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Indigenous vegetation clearance and the
establishment of a Cemetery on a portion of Forty
Four hectares of Portion 1 Townlands of Klerksdorp
424 IP

NWP: EIA/16/2021

City of Matlosana Municipality

North West Province

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ABBREVIATIONS AND DEFINITIONS

1. INTRODUCTION

The purpose of an Environmental Management Program (EMPr) is to guide the planning and design, construction and operational phases of the development. The EMPr should be developed in parallel with the planning and design phase, which enables environmental guidelines and criteria to be incorporated into the detailed design. This is done to eliminate or mitigate the various possible risks to the environment and its surrounding inhabitants during the planning and pre-construction phase. And it will subsequently ensure that minimal damage will occur to these areas during the construction and operational phases of a project.

2. PHASES, ROLES & RESPONSIBILITIES

2.1 Phases of the Project

The Point of departure for any EMPr is to take a pro-active route by addressing and minimising any potentially significant problem before it occurs. In particular this EMPr deals with the following phases:

2.1.1 Planning or Design Phase (DS)

It is essential that possible problematic situations be eliminated or mitigated during the planning phase, to ensure that contingency plans are prepared for any possible accidental situation that may arise during the construction phase. By having these contingency plans in order before construction starts it will limit any further potentially detrimental impacts to the environment and its surrounding inhabitants.

2.1.2 Construction Phase (CO)

The majority of possible impacts on a site would occur during the construction phase, and most of them will have immediate effect (e.g. dust pollution, fuel spillage). It is therefore vital that the site is monitored on a continual basis during this phase, as it would be possible to identify and correct these impacts as they occur, thus minimising their possible impact.

2.1.3 Operational Phase (OP)

By being pro-active during the design and construction phases, potentially harmful impacts originating in the operational phase will be minimised or eliminated. For the proposed Dawkinsville Cemetery development the following aspects are important during operations and are more thoroughly addressed under Items as indicated

- Stability of excavations – 10.1.1
- Groundwater pollution – 10.1.2
- Waste management – 10.3
- Storm water management -10.12
- Traffic – 10.13

2.1.4 Decommissioning Phase (DE)

Thoughtful design, thorough monitoring and strict adherence to the EMPr during the construction and operational phases will ensure that the decommissioning phase (if and when applicable) will be done efficiently and with minimal damage to the bio-physical and social environments.

2.2 Roles and Responsibilities

Various role players have a range of responsibilities to perform during the different phases of a project:

2.2.1 Contract Manager (CM) (Developer Representative)

- The CM will be responsible for overseeing the contract from initiation to completion of construction on the site
- The CM will appoint a team of contractors, which will be responsible for the construction of the entire project
- The CM will be responsible for ensuring that the development is implemented according to the requirements as set out in the EMPr
- The CM should ensure that sufficient resources are available to the other role players to efficiently perform their tasks in terms of the EMPr
- The CM must appoint an independent ECO to ensure strict adherence to the EMPr

2.2.2 Architects (Arch)

Only architects approved by the CM will be allowed to work on the project.

2.2.3 Engineer (Eng)

An engineer act as a direct, on-site resource for all technical aspects related to the development. He is available on the construction site at all times, overseeing all phases of the construction activities.

2.2.4 Environmental Control Officer (ECO)

The ECO will be appointed at the start of the construction phase and is mandated to do the following:

- Ensure that all contractors/subcontractors/employees are fully aware of their environmental responsibilities. This will take the form of an initial environmental awareness-training program in which requirements of this document will be explained
- Any damage to the environment must be repaired as soon as possible after consultation between the ECO, Consulting Engineer and Contractor
- The ECO shall monitor their actions to ensure that the developer staff and/or contractor are adhering to all stipulations of the EMPr
- The ECO shall be responsible for monitoring the construction activities throughout the project by means of site visits and meetings. This should be documented as part of the site meeting minutes
- The ECO must sign off that the PM certify that they shall ensure that all clean-up and rehabilitation or any remedial action required, are completed prior to transfer of properties
- A post construction environmental audit is to be conducted to ensure that all conditions in the EMPr have been adhered to

2.2.5 Community Liaison Officer (CLO)

Where necessary / required a representative of the community, as nominated by the community, will be the CLO and has the role of representing the community and managing all communication between the ECO, the Contractor and the community (I&APs). (The details of the CLO are to be forwarded to the Ward Municipality or for the area.)

3. IMPLEMENTATION AND MONITORING

3.1 Auditing/Inspections

- The appointed ECO on a regular basis, and also ad hoc basis will inspect the site where necessary
- The CM as well as the contractor's representative will accompany the ECO, on-site inspections

- The contractor will use the formats presented in this EMPr to report to the CM as to the compliance to this document

When, in the opinion of the ECO, a construction activity will result in environmental damage, the ECO will issue instructions to the CM, who will in turn order the Contractor to halt the activity. Spot fines or penalties may be levied for non-compliance.

3.2 Methods Statements

Methods statements from the Principal contractor and or subcontractor – where applicable will be required for specific sensitive actions on request of the authorities or ECO. All method statements will form part of the EMPr documentation and are subject to all terms and conditions contained within the EMP document. For each instance wherein it is requested that the contractor submit a method statement to the satisfaction of ECO, the format should clearly indicate the following:

- What – a brief description of the work to be undertaken
- How – a detailed description of the process of work, methods and materials
- Where – a description / sketch map of the locality of work
- When – the sequencing (phases) of actions with commencement date and completion date estimates

The contractor must submit the method statement before any particular construction activity is due to start. Work may not commence until the method statement has been approved by the ECO.

3.3 Record Keeping

All records related to the implementation of this management plan (e.g. site instruction book, ECO diary, methods statements etc.) must be kept together in an office where it is safe. Records should be kept for two years and at any time be available for scrutiny by any relevant authority.

4. STANDARDS

- The ECO will keep written and photographic records of the site and it's surrounding before, after and during construction on the site
- The Contractor will keep records of construction activities, instructions received from the ECO and CM concerning environmental matters
- The ECO will keep records of cases of non-compliance and remedial actions taken
- Where no quantitative standards are applicable, visual standards will apply
- The contractor will rehabilitate the site to a condition acceptable to the ECO, and respond timeously to any complaints and instructions regarding construction activities

5. EMPr OBJECTIVES

This EMPr must be used during the pre-construction, construction and operational phases of the proposed project.

The objectives of this plan are to:

- Ensure all environmental safeguards are carried out correctly
- Manage site activities effectively and coordinate with other trades
- Minimise adverse impacts on the environment
- Ensure that environmental mitigation measures are in place from the start of the project
- Minimise disruption to fauna and flora

- Monitor the project

6. LEGISLATION

The EMPr is compiled in order to comply with the following legislative documents:

- National Monuments Act, 1969 (Act 28 of 1969)
- National Parks Act, 1976 (Act 57 of 1976)
- Environmental Conservation Act, 1989 (Act 73 of 1989)
- National Environmental Management Act, 1998 (Act No. 107 of 1998)
- National Environmental Management : Air Quality Act (Act no 39 of 2004)
- The National Water Act, 1998 (Act 36 of 1998)
- The Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983)
- Animal Protection Act, 1962 (Act 71 of 1962)
- Local Municipality By-Laws
- Municipal Systems Act, 2000 (Act 32 of 2000)
- Municipal Structures Act, 1998 (Act 117 o 1998)

7. PROJECT OVERVIEW

In order to address an articulated need for a new cemetery within the jurisdiction of the City of Matlosana Municipality, CSHELL 264 (Pty) Ltd intends to obtain environmental authorisation for indigenous vegetation clearance and the establishment of a cemetery on a portion of forty four hectares of Portion 1 of the farm Townlands of Klerksdorp 424 IP.

