

Environmental Management Programme

Proposed expansion of the
Kuil's River Cemetery Erf
1338, Erf 1368 and Erf 6282,
Cape Town, Western Cape

PREPARED IN COMPLIANCE WITH THE REQUIREMENTS
OF THE EIA REGULATIONS, GN 326 OF 2017 AND THE
NATIONAL ENVIRONMENTAL MANAGEMENT ACT, ACT
NO. 107 OF 1998

DEA&DP REF NO. 16/3/3/1/A8/74/3028/24

VERSION: FINAL

DATE: FEBRUARY 2026

APPLICANT

City of Cape Town



CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

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REPORT DETAILS

PROPOSED EXPANSION OF THE KUILS RIVER CEMETERY ERF 1338, ERF 1368 AND ERF 6282, CAPE TOWN, WESTERN CAPE: ENVIRONMENTAL MANAGEMENT PROGRAMME

APPLICANT

City of Cape Town

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Project support

K Gilmour (BSc. Hons, Cand. Sci. Nat.)

Report purpose

This Environmental Management Programme is prepared as part of a Basic Assessment in terms of the Environmental Impact Assessment Regulations, 2014 (as amended). It prescribes control methods to mitigate and manage negative environmental impacts and enhance positive impacts associated with the construction and operation of the development and provides a programme for monitoring the performance of personnel in applying such methods.

VERSION HISTORY

Date	Version
May 2024	Draft 1
August 2024	Final
February 2026	Final_Revised

Title: Proposed expansion of the Kuils River Cemetery Erf 1338, Erf 1368 and Erf 6282, Cape Town, Western Cape Environmental Management Programme

Report status : Final

Date : **February 2026**

DECLARATION OF EAP'S INDEPENDENCE

I, Jeremy Rose, appointed by the City of Cape Town as Environmental Assessment Practitioner for the Proposed expansion of the Kuils River Cemetery Erf 1338, Erf 1368 and Erf 6282, Cape Town, Western Cape, hereby declare that the information provided in this report and supporting documentation is complete and correct to the best of my knowledge; that other than fair remuneration for work performed in terms of this application I have no business, financial, personal or other interest in the activity or application and that there are no circumstances that may compromise my objectivity; that I have disclosed, to the Applicant, the specialist(s), the Competent Authority and registered interested and affected parties all material information that have or may have the potential to influence the decision of the Competent Authority; that I have ensured that information in respect of the application was distributed or was made available to registered interested and affected parties and that participation will be facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments; and that I am aware that a false declaration is an offence in terms of Regulation 48 of the NEMA EIA Regulations.

Jeremy Themba Rose BSc, BSc Hons, Reg. E.A.P. 2019/1116, IAIA member #5781

Infinity Environmental (Pty) Ltd: Director & Principal EAP

10 years' experience in environmental management (CV in Appendix A)

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RECORD OF REVISIONS

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EMPr OVERVIEW

Chapter 1	INTRODUCTION
Chapter 2	APPROACH AND STRUCTURE
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Chapter 4	CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN
Chapter 5	OPERATIONAL MAINTENANCE MANAGEMENT PLAN
Chapter 6	ENVIROMENTAL AWARENESS TRAINING PLAN
Chapter 7	GROUNDWATER MONITORING PLAN

1 INTRODUCTION

This Environmental Management Programme (EMPr) has been prepared for the proposed expansion of the Kuils River Cemetery on Erven 1338, 1368 and 6282, Cape Town, Western Cape. The preparation of an EMPr is a requirement of the National Environmental Management Act (107 of 1998 as amended, NEMA) and the Environmental Impact Assessment Regulations, 2014 (as amended). This EMPr will be submitted to the Department of Environmental Affairs and Development Planning as part of an application for environmental authorisation of the works. The project applicant is the City of Cape Town which owns the property wherein the cemetery development will occur.

The project also requires authorisation of water uses listed in Section 21 of the National Water Act, namely section (c) and (i). An application for registration of these water uses was submitted to the Department of Water and Sanitation.

Following a decision on the application for environmental authorisation, this EMPr is intended as a "living" document and should continue to be updated regularly, as needed. Importantly, the management actions can and should be reviewed regularly to ensure that the management outcomes defined in the BAR are still being effectively met by these actions.

The purpose of an EMPr is defined in the Integrated Environmental Management (IEM) Guideline Series (Department of Environmental Affairs and Development Planning, 2005) as "an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented; and that the positive benefits of the projects are enhanced".

1.1 Objective

The overarching objective, from which the detail contained in this EMPr flows, is to construct and operate the project in a manner that –

- » Reduces the risk of pollution or damage to ground and surface water, ecosystems, soils and air;
- » Minimises nuisance and disruption to people residing in, working in or commuting through the area;
- » Adheres to all relevant environmental legislation.

The objectives of this EMPr are therefore:

- » to prescribe the best practicable control methods to mitigate and manage negative environmental
- » impacts and enhance positive impacts associated with the construction and operation of the development; and
- » to provide a programme for monitoring the performance of personnel in applying such methods

1.2 Project Description

The City of Cape Town proposes to expand the Kuils River cemetery on erf 1338, erf 1368 and erf 6282 in Kuils River, Cape Town. Across the city, there is a scarcity of well-located burial space. This department has identified certain parcels of land across the city which could potentially be developed into cemeteries, including the above-mentioned site(s).

The proposed development site is flanked to the east by the R102 (Van Riebeeck Road), to the west by Fabriek Street, and to the south by Kuils River cemetery. The site is also surrounded by residential and industrial land uses with Silveroaks residential area neighbouring the site to the east, Pepkor logistics to the west and various companies such as Siyaya Engine Rebuilders, Supreme Brake & Clutch and Bhats Projects located within an industrial complex to the north.



Figure 1: Locality of the site

The expansion will extend the cemetery by approximately 2.5 ha to cover roughly 8.5 hectares. The layout will consist of:

- » 8 burial blocks
- » Internal roads of a width of 6.4 m to be used as pathways for pedestrians and for vehicle access, if required.
- » Parking provided by the existing parking area and new parking area to be located on the northwestern corner of the site.
- » A new stormwater attenuation pond is proposed for the northwestern corner of the expansion site (Figure 2) due to the existing wetland being separated from the expansion site by a watershed. The northwestern corner is the lowest point on the proposed site

topographically, and the new attenuation pond is incorporated into the design layout in the Stormwater Management Plan (Appendix G5 of the BAR).

- » Supporting infrastructure on the proposed site include public and staff toilet facilities, as well as a guard house.
- » Additional recommended stormwater management measures include the installation of kerb inlets, cut off channels and v-drains along the roads which follow the natural drainage course of the topography of the site.
 - o Stormwater pipes and manholes are also recommended to collect flows from the channels within roadways.

There is already a parking area on the proposed site which has been utilised as a parking area for the existing Kuils River cemetery. This parking will remain, and additional parking is proposed for access on the northern border of the site. Two alternative layouts were identified and assessed regarding the new access points for the proposed cemetery expansion, and Option 1 (access to the northwestern corner of the site off Fabriek Street) was identified as the only feasible alternative due to future plans to realign Van Riebeeck Road through erf 1338.



Figure 2: The proposed Stormwater Layout imposed on the final SDP (Annexure G from the Stormwater Management Plan, 2024). The orange rectangle adjacent to the new buildings has been earmarked as a stormwater attenuation pond.

