

# Draft Environmental Management Program

Proposed New Eersterus X 15 Township Establishment and associated infrastructure on a Portion of the Remainder of the farm Bultfontein 107 JR

Gaut: 002/22-23/E3308

February 2023

Applicant: Plastic Pack (Pty) Ltd

Contact person: Mr. R Streak

Tel: 082 573 0409

Email: [urb-con@mweb.co.za](mailto:urb-con@mweb.co.za)

Submitted By: Texture Environmental (Pty) Ltd

44 Melrose Blvd, Melrose Arch, Johannesburg

Contact Person: Mientjie Coetzee

Tel: 083 253 2246

Email: [mientjie@peopletexture.co.za](mailto:mientjie@peopletexture.co.za)



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## APPENDIX A

### 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.

#### 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:

- The Constitution of South Africa (No. 108 of 1996)
- 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)
- National Environmental Management : Waste Act (Act No. 59 of 2008) as amended
- The National Water Act, 1998 (Act 36 of 1998)
- National Heritage Resource Act (No. 25 of 1999)

- The Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983)
- National Forest Act (No. 84 of 1998)
- Occupational Health and Safety Act (Act 85 of 1993)
- Local Municipality By-Laws
- Municipal Systems Act, 2000 (Act 32 of 2000)
- Municipal Structures Act, 1998 (Act 117 of 1998)

## 7. PROJECT OVERVIEW

Texture Environmental Consultants has been appointed as the independent environmental assessment practitioner (EAP) to undertake the Environmental Impact Assessment (EIA) for the proposed New Eersterus X 15 township development and associated infrastructure on a portion of the Remainder of the farm Bultfontein 107 JR, City of Tshwane, Gauteng Province. The proposed development will consist of the following land use areas: Residential 1, Residential 3, Residential 4, Business 2, Institutional, including Hospital, Educational, Industrial, Municipal, Public Open Space and Provincial Roads and Access Roads.

The site 1190 hectares in extent is located in the northern Development region of Tshwane, East of the R80 Mabopane Highway and the proposed PWV 9 Road - Region 2 (the proposed PWV 9 road to the north forms the western boundary of the township).

The proposed township development area is located directly on the eastern border of proclaimed developed townships of Soshanguve Block MM, X and Y.

The township development site is and is situated on the eastern boundary of the Dr JS Moroka LM next to the Siyabuswa and Kgobokwane settlements along the R573 Moloto Road. It is located approximately 115 km northeast of the City of Tshwane CBD, 25 kilometres southwest of Marble Hall and 30 kilometres west of Groblersdal.

Access to the site will be obtained from from the existing Bultfontein Road on the eastern boundary. Access to the township can also be taken from the western side from the existing Soshanguve Townships.