The subject site covers an area of 44.2595 hectares and is located to the south of Dawkinsville, Klerksdorp. It is bordered by Golden Way to the west and gravel roads to the north, east and south.

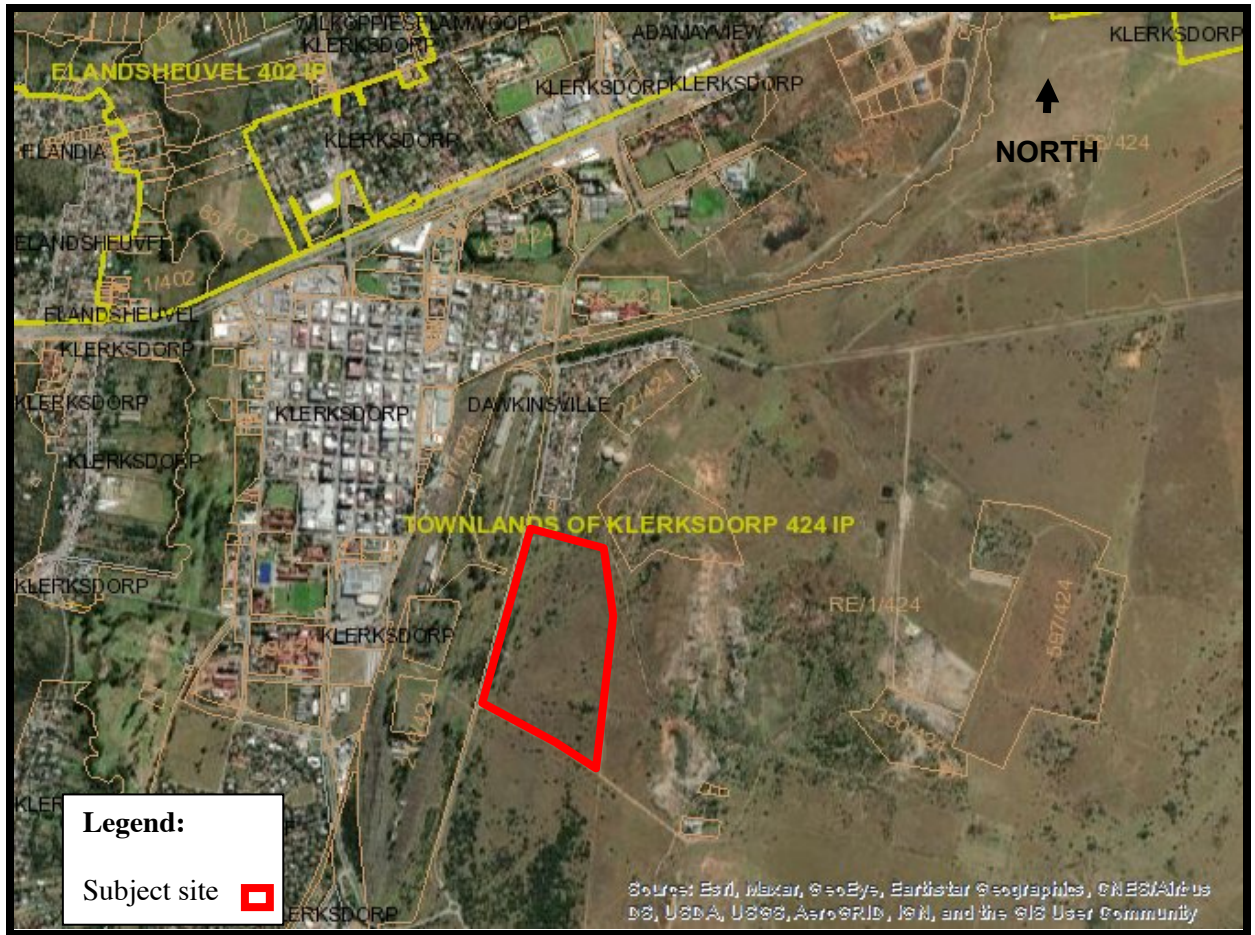


Figure 1: Locality Map (Source: Office of the Chief Surveyor-General) – imagery map

The proposed project consists of approximately 41 000 gravesites implemented in three phases. Phase 1 to be implemented in 2022, Phase 2 in 2030 and Phase 3 in 2037. An office block and ablution facilities will be provided. An electrified fence will be provided.

8. TIMEFRAMES

Phase 1 to be implemented in 2022, Phase 2 in 2030 and Phase 3 in 2037.

9. RECEIVING ENVIRONMENT

The site is situated at the Grassland Biome which is represented by the Vaal-Vet Sandy Grassland vegetation type (Mucina & Rutherford, 2006).

Owing to excavations of the past, present extensive informal dumping, free-roaming cattle, scraped areas, tracks and footpaths much of the vegetation at the site is conspicuously disturbed. Alien invasive wees and tree species are visible at these disturbed areas. Indigenous trees, forbs and grasses are present at remaining grassland patches. Indigenous tree species that are present include *Vachellia karroo* (Sweet Thorn) and *Vachellia erioloba* (Camel Thorn). Indigenous grass species at the site include *Aristida congesta*, *Melinis repens*, *Cynodon dactylon*, *Eragrostis curvula*, *Eragrostis lehmanniana*, *Eragrostis superba* and *Pogonarthria squarrosa*. Indigenous forbs such as *Gazania krebsiana*, *Chamaesyce inaequilatera*, *Hibiscus pusillus*, *Monsonia burkeana* and *Hilliardiella oligocephala* are found at the site.

Extensive clumps of the alien invasive tree *Eucalyptus camaldulensis* occur at the site. Other alien invasive tree species include *Melia azedarach* and *Gleditsia triacanthos*. Alien invasive weeds are widespread at disturbed areas at the site and include *Tagetes minuta*, *Datura ferox*, *Bidens pilosa*, *Conyza bonariensis*, *Verbena aristigera* and *Sonchus oleraceus*.

There are no rocky ridges at the site.

No wetlands or rivers are present at the site.

The site contains the widespread Protected Tree species *Vachellia erioloba* (Camel Thorn). In terms of a part of section 15(1) of the National Forests Act No. 84 of 1998, no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a license granted by the Minister.

Ecological sensitivity at the site is medium-low (Figure 2).