1.3 Environmental Sensitivities

An assessment of the environmental sensitivities was carried out by the EAP through desktop surveys and site visits on the 30th of June and 5th of December 2023. A freshwater study and wetland verification and delineation report was carried out by Philip Frenzel and Justine Ewart-Smith

Freshwater Consulting in January 2024. A groundwater impact assessment was carried out by GEOSS South Africa (Pty) Ltd in March 2024. The assessments identified freshwater and groundwater sensitivities including:

- The presence of a permanently saturated, seasonally inundated depression wetland on the existing Kuils River cemetery with an area of approximately 0.5ha.
- Shallow water table (between 1.24 mbgl – 2.84 mbgl). The standard depth of graves is 1.8, which falls within the water table depth on the site.

1.3.1 Terrestrial Biodiversity Sensitivities

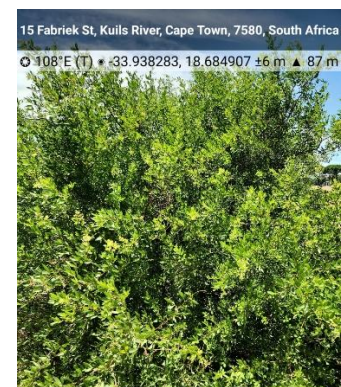
The site is mapped in the national Environmental Screening Tool as very high sensitivity for the terrestrial biodiversity theme due to the site falling within Cape Flats Sand Fynbos region, which is classified as critically endangered vegetation type. The site is however transformed by historical agricultural activities and is dominated by introduced grasses such as kikuyu (*Cenchrus clandestinus*), Fynkweek (*Cynodon dactylon*) and Buffalo grass (*Buchloe dactyloides*). No species of conservation concern were identified during the site visit, although a small number of indigenous plant specimens were identified on the site including the indigenous Blue kunibush (*Searsia glauca*) and Dune currant rhus (*Searsia laevigata*). Alien invasive species identified include Port Jackson Willow (*Acacia saligna*), Thorn apple (*Datura stramonium*), Beefwood (*Casuarina cunninghamiana*), Paterson's curse (*Echium plantagineum*) and Syringa (*Melia azedarach*). There is a small seasonal wetland south of the existing cemetery, but this area is also dominated by grasses (*Bouteloua dactyloides* and *Cenchrus clandestinus*). The wetland has no significant biodiversity value but provides stormwater attenuation functions (Frenzel, 2024).



Photograph 1: Port Jackson (*Acacia saligna*)



Photograph 2: Kikuyu (*Cenchrus clandestinus*), Fynkweek (*Cynodon dactylon*) and Buffalo grass (*Buchloe dactyloides*)



Photograph 3: Dune currant rhus (*Searsia laevigata*)

The proposed site is not located within a Critical Biodiversity Area or any other area selected in the Biodiversity Network (Figure 3). It is located in a highly urbanised environment including residential and industrial developments. Given the highly transformed nature of the site, the proposed cemetery expansion will have little impact on terrestrial biodiversity.



Figure 3: Terrestrial, aquatic and heritage sensitivities surrounding the proposed Kuils River cemetery expansion

1.3.2 Aquatic and groundwater sensitivities

An Aquatic Ecosystem Assessment (Appendix G1 of the BAR) was prepared by Philip Frenzel and Justine Ewart-Smith from Freshwater Consulting (FWC). The assessment found there to be a permanently saturated, seasonally inundated depression wetland with an area of 0.5 hectares located in the southern corner of the existing Kuils River cemetery (erf 1339). This wetland exhibits no significant ecological importance or sensitivity, being classified as Category E/D due to the large extent of modification, although it does perform a storm water attenuation function, being categorised as Moderate Hydrological/Functional Importance (FWC, 2024). It is possible that this wetland is connected to the shallow water table on the proposed site. The freshwater specialists recommend implementing a 15m buffer surrounding the wetland delineated area, and that this section is utilised for low impact activities, such as a memorial garden.

The Groundwater Impact Assessment (Appendix G5 of the BAR) prepared by GEOSS South Africa (Pty) Ltd indicated that there is a highly susceptible primary intergranular aquifer below the proposed site, and beneath the primary aquifer lies a secondary fractured aquifer. The report also identified that the water table on the proposed site is shallow, ranging between 1.24 mbgl – 2.84 mbgl. Given that the site visit took place in summer, this water table is anticipated to be even shallower during winter when there is more rainfall. The depth to groundwater is important to consider when determining the feasibility of a cemetery development or expansion. The soil permeability of the site is high, and the risk of groundwater and soil contamination by chemicals and pathogens associated with human remains, coffins and embalming fluids cannot be ruled out, given the high permeability of the sands underlying the site. The groundwater specialists state that without mitigation measures, the proposed site would not be considered suitable for utilisation as a cemetery. If mitigation

measures are put in place, the specialists conclude that the significance of impacts on groundwater would be low to medium.

1.3.3 Geotechnical sensitivities

The geotechnical assessment prepared by Kobus Roux and Steven Bok from PeraGage identified that shallow groundwater and highly unstable grave walls are the key constraints associated with the cemetery expansion. The investigation took place in summer, when groundwater was detected as shallow as 1.7 mbgl, therefore even shallower groundwater levels are anticipated during winter. Additionally, the sandy soils underlaying the site are highly permeable, increasing the risk of groundwater contamination. The geotechnical specialist states that as such, the site is not well suited for utilisation as a cemetery. The site can be made suitable provided that various mitigation measures are implemented.

1.4 Author of the EMPr

This EMPr has been compiled by the Environmental Assessment Practitioner (EAP) based on best practice environmental management requirements. Details of the EAP who prepared the EMPr are as follows:

Table 1: Authors of the EMPr

Authors	Qualification	Professional registrations	Years of experience	Relevant expertise
Jeremy Rose	B.Sc. (Hons) Environmental and Geographical Science	Registered E.A.P. 2019/1116 Member of IAIAA	10+	More than 40 EIAs or EMPrs

Jeremy Rose has 10 years' experience in the field of environmental management and impact assessment and has managed multiple EIAs and Basic Assessments in South Africa. He holds an Honours degree in Environmental and Geographical Science and is an Environmental Assessment Practitioner duly registered with the Environmental Assessment Practitioners Association of South Africa.

The EMPr also draws on reporting by a number of specialists (Table 2).

Table 2: Specialists consulted

Specialist study	Specialist	Professional registrations	Company
Freshwater	Philip Frenzel and Justine Ewart-Smith	Cand. Sci. Nat. and Pr. Sci. Nat	Freshwater Consulting
Groundwater	Hardy Luttig and Zita Harilall	Pr. Sci. Nat. and Cand. Sci. Nat	GEOSS South Africa (Pty) Ltd
Geotechnical	Kobus Roux and Steven Bok	Pr. Sci. Nat	PeraGage
Traffic	Carla Kleynhand and Inge van Tonder		Innovative Transport Solutions (Pty) Ltd
Heritage and cultural	Liza Malan and John Gribble		Liza Malan and TerraMare

1.5 Impacts

Based on the specialist studies, the impacts indicated in Table 3 have been identified and assessed. Appropriate management and mitigation measures are included within the EMPr (where required) as per the recommendations made in the specialist studies to ensure the potential impacts are adequately mitigated and managed during all phases of the project.