*Refer to Figures 1 & 2 for locality maps.*

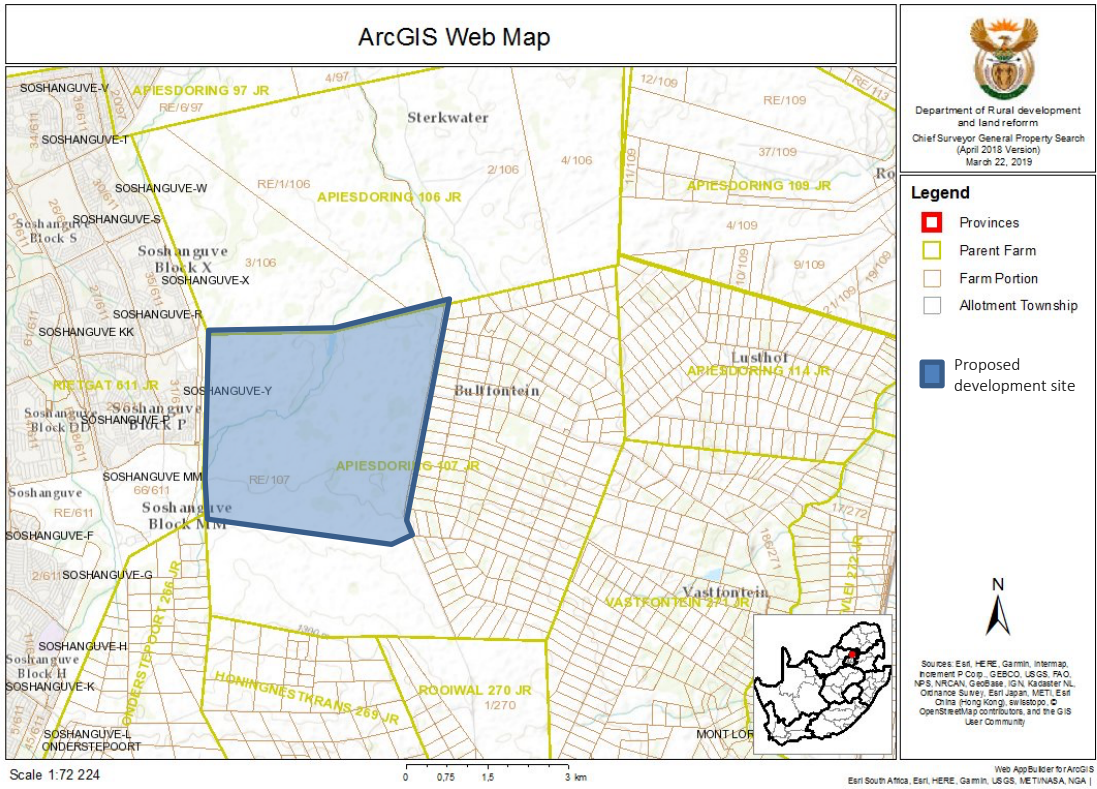


Figure 1: Locality Map

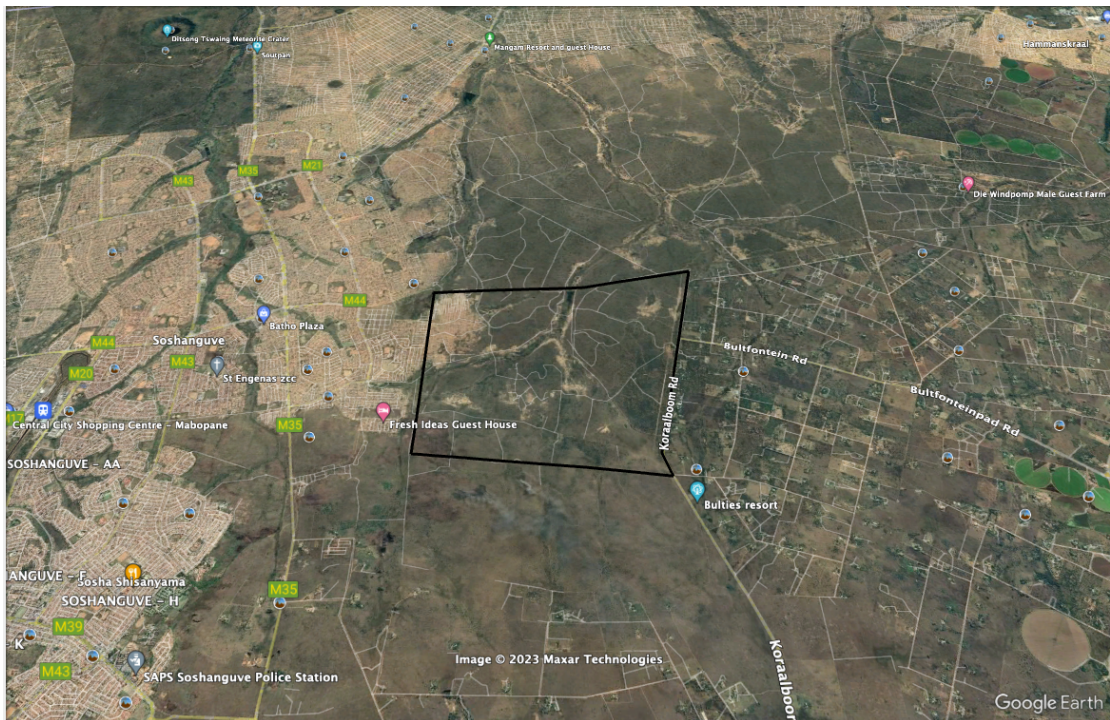


Figure 2: Aerial Map



## 8. RECEIVING ENVIRONMENT

### Biodiversity

The site is degraded due to extensive excavations and groundworks that have transformed large parts of the site including areas at and along the riparian zones at the site. Informal settlements are spreading in the north-western part of the site. Informal dumping has visibly increased in recent years.

Remaining patches of open savanna contain a diversity of indigenous plant species.

No wetlands appear to be present at the proposed site for the development. Non-perennial rivers, with their active channels and riparian zones, are present at the site. Artificial waterbodies, mostly in-channel dams, with groundwalls, are also present at the site. Water gathers at numerous excavations at the site. Large scale removal of soil modified or transformed large parts of the active channels and riparian zones of the non-perennial river systems at the site.