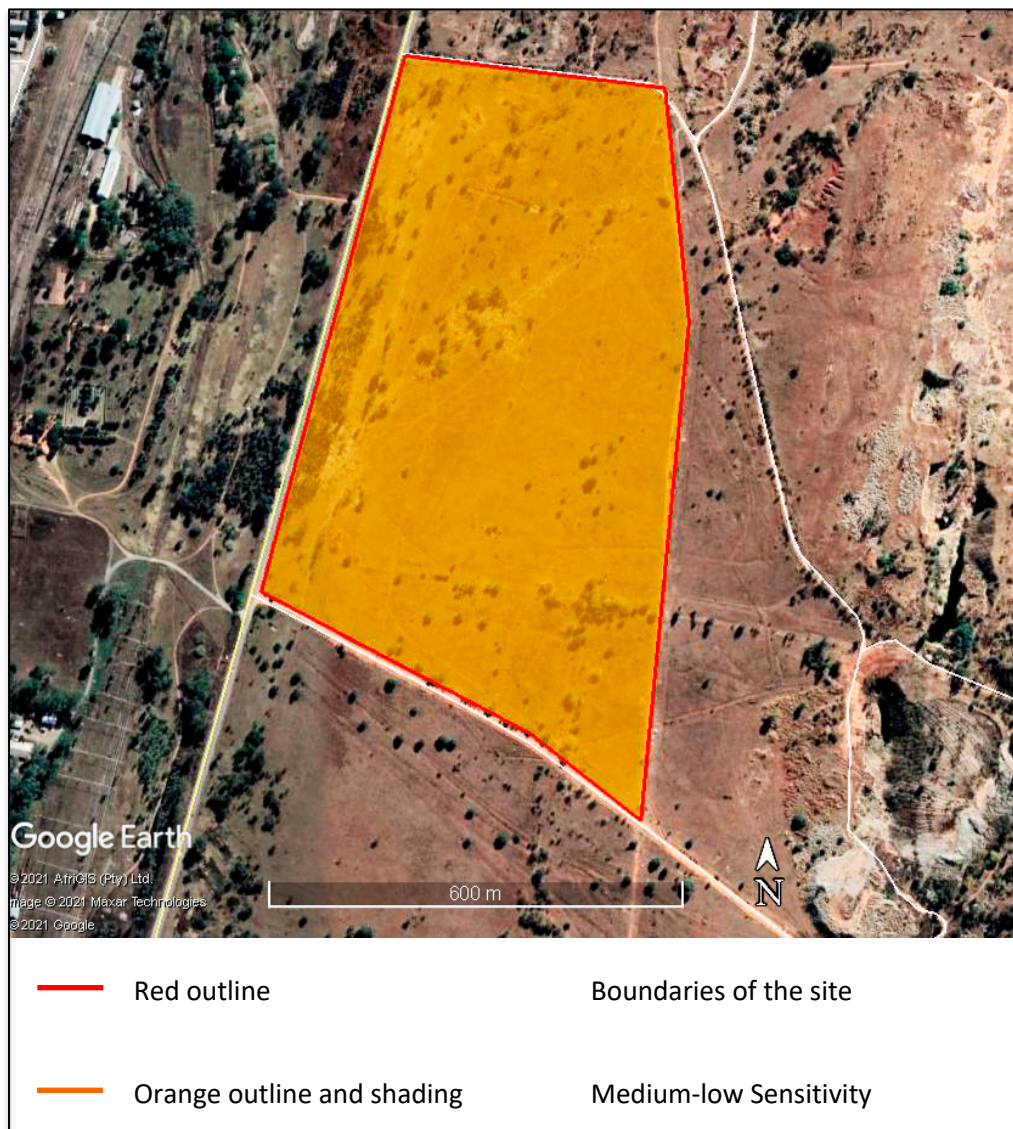


Figure 2: Ecological sensitivity Map

10. ENVIRONMENTAL MANAGEMENT PROGRAM

Table 1: Environmental Management Program

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
10.1 Planning								
a) Appointment and duties of ECO	The Developer must appoint an independent ECO who must monitor the contractor's compliance to the EMPr. The developer must provide all contractors with a copy of the EMPr. The priority of the ECO is to maintain the integrity of the development conditions as outlined in the EMPr. The ECO must form part of the project management team and attend all relevant project meetings.	✓	✓			DEVELOPER, ECO, CONTRACTOR	Continuous	
b) EMPr	This EMPr must be made binding to the Contractor, as well as sub-contractors and should be included in the tender documentation for the construction contract. The EMPr is also binding to the owner during the operations of the facilities.	✓	✓			DEVELOPER, CONTRACT MANAGER, CONTRACTOR	Once-off	
c) Environmental incidents	The Contractor and Owner must take corrective action as per prescribed procedure, to mitigate an incident appropriate to the nature and scale of the incident and must also rehabilitate any residual environmental damage caused by the incident or by the mitigation measures themselves.		✓			CONTRACTOR, ECO	Continuous	
d) Flooding, erosion and sedimentation	<ul style="list-style-type: none"> Storm water system must be implemented as per the approved Storm Water Management Plan. Surface drainage measures should be in place according to the engineer's design to ensure good site drainage without ponding of water after precipitation. 	✓		✓		DEVELOPER, CONTRACT MANAGER		
e) Service systems	The service systems are to be designed according to the minimum requirements of, and submitted to the Local authority for approval. No construction activities must commence on site prior to obtaining the	✓	✓	✓		CONTRACT MANAGER, ENGINEER,		

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
	necessary approval. Underground services should be designed in such a way so as to require minimum maintenance to avoid disturbance of the underground and superficial environment.					CONTRACTOR		

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
10.1.1 Geology	<ul style="list-style-type: none"> The design and construction of raft foundations (whether soil or concrete) should be done in accordance with and under supervision of a civil or structural engineer. Cognizance should be taken in the design of paved areas and roads of the potentially collapsible and compressible nature of the upper soil horizons. To overcome collapsible sidewalls of graves impact rolling could be done over this soil zone or the side slopes of the grave excavations are cut back to prevent collapse of sidewalls. Additional geotechnical testing is recommended after the impact rolling has been conducted. These tests include limited test pitting and DPL tests to confirm dense soil conditions and stable sidewalls of open trenches. 	✓				ENGINEER, GEOLOGIST		
		✓	✓					
		✓	✓	✓				

<p>10.1.2 Geohydrology</p>	<ul style="list-style-type: none"> • On site groundwater assessment and monitoring boreholes are recommended to better define the local groundwater level depths and flow direction, but also to define the current groundwater quality characteristics. One upstream and two downstream boreholes are recommended – upstream between the cemetery site and the Averda incinerator and downstream – one borehole along the southern boundary (possibly on the fault) and one borehole to the west, in the Transnet property. • Mapping of the fault on site is recommended and should be done by applying geophysical surveying techniques. • Water quality determinants during the last phase of site assessment and groundwater monitoring should incorporate major and trace element chemistry, microbiology, physical determinants, and, if possible, selected organics such as formaldehyde. <p>For monitoring purposes or to possibly aid in the earlier detection of potential contamination, the following analytical parameters are recommended:</p> <ul style="list-style-type: none"> • Metals used in coffin ornaments or jewellery, or those historically used in embalming: e.g. aluminium, arsenic, cadmium, chrome, copper, iron, lead, mercury, nickel, vanadium, zinc. • Nutrients and compounds associated with both the landscaping processes as well as the breakdown of the skeleton: e.g. sodium, potassium, calcium, magnesium, chloride, fluoride, sulphate, nitrate, phosphate. • Organics associated with embalming or daughter products of expected other organic compounds: e.g. formaldehyde. • Pathogens associated with the breakdown of biological materials; where appropriate, other pathogens expected: e.g. E. coli. • Other fundamental physical parameters such as pH, hardness, TDS and electrical conductivity <p>The following is also recommended at cemetery sites:</p>	<p>✓</p>	<p>✓</p>	<p>✓</p>		<p>ENGINEER, GEOHYDROLOGIST</p>		
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Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
	<ul style="list-style-type: none"> • A reduction in irrigation for landscaping is proposed as a generic mitigation measure. Graves will likely cause zones of preferential infiltration if somewhat depressed, or will likely increase erosion or obstruct runoff if mounded. Optimal landscaping practices with minimal irrigation at low intensity will ensure that grass can grow without extensive mobilisation of possible contaminants. • Planting larger and indigenous trees with deeper root systems may aid in redistributing subsurface moisture and preventing waterlogging of graves and backfill. Where possible, natural vegetation and trees should not be removed, or should be replanted to aid in the natural management of subsurface waters. • Minimal accessories should be buried and coffins should preferably not contain too many artificial metals and plastics. These do, over time, mobilise, to the likely detriment of the receiving environment and groundwater and surface water resources. • Hardness tends to immobilise some contaminants such as metals and reduce corrosion. If possible, small amounts of lime or dolomite may contribute to attenuating contaminants on-site. 							
h) Structures	Structures should meet the National Building Regulations.	✓		✓		DEVELOPER, ARCHITECT OWNER		
i) Landscape	The natural features of the site should be managed in a holistic manner. Gardens inside and outside the premises should be designed and planted with indigenous vegetation.	✓				DEVELOPER, LANDSCAPE ARCHITECT, ECO		
j) Crime, safety and security	The Developer must determine which security system should be utilised for the site. Entrance points of the construction road must be secured. Loitering must be avoided by clearly indicated signs showing NO JOBS placed around the outside of the site	✓	✓	✓		DEVELOPER, CONTRACTOR		

