from previously disadvantaged communities to participate in the economy need to be created in order to develop a sustainable and inclusive economy and society.

- **Employment**

Unemployment remains one of the major constraints to KwaZulu-Natal's socio-economic prospects; contributing to high levels of poverty and inequality and worsening the overall quality of life of the people of the province.

In terms of the youth employment status, 54.9% of youth (aged 15-24) are unemployed in the province which is a little higher than the rate in South Africa which is 52.4%. 13.2% of youth are

employed, which is about 80% of the rate in South Africa which is 16.4%. 76.9% of employed youth are employed within in the formal sector which is a little higher than the rate in South Africa at 74.7%.

With regards to employment, education and training status, 32.3% of youth are not in employment, education or training (NEET) which is about the same as the rate in South Africa at 32.2%.

In terms of household adult employment, 49.9% of youth live in households without an employed adult which is about 20% higher than the rate in South Africa at 42.2%.

Extrapolations based on historical trends suggest that just under 50% of the population in the AOI are employed (47%), with a corresponding unemployment rate of (16%) and considering the strict definition of unemployment which excludes discouraged job seekers. Under the broad definition of unemployment, the percentage of people within the AOI who are unemployed is 18%.

Currently, the following employment trends feature, most people work within the tertiary sector of the economy and more specifically within the community, social and personal services sector (22%), followed by Financial; insurance; real estate and business services (18%). Wholesale and retail trade accounts for 17% of household employment.

Figure 52 depicts the Sectoral Employment Contribution of the local area.

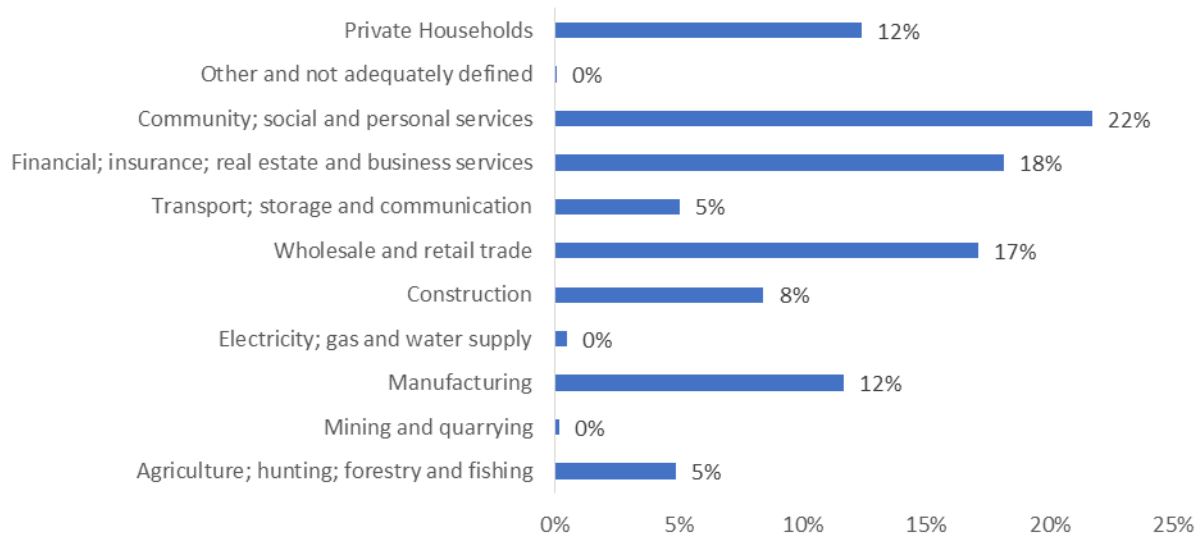


Figure 52: Sectoral Employment Contribution

Figure 53 shows a profile of the occupational levels of the population. The majority of people are involved in elementary occupations (30%), followed by service workers; shop and market sales workers (17%) and legislators, clerks and craft and related trade workers (all at 10%).



Figure 53: Occupational Trends

Figure 54 provides a profile of the annual household income of the region. A significant percentage of the households in the AOI falls within the lower income segment with 15.1% of the households earning between R9 601 – R19 200 per annum, while the majority of households (16.8%) are earning between R19 201 – R38 400 per annum. Less than 1% of the households in La Mercy fall within high income category (>R 2 457 601 per annum).

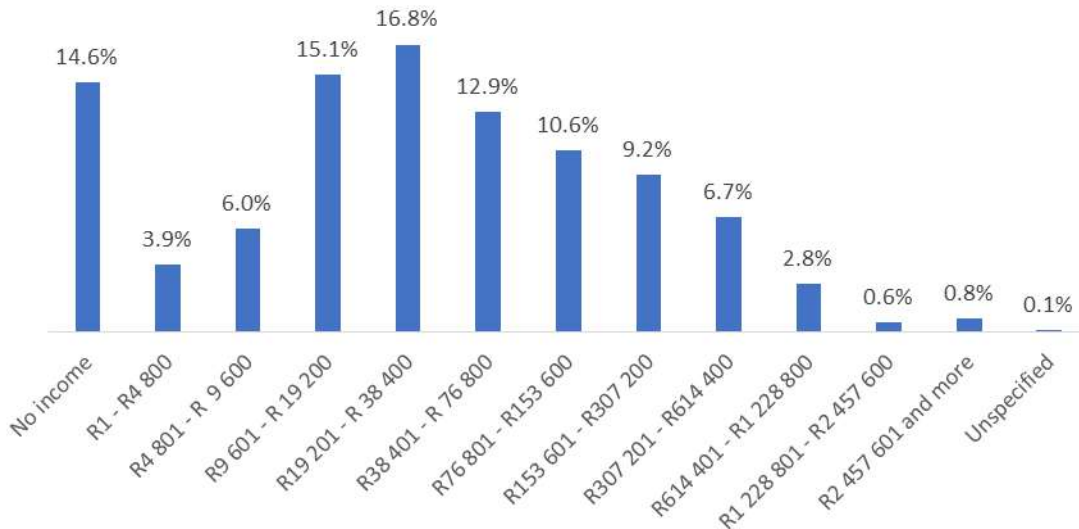


Figure 54: Annual Household Income Profile

- Education**

In terms of highest educational level, 53.3% of youth aged 20-24 have completed matric/matric equivalent or higher a little higher than the rate in South Africa which is 51%. In terms of educational attendance, 55.5% of youth aged 15-24 attend an educational institution about the same as the rate in South Africa which is 56.1%. This is depicted in Figure 55.

The province is home to a number of educational facilities which includes schools and tertiary institutions. The province is home to the University of KwaZulu Natal which is a globally recognized university.

Assuming that individuals who have at least attained some level of secondary education are literate, approximately 82% of the population of La Mercy have some secondary level of education and higher. Generally, higher levels of education are associated with higher levels of income. If this assumption holds, and with the South African job requirements needing Grade 12 and above, it means that more approximately 53% of the residents are employable in La Mercy.

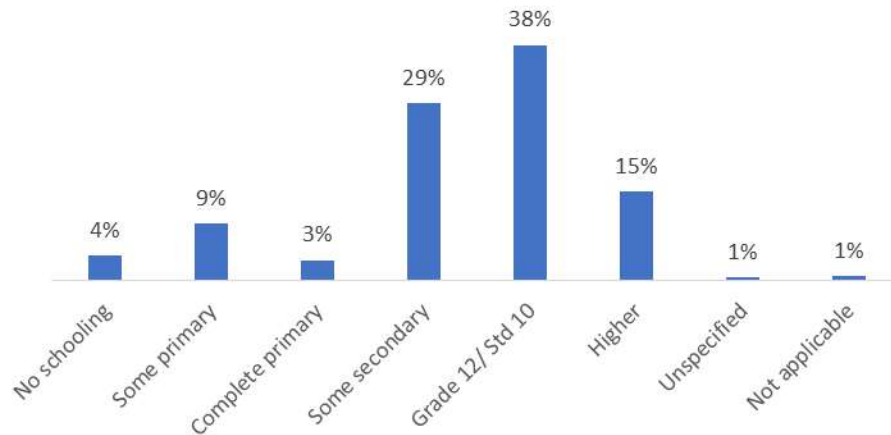


Figure 55: Level of Educational Attainment in La Mercy

- **Housing**

Dwelling Type

In terms of dwelling types, 84% of dwellings are house or brick structures on a separate stand or yard. This is followed by 3% that are traditional dwellings, 3% House/flat/room, in backyard and 3% informal dwelling in an informal settlement.

Tenure Status

In terms of housing tenure status, 38.6% of households are occupying owned and fully paid off dwellings followed by 28.6% of households that are renting.

- **Service Delivery**

Access to electricity

In terms of household facilities, that 83.5% of households in the region have access to electricity while 16% of households make use of candles, paraffin, solar and gas to light up their homes.

Access to Water

In terms of access to water, 83,7% of households have access to piped water inside their dwellings while 12% of households access water within a 200m distance from their dwelling. The remaining 4,3% of the households in La Mercy have to travel a distance greater than 200m to access water supply.

Access to Refuse Disposal

In terms of waste disposal, 87.7% of households have their waste removed by the local authority at least once a week, while 5.1% of households have their waste removed by the local authority less frequent.

Access to Sanitation

Regarding sanitation, 81% of households has access to flush or chemical toilets while, 6% of households have access to pit latrines.

Refer to **Appendix E8** for the comprehensive Socio-Economic Impact Assessment.

5.3.5 Traffic¹⁰

Based on the RISFSA guidelines, the classification of the existing roads surrounding the application site constitute Class 2 and Class 4 roads.

Table 41 presents the roads relevant to this traffic study with its key transport information. The intersections analysed within the study area are priority controlled/traffic circles.

Table 41: Road characteristics

Name of Road	Class	Owner	No. of Lanes	Road Width (m)	Sidewalks	Public Transport	Road Condition
M4 Highway (P398-2)	Class 2	KZN DOT	Two lane north bound One lane south bound	6.0 wide	In close proximity of M4/Park Avenue Traffic Circle, western edge +/-1.0m	Yes	Satisfactory
Park Avenue	Class 4	eThekweni Municipality	One lane each direction	6.0 wide	None from M4/Park Avenue Traffic Circle to End Street, however sidewalk available from End Street to Dolphin Avenue, northern edge	Yes	Satisfactory

¹⁰ It must be stressed that these access proposals are of an interim nature and are superseded upon implementation of the M4 (P398-2) realignment.

					of +/-1.0m		
Watson Highway (M43) (P426)	Class 2	KZN DOT	One lane each direction	8.0 wide	No sidewalks provided	Yes	Satisfactory

Traffic Counts

- Intersection 3 - N2 & Watson Highway (P426) - (Eastern terminal)
- Intersection 4 - N2 & Watson Highway (P426) - (Western terminal)
- Intersection 5 - M4 (P398-2) & Watson Highway (P426)

The proposed development is situated in an area where traffic volumes are expected to increase at a high growth rate, and thus based on information from the eThekweni Municipality, a growth rate of 3% per annum was applied to the Intersection 1 and Intersection 2 counts (2018 traffic volumes) to establish the base year 2021 traffic volumes.

The 2021 Saturday peak hour background traffic counts were escalated at the growth rate of 3% per annum to estimate the 2022 (Opening Year) and 2027 (5 Year Horizon) peak hour background traffic volumes. The projected 2022 and 2027 background traffic volumes are shown in Figure 56 and Figure 57 respectively.