All impacts identified and assessed, as well as the proposed mitigation measures and management actions are set out in Chapter 5 of the BAR. All mitigation and management measures proposed by the specialists, including those additional impacts and management measures identified by the EAP have also been incorporated into an Environmental Management Programme (this report) which will be used during implementation of the proposed activity to manage impacts and monitor compliance. Specialist reports are included in Appendix C of the BAR. In response to the NID, Heritage Western Cape stated that there is no reason to believe that the proposed expansion will impact on heritage resources and no further action under Section 38 of the National Heritage Resources Act (Act 25 of 1999) is required. However, should any heritage resources, including evidence of graves and human burials, archaeological material and paleontological material be discovered during the execution of the activities above, all works must be stopped immediately, and Heritage Western Cape must be notified without delay. The proposed cemetery expansion should also comply with the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) as amended (NEM:AQA) and the National Dust Control Regulation 827 dated 01 November 2013 promulgated in terms of the National Environmental Management: Air Quality Act 39 of 2004 (NEM:AQA) as amended. Dust management methods in this EMPr align with Section 26 (3) of the City of Cape Town Air Quality Management By-Law 2016 as amended.

The **no-go option**, which must always be considered in an environmental assessment, implies that no cemetery related activities will occur.

This project seeks to provide space for burials, which is a city-wide need due to existing cemeteries reaching their maximum capacity. The provisioning of burial space is important to meet the social, cultural and religious needs of surrounding communities. Thus, although the proposed interventions are associated with actual and potential negative impacts to soil, fresh and ground water, with implementation of recommended avoidance, mitigation and management measures outlined in this report, the risk of contamination is medium-low. Should the no-go alternative be selected, the invasive and alien species on the site would likely proliferate and the site would remain unutilised. This would allow for an unmitigated, unmanaged and unknown situation, assessed as of with at least Low negative significance. **The No-go Alternative is not preferred.**

It should be noted that other impacts for which specialist studies were not undertaken but where mitigation or management actions may be required, are also included in the EMPr.

Table 3: Key impacts identified in the EIA process

Impact	Description
Groundwater, freshwater and soil contamination	- Shallow water table on the site (1.24 mbgl – 2.84 mbgl) and depression wetland adjacent to the site (on erf 1339). - Potential contamination due to construction activities (litter, hazardous chemicals and oil/fuel leakages). - Potential contamination due to decomposition of human remains and by metals, paints and other substances.

	Contamination due to formaldehyde is unlikely because when formaldehyde comes into contact with water it tends to breakdown into methanol, amino acids and several other chemicals and therefore does not persist in the environment (World Health Organisation, 2002).
Dust and noise	Potential dust and noise pollution during the construction phase may be experienced by neighbours adjacent to the site due to machinery and vehicles used to clear vegetation for the development of access roads, the new parking area and buildings.
Traffic, safety and access	- Potential impacts on traffic, safety and access to the site during the construction phase due to construction vehicles. - Potential impacts on traffic due to utilisation of the cemetery during the operational phase. - Potential increased safety of the site due to the new guard house and controlled access preventing unauthorised access and use of the site.
Alien and invasive vegetation removal	- During the development of access roads, parking area, new guard building and toilet facilities there will be clearing some clearing of invasive and alien vegetation. - During site operation, there should be routine removal of alien species.
Visual	During the construction phase there may be visual disturbance associated with construction on the site (i.e. construction vehicles and building activities)
Social	- The provision of burial space meets the religious and cultural needs of the surrounding community. Burial is an important rite in many religions and is chosen over other alternatives such as cremation. - Construction-phase employment for construction activities including site preparation (vegetation clearing), building of access roads, new guard house and toilet facilities.
Impacts of cementitious waste and sediment	Potential impacts of cement-laden runoff during construction and any on-site grave slabbing.
Stability of graves	Soil conditions on the site might be unstable and grave walls at risk of collapse.

Table 4: Key mitigation measures identified during the EIA process

Impact	Description of mitigation measures
Groundwater, freshwater and soil contamination	- Implementation of the 15m buffer area surrounding the wetland on erf 1339, in which only low impact activities will be permitted (e.g. use as a memorial garden). - Burials should ideally occur where the water table is more than 4 mbgl, but where this is not possible the installation of a screened layer is recommended to prevent/minimise leachate contact with underground water. Additional clay-rich lining can also be used. - Waste management measures outlined in the construction phase EMP (Section 4) should be followed. - Implementation of a groundwater monitoring plan (Section 7).
Dust and noise	Dust and noise suppression methods can be implemented as described in the EMPr.

	Construction activities should be limited to the hours specified in the EMPr.
Traffic, safety and access	- Construction activities should be limited to the hours specified in the EMPr. - No additional traffic is anticipated during operation due to this being an expansion of an existing cemetery (confirmed by the Traffic Impact Statement, Appendix G4 of the BAR).
Alien and invasive vegetation removal	Alien and invasive species removal is prioritised, and sporadic indigenous bushes are avoided where possible during the construction and operational phase.
Visual	- Construction activities should be limited to the hours specified in the EMPr. - The site should be kept clean and well managed during construction and operation.
Social	- All interested and affected parties must be informed and consulted. - Any complaints or concerns must be addressed promptly, and feedback must be given on complaints. - Construction activities should be limited to the hours specified in the EMPr. - Unreasonable expectations with regards to employment opportunities should not be created. - Skills development and on-the-job training opportunities must be maximised during construction and operation. - Should any heritage resources, including evidence of graves and human burials, archaeological material or palaeontological material be discovered during the execution of the activities, all works must be stopped immediately, and Heritage Western Cape must be notified without delay. - The applicant must implement a channel of communication that allows for concerns and complaints to be brought to its attention.
Input of cementitious waste and sediment	Appropriate cement mixing techniques as outlined in the EMPr should be abided by.
Stability of graves	The shoring of graves during grave digging should be implemented where required to reduce risk of grave wall collapse.

2 APPROACH AND STRUCTURE

2.1 Structure of EMPr

The EMPr is structured as a set of nested environmental management plans, as shown in Figure 4. Aspects of these will be supplemented by more detailed levels of planning as and when the proposed development is implemented, as indicated.

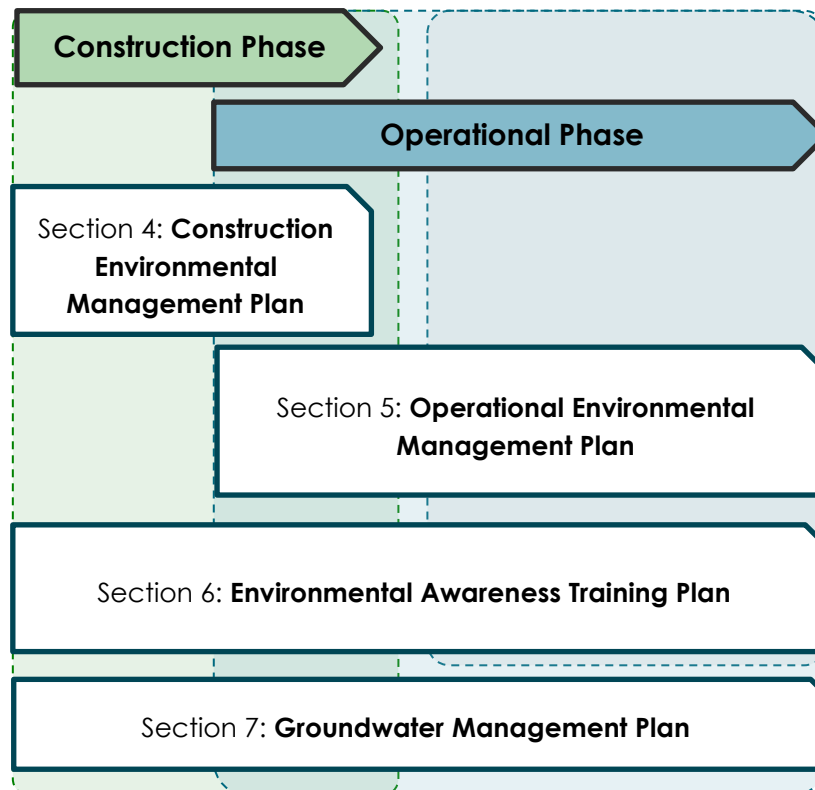


Figure 4: Schematic of EMPr content and structure

The construction phase will commence with the installation of services including the development of access roads, new parking, guard house, administration building and toilet facilities. It will also include the installation of a new stormwater attenuation pond.