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
10.2 Soil								
10.2.1 Compaction								
a) Designated Routes	Designated routes shall be determined for the construction vehicles and designated areas for storage of equipment. These areas shall preferably be already disturbed. The construction camp must be situated on an already disturbed area and approved by the relevant municipal department.	✓	✓			CONTRACT MANAGER, ECO, CONTRACTOR	Once-off	
b) Compacted areas	All areas that are compacted by machinery shall be ripped prior to them being rehabilitated with topsoil and grass seed. The compaction of the soil will be avoided by primarily using areas where existing disturbances exist at a level that precludes vegetation.		✓			CONTRACTOR	Continuous	
c) Access points & route	Clearly mark the site access point and routes on site to be used by construction vehicles and pedestrians.	✓	✓			CONTRACT MANAGER, ECO, CONTRACTOR	Once-off	
d) Vehicular fences	Fence off areas which are off limits to vehicles	✓	✓			ECO, CONTRACTOR	Once-off	
e) Excavated areas	Mark out the areas to be excavated to ensure that only necessary areas are excavated.	✓	✓			ECO, CONTRACTO	Once-off	
10.2.2 Erosion								
a) Erosion prevention	All surface run-offs shall be managed in such a way so as to ensure erosion of soil does not occur. All surfaces that are susceptible to erosion shall be covered with a suitable vegetative cover as soon as construction is completed. Or where erosion may potentially occur, dissipaters such as gravel beds or straw bales must be installed to prevent erosion.	✓	✓			ENGINEER, ECO, CONTRACTOR	Continuous	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
b) Stockpiles	Straw bales or sandbags must be used as a mitigation measure against erosion where needed.	✓	✓			ECO, CONTRACTOR	Once-off	
c) Wet areas	No vehicles what so ever are allowed to move across sensitive areas which could cause erosion scouring and compaction.		✓			CONTRACTOR	Continuous	
d) Swales	Erosion caused by construction methods or unusually heavy rainstorms must be prevented and managed by building retention swales and cut-off swales to direct the water to shallow slow flowing slope.		✓			CONTRACTOR	Continuous	
e) Downhill areas	Straw bales or approved equal should be placed and adequately secured on all downhill locations where erosion may occur to prevent washouts and to retain siltation and topsoil from the site. A supply of straw bales must be kept on site for this purpose.		✓			CONTRACTOR	Continuous	
f) Clearing of large areas outside of construction footprint	Where it is necessary to clear large areas, the clearing activities must be followed by the planting of grass or covering of the surface prior to clearing the area.		✓			CONTRACTOR	Once-off	
g) Clearing on slopes	Where it is necessary to clear slopes, the clearing activities must be followed by the planting of grass or covering of the surface prior to clearing the area.		✓			CONTRACTOR, ECO	Once-off	
h) Clearing footprints	The area being cleared of vegetation for the construction activities must be limited to a minimum.		✓			CONTRACTOR, ECO	Continuous	
10.2.3 Topsoil								
a) Stripping of topsoil	The top (200-300mm) layer (as applicable) of all areas to be excavated for the purposes of construction shall be stripped and stockpiled in areas where this material will not be damaged, removed or compacted. This stockpiled material shall be used for the rehabilitation of the site. Weeds appearing on the stockpiled topsoil shall be removed by hand before seeding.	✓	✓			CONTRACTOR	Once-off	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
b) Storing	In order to minimize erosion and siltation and disturbance to existing vegetation, it is recommended that stockpiling be done/ equipment be stored in already disturbed/exposed areas.	✓	✓			ECO, CONTRACTOR	Continuous	
c) Mowing of vegetation	Only areas directly affected by construction may be grubbed and stripped of topsoil. The vegetation on the remainder of the construction areas, where possible, may only be mowed short and shall not be removed.		✓			CONTRACTOR	Once-off	
d) Grass component	When the stripping of topsoil takes place, the grass component shall be included in the stripped topsoil. The soil will contain a natural grass seed mixture that may assist in the re-growth of grass once the soil is used for back filling and rehabilitation.		✓			CONTRACTOR	Once-off	
e) Infrastructure	During the laying of pipes or infrastructure (on or adjacent to the site), topsoil shall be kept aside to cover the disturbed areas immediately after such activities are completed. Measures should be taken to ensure that no rocks or any other materials are placed on the top layer of soil.		✓			CONTRACTOR	Continuous	
f) Designated areas	Stockpiling will only be done in designated places where it will not interfere with the natural drainage paths of the environment and must be properly planned according to the construction programme.	✓	✓			ENGINEER, ECO, CONTRACTOR	Continuous	
g) Flood line areas	No flood line areas on site.	✓	✓			ECO, CONTRACTOR	Once-off	
h) Stockpile covering	Cover stockpiles and surround downhill sides with a sediment fence to stop materials washing away.		✓			CONTRACTOR	Continuous	
i) Runoff prevention	Care must be taken to prevent the runoff of silt from open soil and stockpiles into the sensitive areas.		✓			CONTRACTOR	Continuous	
j) Removal areas	Remove vegetation only in areas designated during the planning stage.	✓	✓			CONTRACTOR	Once-off	
k) Stockpile footprint	Stockpiles must meet the requirements of the Regulation 28 of the Construction Regulations and Regulation 8 of the General Safety Regulations.		✓			CONTRACTOR	Continuous	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
l) Traversing topsoil	No vehicles are allowed to traverse the stockpiled topsoil areas.		✓			CONTRACTOR	Continuous	
10.3 Waste Management								
10.3.1 Construction waste								
	Waste minimisation principles must be applied during the construction and operational phases of the development. Waste should ideally be avoided but where it does exist, it must be removed from site and disposed of at a registered or licensed landfill site for the type of waste produced. All waste streams to be generated must be managed in accordance with the hierarchy of waste management principles. Proof of disposal of waste must be kept on site and made available to the Department upon request.							
a) Planning	Plan the site before starting – for access, deliveries, construction areas, washout area, waste, stockpiles, and chemicals storage. Plan routes for trucks and also vehicles with limited turning ability. Indicate this on site and on maps prior to the event.	✓				CONTRACT MANAGER, ECO, CONTRACTOR	Once-off	
b) Storage	Temporary waste storage points on site shall be determined. These storage points shall be accessible by waste removal trucks and these points should not be located in areas highly visible from the properties of the surrounding land-owners/tenants/in areas. These areas should also be already disturbed. The storage of solid waste on site, until such time that it may be disposed of, must be in the manner acceptable to the relevant Authority.	✓	✓			CONTRACT MANAGER, ECO, CONTRACTOR	Once-off	
c) Waste Plan	Prepare and submit a Waste Management Plan to ECO. Coordinate with other trades on site and nearby businesses for potential reuse or ‘waste exchange’. Coordinate with other trades working on site regarding: site management, timing of works and waste management (recycling and reuse potential).	✓				CONSULTANT, ECO, CONTRACTOR	Once-off	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
d) Disposal	Solid waste shall be disposed of in a manner approved by the Department of Water and Sanitation (DWS). All solid waste must be removed and transported to a recognised waste disposal site on a weekly basis. . Waste disposal certificates must be obtained for all waste disposal.	✓	✓			CONTRACTOR	Continuous	
e) Record keeping	Keep records of waste reuse, recycling and disposal for future reference. Provide information to ECO.		✓			CONTRACTOR	Continuous	
f) Cleaning/ clearing	Avoid the cleaning of the site camp or paved surfaces with soap. All roads should be cleared of any obstruction and should be swept clean with a broom, as to avoid the waste from entering the storm water systems.		✓	✓		CONTRACTOR	Continuous	
g) Waste removal	On completion of works, the contractor shall clear away and remove from the site all construction paint, surplus material, foundations, plumbing and other fixtures of every kind. Areas thus cleared shall be graded and scarified to restore the ground as near as possible to its original profile.			✓		CONTRACTOR	Once-off	
10.3.2 Household waste								
a) Storage	Temporary waste storage points on the site should be determined. These storage points should be accessible by waste removal trucks and these points should not be located in ecological sensitive areas /areas highly visible from the properties of the surrounding land-owners/ in areas where the wind direction will carry bad odours across the properties of adjacent landowners.	✓	✓	✓		CONTRACT MANAGER, CONTRACTOR	Once-off	
b) Disposal	No waste materials shall at any stage be disposed of in public areas or adjacent properties, or where the wind direction will carry bad odours across the properties of adjacent tenants or landowners. The piling of any material that could rot and release unpleasant smells into the air will not be permitted. Burning of waste is not permitted.		✓	✓		ECO, CONTRACTOR	Continuous	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
c) Recycling	Several waste bins must be provided in offices and domestic areas and clearly marked or colour coded according to industry standards to allow for recycling of waste into <ul style="list-style-type: none"> • Paper • Biodegradable • Glass • Plastics • General 			✓				
d) Waste Bins	The waste bins shall be cleared by approved waste contractor.		✓	✓		CONTRACTOR	Continuous	
10.3.3 Chemical waste								
a) Design	Design the site in such a manner that chemical wastes are not located in close proximity to any fire. These areas shall be predetermined and located in areas that are already disturbed. These areas shall not be within 100 m from any 1:100-year flood line or drainage lines. This area should be on a concrete base to avoid any possible seepage into the soil.	✓		✓		CONTRACT MANAGER, CONTRACTOR	Once-off	
b) Contamination	Cover any wastes that are likely to wash away or contaminate storm water. Build a bund around waste storage area to stop overflow into storm water		✓	✓		CONTRACTOR	Continuous	
	If any soil contamination occurs during the construction phases of the proposed activity, the contaminated soil must be removed to a licensed landfill site and the site must be rehabilitated to the satisfaction of the Department.		✓			CONTRACTOR	Continuous	
	The preparation of building material (e.g. mixing of cement, concrete, sand etc.) must be done on a concrete impermeable surface to avoid seepage into the soil and riverine areas.		✓			CONTRACTOR	Continuous	
c) Containers	All hazardous waste (fuel, lubricants, chemicals, diesel, etc) shall be placed in specifically designed containers and properly sealed. Should		✓	✓		CONTRACTOR	Continuous	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
	any fuel storage tank be required on site, the Contractor shall ensure that he has complied with the necessary legal requirements for the erection of such tanks.							
d) Collection	All containers shall be collected on a weekly basis by certified chemical removal companies (such as OILKOL or WASTETECH).		✓	✓		CONTRACTOR	Continuous	
e) Disposal	All chemical waste shall be disposed of at a certified waste disposal site and proof of this disposal shall be sent to the contractor and ECO.		✓	✓		CONTRACTOR	Continuous	
10.4 Fuel, Fuelling and Maintenance								
10.4.1 Fuel storage								
a) Storage	Fuel storage shall be within the construction camp, and within a bunded area with at least 110% of the volume of the amount of fuel stored, as per agreement and approval of the ECO. No storage of any fuel will be allowed on site, other than what is approved by the applicable provincial government department	✓	✓			ENGINEER, CONTRACTOR	Once-off	
10.4.2 Fuelling								
a) Re-fuelling	According to Construction Regulation 25 and General Safety Regulation 4, in designated areas.	✓	✓			ENGINEER, CONTRACTOR	Continuous	
b) Drip trays and spill kits	Drip trays (min 10cm deep) are to be placed under construction vehicles overnight. The drip tray must be able to contain 110% of the total amount/ volume of oil in the vehicle. Spill kits must be available in all vehicles that transport hydrocarbons for dispensing to other vehicles on the site. The dispensing devices (pump heads) must be compatible with the vehicles to which they are dispensing. In addition, the dispensing devices must be fitted with the necessary valves/ apparatus that will ensure that the nozzles do not drip fuel after pumping has stopped.		✓			ECO, CONTRACTOR	Continuous	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
c) Decontamination	In the event of spills from vehicles, the area should be cleaned immediately using a bioremediation product, such as <i>Petro-Clean TM</i> . The absorbent and soil must be placed in a bin and removed from the site by a certified company and disposed of as a hazardous waste at a licensed commercial facility. No hydrocarbons may escape into the environment. A spill recovery kit must be on site, along with trained personnel.		✓			CONTRACTOR	Continuous	
d) Notification	Applicable provincial and local government departments, local municipalities and adjacent landowners must be notified within 24 hours of a potentially hazardous spillage or leak.		✓	✓		ENGINEER, CONTRACTOR		
10.4.3 Maintenance								
a) Design	The maintenance yard should be indicated on the layout plan of the site.	✓		✓		CONTRACT MANAGER, CONTRACTOR OWNER	Once-off	
b) Maintenance area	The maintenance of vehicles and equipment used for any purpose during the development will take place only in the maintenance yard. Any breakdown in the field requires the presence of a spill treatment team and equipment. This team must prevent and mitigate any spills that occur in this situation.		✓			ENGINEER, ECO, CONTRACTOR	Continuous	
c) Equipment	Equipment used in the development process must be adequately maintained so that during operations it does not spill oil, diesel, fuel, or hydraulic fluid.		✓			ENGINEER, CONTRACTOR	Continuous	
d) Machinery	Machinery or equipment used on the site must not constitute a pollution hazard in respect of the above substances. The main contractor or ECO shall order such equipment to be repaired or withdrawn from use if he or she considers the equipment or machinery to be polluting and irreparable.		✓			ENGINEER, CONTRACTOR	Continuous	
e) Buildings and	Buildings, yards, paving areas, gardens, outside fencing or walls, etc.	✓	✓	✓		CONTRACTOR		