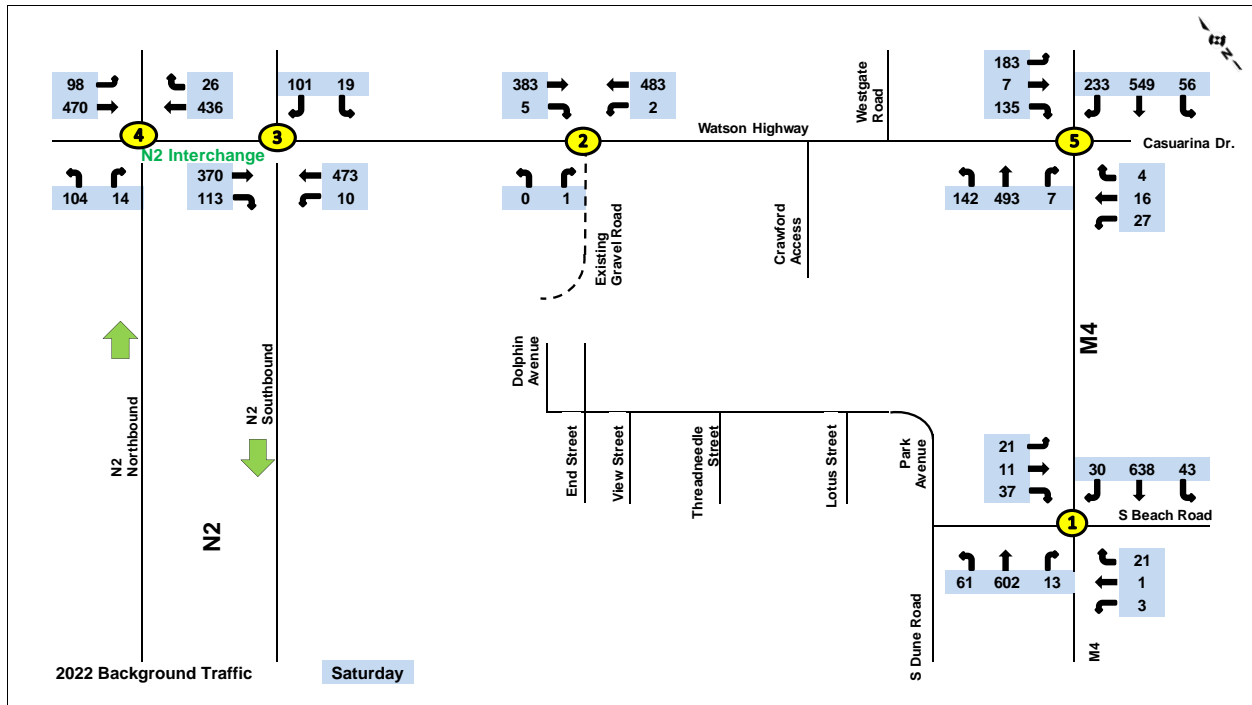


Figure 56: 2022 Saturday Peak Hour Background Volumes

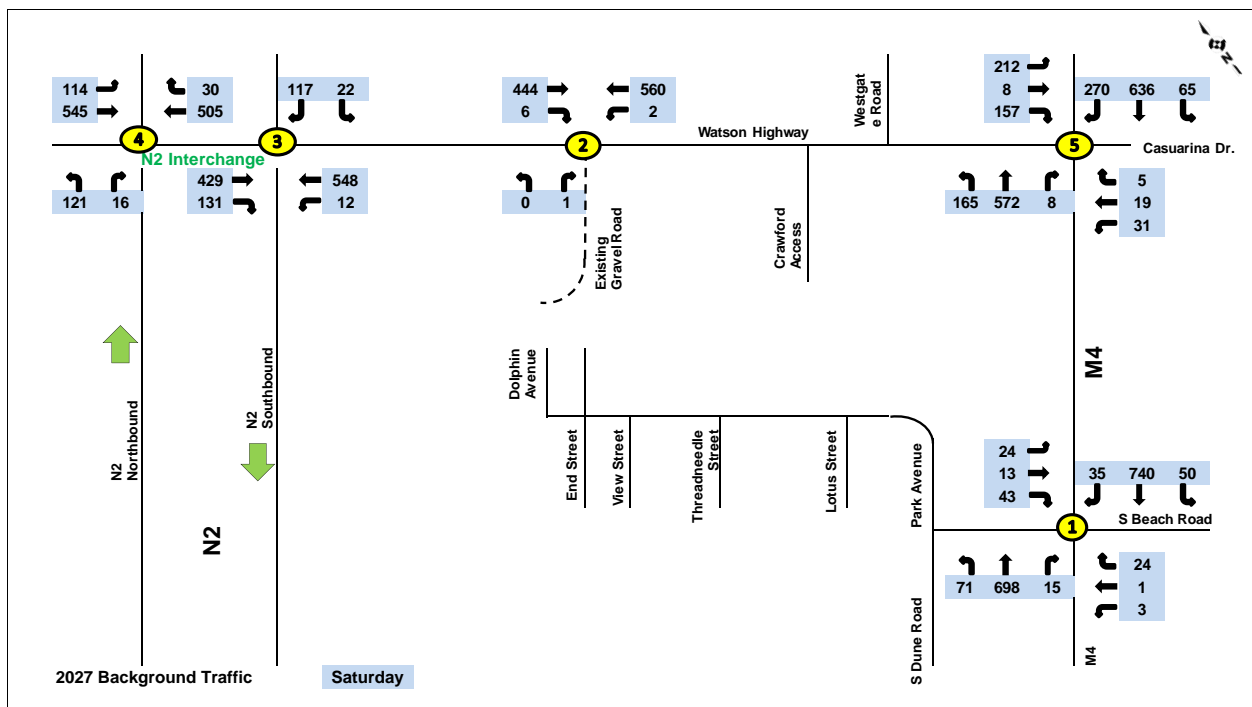


Figure 57: 2027 Saturday Peak Hour Background Volumes

The intersections within the study area operate at an acceptable level in terms of V/C ratios, delay and LOS for both the 2022 and 2027 Saturday peak hour.

The proposed development is anticipated to generate the highest number of trips during the Saturday Peak Hour in terms of the “eThekweni Transport Authority’s Manual for Traffic Impact Assessments”. The proposed development is expected to generate less than 1 000 trips in the peak hour, and accordingly, a 5-year horizon was also assessed (2027) in addition to the 2022 Base Year.

The trip generation characteristics for the LMMP are presented in

Table 42.

Table 42: Trip Generation: LMMP

Proposed Development on Road Network													
Land Use Type	Size	Trip Rate	PHF Dev	Trip Gen Rate	Trip Reduction Factors	Resultant Trip Rate	Split	Peak Hour	Proposed Scheme – 2022				
							Saturday		No. of Hectares	No. of Seats	In	Out	Total
Cemetery Site	61 ha	8	0.65	12.308	0.85	10.4618	50:50	Saturday	61	-	319	319	638
Or													
Cemetery Site	60.32 ha	8	0.65	12.308	0.85	10.46	50:50	Saturday	60.325	-	316	316	631
Halls	3857.14 seats	0.05	-	0.05	0.85	0.0425	55:45	Saturday	-	3857.14	90	74	164
													795
Or													
Cemetery Site	21.785 ha	8	0.65	12.308	0.85	10.46	50:50	Saturday	21.785	-	114	114	228
Halls	3857.14 seats	0.05	-	0.05	0.85	0.0425	55:45	Saturday	-	3857.14	0	74	164
													392

Traffic prediction was done based on the access alternatives. Refer to the Alternatives section above. The traffic analysis of the various proposed options indicates that all the options operate at an acceptable performance level and thus no improvements are required at the existing intersections within the study area to accommodate the additional trips generated by the proposed development.

The worst case trip generation of the proposed development is anticipated to be 795 trips in the Saturday peak hour.

5.3.5.1 Short Term Traffic Impact and Parking

A Traffic Impact Assessment (TIA) has been undertaken which has developed several options for access to the proposed cemetery. In the short term, Option 1 will be utilized which requires that access will be taken from an extension of the existing Park Avenue (Class 4 Road) located on the eastern side of the site.

5.3.5.2 Long Term Traffic Impact and Parking

In the longer term, an additional second access point will be provided from the relocated M4 (a Class 2 Road). With the use of the existing stretch of Park Avenue no longer being required, it is anticipated that the peak period for use of the access roads to the cemetery is likely to be on a Saturday when 795 trips can be expected.

In terms of the Spatial Development Plan for the cemetery, provision has been made for 1 024 car parking spaces. In addition, there are 6 bus parking areas planned in the layout to accommodate burial functions where there are large groups of mourners.

Refer to **Appendix E10** for the comprehensive Traffic Impact Assessment.

5.3.6 Other Sensitivities

In terms of other sensitivities as per the Screening Report, the Civil Aviation and Defense Themes are not expected to be impacted on by the proposed development. Refer to **Appendix E1** for the comprehensive DFFE Screening Report.

6. ENVIRONMENTAL SENSITIVITY – SPECIALIST RECOMMENDATIONS

6.1 Legal Requirements as per Appendix 1 of EIA Regulations, 2014 (as amended)

This Section of the BAR has been prepared in accordance with Appendix 1 of EIA Regulations of 2014 (as amended) and includes the relevant information for Section 6 as outlined in Table 43.

Table 43: Requirements set under Appendix 1 of EIA Regulations of 2014 (as amended) for Section 6

Requirement	Relevant Section
(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 6 provides a summary of the specialist input.

Fresh Water Assessment

No wetlands or watercourses were identified on the property and site of the planned development, with the nearest wetland located approx. 40m from the eastern property boundary. Of the several watercourses (wetlands) mapped and screened within a 500m radius of the planned development (DWS WUL regulated area), the development of the Memorial Park could pose the risk of impacting six (6) watercourses, located to the west and east of the Memorial Park development site. All watercourses, except for W03 ('C' PES Class and Low EIS), are currently in a degraded or 'poor' ecological condition ('D' PES Class) and are of 'moderately-low' to 'moderate EIS (Ecological Importance & Sensitivity). Future management of the freshwater wetlands and river/stream ecosystems associated with the development site should be to maintain the current status quo of aquatic ecosystems without any further loss of integrity/functioning (PES/EIS). This is also supported by Ezemvelo KZN Wildlife (EKZNW) whose guiding principle with regards to biodiversity conservation and sustainable development is one of no net loss of biodiversity and ecosystem processes.

The most significant impacts and risks posed by the LMMP development and WWTW is associated with the operational-phase risk of potential surface and groundwater contamination which could also affect wetland water quality. Research indicates that cemeteries are recognised as having the potential to pollute groundwater as cemeteries can generate a host of potential contaminants that can seep from graveyards, not only limited to pollutants (pathogens/bacteria) emanating from decomposing bodies but also the material they are buried in (such as heavy metals, etc. from coffins) (Richards & Croukamp, 2004). By assessing the topographical profile and inferred water levels across the site of the proposed development, areas in the north of the property that are considered at risk due to shallow water levels (<8mbgl) were identified in the Geohydrological Report (GCS, 2018; Engeolab, 2022)) and considered 'unacceptable' for the development of a cemetery. Should the Memorial Park development utilise the entire project site, there is the potential for ground water contamination to occur within the northern section of the site and under this development scenario, there is a risk of shallow groundwater interacting with downstream wetland areas and impact significance has been conservatively rated as being 'moderate'. Should this zone be avoided for cemetery development as per the recommendations made in the Geohydrological Report (GCS, 2018; Engeolab, 2022), the risk of contaminating shallow ground water and wetland areas is likely to be reduced considerably and impact significance can potentially be reduced to a 'low' level, however the risk associated with the groundwater contamination, treatment and discharge of domestic sewage at the operational Memorial Park and WWTW is likely to remain 'moderate'. This suggests that the project cannot be authorised in terms of the GA (General Authorisation) for Section 21 (c) and (i) water use due to the 'moderate' risk presented by the WWTW and is therefore subject to a full WULA.