The operational phase will include the digging of graves and installation of gravestones and/or cement slabs.

2.2 Legislative compliance

A key objective of the EMPr is to satisfy the requirements of Appendix 4 of the amended NEMA EIA Regulations published in Government Notice No. R 326 of 7 April 2017. These regulations prescribe the content of the EMPr and specify the type of supporting information that must accompany the submission of the report to the competent authority. An overview of where the requirements are addressed in this EMPr is presented in Table 5.

Table 5: Compliance with EIA Appendix 4 Requirements

Appendix 4 of EIA Regulations	
1. An EMPr must include-	Section 1.4 of EMPr
(a) details of-	
(i) the EAP who prepared the EMPr; and	
(ii) the expertise of that EAP to prepare an EMPr, including a curriculum vitae;	
(b) a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Section 1.5 and Sections 4 to 7: 1st column of table
(c) a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;	Figure 3
(d) a description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including—	Sections 4 and 5: 2nd column of table
(i) planning and design;	
(ii) pre-construction activities;	
(iii) construction activities;	
(iv) rehabilitation of the environment after construction and where applicable post closure; and	
(v) where relevant, operation activities;	
(e) a description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraph (d) will be achieved, and must, where applicable, include actions to	Sections 4 and 5: 3rd column of table
(i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;	
(ii) comply with any prescribed environmental management standards or practices;	
(iii) comply with any applicable provisions of the Act regarding closure, where applicable; and	
(iv) comply with any provisions of the Act regarding financial provision for rehabilitation, where applicable;	
(f) the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Sections 4 and 5: 4th column of table
(g) the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Sections 4 and 5: 5th column of table
(h) an indication of the persons who will be responsible for the implementation of the impact management actions;	Section 3 and Sections 4 and 5: 6th column of table
(i) the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Sections 4 and 5: 5th column of table
(j) the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Sections 4 and 5: 4th column of table

(k) a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Sections 4 and 5, responsible parties noted in Section 3.
l) an environmental awareness plan describing the manner in which— (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and	Section 6
m) any specific information that may be required by the competent authority	Not applicable

2.3 Content of the EMPr

Where applicable, each section of the EMPr is divided into three phases of the project life cycle, namely:

- The Design Phase, which will partly coincide with and follow the EIA;
- The Construction Phase, which begins with commencement of physical activities on site and ends when the development has been fully constructed; and
- The Operational Phase, which begins when the first component or phase of the development begins its normal operations, after construction.

There is likely to be overlap between the above phases. A decommissioning phase is not included, as it is not anticipated that water and sewer infrastructure will be decommissioned. The EMPr includes the findings and recommendations of the EIA Process and specialist studies and or compliance statements. The EMPr may be updated with additional information or actions during the design, construction, and operational phases if applicable. A standardised approach is followed, in which outcomes are set, followed by management actions aimed at achieving the objectives. Management actions are accompanied by monitoring requirements, responsibilities, and targets where applicable. A tabular format is used for ease of reference.

Key terms used in the EMPr include:

- **Impact:** The potential positive or negative impact of the development that needs to be enhanced, mitigated or eliminated (as appropriate) to a desired state
- **Outcomes (objectives):** The desired state after mitigation or management
- **Management Actions:** The actions needed to achieve the objectives of enhancing, mitigating or eliminating impacts; taking into consideration factors such as responsibility, methods, frequency, resources required and prioritisation.
- **Monitoring:** The key monitoring actions required to check whether the outcomes are being achieved, taking into consideration methodology, frequency and responsibility.

2.4 Overarching objective

The overarching objective, from which the detail contained in this EMPr flows, is **to construct and operate the project in a manner that -**

- **Reduces** the risk of pollution or damage to ground or surface water, ecosystems, soils and air.
- **Minimises** nuisance and disruption to people residing in, working in or moving through the area.
- **Adheres** to all relevant environmental legislation.

2.5 Amendment of this EMPr

- » Amendments shall be made as and when required to keep this EMPr up to date, and to provide for adaptive management in support of the management outcomes set out in the approved EMPr and the EIA.
- » The EMPr may be amended due to:
 - Legislative changes;
 - Changes to the roles and organisational structure set out in chapter 3;
 - Amendments to the environmental authorisation;
 - Audits of the EMPr carried out in terms of the EIA Regulations;
 - Based on the annual reviews as set out below; or
 - Whenever deemed necessary by the competent authority.
- » Amendments will be numbered sequentially (e.g. Amendment 001, Amendment 002, Amendment 003 etc.). The status of a particular page shall be reflected in the appropriate space of each page. Each amendment shall also have an effective date (the date on which the amendment was made).
- » Amendments to the impact management **actions** may be effected immediately by the authorisation holder and must be reflected in the next environmental audit report submitted to the competent authority in terms of regulation 34 of the EIA Regulations. The record of revisions must be updated accordingly, and the revision number and status of a particular page shall be reflected in the appropriate space of each page.
- » Amendments to the impact management **outcomes** stipulated in this EMPr are subject to an application for amendment to the competent authority, which must be submitted for approval by the authorisation holder and may require public participation. Such an amendment shall only become effective once approved by the competent authority.

2.6 Review of this EMPr

- The EMPr should be reviewed on an annual basis.
- The Authorisation Holder will keep a record of all dates of review, even if review did not necessitate an amendment to the EMPr.
- The review may take the form of an internal audit or may form part of the external audit conducted in terms of regulation 34 of the EIA Regulations.
- The main aims of a review of the EMPr for purposes of a revision will, among other things, be to determine the following:
 - Ability of the EMPr to sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity on an ongoing basis;
 - Conformity and adherence to the minimum legislative requirements;
 - Simplicity and clarity of the content and text; or
 - The incorporation of practical experience gained during implementation

3 PROJECT ROLES AND STRUCTURE

The general roles to be defined are those of the:

- Authorisation holder/ Cemetery manager
- Environmental Control Officer
- Contractor (Principal Contractor / Project Manager)
- Environmental auditor
- Hydrogeologist

The specific titles referred to may vary, but the intent of this section is to broadly define expectations and responsibilities for key role players in the implementation of the EMPr.

3.1 Authorisation Holder

The applicant, the City of Cape Town, will be the holder of the Environmental Authorisation, should it be issued, and will therefore be responsible for ensuring that the conditions of such authorisation are fully adhered to. It is expected that the authorisation holder will appoint the Environmental Control Officer and Contractor during the construction phase, and an Environmental Manager for the operational phase. The responsibility for the implementation of this EMPr lies with the Authorisation Holder. Commonly, responsibilities borne by the Authorisation Holder are delegated to a project manager.

Key responsibilities include ensuring that:

- The ECO is provided with the necessary information in order to adequately undertake their responsibilities.
- This EMPr is included in the contractual agreements with all contractors and subcontractors,
- Method Statements requested by the ECO are provided timeously.
- Corrective action is implemented as required; and
- Appropriate records and information regarding compliance with the EMPr requirements are maintained and made available to the ECO.