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
facilities	must be maintained in good standing at all times. Maintenance must be carried out expeditiously and with care to maintain the residential character of the area at all times.					OWNER		
10.5 Air Pollution								
10.5.1 Dust control								
a) Water dampening	The liberation of dust into the surrounding environment shall be effectively controlled by the use of, <i>inter alia</i> , water spraying and/or other dust-allaying agents, such as dust nets. Regular and effective damping down of working areas (especially during the dry and windy periods) must be carried out to avoid dust pollution that will have a negative impact on the surrounding environment. When necessary, these working areas should be damped down every 3 - 4 hours.		✓	✓		CONTRACTOR	Continuous	
b) Speed of trucks	The speed of haul trucks and other vehicles must be strictly controlled to avoid dangerous conditions and excessive dust.		✓			CONTRACTOR	Continuous	
10.5.2 Fire								
a) Fires on site	A designated area shall be assigned for fire making by the construction workers, so as to ensure that run-away veld fires do not occur. This will reduce air pollution by excessive smoke.	✓	✓			CONTRACTOR	Once-off	
10.5.3 Machinery								
a) Exhaust fumes	Machinery or equipment used on the site must not constitute a pollution hazard in respect of air pollution via excessive exhaust fumes. This shall be inspected regularly by the contractor and rectified immediately.		✓			CONTRACTOR	Continuous	
b) Transporting	All vehicles transporting material to and from a site that can be blown		✓			CONTRACTOR	Continuous	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
materials	off (e.g. soil, rubble, etc.) must be covered with a tarpaulin.							
10.6 Noise Pollution								
10.6.1 Working hours								
a) Construction working hours	Hours stipulated by Local Municipal bylaw. Approval must be sought for working outside the regulated hours.	✓	✓			CONTRACT MANAGER, ECO, CONTRACTOR	Continuous	
10.6.2 Staying on site								
a) Construction workers	Where people stay on site, their actions and activities must be managed to avoid nuisance to adjacent occupants		✓			CONTRACTOR	Continuous	
10.6.3 Noise on site								
a) Noise Regulations	Site workers must comply with the Provincial noise requirements as outlined in Provincial Notice No. 5479 of 1999: Noise Control Regulations. The contractor is required by contract to adhere to SABS 1200 and ISO 9000 safety measures during construction on the entire site. And to fit silencers to frilling and other machinery as required.		✓	✓		CONTRACTOR	Continuous	
10.7 Safety and Security								
10.7.1 Safety								
a) Site and crew	The site and crew are to be managed in strict accordance with the Occupational Health and Safety Act (85 of 1993) and the National Building Regulations.		✓	✓		CONTRACTOR	Continuous	
b) Informal settlement	No informal settlement will be allowed on the premises or in the adjacent roads leading to the construction site.		✓	✓		CONTRACTOR	Continuous	
c) Informal trading	It is the responsibility of the contractor to manage any informal traders		✓	✓		CONTRACTOR	Continuous	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
	on site. If they are allowed, toilets and waste bins must be provided.							
d) Dangerous areas	All dangerous areas and deep excavations should be barrier taped to ensure visibility of these areas in compliance with the Occupational Health and Safety Act (85 of 1993). In the case where demolition of buildings can pose a threat to workers or visitors to the site, emergency officers must be summoned.		✓			CONTRACTOR	Continuous	
e) Equipment and materials	The Contractor should ensure that the handling of equipment and materials is supervised and adequately instructed.		✓			CONTRACTOR OWNER	Continuous	
f) Sign boards	Clear sign boards should be erected at the entrance to the site to indicate that a construction site is being entered and that OHS safety precautions should be followed		✓			CONTRACTOR OWNER	Continuous	
g) Fire extinguisher	A fire extinguisher should be accessible and the personnel should receive training in the use of a fire extinguisher. Furthermore, a fire extinguisher must at all times be available wherever welding or similar activities take place and be present on all construction vehicles. A full-time fire prevention team and the associated equipment must be available on site.	✓	✓	✓		CONTRACTOR OWNER	Continuous	
h) Emergency numbers	A list with all the relevant emergency telephone numbers shall be pasted up in the site office (hospital, fire department, police, ambulance, etc.) for easy access in the event of an accident	✓	✓	✓		CONTRACTOR OWNER	Continuous	
i) Equipment and materials	The Contractor should ensure that the handling of equipment and materials is supervised and adequately instructed.		✓			CONTRACTOR OWNER	Continuous	
10.7.2 Security								
a) Security guards	Security officers will remain on site for the purpose of guarding the equipment.	✓	✓			CONTRACTOR	Continuous	
b) Access control	Access control must be enforced, the site could be checked and a search could be done each night for construction workers. The provincial	✓	✓	✓		CONTRACTOR OWNER	Continuous	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
	government departments will be allowed access to site at any time of the day							
c) Fencing	Fencing is required during the construction phase of the project to demarcate the boundaries of the construction site and work camp. Erection of the fence must occur with minimal impact on the natural environment. The fence will ensure that access to and from the site will be restricted to staff only.		✓			CONTRACTOR	Once-off	
d) Casual access	No casual access to the work camp and the construction site will be allowed.		✓			CONTRACTOR	Continuous	
e) Fence rehabilitation	All negative effects caused by the erection of any temporary fences must be rehabilitated after construction is complete.			✓		CONTRACTOR	Once-off	
10.8 Health								
10.8.1 Chemical Toilets								
a) Number of toilets	One (1) portable chemical toilet for every 30 workers must be established on site (not all in the contractor's camp, but within reasonable walking distance from where the workers are working).	✓	✓			CONTRACTOR	Continuous	
b) Location	Chemical toilets shall not be in close proximity to any natural drainage channels. It is important, however, that toilets be placed in areas where the largest number of workers is located on a daily basis.	✓	✓			ECO, CONTRACTOR	Continuous	
c) Usage	No person is allowed to use any other area than chemical toilets		✓			CONTRACTOR	Continuous	
d) Inspections	Regular inspections shall be carried out to ensure that toilets are kept in a hygienic state.		✓			CONTRACTOR	Continuous	
e) Toilet paper	Toilet paper shall be supplied to all toilets.		✓			CONTRACTOR	Continuous	
f) Cleaning	Toilets shall be cleaned by a certified company on a weekly basis.		✓			CONTRACTOR	Continuous	
g) Locking	Toilets must be secured to the ground so that they cannot be		✓			CONTRACTOR	Continuous	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
	overturned, and have a sufficient locking mechanism operational at all times.							
h) Shower facilities	Shower and changing facilities must be erected separate for each sex					CONTRACTOR	Continuous	
i) Eating areas	Sheltered eating areas must be provided					CONTRACTOR	Continuous	
10.9 Blasting on Site								
a) Authorisation	In cases where blasting is required, an authorisation must be obtained from the local blasting officer at the Local Police station and the Provincial Dept of Minerals and Resources.	✓	✓			CONTRACT MANAGER, ENGINEER, CONTRACTOR		
b) Magazine area	The ECO, Contractor and Safety Officer will earmark a suitable area on site for a temporary magazine for the duration of the construction. This magazine however will only be used to store the daily stock and not for stock to be stored for a long period.	✓	✓			ECO, SAFETY OFFICER, CONTRACTOR	Once-off	
c) Blasting times	Blasting will only take place after confirmation between the ECO and Contractor.		✓			ECO, CONTRACTOR	Continuous	
d) Notification	Blasting shall be limited to specific, pre-agreed periods of the day so as to minimize disturbance and shall be agreed upon with the ECO. The ECO shall be notified in writing 3 days in advance with a two weekly daily schedule of when blasting operations will take place and where so that he can notify surrounding residents of each blasting event in writing, 24 hours in advance before blasting events will take place.		✓			ECO, CONTRACTOR	Continuous	