The proposed development is generally considered acceptable from an aquatic ecological perspective by the ecologist from Eco-Pulse Consulting on condition that the proposed mitigation and management recommendations outlined in this specialist report are implemented and form part of the conditions of any environmental authorisation and water use license issued.

Aquatic Assessment

The site for the cemetery was identified as having Low Sensitivity for the aquatic biodiversity theme by the national Screening Tool. No watercourses are present within the boundaries of the proposed project site. The surrounding watercourses are non-perennial streams which display impaired ecological categories that can mainly be attributed to the associated river

characteristics which include limited habitat and are not a reflection on water quality. The poor ecological health of the streams is supported by the results of the IHI assessment which indicated the impacts of sugarcane agriculture and recent flooding disturbances. The anticipated impacts identified for the construction phase were rated to be medium to low in significance. The main impacts identified were impacts on surface water hydrology, water quality, and the spread of Alien Invasive Plants. Impacts identified for the operational phase were found to be of higher significance than in the construction phase due to the proposed use of a Low Volume Domestic Sewage Treatment System to treat sewage. The overall impact of the proposed project is Low to Insignificant, assuming that mitigation measures are applied.

In terms of the DWS Risk Assessment and by the definitions contained in the NWA, discharge of treated effluent constitutes a water use in terms of Section 21 of the NWA, which need to be authorised through an application for a WUL. As per the exclusions of the GN509 (August 2016), the handling of wastewater does not qualify for a GA and it is recommended that further consultation with the DWS is undertaken regarding the requirements of authorisation in terms of water use activities in regards to Section 21 of the NWA for the proposed LMMP.

Geohydrological Assessment

Zonal maps were drawn up following the investigations and it is recommended that these be used if the site is developed¹¹. Minimum dimensions of gravesites as defined in the regulations in terms of Section 13 of the Local Government Municipal Systems Act, 2000 [Act 32 of 2000] read with Section 162 of the Constitution of the Republic of South Africa Act 1996 [Act 108 of 1996].

Regulation 7(2) states that every burial plot intended for the interment of the human remains of:

- (a) an adult shall be not less than 2,2 m x 1,2 m x 1.8m.
- (b) a child shall be not less than 1.35 m x 0,6 m x 1.5m.

Based on these guidelines, the number of graves can be calculated per ha. Finally, the ground conditions described in this report refer specifically to those encountered in the exposure

¹¹ Drennan Maud (Pty) Ltd, 2017 & 2021

profiles, it is therefore quite possible that conditions of variance with those discussed in the report can be encountered elsewhere.

In terms of the groundwater conditions, the recommendations are as follows: -

- Responsible management of the site will be required to reduce risks/threats to groundwater. This includes adherence to prescriptions noted in this report.
- Groundwater monitoring will be required to assess the impact of the cemetery and the effectiveness of the management programme. Although shallow groundwater or seepage was not detected, shallow groundwater conditions in general are recognised as potentially one of the biggest threats to groundwater quality. It is therefore recommended that at least three monitoring boreholes be drilled on the geological anomalies inferred during the geophysical investigation.
- Accurate groundwater monitoring will be required in order to observe fluctuations in groundwater level and quality.
- Storm water drainage should be installed around the site to drain away surface runoff to the access road and firebreaks along the boundaries.

Monitoring Requirements

To detect any changes in the aquifer system, as well as potential pollution derived directly or indirectly from the proposed development, monitoring of water levels and flow rates, water quality and trends, is imperative.

Water Level Monitoring

The groundwater levels recorded during this investigation are proposed as pre-development values for future gauging.

Three monitoring boreholes are required in the positions indicated in the monitoring section.

Water Quality Monitoring

- The proposed new monitoring boreholes should be sampled bi-annually in terms of water quality (SANS 241) guidelines for domestic use.

- Confirm groundwater and surface water monitoring protocol and plans. The proposed surface water monitoring points are depicted in the report. The adoption of these monitoring points should be able to address the monitoring plan described above.
- Groundwater monitoring will be undertaken according to SABS and DWS requirements according to the schedule presented in Table 44.

Table 44: Groundwater Monitoring Programme

Monitoring position	Sampling interval	Analysis	Water Quality Standards
Surface Monitoring 1 & SW 2	Bi annually (March and October)	Full SABS analysis Groundwater level	South African Water Quality Guidelines: Domestic Use
Drill Site 1, 2 & 3 (New Monitoring boreholes)	Bi annually (March and October)	Full SABS analysis Groundwater level	South African Water Quality Guidelines: Domestic Use

Geotechnical Investigation

Majority of the site is deemed suitable for development. The northern section of the site which comprises the vast majority of the area; underlain by Recent Dune sand and Berea Formation clayey sand; is expected to be less costly to develop due to better quality (more granular) materials. This area is similar to the Gateway Ridge area as a preliminary indication of development costs.

The southern section of the site, underlain by intrusive dolerite and shale / siltstone / sandstone of the Vryheid / Pietermaritzburg Formations and associated clayey cover soils; will likely prove relatively costly to develop given the expected creation of cut to fill platforms and stabilising measures that will be required across the sloping sites, as well as the need to spoil generally poor quality colluvial, residual and completely weathered clayey cover materials during earthworks. This area is very similar to the Cornubia South area as a preliminary indication of development costs.

Ecological Assessment

The following recommendations are made for the existing vegetation on-site:

- Forest is recognised as valuable by the National Forests Act. Conservation or no-development areas should therefore include forest and successional forest. The forest portions have already been considered in the layout for conservation.
- A buffer zone, size yet to be determined, should be applied on specific forest portions; however, this may not be necessary due to the development being largely naturalised.
- Given that these areas provide habitat for faunal species, linkages between forest and open spaces should be ensured. Corridors will be provided for linkage purposes and has already been considered in the layout.
- Management of cultivation areas must occur after cultivation ceases (for any areas which will not be developed), to minimise the site being overtaken by invasive alien plant species.

The following additional recommendations should be considered:

- Removal of the road flanking the Mdloti River to improve landscape connectivity and improve the functioning of the estuary and the wetlands associated with the floodplain;
- The Mdloti Estuary and River requires significant rehabilitation, and it should be a goal of the owners of land that flank it, to undertake a significant rehabilitation of the area, by removing alien plant species and re-planting of areas with indigenous vegetation;
- The artificial drains created on the Mdloti floodplain should be plugged to allow for the natural hydrological flow to return , which will result in the establishment of higher quality wetlands in areas which fall within the 1:100 flood line and are thus not suitable for any form of commercial or residential development;
- The Non-continuous Coastal Forest portion of the development node should be retained and an exercise undertaken in rehabilitating it to provide a natural refuge for both floral and faunal species, as well as provide valuable stabilisation of the soils in that specific area;
- All of the grassland areas on the site retain no primary vegetation and are thus of limited conservation significance even though they have been identified as Critical Biodiversity Areas in the Ezemvelo Wildlife's CBA data layer (this data has not been ground-truthed in this instance and thus the return of a value of Irreplaceable);
- The grassland area at GPS Point 157 through 159, may provide an area for the potential to rehabilitate the secondary grassland to a higher value grassland, with management of

aliens and the introduction of regular burning events to retain the grassland nature and remove the woody vegetation that is establishing on site;

- The large hedgerows dominated by species of Ficus should be retained where possible and incorporated into the development proposal as they will provide natural corridors and linkages across portions of the site for the movement of faunal and avi-faunal species through the development;
- A significant amount of the site has been exposed to illegal dumping, which reduces the conservation value of the site itself and poses a threat to the vegetation, particularly during burning events where the dumped material will burn at a far higher temperature than the surrounding areas, resulting in the plant species directly adjacent being destroyed and thus creating bare areas within the secondary grassland for the establishment of alien species;
- The protected species on site, should they not be able to be retained should be relocated to areas on the site that will remain as Open Space;
- Protected species will require a permit for their relocation and this will require interaction and submission of an application to Ezemvelo KZN Wildlife.

Agricultural Potential Assessment

Having considered the cropping and land use options on the Site together with the inherent restrictions, and the need for development in the growth corridor that has been identified by Province and the eThekweni Municipality, the development of the Site for a Memorial Park with its associated facilities will:

- Fulfil the planned expansion of the Northern Node of eThekweni Municipality
- Provide infill development in this node
- Comply with Provincial and Municipal strategic planning
- Comply with local planning
- Provide a much-needed facility (Memorial Park)
- Create positive socio-economic benefits

DFFE recognise the need for development in growth corridors and would like to ensure that it is appropriately managed. Together with Tongaat Hulett Property they are working toward understanding the agricultural potential in the Western and Northern corridors.

In KZN the land used for sugarcane production has increased and this includes land taken out for urban development. Thus, the impact of urban development on sugarcane production is insignificant. Tongaat Hulett only owns 8% of the total quantum of land that supplies cane to its mills so even a total loss of this 8% is insignificant. What is very significant is the fact that Tongaat Hulett commenced with new sugarcane areas in 2009 and by the end of the 2012/13 season was some 29 937ha. By 2017 it was planned to have a total of 68 397ha of new plantings of sugarcane as compared with the 2009 areas. This is extremely significant and apart it is noteworthy that these new areas being developed are in the rural hinterland (including Tribal Trust areas). This combined with a rural development and food security strategy of new sugarcane development providing an anchor for services, investment, training, etc., allows for other more intensive food related crops to be grown for local consumption. Thus, removing the Site properties from agricultural production will have little or no impact on Food Security in the region.

Heritage Impact Assessment

No excavations are anticipated. The developers are also reminded that it is indeed possible to find more archaeological sites during construction as many of these (such as graves and hut floors) are concealed below surface and could accidentally be unearthed. In such a case all activities should be immediately halted and AMAFA alerted.

It is recommended that AMAFA approve the proposed LMMP provided the developers adhere to recommendations as contained in Section 8 of the HIA (Recommended management/mitigation activities).

Socio-Economic Impact Assessment

The proposed development is intended to enable the provision of adequate facilities to cater for the needs of those people who will be utilising the memorial park. More importantly, it also aims to address the current capacity shortages within the region's cemeteries. Given the constraints in burial space experienced in eThekweni, the idea of developing a memorial park would alleviate the pressure on municipal facilities which are close to reaching capacity.

The proposed development site is located in close proximity to the International King Shaka Airport which would make it convenient for travellers who are traveling for funerals in La Mercy. Since there are two other cemeteries which are being used by La Mercy residents, one

specifically for Muslims and the other being a municipal cemetery, the proposed memorial park development has a greater chance of being socially acceptable. Residents of La Mercy, which were engaged during the consultation process, have highlighted that the existence of the two cemeteries in the area have not had any noticeable impacts on the neighbourhood of La Mercy.