A Cemetery Manager will be appointed by the Authorisation Holder and will be responsible for the maintenance and daily operation of the cemetery. The role of the Cemetery Manager includes:

- Record keeping: of burials, plot ownership, and related documentation
- Regulatory compliance: ensure activities on site comply with municipal, provincial and national regulations (including health and safety standards). Regarding specialists' recommendations -
 - Overseeing grave digging to ensure graves are appropriately lined according to the hydrogeologists' recommendations (Appendix G2 of the BAR).
 - The 15m buffer area surrounding the wetland on erf 1339 is respected and not encroached upon or impacted by burial activities.
- Policy enforcement: ensuring appropriate cemetery policies and procedures are enforced in accordance with the Regulations Relating to the Management of Human Remains (2013).
- Staff management: supervising and training cemetery staff, including the groundskeeper/s and administrative personnel.
- Conflict resolution: addressing any disputes or concerns relating to service delivery or complaints from adjacent landowners.

3.2 Environmental Control Officer

An independent Environmental Control Officer (ECO) must be appointed for the duration of the construction phase of the development to ensure compliance with the EMPr and conditions of the EA. The ECO's role also includes monitoring compliance with other environmental legislation, the monitoring of environmental impacts, and the keeping of accurate records.

The ECO shall update the EMPr when necessary and shall compile a monitoring checklist or protocol based on the EMPr. The ECO's role includes the following aspects:

- Periodic environmental audits during the construction phase of the proposed project to monitor and record environmental impacts and nonconformances, and to monitor site activities to ensure adherence to the specifications contained in the EMPr, using a monitoring checklist.
- Maintain a record of site visits and audits, a copy of the environmental authorisation (should it be granted) and other permits and licenses, a register of non-conformances, and a copy of previous environmental audits.
- Prior to construction commencement, the ECO must meet on site with the Contractor representative to confirm designated development and no-go areas and to confirm the method statements required.
- Request, review and approve Method Statements from the contractor and sub-contractors prior to the commencement of the activities concerned.
- Ensure that the contractors and sub-contractors and their employees have received the appropriate environmental awareness training.
- Meet with the contractors to discuss the implementation of this document.
- Identify appropriate corrective measures if transgressions occur.
- Keep a register of monitoring activities and results
- Assist in finding environmentally acceptable solutions to construction problems.
- Identify and make amendments to the EMPr where appropriate.
- Conduct an environmental inspection on completion of the construction period and prepare a close-out report.

3.3 Contractor

The role of the contractor is as follows:

- The Contractor shall ensure that all employees, contractors and sub-contractors are made aware of the EMPr and their responsibilities.
- Prior to construction commencement, the Contractor must meet on site with the ECO representative to confirm designated development and no-go areas and to confirm the method statements required.
- Liaise with the ECO and Authorisation Holder (or representative) and ensure that works on site are conducted in an environmentally sensitive manner in accordance with this EMPr.
- Maintain on site a copy of this EMPr and all environmental authorisations and licenses pertinent to the development on site.
- Ensure that all appointed contractors and sub-contractors repair, at their own cost, any environmental damage because of a contravention of the specifications contained in the EMPr, to the satisfaction of the Project Owner's ECO.
- Ensure that all employees (permanent and temporary) and all sub-contractors that work on the site for longer than two days, receive environmental awareness training within one week of being on site.

- Designate an Environmental Officer (or employ a designated suitably qualified individual to fulfil the role of an Environmental Officer) to monitor and report on the daily activities on-site during the construction period.

The Contractor and individual contractors may designate Environmental Officers to liaise with the ECO on environmental matters.

3.4 Environmental Auditor

An independent Environmental Auditor must be appointed for the duration of the construction phase of the development responsible for assessing the ECO's and subsequently the Contractor's compliance with environmental regulations, policies, and standards as stipulated in the EMPr and ECO Reports.

The Environmental Auditor's role includes the following aspects:

- Periodic environmental audits to perform comprehensive audits to evaluate the environmental performance of an organization. This includes site inspections, reviewing documentation (i.e) EMPr, ECO Reports and other documentation contained in the Contractor's file.
- Conducting follow-up audits to ensure that corrective actions have been implemented and to verify ongoing compliance.
- Preparing detailed audit reports that summarize findings, including areas of compliance and non-compliance, and providing actionable recommendations for improvement.

3.5 Hydrogeologist

The Authorisation holder will appoint an experienced hydrogeologist to conduct groundwater monitoring protocols that must be implemented. The hydrogeologist will be responsible for the following:

- Determining the location of monitoring wells/boreholes
- Conduct groundwater level monitoring
- Conduct groundwater quality monitoring
- Outline groundwater monitoring parameters and frequency of monitoring

4 CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

The outcomes, management measures, and monitoring requirements detailed in this section are applicable to the design and construction phases of the proposed activity.

Environmental aspect or impact	Impact Management Outcomes	Impact Management Actions	Monitoring Actions		
			Method	Frequency	Responsibility
4.1 Soil and groundwater contamination	The wetland and buffer zone are not impacted negatively.	4.1.1 Maintenance of recommended 15m buffer zone for the wetland on erf 1339	Monitor activities and record and report non-compliance	Weekly	ECO and Contractor
	To control and eliminate fuel and oil spillages which may result in soil, surface water and groundwater contamination.	4.1.2 Pollution control measures, bunding and inspection of vehicles, use of drip trays, and spill clean-up / remediation. 4.1.3 Safe and appropriate storage of hazardous chemicals	Monitor activities and record and report non-compliance	Weekly	ECO and Contractor
4.2 Waste management	Manage waste in accordance with legislation and best practice methods. Minimise the production of general waste.	4.2.1 Contractor is responsible for creating and implementing a waste management plan for the construction phase	Establish a site camp and waste management plan	Prior to construction	ECO and Contractor
		4.2.2 A waste management area should be identified and include skips and bins	Designated waste management area demarcated	Prior to construction	ECO and Contractor
		4.2.3 Waste should be separated into hazardous, general and recyclable waste, with clearly	Monitor by visual inspections	Weekly	ECO and Contractor

Environmental aspect or impact	Impact Management Outcomes	Impact Management Actions	Monitoring Actions		
			Method	Frequency	Responsibility
	Prevent pollution or contamination due to improper waste handling or storage on site.	designated bins and skips for each type to be stored in at accessible locations on site.			
		4.2.4 Storage of any hazardous waste may not take place within the wetland on erf 1339 and its associated 15m buffer area.	• Monitor by visual inspections and record non-compliance	• Weekly	• ECO and Contractor
		4.2.5 Materials contaminated with oils and hydrocarbons must be removed by a licensed contractor.	• Monitor waste disposal slips and waybills via site audits and record non-compliance and incidents	• Weekly	• ECO and Contractor
		4.2.6 All hazardous material (including petrochemicals, oils, bitumen based products etc.) and general waste must be stored on site under controlled conditions. If the volume of hazardous waste stored exceeds 80m³ and/or 100m³ for general waste the National Environmental Management: Waste Act National Norms and Standards for the Storage of Waste in terms of Government Notice (GN) No. 926 of 29 November 2013 must be adhered to.	• Monitor waste disposal slips and waybills via site audits and record non-compliance and incidents	• Weekly	• ECO and Contractor