e) Safety precautions for blasting	The National Blasting procedures and regulations must be adhered to.		✓			ECO, CONTRACTOR	Continuous	
10.10 Fauna								
a) Regulations	All activities on site must comply with the regulations of the Animal		✓			CONTRACTOR	Continuous	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
	Protection Act, 1962 and NEMPAA 2003.							
b) Sensitive areas	No construction worker activity whatsoever will be allowed outside of the specific construction area.	✓	✓			CONTRACTOR	Continuous	
c) Snaring / hunting	Contractors must ensure that no animal species are disturbed, trapped, hunted or killed during the construction phase.		✓			CONTRACTOR	Continuous	
d) Training	Workers must be trained on how to deal with fauna species as intentional killing will not be tolerated.		✓			ECO, CONTRACTOR	Continuous	
10.11 Flora								
a) Site inspection	Before any vegetation is removed, a suitably qualified person (i.e. on ECO request of a vegetation specialist) shall inspect the study area for any plant/ grass/ tree species that could be transplanted to other similar/ suitable areas. This includes all Red Data or Protected, or rare plants that may be found during the flora site assessment or during construction operations.	✓	✓	✓		FLORA SPECIALIST, ECO, CONTRACTOR	Once-off	
b) Sensitive flora	The site contains the widespread Protected Tree species <i>Vachellia erioloba</i> (Camel Thorn). In terms of a part of section 15(1) of the National Forests Act No. 84 of 1998, no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a license granted by the Minister. Avoidance of individual <i>Vachellia erioloba</i> trees where practical (Application for permits when <i>Vachellia erioloba</i> trees will be damaged or removed, if the development is approved, is essential).	✓		✓		FLORA SPECIALIST, ECO	Once-off	
c) Site access and circulation	Strictly no unauthorised access, land clearing, construction activities, vehicular traffic of any kind, pedestrian traffic or fires will be permitted external of specific construction areas or in sensitive vegetation areas.	✓	✓	✓		ECO, CONTRACTOR	Continuous	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
d) Drainage lines	No drainage lines present.	✓	✓			ECO, CONTRACTOR	Continuous	
e) Exotic / invader species	<ul style="list-style-type: none"> • Cultivation of indigenous plant species at the site is imperative. Control of alien invasive plant species should be applied. • Continued monitoring and eradication of alien invasive plant species are imperative. It is in particular declared alien invasive species such as alien invasive Australian <i>Acacia</i> species, <i>Melia azedarach</i> (Syringa Berrytree) and <i>Prosopis glandulosa</i> (Honey Mesquite) that should not be allowed to establish. 		✓	✓		FLORA SPECIALIST, CONTRACTOR	Continuous	
f) Landscaping	The use of indigenous vegetation should be optimised during the landscaping of the development.	✓	✓	✓		FLORA SPECIALIST, LANDSCAPE ARCHITECT, LANDSCAPE CONTRACTOR	Once-off	
g) Wood harvesting	Wood harvesting of any trees or shrubs inside the protected area or adjacent areas for firewood shall be prohibited and subject to a fine.		✓	✓		CONTRACTOR	Continuous	
h) Retaining flora	On site floral assets and tree clumps shall be identified and retained where possible. Floral assets intended to be retained shall be clearly marked on site and be fenced off until they have been removed.	✓	✓	✓		FLORA SPECIALIST, ECO, CONTRACTOR	Continuous	
10.12 Storm water								
a) Covering of wastes	Cover any wastes that are likely to wash away or contaminate storm water		✓	✓		CONTRACTOR OWNER	Continuous	
b) Bunded area	Build a bund around waste storage area to stop overflow into storm water		✓	✓		CONTRACTOR OWNER	Continuous	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
c) Natural flow	Natural storm water must flow freely, either as sheet flow or where necessary in open grass swales, to allow for infiltration and retention. Natural veld grass must be left undisturbed as far as possible, to allow natural drainage.		✓	✓		ENGINEER, CONTRACTOR	Continuous	
d) Piping of flow	Natural storm water must not be piped other than in areas where it runs perpendicularly cross a roadway.		✓	✓		ENGINEER, CONTRACTOR	Continuous	
e) Drainage channels	Drainage channels must be constructed along access roads every 50m to divert runoff during construction period.	✓	✓	✓		ENGINEER, CONTRACTOR	Continuous	
f) Energy dissipaters	Depending on design, direction of stormwater run-off, etc. it is possible that a certain amount of erosion control (eg. Gabions along the outer edge of the floodline, etc.) may be required. The idea is to protect the integrity of the watercourse at all costs.		✓	✓		ENGINEER, CONTRACTOR	Once-off	
g) Engineering report	The engineer's service report will also specifically address storm water to the satisfaction of the Local Municipality. This report will only be set up once the development has been approved. This storm water design (as per civil engineers) for all hard surfaces will ensure the proper management and precautionary measures are taken into account.	✓		✓		ENGINEER	Once-off	
h) Vegetated swales	Where feasible the use of vegetated swales should be used to accommodate surface runoff, in order to increase infiltration into the soil. The swales should be vegetated with indigenous, riparian vegetation in order to provide habitat for bird life and other aquatic and semi-aquatic species. Where feasible, the swales should be provided adjacent to the property boundaries along the natural gradient.	✓	✓	✓		ENGINEER, ECO, CONTRACTOR	Continuous	
l) Maintenance of swale	Maintenance of the swale should include periodic mowing of the grass (never shorter than the design flow depth of the channel). Bare areas		✓	✓		CONTRACTOR	Continuous	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
	should be re-seeded and debris and blockages regularly removed. Sediment depositions should be regularly removed from the swale, to prevent pollution of the runoff from contaminants contained therein.							
10.13 Traffic Impact								
a) Departmental requirements	All requirements from the provincial roads and traffic departments and the Local Municipality must be adhered to and precautionary measures taken to provide safe and effective traffic management.	✓		✓		ENGINEER OWNER	Once-off	
b) Delivery trucks	Deliveries by excessive large vehicles vehicles may only take place during weekdays and pre-warning of at least one day prior to delivery must be given to the facility manager to ensure adequate space and manoeuvrability inside the facility and in the adjacent roads.		✓	✓		CONTRACTOR OWNER	Continuous	
c) Site access	The access of abnormal trucks will be investigated by the CM to provide a suitable access route that does not become a nuisance to surrounding residents. Only a specified number of trucks at any one time will be allowed onto the property as agreed to between the CM and the ECO based on the capacity of the site to carry the number of trucks.		✓			ENGINEER, CONTRACTOR	Continuous	
d) Peak traffic hours	Construction vehicles and activities must aim to avoid peak hour traffic times.		✓	✓		CONTRACTOR OWNER	Continuous	
e) Legislation	Access roads and traffic planning will adhere to Provincial and the Local Municipality requirements.	✓				ENGINEER	Once-off	
f) Established tracks	Access and travelling on site must follow current and established tracks only.		✓			CONTRACTOR	Continuous	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
10.14 Sensitive Areas								
10.14.1 Rivers / Streams - not present on this project								
10.14.2 Rocky Outcrops – not present on this project								
10.14.3 Heritage / Cultural / Archaeological Sites								
a) Discovery of artefacts	Should any Cultural / Archaeological artefacts be discovered during construction activities, construction shall immediately cease and the National, Cultural and History Museum shall be contacted for investigation. The area must be barrier taped immediately until the ECO can communicate appropriate methods of protection to the contractor.		✓			CONTRACTOR, HERITAGE SPECIALIST, ECO	Continuous	