Based on the information presented in the report, the key findings from a socio-economic perspective are as follows:

- The net positive impacts associated with the development and operation of the memorial park is expected to far outweigh the net negative effects.
- The project is envisaged to have a positive impact on service delivery and the needs of the community.
- The proposed development will also make a small positive contribution to employment creation and overall living standards, opening up of the area for further development.
- It is recommended that the developers aim to maximise the opportunities that the proposed memorial park may present by focusing on local employment.

The proposed memorial park establishment should, therefore, be considered for development from a socio-economic point of view. It should, however, be acknowledged that the potential negative impacts would be largely borne by the nearby residential areas, whilst the positive impacts will be largely concentrated in the local and regional communities. As a result of this imbalance, it is recommended that the mitigation measures be strictly adhered to. The application of these mitigation measures will ensure that the negative impacts on the nearby properties are minimised and that the distribution of the potential benefits of the project are more balanced.

Traffic Impact Assessment

The traffic analysis of the proposed LMMP indicated that the existing road network surrounding the development site would be able to accommodate the additional traffic generated by the proposed development. In addition, Option 1 is considered to be appropriate from a transportation perspective as there are no critical implications in terms of the alignment and accessibility point. The cost of all improvements is the client's responsibility.

It is therefore recommended that the proposed LMMP application be approved from a Traffic and Transportation engineering perspective.

7. ENVIRONMENTAL IMPACT ASSESSMENT

7.1 Legal Requirements as per Appendix 1 of EIA Regulations, 2014 (as amended)

This Section of the BAR has been prepared in accordance with Appendix 1 of EIA Regulations of 2014 (as amended) and includes the relevant information for Section 7 as outlined in Table 45.

Table 45: Requirements set under Appendix 1 of EIA Regulations of 2014 (as amended) for Section 7

Requirement	Relevant Section
<p>(i) 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 these impacts—</p> <p>(aa) can be reversed;</p> <p>(bb) may cause irreplaceable loss of resources; and</p> <p>(cc) can be avoided, managed or mitigated;</p> <p>(i) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;</p> <p>(ii) 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 geographical, physical, biological, social, economic, heritage and cultural aspects;</p> <p>(iii) the possible mitigation measures that could be applied and level of residual risk;</p> <p>(i) a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the</p>	<p>Table 46 within section 7.3 outlines all possible risks and identifies their significance and mitigation measures to reduce significance.</p> <p>The methodology used to determine the impact significance is indicated in section 7.2.</p>

<p>preferred location through the life of the activity, including—</p> <ul style="list-style-type: none"> (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. 	
<p>(j) an assessment of each identified potentially significant impact and risk, including—</p> <ul style="list-style-type: none"> (i) cumulative impacts; (ii) the nature, significance and consequences of the impact and risk; Appendix I (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. 	<p>The cumulative impacts are identified in section 7.4.</p> <p>The nature, significance, consequences of the impact is outlined in Table 46 within section 7.3.</p> <p>The extent and duration, probability and degrees are indicated in Appendix F.</p>
<p>(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</p>	<p>A summary of the findings are identified in section 7.</p>

indication as to how these findings and recommendations have been included in the final report.	
(l) an environmental impact statement which contains.	The environmental impact statement is identified in section 7.5.

7.2 Impact Assessment Methodology

The following methodology and criteria were used in assessing impacts related to the proposed development.

- The **Nature**, a description of what causes the effect, what will be affected, and how it will be affected.
- The **Extent**, wherein it is indicated whether:
 - 1 is limited to the immediate area or site of development
 - is the local area
 - is regional
 - is national
 - is international
- The **Duration**, wherein it is indicated whether:
 - The lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
 - The lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
 - Medium-term (5–15 years) – assigned a score of 3;
 - Long term (> 15 years) - assigned a score of 4; or;
 - Permanent - assigned a score of 5.
- The **Magnitude**, quantified on a scale from 0-10, where a score is assigned:
 - 0 is small and will have no effect on the environment;
 - 2 is minor and will not result in an impact on processes;
 - 4 is low and will cause a slight impact on processes;
 - 6 is moderate and will result in processes continuing but in a modified way;
 - 8 is high (processes are altered to the extent that they temporarily cease); and
 - 10 is very high and results in complete destruction of patterns and permanent cessation of processes.

- The **Probability of occurrence**, which describes the likelihood of the impact actually occurring. Probability is estimated on a scale, and a score assigned:
 - Assigned a score of 1–5, where 1 is very improbable (probably will not happen);
 - Assigned a score of 2 is improbable (some possibility, but low likelihood);
 - Assigned a score of 3 is probable (distinct possibility);
 - Assigned a score of 4 is highly probable (most likely); and
 - Assigned a score of 5 is definite (impact will occur regardless of any prevention measures).
- The **Significance**, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high.
 - The status, which is described as **positive, negative or neutral**.
 - The degree to which the impact can be reversed.
 - The degree to which the impact may cause irreplaceable loss of resources.
- The degree to which the impact can be mitigated.

The significance is determined by combining the criteria in the following formula:

$S = (E + D + M) P$; where

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

The significance weightings for each potential impact are as follows:

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

7.3 Impact Assessment

Table 46 summarises the impacts for all alternatives as the associated impacts are similar; however, the length differs between the pipeline routes which implies that the construction timeframes would differ but the impacts significance of the development irrespective of the route, is still medium risk. This will be discussed in the Impact Statement section to follow. The scoring of the preferred options is attached within **Appendix F**.

Table 46: Proposed Impacts

POTENTIAL IMPACTS	PROPOSED MITIGATION
<p>Nature of Impact: <u>Destruction and modification of freshwater habitat.</u></p> <p>This impact refers to the physical destruction or disturbance of wetland and riverine (instream and riparian) habitat caused by vegetation clearing, excavation and/or infilling during construction of the proposed infrastructure associated with the development project as well as associated unintended indirect / secondary disturbances that are likely to persist during the operational phase of the infrastructure.</p> <p>Construction</p> <p>Wetlands and the stream identified and delineated in the area of study are situated outside the proposed development site and will neither be physically disturbed by the construction of the proposed Memorial Park (i.e., no wetlands were identified within the planned development footprint). Temporary modification/disturbance of watercourses by construction machinery and workers is also unlikely to occur due to the distance from the site to the nearest watercourse. Impact significance is therefore likely to be low/negligible for the construction phase of the Memorial Park development.</p>	<ul style="list-style-type: none"> • Layout plan indicating the alignment of service infrastructure (water, sewage, etc.). • Stormwater management plan for all access roads, buildings and parking areas. • If required, site demarcations must be established and these must be signed off by the Environmental Control Officer (ECO) before any work commences. • Demarcations are to remain until construction and rehabilitation is complete. • Access to and from the development area should be via existing agricultural contour roads. • Wherever possible, existing vegetation cover should be maintained during the construction phase. The unnecessary removal of groundcover from slopes must be prevented, especially on steep slopes. • Clearing activities must only be undertaken during agreed working times and permitted weather conditions. If heavy rains are expected, clearing activities should be put on hold. In this regard, the contractor must be aware of weather forecasts. • Temporary downslope erosion and sediment protection such as silt fences, sandbags and/or earthen berms must be established downslope of active work areas to protect downslope watercourses. • Steep slopes at risk of erosion and/or slumping must either be

POTENTIAL IMPACTS				PROPOSED MITIGATION																																												
<p>Operational</p> <p>During operation, there is unlikely to be any direct or indirect impacts to watercourses which are located a distance downstream and beyond the development footprint. Impact significance is therefore likely to be none/negligible for operation.</p>				<p>temporarily re-graded or temporarily stabilised using sandbags or other available material like dump rock.</p> <ul style="list-style-type: none"> All bare slopes and surfaces to be exposed to the elements during clearing and earthworks must be protected against erosion using rows of sandbags and/or silt fences aligned along the contours and spaced at regular intervals (e.g. every 2m) to break the energy of surface flows. Once shaped, all exposed/bare surfaces must be re-vegetated immediately. If re-vegetation of exposed surfaces cannot be established immediately, temporary erosion and sediment control measures must be maintained until such a time that re-vegetation can commence. All temporary erosion and sediment control measures must be monitored for the duration of the construction phase and repaired immediately when damaged. All temporary erosion and sediment control structures must only be removed once vegetation cover has successfully re-colonised the affected areas. After every significant rainfall event, the contractor must check the site for erosion damage and rehabilitate this damage immediately. Erosion rills and gullies must be filled-in with appropriate material and silt fences or fascine work must be established along the gulley for additional protection until vegetation has re-colonised the rehabilitated area. The site camp must only be established within the proposed development site. No equipment laydown or storage areas must be located within 20m of any delineated watercourse and/or within the 1:100 year floodline of any river. When locating the construction site camp and equipment yard areas susceptible to soil erosion and/or contamination must be avoided. The location of the site camp should be approved by the appointed Environmental Control Officer (ECO). Hazardous storage and refuelling areas must be bunded prior to their use on site during the construction period following 																																												
<table border="1"> <thead> <tr> <th>Alternative Type</th> <th>Options</th> <th>Without Mitigation</th> <th>With Mitigation</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Layout</td> <td>Option 1</td> <td>Low</td> <td>Very Low</td> </tr> <tr> <td>Option 2</td> <td>Medium</td> <td>Low</td> </tr> <tr> <td rowspan="3">Bulk Sewer Infrastructure</td> <td>Option 1</td> <td>Low</td> <td>Very Low</td> </tr> <tr> <td>Option 2</td> <td>High</td> <td>Medium</td> </tr> <tr> <td>Option 3</td> <td>Medium</td> <td>Low</td> </tr> <tr> <td rowspan="4">Access Roads</td> <td>Option 1</td> <td>Low</td> <td>Low</td> </tr> <tr> <td>Option 2</td> <td>Medium</td> <td>Low</td> </tr> <tr> <td>Option 3A</td> <td>Medium</td> <td>Medium</td> </tr> <tr> <td>Option 3B</td> <td>Medium</td> <td>Medium</td> </tr> <tr> <td rowspan="3">New Roads and Widening</td> <td>Option 1</td> <td>High</td> <td>Medium</td> </tr> <tr> <td>Option 2</td> <td>Medium</td> <td>Low</td> </tr> <tr> <td>Option 3</td> <td>Medium</td> <td>Low</td> </tr> </tbody> </table>					Alternative Type	Options	Without Mitigation	With Mitigation	Layout	Option 1	Low	Very Low	Option 2	Medium	Low	Bulk Sewer Infrastructure	Option 1	Low	Very Low	Option 2	High	Medium	Option 3	Medium	Low	Access Roads	Option 1	Low	Low	Option 2	Medium	Low	Option 3A	Medium	Medium	Option 3B	Medium	Medium	New Roads and Widening	Option 1	High	Medium	Option 2	Medium	Low	Option 3	Medium	Low
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	Option 3	Medium	Low																																													
<p>Nature of Impact: <u>Flow modification and erosion / sedimentation.</u></p> <p>This impact relates to the potential for modification of hydrological drivers (volumes, velocities pattern and timing of flow received and distributed through wetlands and rivers), including the resultant change in fluvio-geomorphological processes (i.e., such as rates of erosion and deposition of sediment).</p>																																																
<p>Construction</p> <p>During the construction phase, vegetation clearing associated with the proposed Memorial Park to be developed within the catchment of watercourses (downstream wetlands) will inevitably expose bare ground and soil stockpiles to the elements (wind and rain for example). Such exposure of bare soils and soil stockpiles could possibly lead to localised soil erosion and alter surface runoff</p>																																																