Slopes of rocky ridges at the southern parts of the site contains vegetation in fairly good condition, with a diversity of indigenous plant species. Slopes of rocky ridges which enter the southern parts of the site are excluded from the proposed footprint and forms part of a conservation area at the site and south of the site

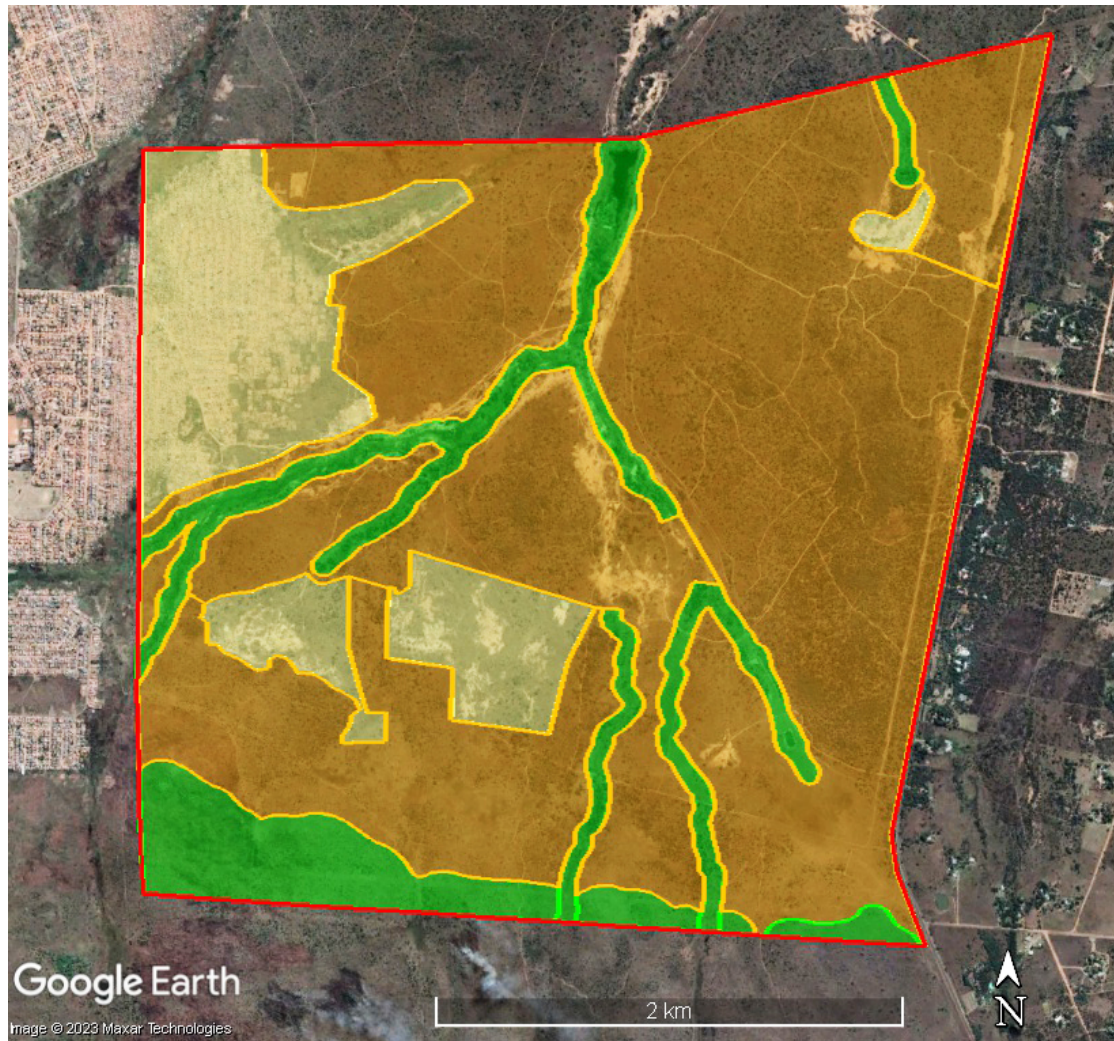
One protected tree species *Sclerocarya birrea* (Marula), is sparsely distributed at the site. A permit at the relevant authorities should be applied for in case of any damage or removal of individual trees of *Sclerocarya birrea* (Marula) trees, if the development is approved.

Apart from the above Protected plant species no loss of sensitive species is anticipated if the development is approved according to a footprint that excludes the slopes of rocky ridges that enter the southern parts of the site as well as the area at southeastern part of the site where the Near Threatened plant species *Searsia gracillima* var. *gracillima* is found.

Ecological sensitivity at most of the site is medium. The ecological sensitivity at increasingly larger parts of the site is low. Some of the terrestrial areas are of low sensitivity where these terrestrial areas have been degraded and transformed by extensive excavations and groundworks as well as informal residences. Ecological sensitivity at the non-perennial rivers, their riparian zones and buffer zones as well as the artificial waterbodies at the site is high (Figure 3). The main reason for the high sensitivity of the active channel and riparian zones is only based on their importance as conservation corridors and not on the poor current state of the active channels and riparian zones. Rocky slopes and their bufferzones at the southwestern parts of the site are also of high ecological sensitivity (Figure 3). The area where the Near Threatened plant species *Searsia gracillima* var. *gracillima* has been found at the site, is of high ecological sensitivity.