Environmental aspect or impact	Impact Management Outcomes	Impact Management Actions	Monitoring Actions		
			Method	Frequency	Responsibility
		4.2.7 Non-hazardous solid waste is to be disposed of at a licensed landfill, and a suitable contractor must be appointed to collect the waste from the site on a regular basis. Proof of disposal (waybills or waste disposal slips) must be kept on file for auditing.	Waste removal and disposal to be monitored (disposal slips or waybills required on file) via site audits and record non-compliance.	Weekly	ECO and Contractor
		4.2.8 Drip trays must be provided for all equipment and generators that may require re-fuelling to avoid possible spillage of fuel or oil.	Monitor by visual inspections and record non-compliance	Weekly	ECO and Contractor
4.3 Dust, noise and fumes impacts	Prevent or minimise wind erosion and dust impacts.	4.3.1 Dust-causing construction activities (i.e. clearing of vegetation for access roads, buildings, excavations, transporting of erodible materials etc.) should be avoided under high wind conditions	- Review works programme beforehand to confirm best time for activities - Monitor activities, establish a register for recording complaints and report non-compliance	- Before construction - Weekly	ECO and Contractor
		4.3.2 If more than one complaint regarding dust nuisance is registered, dustfall rates should be monitored and kept less than 600 (mg/m ² /day, 30-days average) for residential areas,	Monitor and record non-compliance	As required during construction	ECO and Contractor

Environmental aspect or impact	Impact Management Outcomes	Impact Management Actions	Monitoring Actions		
			Method	Frequency	Responsibility
		and less than 1200 (mg/m ² /day. 30-days average) for non-residential areas. Two occasions of exceedance are permitted within a year, but not in sequential months.			
		4.3.3 All sources of dust should be identified. For example, exposed sand and stockpiles should be stabilised if dust generation is apparent. Stockpiles can be covered or sealed if necessary.	• Monitor activities and report non-compliance	• Weekly	• ECO and Contractor
		4.3.4 Non-potable water may be used for short-term dust stabilisation.	• Monitor activities and report non-compliance	• Weekly	• ECO and Contractor
		4.3.5 All vehicles transporting sand and spoil must be covered with tarpaulins to reduce spillage and windblown dust	• Record non-compliance incidents	• As required during construction	• ECO and Contractor
		4.3.6 Should the dustfall rates exceed the permissible dustfall standards, the dust mitigation measures should be amended accordingly to ensure that dust nuisances are not caused and that the dustfall rates are brought	• Monitor and record exceedances of permissible standards	• As required during construction	• ECO and Contractor

Environmental aspect or impact	Impact Management Outcomes	Impact Management Actions	Monitoring Actions		
			Method	Frequency	Responsibility
		back into compliance. In this regard the amendments must be submitted to the City's AQO for review and approval.			
	Avoid unnecessary noise and causing nuisance to adjacent landowners	4.3.7 Construction equipment utilised and activities undertaken must be compliant with the Western Cape Noise Control Regulations (P.N. 200/2013).	- Monitor via site audits and record incidents and non-compliance. - Maintain a complaints register on site. If two or more noise complaints are received, the ECO must investigate whether the noise generated on site exceeds thresholds outlined in the Western Cape Noise Control Regulations	Ongoing throughout construction phase	ECO and Contractor
		4.3.8 Construction activities should be restricted that generate noise outputs of 85 dB (A) or more to between the hours of 08h00 to 17h00 from Monday to Friday. The approval of the ECO must be obtained if the Contractor needs to do this work outside of these hours, and surrounding communities must be informed before work takes place.			
		4.3.9 No amplified music shall be allowed on the site, and only unobtrusive audio equipment with low volume will be permitted. Sound amplification equipment on site is only permitted for use			

Environmental aspect or impact	Impact Management Outcomes	Impact Management Actions	Monitoring Actions		
			Method	Frequency	Responsibility
		by the Contractor in emergency situations.			
		4.3.10 If excessive noise is expected on the boundary of the site, neighbouring residents must be informed in writing and in advance of when the high noise levels will occur and for how long they will occur.			
		4.3.11 If noise levels at the site boundary are excessively high (i.e. above 70 dBA during the day, as stipulated in SANS 10103 Table 2 for industrial districts), machinery must be fitted with silencers.			
		4.3.12 The Contractor must post signage indicating contact details of the Contractor and/or ECO on the site to allow for reporting of complaints			
	Avoid or minimise the production of fumes during construction	4.3.13 Vehicles and machinery that use fuel must be in good condition and routinely serviced	Monitor activities and report non-compliance	As required during construction	ECO and Contractor

Environmental aspect or impact	Impact Management Outcomes	Impact Management Actions	Monitoring Actions		
			Method	Frequency	Responsibility
4.4 Traffic, safety and access	Traffic is avoided or minimised. Safety on site is ensured and access to the site is controlled	4.4.1 Construction should occur within working hours during the week	- Monitor via site audits and record incidents and non-compliance. - Monitor by visual inspections	Ongoing throughout construction phase.	ECO and Contractor
		4.4.2 The contractor must provide a traffic marshal for situation where heavy construction-related traffic may impede normal traffic flows surrounding the site			
		4.4.3 The Contractor must ensure that any large or abnormal loads (including hazardous materials) that must be transported to/ from the site are routed appropriately, and that appropriate safety precautions are taken during transport to prevent road accidents.			
		4.4.4 All vehicles must be legally compliant and drivers in possession of an appropriate valid driver's license.			
		4.4.5 Vehicles must utilise designated routes and adhere to speed limits			
		4.4.6 Warning signage (i.e. "trucks turning") must be erected			

Environmental aspect or impact	Impact Management Outcomes	Impact Management Actions	Monitoring Actions		
			Method	Frequency	Responsibility
4.5 Visual impacts	Unnecessary visual disturbance is avoided	near the access point to the site			
		4.4.7 No member of the workforce will be permitted to drive a vehicle if under the influence of alcohol or narcotic substances.			
		4.5.1 Stockpiles and site camp areas must be appropriately placed and demarcated on site. They should be managed and kept clean (i.e. no littering, correct management of waste)	• Refer to the method statement for the site camp establishment regarding locational and visual management measures.	• Prior to construction	• ECO and Contractor
		4.5.2 Construction activities must take place during working hours	• Monitor by visual inspections and record non-compliance.	• Weekly	• ECO and Contractor
		4.5.3 Unnecessary signage or advertising must be avoided			

5 OPERATIONAL ENVIRONMENTAL MANAGEMENT PLAN

The outcomes, management measures, and monitoring requirements detailed in this section are applicable only to the operational phase of the proposed maintenance. Since the sewers are all pre-existing, freshwater impacts associated with the present condition of the pipes are include leakages and spills associated with the pipe defects. Ecological impacts during the operational phase are anticipated to be negligible based on implementation of the specialist mitigation measures. Potential spillage of hazardous materials, loss of vegetation and loss of habitat during the operational phase and are anticipated. The outcomes, management measures, and monitoring requirements detailed in this section are applicable only to the operational phase of the proposed development.