POTENTIAL IMPACTS				PROPOSED MITIGATION			
<p>distribution patterns within the catchment of watercourses. If stormwater and soil stockpiles are not managed adequately during construction, there is the potential for sediment to be transported downstream, however given the distance to the nearest watercourse being >40m and the presence of a well-vegetated bufferzone between the development and the nearest watercourses, the intensity and probability of such impacts being sustained by watercourses downstream the development is likely to be moderately-low, with impact significance also likely to be moderately-low.</p> <p>Operational</p> <p>During operation, there are ecological risks associated with storm water runoff and the potential for erosion of downstream watercourses, however given the footprint of the development and limited extent of hardened surfaces proposed in relation to the broader catchment, the intensity of impact and probability of occurrence is likely to be relatively low.</p> <p>Increased flows from the discharge stormwater and of treated wastewater from the WWTW into the wetland is likely to result in an identifiable impact on wetland hydrology, with the increased flows leading to increased soil saturation and possible inundation of areas of the wetland this will cause an increasing the saturation regime of the wetland, with a shift from seasonally dominated habitat to permanently saturated habitat. Due to the already degraded nature and low sensitivity/importance of the wetlands, an increase in soil saturation may be positive in terms of improving habitat condition and increasing functional value. Water quality impacts would however remain a key risk from the WWTW (covered below). With adequate onsite management of stormwater run-off from the site and sediment/erosion control measures, flow and erosion impact significance likely to be 'Moderately low' under a 'best practical management' operational scenario.</p>				<p>the appropriate SANS codes.</p> <ul style="list-style-type: none"> • The bund wall should be high enough to contain at least 110% of any stored volume. • The surface of the bunded surface should be graded to the centre so that spillage may be collected and satisfactorily disposed of. • Mixing and/or decanting of all chemicals and hazardous substances must take place on a tray, shutter boards or on an impermeable surface and must be protected from the ingress and egress of stormwater. • Drip trays should be utilised at all dispensing areas. • No re-fueling, servicing nor chemical storage should occur within 50m of the delineated wetland/aquatic habitat. • No vehicles transporting concrete, asphalt or any other bituminous product may be washed on site. • Vehicle maintenance should not take place on site unless a specific bunded area is constructed for such a purpose. • Ensure that transport, storage, handling and disposal of hazardous substances is adequately controlled and managed. Correct emergency procedures and cleaning up operations should be implemented in the event of accidental spillage. • An emergency spill response procedure must be formulated and staff are to be trained in spill response. All necessary equipment for dealing with spills of fuels/chemicals must be available at the site. Spills must be cleaned up immediately and contaminated soil/material disposed of appropriately at a registered site. • 44-gallon drums must be kept on site to collect contaminated soil. These should be disposed of at a registered hazardous waste site. • Fire prevention facilities must be present at all hazardous storage facilities. • An adequate number of self-contained chemical toilets must be established on site – at least one toilet for every 10 workers. • Waste from chemical toilets must be disposed of regularly (at 			
Alternative Type	Options	Without Mitigation	With Mitigation				
Layout	Option 1	Low	Very Low				

POTENTIAL IMPACTS				PROPOSED MITIGATION
	Option 2	Medium	Low	least once a week) and in a responsible manner by a registered waste contractor. <ul style="list-style-type: none"> The location of the toilets should be approved by the appointed ECO. Soil required for construction purposes must not be derived from the wetlands or rivers/streams. Soil stockpiles must be established on flat ground at least 20m away from delineated watercourses. Erosion/sediment control measures such as silt fences, low soil berms or wooden shutter boards must be placed around the stockpiles to limit sediment runoff from stockpiles. Subsoil and topsoil is to be stockpiled separately. Stockpiled soil must be replaced in the reverse order as to which it was removed (subsoil first followed by topsoil). Stockpiles of construction materials must be clearly separated from soil stockpiles in order to limit any contamination of soils. The stockpiles may only be placed within demarcated stockpile areas, which must fall within the development area. Stockpiled soils are to be kept free of weeds and are not to be compacted. The stockpiled soil must be kept moist using some form of spray irrigation on a regular basis as appropriate and according to weather conditions. If soil stockpiles are to be kept for more than 3 months they must be hydro-seeded. The slope and height of stockpiles must be limited to 1.5m and are not be sloped more than 1:2 to avoid collapse. Waste bins must be provided at the eating areas. Bins and/or skips need to be supplied at convenient intervals on site for disposal of waste within the construction camp. The bins should have liner bags for easy control and safe disposal of waste. Bins should be provided to all areas that generate waste e.g. worker eating and resting areas and the camp site. General refuse and construction material refuse should not be mixed. Regular clearing/maintenance of bins is required. Bins should be monkey-proof. A basal buffer zone refers to the vertical soil succession
Bulk Sewer Infrastructure	Option 1	Low	Very Low	
	Option 2	High	Medium	
	Option 3	Medium	Low	
	Option 1	Medium	Low	
Access Roads	Option 2	Medium	Low	
	Option 3A	Medium	Medium	
	Option 3B	Medium	Medium	
	Option 1	High	Medium	
New Roads and Widening	Option 2	Medium	Medium	
	Option 3	Medium	Medium	
	<p>Nature of impact: <u>Water Quality.</u></p> <p>This impact refers to the modification of the microbiological, physical and chemical properties of water that determine its fitness for a specific use, determined by substances which are either dissolved or suspended in the water. Pollution of water resources is a human-induced impact and defined by the National Water Act No. 36 of 1998 as the direct or indirect alteration of the physical, chemical or biological properties of a water resource so as to make it:</p> <p>a) Less fit for any beneficial purpose for which it may reasonably be expected to be used;</p> <p>b) Harmful or potentially harmful –</p> <ul style="list-style-type: none"> ➤ to the welfare, health or safety of human beings; ➤ to any aquatic or non-aquatic organisms; ➤ to the resource quality; or ➤ to property. 			

POTENTIAL IMPACTS	PROPOSED MITIGATION
<p>Construction</p> <p>In the context of the planned development and receiving freshwater environments, water quality refers to its fitness for maintaining the health of aquatic ecosystems namely wetlands, river and streams and doesn't address any impacts to downstream human users. Key sources of contaminants during the construction phase of the development project that could alter water quality include:</p> <ul style="list-style-type: none"> • Hydrocarbons – leakages from petrol/diesel stores and machinery/vehicles, spillages from poor dispensing practices. • Oils and grease - leakages from oil/grease stores and machinery/vehicles, spillages from poor handling and disposal practices. • Cement - spillages from poor mixing and disposal practices. • Sewage – leakages from and/or poor servicing of chemical toilets and/or informal use of surrounding bush by workers. • Suspended solids – suspension of fine soil particles as a result of soil disturbance and altered flow patterns. <p>Mismanagement of the above contaminants and bare soils/ soil stockpiles could potentially result in the pollution of nearby watercourses. The most likely water quality risk during the construction phase is the potential increase suspended solids and sediment received by downstream watercourses from bare soils on the site during rainfall events. Although suspended sediment is a risk, it is unlikely to result in significant deterioration of freshwater habitat downstream of the site. In conclusion, water pollution impacts can potentially be experienced during the construction phase of the project, although the significance is likely to be 'Moderately-Low' and can be reduced by sound construction phase mitigation.</p>	<p>which occurs between the base of the deepest grave and the water table, whether be it permanent or perched water table (Richards and Croukamp, 2004). While the recommended depth of the basal buffer zone is very variable depending on prevailing soil conditions and other factors, a minimum buffer zone depth of at least 2.5m is recommended (Richards and Croukamp, 2004). However, this is a minimum depth recommended and the basal buffer zone should ideally be deeper (Richards and Croukamp, 2004). Further to this, an appropriate specialist must be appointed to determine the correct depth of the basal buffer zone for the proposed Memorial Park.</p> <ul style="list-style-type: none"> • It is recommended that landscaping promote the use of indigenous species common to the region and that as much natural ground cover is established on the site to help with binding soils and encouraging water infiltration, thus reducing overland flows and the pressure on storm water management infrastructure. Any of the following plant species are recommended <i>Cynodon dactylon</i>, <i>Stenotaphrum secundatum</i>, <i>Paspalum distichum</i>. • A culture of “conserve, reduce, reuse & recycle” should be promoted with regards to the use and disposal of products to minimise resource consumption and reduce the amount of potential waste. Project design can also promote the conservation and efficient utilisation of water, implement rainwater harvesting measures, the recycling / re-use through grey water systems and using water efficient fittings. • Importantly, the storm water management system and related infrastructure is likely to require regular on-going maintenance in the form of silt, debris/litter clearing in order to ensure the optimal functioning of such systems. Storm water management systems will therefore be designed with longevity in mind and in order to require little maintenance by catering for silting, etc. Any damaged infrastructure will need to be repaired or replaced as necessary. • Regular, effective maintenance and supervision systems are in place to ensure the works is correctly functioning. • The water services provider to provide process control

POTENTIAL IMPACTS	PROPOSED MITIGATION
<p>Operational</p> <p>Research indicates that cemeteries are recognised as having the potential to pollute groundwater as cemeteries can generate a host of potential contaminants that can seep from graveyards, not only limited to pollutants (pathogens/bacteria) emanating from decomposing bodies but also the material they are buried in (such as heavy metals, etc. from coffins) (Richards & Croukamp, 2004). The risk to surface water resources such as wetlands exists, primarily due to a potentially shallow/ perched water table in wetlands due to an underlying impermeable subsurface layer (such as clay material underlying sandy soils). Where significant changes in water quality do occur in watercourses downstream of site, this will ultimately result in a shift in aquatic species composition, favouring more tolerant species and potentially resulting in the localised reduction of sensitive species.</p> <p>Since the risk of groundwater contamination through leachate from cemeteries is not uniform, and is influenced by a number of factors such as soil characteristics (type of soil, depth, pH, permeability and porosity); climate (rainfall and temperature); geology, the hydrological setting, and terrain features.</p> <p>(Water Wheel, 2015), a geohydrological assessment was deemed relevant to understand groundwater contamination pathways and risks.</p> <p>The Geohydrological Assessment undertaken by GCS (2018) and Engeolab (2022) mentions that the typical depth to groundwater in this regions is between 20 – 30 mbgl (meters below ground level), however, due to the high clay content of the Berea Formation (which can act as an impermeable barrier to flow), perched aquifer conditions are possible at shallow depths. Indeed, ground water levels measured at boreholes at the nearby King Shaka International Airport showed a range in water levels of 0.5 – 9.7 mg/lb, with an average water level of 5.2 mbgl (GCS, 2018; Engeolab, 2022). This does suggest the potential for perched aquifer conditions where ground water is at relatively shallow</p>	<p>services.</p> <ul style="list-style-type: none"> • The water service provider for the routine electrical/mechanical maintenance and breakdown interventions on the plant. • Daily plant inspection by supervisory staff. • Weekly inspections and sampling visits (service provider to be appointed). • In the case of mechanical breakdown, all essential items of equipment are provided with a standby to assume duty in the event of a break down. • Similarly, all switchgear (with the exception of the transformer) is duplicated with the mechanical plant. • In the event of an electrical breakdown or outage, a standby genset will be installed to provide emergency power. • Process poisoning can occur if poisons find their way into the sewer system, this is unlikely as the system is for domestic sewage only and not industrial effluents. • If the operation of the works is not diligent, then process failure could result. The water services provider has an obligation to ensure that all routine and intervention actions are carried out by the operational staff. • All mechanical and electrical equipment is provided in a duty / standby configuration, with the exception of the aerators, a spare motor and gearbox is held in store for this this equipment. • A standby generator set will be provided. • All equipment is generic and spares are readily obtainable. • The quantity of the discharge must be metered and the total recorded weekly; and • The quality of domestic wastewater discharges must be monitored on a monthly basis by grab sampling and analysed for specific substances and parameters as required by DWS, which may be amended from time to time; and results submitted to the responsible authority. • Importantly, WWTW discharge quality monitoring conditions will need to be informed by interactions with DWS during the licensing of these activities and will likely be formalised in the