The ecological specialist recommended a 32m buffer zone along the non-perennial rivers and artificial water bodies.

Note that the buffer zone is included in the 'high sensitivity' area, as this is basically also a 'no-go zone' or limited access area. Refer to Figure 3, Sensitivity Map.







- |   |                                  |                        |
|---|----------------------------------|------------------------|
|  | Red outline                      | Boundaries of the site |
|  | Light yellow outline and shading | Low Sensitivity        |
|  | Orange outline and shading       | Medium Sensitivity     |
|  | Green outline and shading        | High Sensitivity       |

Figure 3: Sensitivity Map

**Heritage**

A number of Stone Age sites and occurrences (scatters of Middle Stone Age tools) were identified in the area during the field work. These are located in the area where large-scale sand quarrying is currently undertaken and although two of these sites are deemed to be more in-situ the impact of the sand quarrying is deemed to have disturbed and destroyed a large number of sites and occurrences. The sites are also located fairly close to the river/stream beds in the area and it is unlikely that the planned township development will be located here.

However, the sites are fairly significant from an archaeological point of view as not many of these open-air sites are known to exist in the larger area and therefore some mitigation measures will have to be

implemented to record the Stone Age archaeology of the area before it is ultimately destroyed through both the quarrying of sand and activities related to the township development

The possible existence of Bafokeng stone-walled sites in the southern section of the study & proposed development area were brought to the attention of Mr. Cappie Linde by the Bultfontein Land Use Committee before he passed away. These sites were not noticed by the Heritage Specialist during the initial surveys. However, some circles that presumably represent these sites can be seen on aerial images (Google Earth) of the area, with some also visible outside of the area. Whether these features are indeed stone-walled remnants of Bafokeng settlement sites cannot be determined without a doubt at this stage, but based on the aerial imagery it seems highly likely. These sites will have to be mitigated during Phase 2 Archaeological work should the proposed development impact on them.

## 9. ENVIRONMENTAL MANAGEMENT PROGRAM

Table 1: Environmental Management Program

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
9.1 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 must 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"> <li>Site specific stormwater management plan is required.</li> <li>Storm water system must be implemented as per the approved Storm Water Management Plan.</li> <li>Surface drainage measures must be in place according to the engineer's design to ensure good site drainage without ponding of water after precipitation.</li> <li>Floodline assessment with certified 1:50-year and 1:100-year Floodlines must be done.</li> </ul>	✓ ✓	✓ ✓	✓ ✓		DEVELOPER, CONTRACT MANAGER		

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
	<ul style="list-style-type: none"> <li>Site-specific ground survey for identification of potential flash-flood areas/paths to incorporate and address in the stormwater drainage designs is required.</li> </ul>							
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 necessary approval. Underground services must be designed in such a way so as to require minimum maintenance to avoid disturbance of the underground and superficial environment.	✓	✓	✓		CONTRACT MANAGER, ENGINEER, CONTRACTOR		
h) Structures	Structures must meet the National Building Regulations.	✓		✓		DEVELOPER, ARCHITECT OWNER		
i) Landscape	The natural features of the site must 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 <b>NO JOBS</b> placed around the outside of the site.	✓	✓	✓		DEVELOPER, CONTRACTOR		
9.2 Geology								
9.2.1	Earthworks and foundation precautionary recommendations by the Geotechnical Engineer must be implemented. The use of pneumatic equipment and/or localised blasting may be required in areas across the site due to excavation difficulty. Regular checks on the quality and compaction of the backfill to the terraces should be made.		✓			ENGINEER, GEOLOGIST		

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
	The detailed preliminary shallow soil engineering geological investigation should be followed with a SANS634:2012 aligned Phase 1 detailed engineering geological assessment. The information from the flood assessment and ground elevation survey should be made available to incorporate into the Phase 1 detailed assessment, together with the infill investigation, to refine the preliminary assigned zones provided in the report.							
9.3 Soil								
9.3.1 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. A rehabilitation plan for disturbed areas to be compiled and implemented as part of the construction phase of the project. This includes access roads and temporary laydown / site office areas.	✓	✓			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	✓	✓			ECO, CONTRACTOR	Once-off	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
	are excavated.							
9.3.2 Erosion								
a) Erosion prevention	All surface run-offs must 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. Careful monitoring during the construction phase is essential to locate and mitigate any erosion observed. Investigations must be conducted after every rain downpour. Any problems need to be rectified immediately to avoid the problem escalating. All work areas must be monitored at all times and maintained. Channelled and piped stormwater must be released outside of all buffer zones.	✓	✓			ENGINEER, ECO, CONTRACTOR	Continuous	
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 (except for the installation of services and construction of roads across non-perennial rivers) 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 must be placed and adequately secured on all downhill locations where erosion may occur to prevent washouts		✓			CONTRACTOR	Continuous	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
	and to retain siltation and topsoil from the site. A supply of straw bales must be kept on site for this purpose.							
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. Ensure a small footprint during construction phase. A rehabilitation plan for disturbed areas to be compiled and implemented as part of the construction phase of the project. This includes access roads and temporary laydown / site office areas.		✓			CONTRACTOR, ECO	Continuous	
9.3.3 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	
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		✓			CONTRACTOR	Once-off	



Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
	removed.							
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 stockpiles will be placed within the 1:100 year flood lines or 32m buffer zones of non-perennial rivers.		✓			CONTRACTOR	Continuous	
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	
l) Traversing topsoil	No vehicles are allowed to traverse the stockpiled topsoil areas.		✓			CONTRACTOR	Continuous	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
9.4 Waste Management								
9.4.1 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. Under no circumstances may building rubble be dumped in the nearby open veld – not even temporarily. All rubble to be taken to an officially registered dumpsite.	✓	✓			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	✓				CONSULTANT, ECO, CONTRACTOR	Once-off	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
	reuse potential).							
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. All excess materials brought onto site for construction must be removed after construction.	✓	✓			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	
9.4.2 Household waste								
a) Storage	Temporary waste storage points on the site must be determined. These storage points must be accessible by waste removal trucks and these points must 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		✓	✓		ECO, CONTRACTOR	Continuous	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
	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.							
c) Recycling	Waste minimization strategies to be implemented. 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"> <li>• Paper</li> <li>• Biodegradable</li> <li>• Glass</li> <li>• Plastics</li> <li>• General</li> </ul>			✓				
d) Waste Bins	The waste bins shall be cleared by approved waste contractor.		✓	✓		CONTRACTOR	Continuous	
9.4.3 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. 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		✓			CONTRACTOR	Continuous	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
	seepage into the soil and riverine areas.							
c) Containers	All hazardous waste (fuel, lubricants, chemicals, diesel, etc) shall be placed in specifically designed containers and properly sealed. Should 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.		✓	✓		CONTRACTOR	Continuous	
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	
9.5 Fuel, Fuelling and Maintenance								
9.5.1 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	
9.5.2 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		✓			ECO, CONTRACTOR	Continuous	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
	(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.							
c) Decontamination	In the event of spills from vehicles, the area must 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		
9.5.3 Maintenance								
a) Design	The maintenance yard must 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		✓			ENGINEER, CONTRACTOR	Continuous	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
	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.							
e) Buildings and facilities	Buildings, yards, paving areas, gardens, outside fencing or walls, etc. 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.	✓	✓	✓		CONTRACTOR OWNER		
9.6 Air Pollution								
9.6.1 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	
9.6.2 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	
9.6.3 Machinery								
a) Exhaust fumes	Machinery or equipment used on the site must not constitute a		✓			CONTRACTOR	Continuous	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
	pollution hazard in respect of air pollution via excessive exhaust fumes. This shall be inspected regularly by the contractor and rectified immediately.							
b) Transporting materials	All vehicles transporting material to and from a site that can be blown off (e.g. soil, rubble, etc.) must be covered with a tarpaulin.		✓			CONTRACTOR	Continuous	
9.7 Noise Pollution								
9.7.1 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	
9.7.2 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	
9.7.3 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	
9.8 Safety and Security								
9.8.1 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		✓	✓		CONTRACTOR	Continuous	



Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
	Building Regulations.							
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 on site. If they are allowed, toilets and waste bins must be provided.		✓	✓		CONTRACTOR	Continuous	
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 must be accessible, and the personnel must 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 must ensure that the handling of equipment and materials is supervised and adequately instructed.		✓			CONTRACTOR OWNER	Continuous	
9.8.2 Security								
a) Security guards	Security officers will remain on site for the purpose of guarding the	✓	✓			CONTRACTOR	Continuous	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
	equipment.							
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 government departments will be allowed access to site at any time of the day	✓	✓	✓		CONTRACTOR OWNER	Continuous	
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	
9.9 Health								
9.9.1 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	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
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 overturned, and have a sufficient locking mechanism operational at all times.		✓			CONTRACTOR	Continuous	
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	
9.10 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	The National Blasting procedures and regulations must be adhered to.		✓			ECO,	Continuous	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
for blasting						CONTRACTOR		
9.11 Fauna								
a) Regulations	All activities on site must comply with the regulations of the Animal Protection Act, 1962 and NEMPAA 2003.		✓			CONTRACTOR	Continuous	
b) Sensitive areas	No construction worker activity whatsoever will be allowed outside of the specific construction area.	✓	✓			CONTRACTOR	Continuous	
c) Snaring / hunting	Care must be taken not to interact directly with any wild life encountered. Any bird nests encountered in the grass or on the water must not be interfered with. If encountered must first be discussed with specialist. During the summer months (rainy season) staff must be continually made aware of being cautious and vigilant in encountering snakes. No snakes encountered may be killed and must be removed by a specialist on site or called in when required. Contractors and staff are not allowed to catch fish in the on-site dam.		✓			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	
9.12 Flora								
a) Site inspection	The Near Threatened plant species <i>Searsia gracillima</i> var. <i>gracillima</i> has been found in the south-eastern parts of the site. This part of the site must be excluded from the development. One protected tree species <i>Sclerocarya birrea</i> (Marula), is sparsely distributed at the site. A permit at the relevant authorities should be applied for in case of any damage or removal of individual trees of <i>Sclerocarya birrea</i> (Marula) trees, if the development is approved.	✓	✓	✓		FLORA SPECIALIST, ECO, CONTRACTOR	Once-off	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
	If any unknown plants are found that need to be moved or destroyed then once again the ECO and/or specialist must first be contacted. Any priority species encountered must be identified and rescued prior to any excavation or construction activities.							
b) Sensitive flora	The Near Threatened plant species <i>Searsia gracillima</i> var. <i>gracillima</i> has been found in the south-eastern parts of the site. This part of the site must be excluded from the development. One protected tree species <i>Sclerocarya birrea</i> (Marula), is sparsely distributed at the site. A permit at the relevant authorities should be applied for in case of any damage or removal of individual trees of <i>Sclerocarya birrea</i> (Marula) trees, if the development is approved. A weed control programme should be implemented. This can form part of the routine maintenance programme for the road. Ensure small footprint during construction phase. Burning of removed vegetation is not allowed. Open fires by contractors are not allowed. Contractors should be allowed to use and/or distribute wood that is removed (trees cut down) during the operational phase. Keep disturbance to less sensitive area. Avoid non-perennial rivers and their buffer zones. Avoid artificial waterbodies and their buffer zones.	✓		✓		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. No temporary site offices or lay-down areas are allowed on top of any rocky hills or along any steep hill slopes. All laydown areas must be on flat, plains / surfaces and must be within disturbed areas as far as	✓	✓	✓		ECO, CONTRACTOR	Continuous	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
	possible. No areas of trees may be specifically cleared for a laydown area or temporary office site. Care must be taken with heavy machinery used on the project. All access roads used during construction must be monitored and maintained.							
d) Drainage lines	There are a number of non-perennial watercourses and artificial waterbodies, mostly in-channel dams, with groundwalls, present at the site. Demarcate and avoid riparian zones and 32 m buffer zones of non-perennial watercourses and artificial waterbodies. If the development is approved there will be small, restricted parts of the non-perennial rivers and their buffer zone that will be impacted. Any such developments, if approved, should be restricted to a minimum and followed up by rehabilitation. The footprint area with the area needed for moving of construction vehicles, machinery and equipment to operate should be fenced off with appropriate material beyond which no activities should be allowed. Equipment to avoid any spills of fuels/ oils/ hydrocarbons should be available and at once implemented where necessary at the site. Regular inspections of machinery and equipment are essential to observe any leaks and should be serviced outside the proposed footprint.	✓	✓			ECO, CONTRACTOR	Continuous	
e) Exotic / invader species	Continued monitoring and eradication of alien invasive plant species are imperative. A rehabilitation plan would be necessary which include the combating of alien invasive plant species.		✓	✓		FLORA SPECIALIST, CONTRACTOR	Continuous	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
	Rehabilitation should take place which could include shallow ripping in appropriate direction and spacing. Mulch of indigenous widespread plant species or brushpacks of indigenous widespread species could also be included. Considerations such as too much ripping which could enhance erosion during high rainfall events should also be taken into account in the rehabilitation plan.							
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	
i) Fringe impacts arising from construction	Due to the nature of the project the potential for any significant fringe benefits is low during the construction phase and moderate during the operational phase. Care must be taken with heavy machinery used on the project. All access roads used during construction must be monitored and maintained. Soils and stones excavated may be used on the site as backfill, fixing of roads, filling of dongas, etc. but not within any demarcated or other watercourses, including drainage lines.	✓	✓	✓		FLORA SPECIALIST, ECO, CONTRACTOR	Continuous	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
	<p>All temporary access roads must be fully rehabilitated by the contractors prior to final signing off of the construction phase of the project.</p> <p>Continual communication must be maintained with landowners. A record of any official and general complaints must be kept on site. Great care must be taken not to leave any excavated holes open or unfenced over night, as there are numerous people and livestock moving in and through the general area. The entire project site should be properly fenced-off and secured, with all the necessary danger and other signage during the construction phase.</p> <p>Dust suppression is required during the construction phase due to the close proximity of the site to homes.</p> <p>The use of heavy machinery is not allowed after normal working hours (7am to 5pm) due to the close proximity to homes.</p>							
9.13 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	
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		✓	✓		ENGINEER,	Continuous	



Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
	runs perpendicularly cross a roadway.					CONTRACTOR		
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 (e.g. Gabions along the outer edge of the stormwater drainage line on site, etc.) may be required. The idea is to protect the integrity of the drainage line and manmade dam on the site 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 must include periodic mowing of the grass (never shorter than the design flow depth of the channel). Bare areas must be re-seeded and debris and blockages regularly removed. Sediment depositions must be regularly removed from the swale, to prevent pollution of the runoff from contaminants contained therein.		✓	✓		CONTRACTOR	Continuous	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
9.13 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 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 maneuverability 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			
9.15 Sensitive Areas								
9.15.1 Rivers / Streams								
Non-perennial rivers are present on the site	32m buffer zones along the non-perennial rivers must be conserved. No development is allowed in this areas except for the installation of services and construction of roads and bridges.	✓	✓	✓	✓	CONTRACTOR, ECO	Weekly	
9.15.2 Rocky Outcrops and other sensitive areas								
A rocky outcrop is present on the south- western section of the site and the Near Threatened plant species <i>Searsia gracillima</i> var. <i>gracillima</i> has been found in the south-eastern parts of the site.	The rocky outcrop area and area where the Threatened plant species <i>Searsia gracillima</i> var. <i>gracillima</i> has been found must be excluded from the development and be conserved. These areas must be fenced off during construction and no access is allowed.	✓	✓	✓	✓	CONTRACTOR, ECO	Weekly	
9.15.3 Heritage / Cultural / Archaeological Sites								
a) A number of Stone Age sites and occurrences (scatters of Middle Stone Age tools)	<ul style="list-style-type: none"> <li>Mapping of the Stone Age sites and scatters of Stone Age material</li> <li>Surface sampling of representative Stone Age material (stone tools) for curation in a Museum</li> <li>A detailed report on the findings of the mapping and sampling to be submitted to SAHRA after obtaining an archaeological research permit</li> </ul>	✓	✓	✓	✓	CONTRACTOR, HERITAGE SPECIALIST, ECO	Weekly	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
<p>were identified in the area during the field work. GPS Location of Sites: Site 1: S252917.50 E280942.90 Site 2: S252908.60 E280942.50</p>								
<p>b) The possible existence of Bafokeng stone-walled sites to be confirmed</p>	<ul style="list-style-type: none"> <li>• Mapping of the Stone-walled sites that fall inside the development area</li> <li>• Limited archaeological excavation at these sites in order to recover cultural material to assist with interpreting and reconstructing their history and origin</li> <li>• A detailed report on the findings of the mapping and sampling to be submitted to SAHRA after obtaining an archaeological research permit</li> </ul>	✓	✓	✓	✓			
<p>c) Cultural Resources chance finds</p>	<p>If risks are manifested (accidental discovery of heritage resources) the chance find procedure should be implemented:</p> <ol style="list-style-type: none"> <li>1. Cease all works immediately;</li> <li>2. Report incident to the Sustainability Manager;</li> <li>3. Contact an archaeologist/ palaeontologist to inspect the site;</li> <li>4. Report incident to the competent authority; and</li> <li>5. Employ reasonable mitigation measures in accordance with the requirements of the relevant authorities.</li> </ol> <p>Only recommence operations once impacts have been mitigated.</p> <p><u>Chance Find Procedure</u></p>	✓	✓	✓	✓			

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
	<ul style="list-style-type: none"> <li>• If during the pre-construction phase, construction, operations or closure phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance or heritage site, this person must cease work at the site of the find and report this find to their immediate supervisor, and through their supervisor to the senior on-site manager.</li> <li>• It is the responsibility of the senior on-site Manager to make an initial assessment of the extent of the find and confirm the extent of the work stoppage in that area.</li> <li>• The senior on-site Manager will inform the ECO of the chance find and its immediate impact on operations. The ECO will then contact a professional archaeologist for an assessment of the finds who will notify the SAHRA.</li> </ul> <p><u>Monitoring Program for Palaeontology</u></p> <ol style="list-style-type: none"> <li>1. The following procedure is only required if fossils are seen on the surface and when drilling/excavations commence.</li> <li>2. When excavations begin the rocks and must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (trace fossils, fossils of plants, insects, bone or coalified material) should be put aside in a suitably protected place. This way the project activities will not be interrupted.</li> <li>3. Photographs of similar fossils must be provided to the developer to assist in recognizing the fossil plants, vertebrates, invertebrates or trace fossils in the shales and mudstones. This information will be built into the EMPr’s training and awareness plan and procedures.</li> <li>4. Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.</li> </ol>							