b) Fencing	Any archaeological sites present on site shall be fenced and at least 5 metres around it should be safeguarded from construction and development.	✓	✓			CONTRACTOR	Once-off	
c) Structures older than 60 years	No buildings / structures older than 60 years shall be damaged / demolished, or archaeological artefacts removed, without written authorisation from SAHRA.	✓	✓			CONTRACTOR	Continuous	
d) Burial grounds	Any burial ground or grave found on site will be reported immediately to the Contractor, ECO and Contract Manager. An undertaker must also be contacted who will place advertisements in the newspapers. This should be investigated by a specialist and recommendations made.		✓			CONTRACT MANAGER, CONTRACTOR, ECO	Continuous	
e) Suspicious artefacts	The ECO will be notified of any suspicious artefacts prior to it being moved or removed.		✓			CONTRACTOR	Continuous	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
10.15 Services								
10.15.1 Disruption in services								
a) Informing EC	If any disruption in services to outside portions (electricity, water, sewage) are foreseen the contractor must inform the adjacent land owners and the ECO at least 4 days prior to these activities, to enable the ECO to inform the surrounding land owners of such possible disruptions.		✓			CONTRACTOR	Continuous	
10.15.2 Installation of services								
a) Requirements	The service systems are to be designed according to the minimum requirements of, and submitted to, the Local Authority for approval. Thus no construction activities must commence on site prior to obtaining the necessary approval.	✓	✓			ENGINEER, CONTRACTOR	Once-off	
b) Trenches	Excavate, close and rehabilitate trenches as soon as possible after site services pipes are installed. Avoid open trenches for any extended period of time. This shortens the duration of impacts and improves the recovery of the vegetation. This limitation includes the grubbing of the trench area.		✓			CONTRACTOR	Continuous	
c) Backfill material	All trenching and excavations must be properly backfilled and compacted as per sub clause 5.7.1 of SABS 1200 DB. The backfill material must be less permeable than surrounding soil layers so as to prevent erosion of the sides of trenches.		✓			CONTRACTOR	Continuous	
d) Corrosivity of soils	The foundation materials are expected to be potentially highly to very highly chemically corrosive with regards to buried ferrous pipes or buried	✓	✓			CONTRACTOR	Continuous	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
	tanks and the use of nonferrous metal pipes or plastic pipes are recommended for underground wet services.							
d) Water pressure from surrounding soil	Caution must be exercised to prevent that the water pressure from the surrounding soil is not greater than that within the pipe, as this may lead to damage.		✓			CONTRACTOR	Continuous	
e) Existing storm water channels and other services	Existing storm water channels and services are not to be impacted upon in any way during the course of construction, except when part of the construction scope of works. Any damage repairs shall be for the Contractor’s account. No littering or dumping of rubble shall be permitted in the channel and all potential blockages shall be removed immediately. Where necessary these areas should be clearly fenced off with white poles at 5m centres, with blue wire and orange barrier netting.		✓			CONTRACTOR	Continuous	
10.15.3 Contractor’s Site Camp								
a) Establishment of site camp	A work site will be established and maintained for storing construction equipment on a non-sensitive area to be agreed upon by the ECO and contractor. The contractor shall furnish the Engineer on site with a site plan indicating the layout of site offices, facilities, such as chemical toilets, areas for stockpiling of materials and provision of containers		✓			CONTRACTOR, ECO	Once-off	
b) Fencing	The site camp shall be fenced and all materials shall be stored within this camp. All hazardous materials i.e. fuel, polyethylene liners, etc. shall be stored in an appointed area that is fenced off and has restricted access.		✓			CONTRACTOR	Continuous	
c) Rehabilitation of camp	The area where the camp was established must after the construction period be rehabilitated to guidelines in this document or as otherwise		✓			CONTRACTOR, VEGETATION	Once-off	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
	directed by the ECO.					SPECIALIST, ECO		
10.15.4 Environmental Awareness Training								
a) Training program	An environmental awareness-training program must be organized as part of the EMP to ensure that each employee knows his/her responsibilities regarding the EMP and the environment in general. Attendance certificates must be issued. Additional training as required, i.e. encounters with Red Data or other fauna should be arranged and provided.	✓	✓			CONTRACTOR, ECO	Once-off	
b) Appropriate activities	The employees, construction workers and maintenance crews will receive instruction in the appropriate activities that could take place among the natural resources of the area.		✓			ECO	Once-off	
10.15.5 Rehabilitation & Landscaping								
a) Landscaping	The use of indigenous vegetation should be optimised during the landscaping of the development. Landscaping should enhance the aesthetic appeal of the development/ mitigate the visual impact as far as possible.	✓				LANDSCAPE ARCHITECT	Once-off	
b) Compacted areas	All compacted areas (including backfilled trenches) should be ripped prior to them being rehabilitated.		✓			CONTRACTOR	Continuous	
c) Reseeding	Stored topsoil and reseeded must be used to rehabilitate all open soil areas following construction activities. Any proclaimed weed or alien invader plants shall be cleared by hand before seeding. All rehabilitated areas must be maintained and irrigated as required to ensure sufficient vegetation coverage. Re-seeding may be required if sufficient coverage		✓			LANDSCAPE ARCHITECT, CONTRACTOR	Once-off	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
	has not been achieved after 6 months and shall be at the Contractor' expense.							
d) Timeframe	Rehabilitation/ landscaping is to be done immediately after the involved works are completed.		✓			CONTRACTOR	Once-off	
e) Rehabilitation by Sub-contractors	The Contractor is responsible for the actions and works of the sub-contractors and is required to complete the rehabilitation work if the sub-contractor fails to do so. Payment may be withheld from the sub-contractor in the event that the work must be completed by the main contractor.		✓			CONTRACTOR	Continuous	
f) Completion of work	On completion of works, the contractor shall clear away and remove from the site all construction paint, surplus materials, foundations, plumbing and other fixtures, rubbish and temporary works of every kind. Areas thus cleared shall be graded and scarified to restore the ground to its original profile as near as practicable before topsoil placement.		✓			CONTRACTOR	Once-off	
g) Cement mixing	Cement mixing shall be done only at specifically selected areas within the construction sites. The preparation of building material (e.g. mixing of cement, concrete, sand etc.) must be done on a concrete impermeable surface to avoid seepage into the soil and riverine areas. After construction activities ended the cement shall be crushed and removed from the site. This mixing area shall then be ripped and rehabilitated.		✓			CONTRACTOR	Continuous	
h) Natural features	The natural features of the site should be managed in a holistic manner.	✓				LANDSCAPE ARCHITECT	Continuous	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
10.16 Advertising								
a) Design	A graphic design of the advertisement will be subject to the local bylaws and the approval of the local municipality.	✓				ARCHITECT, CONTRACTOR	Once-off	
b) Requirements	Must meet local municipal requirements. Advertisements will not obstruct traffic view, movement of pedestrians, cause visual pollution or appear to be unsightly. It will be tastefully low key, as will be defined by the Local Municipality and will not unrightfully interfere with other existing advertising rights.	✓		✓		ARCHITECT, CONTRACTOR	Continuous	
10.17 Penalties								
a) Payment of penalties	To prevent the contravention of the requirements of EMPr spot fines or penalties may be implemented in consultation with the CM.	✓	✓	✓		CONTRACT MANAGER, CONTRACTOR, ECO	Continuous	