POTENTIAL IMPACTS	PROPOSED MITIGATION
<p>depths in the region. Based on the intrusive fieldwork conducted during the geohydrological investigations on the site of the Memorial Park development, water levels are likely to be deeper than 3 mbgl (GCS, 2018).</p> <p>The geohydrological assessment report also indicates that ground water in the area will most likely drain in the direction of the slope (south to north) but the regional groundwater flow direction will be in an easterly direction towards the coast. Seepage of potential water quality contaminants from the Memorial Park through the vadose zone (unsaturated zone) and saturated zone were identified pathways for the migration of potential pollutants, with the identified local receptors including downstream water uses and nearby wetlands/streams (GCS, 2018; Engeolab, 2022). Importantly, the hydrocensus conducted as part of the Geohydrological Assessment undertaken by GCS (2018) identified no groundwater users down gradient of the proposed Memorial Park.</p> <p>The Risk Assessment undertaken by GCS (2018) and Engeolab (2022) contained in the Geohydrological Assessment for the project, considers risk of ground water contamination as being related directly to the depth of the local water table, with shallow water depths being at a higher risk of contamination/pollution from the proposed cemetery development. By assessing the topographical profile and inferred water levels across the site of the proposed development, areas considered at risk due to shallow water levels (<8mbgl) were identified in the Geohydrological Report as being 'high risk' areas and unacceptable for the development of a cemetery (GCS, 2018; Engeolab, 2022).</p> <p>In addition to sub-surface leachate impacts, water pollution impacts are also likely to result from the discharge of treated effluent into the receiving wetland, particularly if discharge quality limits are not adhered to. There is also a risk of leaking and surcharging sewage manholes and pipeline infrastructure failures, all of which will result in raw sewage entering local watercourses. The probability and duration of pipeline infrastructure failures is however relatively low, thus lowering the overall impact significance.</p>	<p>Water Use license as specific conditions. These will need to be complied with.</p> <ul style="list-style-type: none"> • In addition to the monitoring obligations set out above, it is recommended that the applicant develop and implement a surface water quality and biomonitoring programme for watercourses that receive wastewater from the WWTW. This should be developed and implemented by a suitable qualified aquatic ecologist. The monitoring programme needn't be complicated in nature and should include at a minimum biannual water quality sampling of selected determinands, supplemented by SASS5 biomonitoring and basic visual investigations at suitable sites. • A Contingency Plan for Aquatic Ecosystems (wetlands & rivers/streams) to be developed for the project. Emergency breakdowns to be handled by the contracted mechanical and electrical service provider. Process emergencies will be handled by appointed service provider.

POTENTIAL IMPACTS	PROPOSED MITIGATION
<p>The Average Annual Daily sewer flow to the Wastewater Treatment Works was tentatively provided by the client as follows:</p> <ul style="list-style-type: none"> • Current Memorial Park development site: 0.052 MI/day • Possible future developments: 2.307 MI/day • Total flow is 2.36 MI/day <p>Upon review of the design report and the WWTW appears to be designed to satisfactory standards. Should the plant perform as indicated in the design report, 'moderate' impacts are expected in good mitigation scenario (i.e., good operational maintenance and monitoring). It is recommended that the plant comply with Special Limit Values (SLV's) as set out by the DWS General Authorisation (Notice No. 665, dated 6 September 2013) under Section 21(f) of The National Water Act (Act 36 of 1998) Act for Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit. DWS to comment and set appropriate limits for the catchment.</p> <p>Wastewater discharges will likely increase bacterial, salt and nutrient levels within the receiving watercourse, the extent to which depends on how well the plant performs. This may result in reduced water quality within the wetland and a negative biotic ecological response, including a shift in biotic communities to tolerate/ resilient and/or generalist species of aquatic flora and fauna. As the wetland and aquatic is already in a degraded, characterise by disturbance tolerate species, the impact is unlikely to reduce habitat condition and aquatic species significantly further.</p> <p>The wetland affected by the WWTW is not regarded as providing any important direct use values, however reduced water quality to further downstream areas may result but is likely to be mitigated by the role the wetland vegetation in improving water quality by trapping nutrients and neutralising other pathogens.</p> <p>Should the Memorial Park development utilise the entire project site, there is the potential for surface and ground water contamination to occur within the northern section of the site and the release of treated effluent and under this development</p>	

POTENTIAL IMPACTS				PROPOSED MITIGATION
<p>scenario, there is a risk of surface and shallow groundwater interacting with downstream wetland areas and impact significance has been conservatively rated as being ‘Moderately-High’. Should the zones be avoided for cemetery development as per the recommendations made in the Geohydrological Reports (GCS, 2018; Engeolab, 2022), the risk of contaminating surface water, shallow ground water and wetland areas is likely to be reduced considerably and impact significance can potentially be reduced to a ‘moderate’ level.</p>				
Alternative Type	Options	Without Mitigation	With Mitigation	
Layout	Option 1	Medium	Low	
	Option 2	High	Medium	
Bulk Sewer Infrastructure	Option 1	Medium	Low	
	Option 2	High	Medium	
	Option 3	Medium	Medium	
Access Roads	Option 1	Medium	Low	
	Option 2	Medium	Low	
	Option 3A	Medium	Medium	
	Option 3B	Medium	Medium	
New Roads and Widening	Option 1	High	Medium	
	Option 2	Medium	Medium	
	Option 3	Medium	Medium	
<p>Nature of the Impact: <u>Changes in local hydrology.</u></p> <p>Land clearance for roadways and parking areas results in changes in surface roughness and increased surface flow volumes and velocities and erosion potential.</p>				<ul style="list-style-type: none"> • An adequate stormwater management plan. • Construct cut-off berms downslope of working areas and demarcate footprint areas to be excavated to avoid unnecessary digging. • Use semi-permeable surfaces that can absorb artificial run-off but releases a certain amount into the landscape. • Energy dissipating structures must be installed. • Maintain drains and attenuation structures. • Ensure all clean water is dissipated towards the natural flow area and all dirty water is directed towards a control structure.
Alternative Type	Options	Without Mitigation	With Mitigation	
Layout	Option 1	Medium	Low	
	Option 2	Medium	Medium	
Bulk Sewer Infrastructure	Option 1	Low	Very Low	
	Option 2	Medium	Medium	
	Option 3	Medium	Low	

POTENTIAL IMPACTS				PROPOSED MITIGATION																																												
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New Roads and Widening	Option 1	Medium	Medium																																													
	Option 2	Medium	Medium																																													
	Option 3	Medium	Medium																																													
<p>Nature of the Impact: <u>Changes to Surface Water Quality.</u></p> <p>Physiochemical changes in water quality due to earth works, hazardous material handling, and waste management. Contaminated runoff and litter.</p> <table border="1"> <thead> <tr> <th>Alternative Type</th> <th>Options</th> <th>Without Mitigation</th> <th>With Mitigation</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Layout</td> <td>Option 1</td> <td>Medium</td> <td>Low</td> </tr> <tr> <td>Option 2</td> <td>High</td> <td>Medium</td> </tr> <tr> <td rowspan="3">Bulk Sewer Infrastructure</td> <td>Option 1</td> <td>Medium</td> <td>Low</td> </tr> <tr> <td>Option 2</td> <td>High</td> <td>Medium</td> </tr> <tr> <td>Option 3</td> <td>Medium</td> <td>Medium</td> </tr> <tr> <td rowspan="4">Access Roads</td> <td>Option 1</td> <td>Medium</td> <td>Low</td> </tr> <tr> <td>Option 2</td> <td>Medium</td> <td>Low</td> </tr> <tr> <td>Option 3A</td> <td>Medium</td> <td>Medium</td> </tr> <tr> <td>Option 3B</td> <td>Medium</td> <td>Medium</td> </tr> <tr> <td rowspan="3">New Roads and Widening</td> <td>Option 1</td> <td>High</td> <td>Medium</td> </tr> <tr> <td>Option 2</td> <td>Medium</td> <td>Medium</td> </tr> <tr> <td>Option 3</td> <td>Medium</td> <td>Medium</td> </tr> </tbody> </table>				Alternative Type	Options	Without Mitigation	With Mitigation	Layout	Option 1	Medium	Low	Option 2	High	Medium	Bulk Sewer Infrastructure	Option 1	Medium	Low	Option 2	High	Medium	Option 3	Medium	Medium	Access Roads	Option 1	Medium	Low	Option 2	Medium	Low	Option 3A	Medium	Medium	Option 3B	Medium	Medium	New Roads and Widening	Option 1	High	Medium	Option 2	Medium	Medium	Option 3	Medium	Medium	<ul style="list-style-type: none"> • Implementation of a waste management plan. • Implementation of a spill management plan. • Spill prevention kits must be available on site. • Appropriate sanitary facilities must be provided and all waste to be removed to an appropriate waste facility. • The ECO must confirm all designated maintenance areas. • The ECO must audit any likely pollution areas regularly.
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<p>Nature of the Impact: <u>Spread of Alien Invasive Plants.</u></p> <p>Alien invasive plants can spread through seed disbursement in spoils areas and stockpiles. Spread of alien invasives along road edges can take place.</p> <table border="1"> <thead> <tr> <th>Alternative Type</th> <th>Options</th> <th>Without Mitigation</th> <th>With Mitigation</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Layout</td> <td>Option 1</td> <td>Medium</td> <td>Low</td> </tr> <tr> <td>Option 2</td> <td>High</td> <td>Medium</td> </tr> </tbody> </table>				Alternative Type	Options	Without Mitigation	With Mitigation	Layout	Option 1	Medium	Low	Option 2	High	Medium	<ul style="list-style-type: none"> • An alien plant management plan to be implemented throughout the construction period. • The ECO must monitor any incidences of alien plant presence. • All stockpiles and road edges to be monitored and cleared of alien plants. 																																	
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<p>Nature of the Impact: <u>Changes in Surface Water Quality.</u></p> <p>Spills from maintenance equipment and vehicles may occur. Solid waste such as litter may enter streams. Potential pollutants being washed to streams from excavation machinery. Spill from Domestic Sewage Treatment System will increase nutrient input.</p> <table border="1"> <thead> <tr> <th>Alternative Type</th> <th>Options</th> <th>Without</th> <th>With</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>				Alternative Type	Options	Without	With					<ul style="list-style-type: none"> All hazardous substances or potential contaminants to be stored separately in appropriately banded and demarcated facilities. Implementation of a waste management plan. Implementation of a spill management plan. Spill prevention kits must be available on site. Appropriate sanitary facilities must be provided and all waste to be removed to an appropriate waste facility. 																																				
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<p>Nature of the Impact: <u>Leachate Seepage from graves into underground water bodies.</u></p> <p>Cemeteries do pose risk. Decay of organic material will inevitably</p>				<ul style="list-style-type: none"> Leak detection and management plan must be in place. Constant monitoring is required. 																																												