Environmental aspect or impact	Impact Management Outcomes	Impact Management Actions	Monitoring Actions		
			Method	Frequency	Responsibility
5.1 Impact of cementitious waste and sediment on surface water and groundwater	Correct cement mixing techniques used and pollution associated with cement avoided/minimised. Incorrect cement mixing techniques (for lining and slabbing of graves) can lead to soil and groundwater pollution.	5.1.1 Cement and concrete must not be mixed directly on soil surface. An impermeable substratum must be used as mixing surface.	- Monitor via site audits and record non-compliance and incidents (i.e. by implementing walk through inspections). - Collect water samples at monitoring boreholes and submit to SANAS accredited laboratories for analysis of pH and EC.	- As required. - Quarterly	Authorisation holder
		5.1.2 All contaminated concrete mixing surplus water must be directed away from the wetland on erf 1339 such that the 15m buffer is respected.			
		5.1.3 All runoff from batching areas shall be strictly controlled, and cement-contaminated water shall be collected, stored and disposed of at a licenced site;			
		5.1.4 Cement contaminated water may also be collected and recycled for reuse in batching activities;			

Environmental aspect or impact	Impact Management Outcomes	Impact Management Actions	Monitoring Actions		
			Method	Frequency	Responsibility
		5.1.5 Used (empty) cement bags shall be collected and stored in weatherproof containers to prevent windblown cement dust and water contamination; and 5.1.6 Contaminated water storage facilities shall not be allowed to overflow and appropriate protection from rain and flooding shall be implemented.			
5.2 Groundwater contamination due to decomposition of human remains	Groundwater quality maintained and potential for contamination minimised. Groundwater monitored over time (See Section 7 below).	5.2.1 The 15m buffer surrounding the wetland on erf 1339 must be maintained.	- Monitor during site visits and record non-compliance - At least three sites should be monitored on the cemetery - Refer to Section 7 for the monitoring plan and Appendix G2 for the hydrogeologist specialist report	• Biannually	• Authorisation holder supervised by a geohydrologist
		5.2.2 Ensure burial occurs sufficiently above water table depth to enable natural attenuation in the vadose zone (region between surface and water table).			
		5.2.3 Where shallow groundwater conditions persist, it might be considered to line the site or newly dug graves to prevent groundwater interaction with human remains.			
		5.2.4 Maintain an effective stormwater system channelling water away from the cemetery area and limiting			

Environmental aspect or impact	Impact Management Outcomes	Impact Management Actions	Monitoring Actions		
			Method	Frequency	Responsibility
		surface water infiltration (See Appendix G5 of the BAR). 5.2.5 Where possible, limit groundwater use of the shallow aquifer immediately down-gradient /downstream of the site. 5.2.6 Implement a groundwater management plan (See Section 7 below) to detect any potential contamination as quickly as possible.			
5.3 Groundwater contamination by metals, paints and other substances	Groundwater quality maintained and potential for contamination minimised. Groundwater monitored over time (See Section 7 below).	5.3.1 Implementation of an impermeable liner in each grave aimed at safeguarding groundwater quality from deterioration 5.3.2 Standardise coffin size with ordinary dimensions. 5.3.3 Coffin materials should primarily consist of untreated wood and/or other biodegradable materials. 5.3.4 Refrain from using excessive ornamental metals, plastics, paints varnishes, etc.	Water analysed for presence of metals (Fe, Al, Se, Cu, Pb, Zn, Cd, As, Sb) and other substances such as inorganic parameters (K, Cl, NO₃, NH₄, P, Na, Ca, HCO₃).	Biannually	Authorisation holder supervised by a geohydrologist

Environmental aspect or impact	Impact Management Outcomes	Impact Management Actions	Monitoring Actions		
			Method	Frequency	Responsibility
		5.3.5 Where possible, all jewellery, watches, batteries, excessive cosmetics, and other such materials should be removed prior to burial. It is harder to remove dentures and pace makers.			
5.4 Clearing of invasive and alien vegetation	Alien and invasive vegetation is routinely cleared from the site.	5.4.1 Alien vegetation (such as <i>Acacia saligna</i>) should be routinely removed from the site.	Mechanical removal	As required	Authorisation holder
5.5 Stability of graves	Avoid grave wall collapse and ensure the safety of grave diggers and mourners during interment	5.5.1 It is recommended that shoring be initiated during the burial ceremony and that the grave should be closed within a short period.	Graves stabilised by grave diggers accordingly	As required	Authorisation holder
		5.5.2 Should the material be compacted well, this will reduce the permeability to the surface. Considering the rites of the deceased, the compaction should be carried out using hand tools.			
5.6 Noise	Avoid unnecessary noise and causing nuisance to adjacent landowners	5.6.1 Should there be large burial ceremony that would require the use of amplified sound that must be dealt with in terms of the Regulation 12 of the Western Cape Noise Control Regulations PN 200 of 2013. The noise emissions from activities at the proposed cemetery must adhere	To be established prior to the burial ceremony.	As required	Authorisation holder

Environmental aspect or impact	Impact Management Outcomes	Impact Management Actions	Monitoring Actions		
			Method	Frequency	Responsibility
		to the Western Cape Noise Control Regulations, 2013.			
		5.6.2 If any activities at the premises result in a contravention of the Western Cape Noise Control Regulations, 2013, the appropriate procedure for control of noise outlined in the noise legislation will be applied by the City of Cape Town's Noise Control.	Refer to procedure in noise legislation	As required	Authorisation holder and City of Cape Town's Noise Control

6 ENVIRONMENTAL AWARENESS TRAINING PLAN

This section outlines the training by which the authorisation holder (via its appointed contractor) will inform its employees of environmental risks and the manner in which risks must be dealt with to avoid pollution or degradation of the environment. It may be adapted as needed to suit the circumstances in which it is implemented.

Course	Required attendees	Presented by	Course content	Timing	Records to be kept
6.1 Construction phase Environmental Awareness Training for managers	Project Manager appointed by the authorisation holder Principal contractor's contract manager, site agents, and assistant site agents (as applicable) Contractor's designated environmental officer or SHE representative	ECO	6.1.1 Overview of environmental authorisations and permits granted 6.1.2 Basic environmental law 6.1.3 Roles of the ECO, authorisation holder, project manager, and contractor 6.1.4 Purpose and content of method statements 6.1.5 Management actions and measures for the implementation phase as detailed in this EMPr 6.1.6 Record keeping requirements 6.1.7 Emergency procedures 6.1.8 Reporting and compliance monitoring	Prior to commencement of construction	Declaration of adherence to Implementation phase EMPr, signed by Contractor's representative Register of attendance

Course	Required attendees	Presented by	Course content	Timing	Records to be kept
6.2 Environmental Awareness Training for site personnel	All site staff and personnel, including temporary staff and visitors to site Maximum of 20 attendees at any one session	Contractor's designated environmental officer	Environmental do's and don'ts, including: 6.2.1 Access to work areas, location and identification of no-go areas 6.2.2 Smoking and fires 6.2.3 Storing and handling fuels and oils 6.2.4 Storing and handling chemicals 6.2.5 Management of cement, cement bags, slurry, and wash water 6.2.6 Dust and noise 6.2.7 Water wastage 6.2.8 Waste management and litter 6.2.9 Waste site management 6.2.10 Ablution facilities 6.2.11 Plant and machinery maintenance and load management 6.2.12 Accident and incident reporting 6.2.13 Managing animals found on the site	Before any staff member begins work on site	Register of attendance, identifying all attendees by name and ID number, the topics covered, the presenter, and the date and time.
6.3 Environmental Awareness Training for cemetery manager and staff (operational phase)	Cemetery manager/s and cemetery staff	Contractor's designated environmental officer	Environmental do's and don'ts, including: 6.3.1 Maintenance of the wetland and 15m buffer on erf 1339	Before the cemetery manager begins work on site	Register of attendance, identifying all attendees by name and ID number, the

Course	Required attendees	Presented by	Course content	Timing	Records to be kept
			6.3.2 Ensure grave depths, shoring, lining and spatial arrangement meets the requirements of the specialists while following the relevant cemetery layout guidelines 6.3.3 Groundwater monitoring plan 6.3.4 Emergency procedures 6.3.5 Record keeping 6.3.6 Waste management 6.3.7 Reporting and compliance monitoring		topics covered, the presenter, and the date and time.