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
	<p>5. If there is any possible fossil material found by the developer/environmental officer then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the selected material and check the dumps where feasible.</p> <p>6. Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.</p> <p>7. If no good fossil material is recovered, then no site inspections by the palaeontologist will be necessary. A final report by the palaeontologist must be sent to SAHRA once the project has been completed and only if there are fossils.</p> <p>8. If no fossils are found and the excavations have finished then no further monitoring is required.</p>							
d) 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	
e) Structures older than 60 years	No buildings / structures older than 60 years present on site.	✓	✓			CONTRACTOR	Continuous	
f) 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	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
g) Suspicious artefacts	The ECO will be notified of any suspicious artefacts prior to it being moved or removed.		✓			CONTRACTOR	Continuous	
9.16 Services								
9.16.1 Disruption in services								
a) Informing ECO	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	
9.16.2 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.	✓	✓			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) 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	
d) 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	Continuous	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
	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.							
9.16.3 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 Any temporary storage, lay-down areas or accommodation facilities to be setup within the study site. No laydown or temporary areas may be established within <u>50m</u> from the 32m buffer zone of the riparian area along the delineated stormwater drainage line and manmade dam on the site.		✓			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	A rehabilitation plan for disturbed areas to be compiled and implemented as part of the construction phase of the project. This includes access roads and temporary laydown / site office areas. The area where the camp was established must after the construction period be rehabilitated to guidelines in this document or as otherwise		✓			CONTRACTOR, VEGETATION SPECIALIST, ECO	Once-off	



Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
	directed by the ECO.							
9.16.4 Environmental Awareness Training								
a) Training program	An environmental awareness-training program must be organized as part of the EMPr to ensure that each employee knows his/her responsibilities regarding the EMPr and the environment in general. Attendance certificates must be issued. Additional training as required, i.e. encounters with Red Data or other fauna must 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	
9.16.5 Rehabilitation & Landscaping								
a) Landscaping	The use of indigenous vegetation must be optimised during the landscaping of the development. Landscaping must 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 must be managed in a holistic manner.	✓				LANDSCAPE ARCHITECT	Continuous	

Possible Impact	Mitigation measures	Applicable phases				Responsible Person	Frequency	Compliant
		DS	CO	OP	DE			
9.17 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	
9.18 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

<b>ARCH</b>	Architect
<b>CE</b>	Consulting Engineer
<b>CO</b>	Construction
<b>DE</b>	Demolition
<b>DS</b>	Design
<b>DWS</b>	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.
<b>ECA</b>	Environment Conservation Act (Act 73 of 1989)
<b>ECO</b>	Environmental Control Officer
<b>EIA</b>	An Environmental Impact Assessment as contemplated in Sections 21, 22 and 26 of the Environment Conservation Act
<b>EMI</b>	Environmental Monitoring Inspector – from Provincial Government (E.g. DARDLEA)
<b>EMPr</b>	Environmental Management Programme
<b>FAUNA</b>	All living biological creatures, usually capable of motion, including insects and predominantly of protein-based consistency.
<b>FENCE</b>	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.
<b>FLOOD LINE</b>	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
<b>FLORA</b>	All living plants, grasses, shrubs, trees, etc., usually incapable of easy natural motion and capable of photosynthesis.
<b>FLORA</b>	All living plants, grasses, shrubs, trees, etc., usually incapable of easy natural motion and capable of photosynthesis.
<b>IEM</b>	Integrated Environmental Management
<b>MPRDA</b>	The Mineral and Petroleum Resources Development (Act 28 of 2002)
<b>NEMA</b>	National Environmental Management Act (Act 107 of 1998)
<b>NHRA</b>	National Heritage Resources Act (Act 25 of 1999)
<b>NWA</b>	National Water Act (Act 36 of 1998)
<b>OP</b>	Operational
<b>PENALTY</b>	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).
<b>RA</b>	Resident Architect
<b>SABS</b>	South African Bureau of Standards
<b>SAHRA</b>	South African Heritage Resource Agency
<b>SAMOAC</b>	South African Manual for Outdoor Advertising Control
<b>SPOTFINE</b>	A fine against a labourer by the PM as per request from the ECO. This fine should be used for the labourers’ benefit.
<b>SWALE</b>	A depression between slopes that provides for drainage
<b>TLB</b>	Tractor, Load & Backhoe
<b>TOPSOIL</b>	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).