POTENTIAL IMPACTS				PROPOSED MITIGATION
<p>result in some form of contamination of the subsurface; whether this reaches receptors (through for instance groundwater, surface water or the biosphere) is subject to the quality of the land use investigation, the ability of the vadose zone to protect groundwater and the practices employed in interments.</p>				
Alternative Type	Options	Without Mitigation	With Mitigation	
Layout	Option 1	Medium	Medium	
	Option 2	High	Medium	
Bulk Sewer Infrastructure	Option 1	Medium	Low	
	Option 2	High	Medium	
	Option 3	Medium	Medium	
Access Roads	Option 1	Medium	Low	
	Option 2	Medium	Low	
	Option 3A	Medium	Medium	
	Option 3B	Medium	Medium	
New Roads and Widening	Option 1	High	Medium	
	Option 2	Medium	Medium	
	Option 3	Medium	Medium	
<p>Nature of the Impact: <u>Impact to the vegetation.</u></p>				
Alternative Type	Options	Without Mitigation	With Mitigation	
Layout	Option 1	Medium	Low	
	Option 2	High	Medium	
Bulk Sewer Infrastructure	Option 1	Medium	Low	
	Option 2	High	Medium	
	Option 3	Medium	Medium	
Access Roads	Option 1	Medium	Low	
	Option 2	Medium	Low	
	Option 3A	Medium	Medium	
	Option 3B	Medium	Medium	
New Roads and Widening	Option 1	High	Medium	
	Option 2	Medium	Medium	
	Option 3	Medium	Medium	
				<ul style="list-style-type: none"> • Activities should take place during winter to minimise the risk of pollution. • Erosion from the development footprint could increase sedimentation in already degraded watercourses. Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction/ earthworks in that area (DWAF, 2005). • Runoff from roads/ footpath must be managed to avoid erosion and pollution problems. • Ensure that runoff from compacted or sealed surfaces is slowed down and dispersed sufficiently to prevent accelerated erosion from being initiated • Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and work areas. • After construction clear any temporarily impacted areas of all

POTENTIAL IMPACTS		PROPOSED MITIGATION									
<p>Nature of the Impact: <u>Loss and disturbance of cultural heritage sites and artefacts due to the development.</u></p> <p>This is low for all alternatives and all options.</p>		<p>foreign materials, re-apply and/or loosen topsoils and landscape to surrounding level.</p> <ul style="list-style-type: none"> Should graves, fossils or any archaeological artefacts be identified during construction, work on the area where the artefacts were found, must cease immediately and it should immediately be reported to a heritage practitioner or local museum so that an investigation and evaluation of the finds can be made. 									
<p>Nature of the Impact: <u>Loss and disturbance of palaeontology sites and artefacts due to the development.</u></p> <p>This is low for all alternatives and all options.</p>		<ul style="list-style-type: none"> Should any palaeontology features be identified during maintenance, work on the area where the artefacts were found, must cease immediately and it should immediately be reported to a specialist so that an investigation and evaluation of the finds can be made. Chance find protocol must be in place. 									
<p>Nature of Impact: <u>Visual</u></p> <p>Surface disturbances and the presence of a construction team are uncharacteristic events in the study area and may cause unsightly views as a result of the activity.</p> <p>Introduction of construction equipment, ground staff, construction vehicles and equipment that is unfamiliar in the baseline environment.</p> <p>Source of Impact:</p> <ul style="list-style-type: none"> Construction vehicles. Construction material. Barricading and fencing. Rubble on site. Construction crew. 		<ul style="list-style-type: none"> Construction vehicles should only park in designated areas. Waste to be kept only at specific sites on site and to be removed weekly. Do not locate the construction camp or laydown yards within 1km from any residential area or tourist attraction, unless it can be completely screened from sensitive viewpoints. Preferably, construction camps should be in a dedicated construction camp in the industrial area, in an area that is already disturbed. Avoid the construction of additional access roads by keeping to existing roads where possible. Avoid removal of any large trees or shrubs that may open views to the construction site and compromise the natural screening capacity of the study area. Clearly demarcate the construction site to limit the area of disturbance. Keep dust levels down by regularly wetting dirt roads and exposed soil areas. Remove rubble and other waste that is generated by the construction process as soon as possible and dispose at an 									
<table border="1"> <thead> <tr> <th>Alternative Type</th> <th>Options</th> <th>Without Mitigation</th> <th>With Mitigation</th> </tr> </thead> <tbody> <tr> <td>All</td> <td>All</td> <td>High</td> <td>Medium</td> </tr> </tbody> </table>		Alternative Type	Options	Without Mitigation	With Mitigation	All	All	High	Medium		
Alternative Type	Options	Without Mitigation	With Mitigation								
All	All	High	Medium								

POTENTIAL IMPACTS		PROPOSED MITIGATION									
		appropriate dump site. <ul style="list-style-type: none"> Keep the construction camp neat and tidy at all times. Remove any waste from the site or contain it in an enclosed area out of sight from sensitive viewpoints. Enhance screening of the construction camps by erecting a temporary fence with a 3m high shade cloth to limit the intrusive nature of such a site. 									
<p>Nature of Impact: <u>Dust Generation</u></p> <p>Construction machinery and heavy vehicles which are likely to make use of the existing gravel roads to transport equipment and material to the construction site, are likely to generate dust which is likely to be perceptible by adjacent residents. Trucks may potentially distribute dust along internal access roads as well as into the watercourse given the nature of the activities.</p> <p>Source of Impact:</p> <ul style="list-style-type: none"> Clearing of vegetation. Construction vehicles. <table border="1"> <thead> <tr> <th>Alternative Type</th> <th>Options</th> <th>Without Mitigation</th> <th>With Mitigation</th> </tr> </thead> <tbody> <tr> <td>All</td> <td>All</td> <td>High</td> <td>Medium</td> </tr> </tbody> </table>		Alternative Type	Options	Without Mitigation	With Mitigation	All	All	High	Medium	<ul style="list-style-type: none"> Vegetation clearance should be kept to a minimum (only where necessary). Wet all unprotected cleared areas and stockpiles with water to suppress dust pollution during dry and windy periods. Warning barricading should be placed around open trenches and should be suitable for high winds. Speed limits should be enforced to ensure that the generation of dust by construction vehicles are limited. Dust suppression at least twice a day; morning and before the end of the working day. A continuous dust monitoring process needs to be undertaken during construction. All vehicles transporting friable materials such a sand, rubble etc must be covered by a tarpaulin or wet down. Construction work to be undertaken during weekdays as far as practical. 	
Alternative Type	Options	Without Mitigation	With Mitigation								
All	All	High	Medium								
<p>Nature of Impact: <u>Crime, safety and security</u></p> <p>Source of Impact:</p> <ul style="list-style-type: none"> Lack of security. Easy access. Construction area not enclosed. Poorly trained personnel using equipment and vehicles. <table border="1"> <thead> <tr> <th>Alternative Type</th> <th>Options</th> <th>Without Mitigation</th> <th>With Mitigation</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		Alternative Type	Options	Without Mitigation	With Mitigation					<ul style="list-style-type: none"> Ensure that the construction vehicles as well as equipment are under the control of competent personnel and are in proper working order. Ensure that the contact details of the police or security company and ambulance services are available on site. Limit access to the construction camp to construction workers through access control. Comply with the requirements of the Occupational Health and Safety Act, 1993 (Act No.85 of 1993) requirements. 	
Alternative Type	Options	Without Mitigation	With Mitigation								

POTENTIAL IMPACTS				PROPOSED MITIGATION								
All	All	High	Medium	<ul style="list-style-type: none"> Ensure that the handling of equipment and materials is supervised and adequately instructed. Vehicular traffic during construction activities must be limited to a maximum speed limit of 30 km/hr. The security fence around the development site must be completed before construction commences internally. 								
<p>Nature of Impact: <u>Noise</u></p> <p>Source of Impact:</p> <ul style="list-style-type: none"> Construction vehicles. Equipment and machinery. <table border="1"> <thead> <tr> <th>Alternative Type</th> <th>Options</th> <th>Without Mitigation</th> <th>With Mitigation</th> </tr> </thead> <tbody> <tr> <td>All</td> <td>All</td> <td>High</td> <td>Medium</td> </tr> </tbody> </table>				Alternative Type	Options	Without Mitigation	With Mitigation	All	All	High	Medium	<ul style="list-style-type: none"> Construction and the use of construction machinery should be limited between 06h00 and 18h00 on weekdays only. Institute noise control measures throughout the construction phase for all applicable activities, including the construction times. Ensure that noise licensers are installed on the construction vehicles and machineries to reduce the noise level. Inform residents of nearby residential areas of planned noisy activities outside the timeframes stated above. No construction should occur during weekends, unless the adjacent residents have been notified in writing at least three days in advance. Construction activities must abide by the national noise laws and the municipal noise by-laws with regard to the abatement of noise caused by mechanical equipment.
Alternative Type	Options	Without Mitigation	With Mitigation									
All	All	High	Medium									
<p>Nature of impact: <u>Socioeconomic</u></p> <p>Source of Impact:</p> <ul style="list-style-type: none"> Job creation for local skilled labour, general labour and suppliers. Provision of a service to the area – Memorial Park. <table border="1"> <thead> <tr> <th>Alternative Type</th> <th>Options</th> <th>Without Enhancement</th> <th>With Enhancement</th> </tr> </thead> <tbody> <tr> <td>All</td> <td>All</td> <td>Medium</td> <td>High (+)</td> </tr> </tbody> </table>				Alternative Type	Options	Without Enhancement	With Enhancement	All	All	Medium	High (+)	<ul style="list-style-type: none"> General and skilled locals must be considered for employment during construction (contractor and construction crew). Local suppliers must be considered for the purchase of construction material. Continuous maintenance of the LMMP.
Alternative Type	Options	Without Enhancement	With Enhancement									
All	All	Medium	High (+)									

7.4 No-Go Alternative

This is the alternative of not developing the LMMP. This alternative will result in limited construction impacts already occurring in the study area. However, should the LMMP not be developed as proposed, the issue of overcrowded graveyards will not be resolved within the municipality as the need for additional burial space is a necessity. A service to the communities within the region will not be met. This is an undesirable alternative for the project as it will pose negative impacts on the social and economic perspective and is not considered desirable. The negative impacts of the no-go alternative are considered to outweigh the positive impacts. The no go alternative is therefore not preferred. The associated impacts with the no-go option is addressed in Table 47.