7 GROUNDWATER MONITORING PLAN

The groundwater specialists recommend a groundwater monitoring plan which includes at least three groundwater sites where the water quality and level should be monitored at the cemetery during operation by a qualified and experienced hydrogeologist. This section outlines the groundwater monitoring protocols that must be implemented.

The primary aquifer is suspected to be linked to the secondary aquifer and requires 'early-warning' wells be installed into the primary aquifer to detect potential contamination. Deeper boreholes are recommended if contamination of shallow groundwater is detected. Groundwater flows on the site follow the topography, from northeast to southwest direction. One monitoring site is recommended to be upgradient of the site to monitor background water quality, with two boreholes located downgradient of the site to detect any potential impact on downgradient users. Locations of monitoring sites will be finalised once the final site development plan is available.

PREDEVELOPMENT

Impact Management Outcomes	Impact Management Actions	Monitoring Actions		
		Method	Frequency	Responsibility
No groundwater contamination by wastewater or sanitation leaks	- Take care that temporary onsite sanitation facilities are well maintained and serviced regularly. - Provide sufficient sanitation for the number of workers on site - If portable toilets are used, they must be located outside of wetland buffer areas and be staked or tied down. - Spill response kits and plans to be in place and staff trained in their application. - Seal boreholes at the surface to prevent pollution ingress	- Monitor by visual inspections. - Observations during site visits	As required	ECO and Contractor

Impact Management Outcomes	Impact Management Actions	Monitoring Actions		
		Method	Frequency	Responsibility
No groundwater contamination by fuel and oil spills from construction vehicles	- Place oil traps under stationary machinery, only re-fuel machines at fuelling station, construct structures to trap fuel spills at fuelling station, immediately clean oil and fuel spills and dispose contaminated material (soil, etc.) at licensed sites only. - Draw-up and strictly enforce procedures for the storage, handling and transport of different hazardous materials. - Ensure vehicles and equipment are in good working order and drivers and operators are properly trained - Ensure that good housekeeping rules are applied. - Install and commission monitoring boreholes downstream of potential contamination point sources in both the intergranular and the deeper fractured rock aquifers	Collect water samples at monitoring boreholes and submitted to SANAS accredited laboratories for analysis of pH, EC, macro-chemistry (Na, Mg, K, Ca, NH₄, Cl, SO₄, Alk, PO₄, F, NO₃), total petroleum hydrocarbons, ethanol, COD, TOC, metals (Fe, Al, Se, Cu, Pb, Zn, Cd, As, Sb).	<u>Biannual</u>	<u>Hydrogeologist</u>
No groundwater contamination by wastewater or cementitious waste	- Effluent and wastewater systems to be maintained and kept in working order - Spill response kits and plans to be in place and staff trained in their application. - Seal boreholes at the surface to prevent pollution ingress - Cement and concrete must not be mixed directly on soil surface. An impermeable substratum must be used as mixing surface. - All contaminated concrete mixing surplus water must be directed away from watercourses and wetlands. - All runoff from batching areas shall be strictly controlled, and cement-contaminated water	- Monitor via site audits and record non-compliance and incidents (i.e. by implementing walk through inspections). - Collect water samples at monitoring boreholes and submit to SANAS accredited laboratories for analysis of pH and EC.	- As required - Quarterly	<u>Hydrogeologist</u>

Impact Management Outcomes	Impact Management Actions	Monitoring Actions		
		Method	Frequency	Responsibility
	shall be collected, stored and disposed of at a licenced site. - Cement contaminated water may also be collected and recycled for reuse in batching activities; - Used (empty) cement bags shall be collected and stored in weatherproof containers to prevent windblown cement dust and water contamination			

This section outlines the groundwater monitoring plan for the Operational Phase of the Kuils River Cemetery as recommended by the hydrogeological specialist. See Appendix G2 of the BAR

OPERATIONAL PHASE

The hydrogeologist specialist recommends a fourth piezometer be installed downgradient of the site to continue groundwater monitoring of the downstream groundwater quality and levels. Both upgradient and downgradient monitoring should be initiated before the commencement of any development activities on site. The suggested monitoring actions are tabulated in the table below.

Impact Management Outcomes	Impact Management Actions	Monitoring Actions		
		Method	Frequency	Responsibility
Groundwater Level Monitoring	Groundwater level measurements are recommended for the monitoring points at the study site.	- A dip meter can be used to measure water level below the top of the borehole casing height (mbch). - The casing height can be subtracted from the water level to calculate water level (mbgl). - Date and time of measurement should be recorded	Monthly	Authorisation holder supervised by a geohydrologist

Impact Management Outcomes	Impact Management Actions	Monitoring Actions		
		Method	Frequency	Responsibility
Groundwater Quality Monitoring	The groundwater quality is recommended for the monitoring points at the study site.	- Piezometers or monitoring wells should be purged prior to sampling. - Low-volume sampling pump can be used, or the site bailed and allowed to recover before sample collection. - Groundwater should be pumped through a flow-through cell until field chemistry parameters have stabilised when using a low-volume sampling pump. Alternatively, a bailer can be used. <u>Sample collection, preservation, and submission:</u> - Sample bottles must be labelled with site name, borehole name and date. - Field chemistry parameters must be measured and recorded at the time of sampling, including electrical conductivity, oxidation reduction potential, pH, temperature and dissolved oxygen. - Disposable nitrile gloves should be worn during sampling to minimise the transfer of any potential contaminants. - Nitrile gloves should be dedicated to a sampling location and disposed of after use. - Samples must be collected in an appropriate sampling container and preserved in the correct manner prior to submission to an accredited laboratory for the analysis parameters. - The sample method and preservation must be discussed with the laboratory prior to sampling.	<u>Biannual</u>	Authorisation holder supervised by a geohydrologist
Monitoring Frequency and Parameter Analysis	Regular water level and quality measurements	- Water level measurements be taken to determine seasonal fluctuation. - Water quality on site should also be monitored (See above section)	- Monthly - Quarterly	Authorisation holder supervised by a geohydrologist

The details of the monitoring sites are summarised in Figure 5, Table 6 and Table 7.



Figure 5: Proposed monitoring boreholes on the site

Table 6: Location and depth of proposed monitoring sites

Site_ID	Latitude	Longitude	Depth (m)
MW_1	33° 56' 15.6048" S	18° 41' 10.6044" E	10
MW_2	33° 56' 12.6744" S	18° 41' 4.0776" E	10
MW_3	33° 56' 14.4816" S	18° 41' 3.0588" E	10

Table 7: Proposed groundwater monitoring parameters and their recommended frequency

Parameter	Frequency		
	MB_BH1	MB_BH2	MB_BH3
Groundwater Level	Monthly	Monthly	Monthly
pH	Quarterly	Quarterly	Quarterly
Electrical conductivity (EC)	Quarterly	Quarterly	Quarterly
Total Dissolved Solids (TDS)	Quarterly	Quarterly	Quarterly
Inorganic parameters: K, Cl, NO3, NH4, P, Na, Ca, HCO3	Biannually	Biannually	Biannually
Metals: Fe, Mn, Al, Ti, Cr, Cd, Pb, Ni	Biannually	Biannually	Biannually
Total Organic Carbon (TOC)	Biannually	Biannually	Biannually
Total Coliforms	Biannually	Biannually	Biannually
E.coli	Biannually	Biannually	Biannually
Biological Oxygen Demand (BOD)	Biannually	Biannually	Biannually
Chemical Oxygen Demand (COD)	Biannually	Biannually	Biannually

* Frequency of chemistry sampling may be revised to biannually after one year of data has been collected but level monitoring should continue on a quarterly basis.