APPENDIX A

ABBREVIATIONS AND DEFINITIONS

ARCH	Architect
CE	Consulting Engineer
CO	Construction
DE	Demolition
DS	Design
DWS	The Department of Water and Sanitation – both national office and their various regional offices, which are divided across the country on the basis of water catchment areas.
ECA	Environment Conservation Act (Act 73 of 1989)
ECO	Environmental Control Officer
EIA	An Environmental Impact Assessment as contemplated in Sections 21, 22 and 26 of the Environment Conservation Act
EMI	Environmental Monitoring Inspector – from Provincial Government (E.g. GDARD)
EMPr	Environmental Management Programme
FAUNA	All living biological creatures, usually capable of motion, including insects and predominantly of protein-based consistency.
FENCE	A physical barrier in the form of posts and barbed wire or any other concrete construction, (“palisade”- type fencing included), constructed with the purpose of keeping humans and animals within or out of defined boundaries.
FLOOD LINE	The line or mark to which a flood could rise, every 50 (1:50 year flood line), or 100 (1:100 year flood line) years
FLORA	All living plants, grasses, shrubs, trees, etc., usually incapable of easy natural motion and capable of photosynthesis.
FLORA	All living plants, grasses, shrubs, trees, etc., usually incapable of easy natural motion and capable of photosynthesis.
IEM	Integrated Environmental Management
MPRDA	The Mineral and Petroleum Resources Development (Act 28 of 2002)
NEMA	National Environmental Management Act (Act 107 of 1998)
NHRA	National Heritage Resources Act (Act 25 of 1999)
NWA	National Water Act (Act 36 of 1998)
OP	Operational
PENALTY	A fine against the contractor by the PM as per request from the ECO. This could also be used for the benefit of the labourers (such as a camp braai).
RA	Resident Architect
ROD	Record of Decision (approval or dismissal of project) as issued by GDACE
SABS	South African Bureau of Standards
SAHRA	South African Heritage Resource Agency
SAMOAC	South African Manual for Outdoor Advertising Control
SPOTFINE	A fine against a labourer by the PM as per request from the ECO. This fine should be used for the labourers’ benefit.
SWALE	A depression between slopes that provides for drainage
TLB	Tractor, Load & Backhoe
TOPSOIL	The layer of soil covering the earth which- (a) provides a suitable environment for the germination of seed;

- (b) allows the penetration of water;
- (c) is a source of micro-organisms, plant nutrients and in some cases seed; and
- (d) is not of a depth of more than 0,5 metres or such depth as the Minister may prescribe for a specific prospecting or exploration area or mining area.

VEGETATION

Any and all forms of plants, see also Fauna

WETLAND

A wetland is defined as land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which under normal circumstances supports or would support vegetation typically adapted to life in saturated soil

(Water

Act 36 of 1998).