Table 47: Potential impacts should the Development not be Approved ("No-Go" Alternative)

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
Destruction and modification of freshwater habitat – No-go would mean study site status quo is maintained.	P – High	There are no mitigation measures	P – High	Low risk
Flow modification and erosion / sedimentation – No-go would mean study site status quo is maintained.	P – High	There are no mitigation measures	P – High	Low risk
Changes in local hydrology – No-go would mean study site status quo is maintained.	P – Medium	There are no mitigation measures	P – Medium	Low risk
Changes to Surface Water Quality – No-go would mean study site status quo is maintained.	P – Medium	There are no mitigation measures	P – Medium	Low risk
Spread of Alien Invasive Plants – No-go would mean study site status quo is	P – Low	There are no mitigation measures	P – Low	Low risk

maintained.				
Change in Aquatic Species Diversity – No-go would mean study site status quo is maintained.	P – Low	There are no mitigation measures	P – Low	Low risk
Changes in Local Hydrology – No-go would mean study site status quo is maintained.	P – Low	There are no mitigation measures	P – Low	Low risk
Changes in Surface Water Quality – No-go would mean study site status quo is maintained.	P – Low	There are no mitigation measures	P – Low	Low risk
Changes in Aquatic Species Diversity – No-go would mean study site status quo is maintained.	P – Low	There are no mitigation measures	P – Low	Low risk
Leachate Seepage from graves into underground water bodies – No-go would mean study site status quo is maintained.	P – Low	There are no mitigation measures	P – Low	Low risk
Impact to the vegetation – No-go would mean study site status quo is maintained.	P – Low	There are no mitigation measures	P – Low	Low risk
Loss and disturbance of cultural heritage sites and artefacts due to the development – No-go would imply no heritage sites or artefacts will be disturbed.	P – Low	There are no mitigation measures	P – Low	Low risk
Loss and disturbance of palaeontology sites and artefacts due to the development – No-go would imply no heritage sites or artefacts will be disturbed.	P – Low	There are no mitigation measures	P – Low	Low risk
Dust generation – No-go would mean study site status quo is maintained.	P – High	There are no mitigation measures	P – High	Low risk
Crime, safety and security: during construction – No-go would imply that the area remains as is.	P – High	There are no mitigation measures	P – High	Low risk
Noise – No-go would imply no construction	P – High	There are no mitigation measures	P – High	Low risk

noise.		measures		
Socioeconomic impacts anticipated during the construction period – No-go would mean no local job opportunities for general and skilled labourers as well as no opportunities for local retailers.	N – High	The development and operation of the LMMP will provide job opportunities for locals and for local retailers.	N – High	High risk
Socioeconomic impacts anticipated during the operational period – No-go would mean that overall community upliftment will not occur.	N – High	The provision of a service to the area – Memorial Park will not be addressed and the shortage of burial spaces will remain an issue for the city.	N – High	High risk
Visual: during construction – No-go would imply that the study site will remain as is.	P – Medium	There are no mitigation measures	P – Medium	Low risk
Visual: during operation – No-go would imply the study site will remain as is.	N – Low	There are no mitigation measures	N – Low	High risk

7.5 Cumulative Impacts

Cumulative impacts can result from actions which may not be significant on their own but which are significant when added to the impact of other similar actions. The anticipated cumulative impacts of this development include the following:

- **Impacts on the Wetland**

Impacts associated with construction could increase the significance of this impact already present as a result of other activities in the area such as dumping; erosion and pollution input and infilling are amongst the most significant impact.

- **Cumulative Impacts on traffic congestion**

Public traffic and general access to the cemetery and passing by will have added pressure during operation.

- **Cumulative vegetation impacts**

- Fragmentation of open space within the province.
- Loss of grassland and open space within KZN.
- If mitigation measures to limit and prevent the spread of alien species are not implemented, the cumulative impact could lead to further transformed by alien plant species.

- **Increased socio-economic upliftment as a result of the proposed LMMP**

The cemetery will result in direct jobs being created during the construction phase. During the operation phase, overall upliftment will occur as more burial spaces will be provided for the regional community and less commuting to further cemeteries will be required.

Responsible environmental management will be required during the entire project life cycle. These management measures should be guided by the Environmental Management Programme (EMPr), attached as **Appendix G**.

7.6 Environmental Impact Statement

The proposed activities assessed within this Basic Assessment Report are required to provide essential information associated with the proposed LMMP that may impact on the environment. In summary, the Basic Assessment has assessed potential impacts and identified appropriate management and mitigation measures. No environmental fatal flaws and no significant negative impacts have been identified to be associated with the proposed activities. The Impact Assessment section of this report indicates that the identified environmental impacts associated can be effectively mitigated to have a low significance impact rating provided the recommended mitigation and management measures are implemented.

Environmental cost that can be expected to arise as a result of the project proceeding for all alternatives include:

Disturbance of the wetland

- Riparian areas may be disrupted (minimally as a result of the informed layout).

Benefits of the project include the following:

- The proposed LMMP will negate the problem of lack of burial spaces within the region and commuting to further cemeteries.
- eThekweni is running out of burial spaces so this development will assist with additional capacity.
- it provides an important service to communities.
- The proposed development will result in important economic benefits at the local and regional scale through job creation, procurement of materials for construction and provision of services and other associated downstream economic development at local and regional scale. These will extend beyond the site and would be experienced at local and regional scale.

The benefits of the project are expected to outweigh the costs.

A number of mitigation and monitoring measures have been identified which would allow for the minimisation and management of potential environmental impacts associated with the proposed

development, which have been incorporated into the EMPr (**Appendix G**) for the project, which will be further developed during the detailed planning and construction phase of the project.

It is the opinion of NFZ Environmentals that the proposed project will not have a significant environmental impact and is therefore preferred as it is considered to be sustainable from an environmental perspective.

8. CONCLUSIONS AND RECOMMENDATIONS

8.1 Legal Requirements as per Appendix 1 of EIA Regulations, 2014 (as amended)

This Section of the BAR has been prepared in accordance with Appendix 1 of EIA Regulations of 2014 (as amended) and includes the relevant information for Section 8 as outlined in Table 48.

Table 48: Requirements set under Appendix 1 of EIA Regulations of 2014 (as amended) for Section 8

Requirement	Relevant Section
(l) an environmental impact statement which contains.	The environmental impact statement is identified in section 8.2.
(m) based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management outcomes for the development for inclusion in the EMPr.	Mitigation measures are outline within section 8.2 and within Appendix G .
(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.	EAP recommendations are highlighted in section 8.2.
(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; 8.2	EAP opinion on authorisation is outlined in section 8.2.

8.2 Conclusion (Impact Statement)

This Report has identified and assessed the potential impacts on the environment associated with the proposed LMMP project.

The findings of the specialist studies undertaken within this EIA to assess both the benefits and potential negative impacts anticipated as a result of the proposed project conclude that the project will result in some unavoidable environmental impacts during both construction and operation but there are **no environmental fatal flaws** that should prevent the proposed project from proceeding, provided that the recommended mitigation and management measures outlined are implemented. The significance levels of the majority of identified negative impacts have been reduced to acceptable levels by implementing the mitigation

measures recommended by the specialist team during the EIA process, which included the consideration of the proposed layout in relation to environmental sensitivities identified. The development on areas of environmental sensitivities must be avoided as far as possible. Where required, respective mitigation measures must be implemented. The project has considered environmental constraints and is considered to meet requirements of sustainable development if mitigation measures are effectively implemented. Environmental specifications for the management of potential impacts are detailed within **Appendix G**.

8.3 Recommendations

NFZ Environmentals thus suggests the approval of the following preferred alternatives:

- Site Development Plan Option 1 (Preferred)
- Bulk Sewer Infrastructure Option 3 – Privately Owned Low Volume Domestic Sewage Treatment System (Preferred)
- Access Roads Option 1 – Access Off Park Avenue (Extension) (Preferred)
- New Roads and Widening Option 1 – New Road and Widening (Preferred)

These preferred options are informed by the specialist input and therefore has the least impact to the environment in both the construction and operational phases of the project. It is believed that the impacts associated with these alternatives can be mitigated to an acceptable level provided that the mitigation measures implemented are in line with measures set out in the EMP. The proposed development is further subject to approval by DWS by means of a Water Use License, without which development cannot commence.

Based on the assumption NFZ Environmentals believes through effective implementation of the stipulated mitigation measures, the adverse impacts can be reduced. With the proposed mitigation measures, EDTEA may agree that the proposed LMMP development be granted approval.

General Recommendations

NFZ Environmentals recommends that the preferred alternatives as per above, be considered for approval subject to the following general recommendations:

1. Future management of the freshwater wetlands and river/stream ecosystems associated with the development site should be to maintain the current status quo of aquatic ecosystems without any further loss of integrity/functioning (PES/EIS).

2. Vegetation extents need to be assessed in relation to the final proposed development layout. However, it is confirmed that the current layout suits the ecological nature of the site
3. The Geohydrology Study recommends that the site be developed in stages, commencing with areas where Berea Formation clayey sand material naturally occurs at shallow depth below the surface (<1m) demarcated as 'green' zones on the geotechnical plan.
4. Chance find protocols for Archaeological, Heritage and Palaeontological features must be in place and adhered to.
5. Tongaat Hulett Property must aim to maximise the opportunities that the proposed memorial park may present by focusing on local employment.
6. Implementing the EMPr to guide construction and operational activities to provide a framework for the on-going assessment of environmental performance.
7. Water Use License: The relevant authorisations and water use licenses must be obtained from the Department of Water and Sanitation prior to the commencement of construction activities.
8. No development other than the authorized activities will be allowed within a wetland or buffer of the wetland measured from the edge of the wetland.
9. An independent ECO must be appointed/ designated to ensure that regular inspections are performed during the construction phase and to ensure the implementation of mitigation measures. Furthermore, an ECO must monitor compliance with all the conditions of the EMPr and the environmental authorization once issued.
10. There is continued consultation with relevant stakeholders/landowner through an appointed community liaison officer during construction.
11. Reports on the status of construction and legal compliance are submitted to EDTEA at stipulated intervals.
12. Clearance of the area should be as minimal as possible and construction activities be confined to areas where construction will take place (development footprint) to prevent negative impacts onto the surrounding environment.
13. Avoid, as far as reasonably possible, disturbing the wetlands. Similarly, restore wetlands that will remain intact if they have been affected by construction activity – this project constitutes activities within a wetland.
14. Adequate measures must be put in place to prevent polluted runoff water from entering the, wetland and soil, thus preventing surface and groundwater pollution.
15. Servicing/maintenance/washing of vehicles must not be carried on the construction site and only emergency repairs can be done on site.

16. In the event of a major incident (e.g. fire causing damage to property and environment, major spill or leak of contaminants), the relevant authorities should be notified as per the notification of emergencies/ incidents, as per the requirements of Section 30(3) of NEMA.
17. Construction noise on site must not exceed 85 decibels (DB) as stipulated in the Occupation Health and Safety Act (Act No. 85 of 1993).
18. All relevant legislation and requirements of other government departments (National, Provincial), in particular of Section 28 (duty of care) of NEMA, must be complied with.
19. Compliance with all legal requirements in relation to environmental management and conditions of the authorisation issued by EDTEA.
20. Maximise the employment of local people and the procurement of local resources during the construction and maintenance phases to ensure maximum benefit to the provincial/local economy.
21. Implement the recommendations made in the specialist studies and EMPr.
22. The EMPr should form part of the contractor's tender documentation.

From the impact assessment, it is evident that prior to mitigation, impacts associated with the proposed development are generally moderate. Thus, based on the specialist recommendations, it is the opinion that the project be considered favourably and environmental authorisation granted for the proposed activities, provided the essential and recommended mitigation measures as defined in this report are strictly adhered to.

APPENDICES

The following appendixes are attached:

Appendix A: Site plans

Appendix B: Site Photographs

Appendix C: Layouts

Appendix D: Public Participation

Appendix E: Specialist Studies

Appendix F: Impact Assessment Scoring

Appendix G: Environmental Management Programme (EMPr)

Appendix H: Bulk Services

Appendix I: Declarations