DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME

(EMPr)

for the management of activities relating to the protection of the natural environment during the construction, operation and decommissioning phases of the

PROPOSED DEVELOPMENT OF THE KTE WATER PIPELINE AND ASSOCIATED INFRASTRUCTURE AND THE EXPANSION OF THE EXISTING KENHARDT PIPELINE INFRASTRUCTURE FROM THE ORANGE RIVER TO THE FARM UITKYK, NO.889 WITHIN THE KAI! GARIB AND HANTAM MUNICIPALITIES, NORTHERN CAPE.

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TABLE OF CONTENTS

LIST OF APPENDIXES

1. INTRODUCTION

The main purpose of this Environmental Management Programme (EMP) is to prevent avoidable damage and/or minimise or mitigate unavoidable environmental damage associated with any construction, operational, maintenance, or decommissioning/ demolition work where there is a risk of environmental damage and to enhance positive benefits of the project.

The EMP forms part of the contractual obligations to which all contractors/employees involved in construction, maintenance, or demolition work must be committed. It serves as a guideline and baseline information document for the construction and operational of the proposed project and aims to comply with Section 24N of the National Environmental Management Act (Act no 107 of 1998) also known as NEMA, as well as the Environmental Impact Assessment Regulations, 2014 (Government Notice No R 326) and any additional specific information requested by any State Department, including the Department of Environment and Nature Conservation (DENC) for specific projects.

This EMP:

- Identifies project activities that could cause environmental damage (risks) and provides a summary of actions required
- Identifies persons responsible for ensuring compliance with the EMP and provides their contact information
- Provides standard procedures to avoid and/or minimise the identified negative environmental impacts and to enhance the positive impact of the project on the environment
- Provides site and project specific rules and actions required, including a site plan/s showing:
    - Areas where construction, maintenance, or demolition work may be carried out
    - Areas where any material or waste may be stored
    - Allowed access routes, parking and turning areas for construction or construction related vehicles
- Forms a written record of procedures, responsibilities, requirements and rules for Contractor/s, their staff and any other person who must comply with the EMP
- Provides a monitoring and auditing programme to track and record compliance and identify and respond to any potential or actual negative environmental impacts
- Provides a monitoring programme to record any mitigation measures that are implemented

The EMP is partly prescriptive (identifying specific people or organisations to undertake specific tasks, in order to ensure that impacts on the environment are minimised), but it is also an open-ended document in that information gained during the construction activities and/or monitoring of procedures on site could lead to changes in the EMP.

This EMP was compiled by Zandria Jordaan who is a junior Environmental Consultant with EnviroAfrica cc. She holds a MSc in Geology from Stellenbosch University and BSc (Hons) in Environmental Sciences with Environmental Geology from the North-West University. Zandria has accumulated experience in the fields of environmental compliance auditing, environmental management, renewable energy and public participation processes. Zandria is a Candidate EAP (#2023/7974) registered with the Environmental Assessment Practitioners Association of South Africa (EAPASA).

This EMP was reviewed by Bernard de Witt who is an Environmental Consultant at EnviroAfrica cc. In his first 14 years, he joined the Department of Forestry as an Indigenous Forest Planner in 1983, going on to become Manager of the Table Mountain Reserve with the Cape Town City Council. He then joined Cape Nature Conservation (CNC) and headed its Conservation Planning Section before taking up the position of District Manager of the Boland area (incl. the Hottentots Holland and Kogelberg). As a Regional Ecologist, he coordinated managerial and scientific inputs into Provincial Nature Reserves in the Boland, Overberg and West Coast regions. For the last four years of his employment, he assessed and evaluated EIA reports for development applications, from an environmental perspective, on behalf of CNC (now DEA&DP). Since he left government service at the end of 1997 he has been involved in environmental consulting in the private sector as a member of EnviroAfrica conducting EIA's and other Environmental Management services. Bernard acted as EAP (Environmental Assessment Practitioner) and Project leader in a wide number of projects. Bernard is a Registered EAP (#2021/2021/3903) registered with the Environmental Assessment Practitioners Association of South Africa (EAPASA).

1.1.1 PURPOSE

The purpose of the EMP is to give direction and guidance to all responsible parties, which are in turn expected to cooperate closely to minimise or avoid unnecessary environmental impacts or delays. The ECO will ensure compliance with the EMP (and other Environmental issues) and will visit the site on a regular basis during the construction phase, with additional visits at the professional, project-linked, discretion of the ECO or relevant authority.

This EMP binds all contractors, sub-contractors and other persons working on the site to adhere to the terms and conditions of the EMP throughout the construction activities of the project**.**

Any other site-specific additional activities decided and agreed upon at the "On Site Start-Up Meeting" must be included to form part of this EMP.

1.1.2 SCOPE

This EMP addresses the construction phase (CEMP) and operational phase (OEMP) and all activities associated with the project. In addition, it will deal with all the requirements of regulation 19 (4) of the EIA regulations (R. 326) as well as any additional specific information requested by the Department of Environment and Nature Conservation (DENC) pertaining to some developments.

Compliance to this EMP (which serves as a basis for all the phases of the project) will be monitored by the Environmental Control Officer (ECO). The Construction Engineer/Project Managers, the Contracting Agent(s) and the Client will be responsible for the implementation of this Environmental Management Plan.

1.1.3 SITE LOCATION AND PROJECT DESCRIPTION

Kotulo Tsatsi Energy (KTE) intends to expand the existing Kenhardt water pipeline system, and develop a new 750 mm KTE pipeline and associated infrastructure. The existing Kenhardt pipeline supplies water to Kenhardt in the Northern Cape, South Africa. The proposed 221 km pipeline development and expansion will extend from the Orange River abstraction point near Neilersdrift to Portion 5 of Farm Uitkyk No. 889, incorporating various reservoirs and supporting infrastructure along its route.

The proposed development and expansion include the following:

1. Abstraction Point and Initial Infrastructure: Water will be drawn from the Orange River at a pump station located on Portion 103 of Farm No.34 Neilersdrift. The raw water will be transported to the Lennertsville Water Treatment Plant through a 3.1 km 800 diameter pipeline.
2. Water Treatment and Storage: The Lennertsville Water Treatment Plant, with a 30 Megalitre (Ml) capacity, will include a 10 Ml storage reservoir and a booster pump station on Portion 213 of Farm No.38 Neilersdrift.
3. Clear Water Distribution:
    - Clear Water Rising Main No.1 (Upgrade of the existing pipeline): A 29 km 750 mm diatmeter pipeline will carry treated water from Lennertsville to the Piet Rooi Reservoir adjacent to the R27
    - Piet Rooi Reservoir (expansion of the existing reservoir): This 3 Ml concrete reservoir will act as a transitional storage point for further water distribution
4. Gravity and Rising Mains:
    - A 64 km gravity main (800 mm diameter) will transport water from Piet Rooi (Upgrade of the existing Kenhardt Pipeline) to a reservoir at Farm De Bakke (a new 750 mm pipeline will be developed from Kenhardt to the De Bakke reservoir)
    - A 59 km 750 mm diameter rising main will connect De Bakke to the Steyns Vley Reservoir (via the R27 & Soafsklok road reserve), on a renewable energy project site
5. Final Storage and Alternative Routes:
    - From Steyns Vley, the preferred alternative 58 km 750 mm diameter pipeline route, will lead to the final 30 Ml reinforced concrete storage reservoir on Portion 1 of Farm Uitkyk No.889
    - Internal pipelines and pump stations will distribute water from Steyns Vley and Uitkyk to 16 steel reservoirs (500 kl capacity each) at various locations

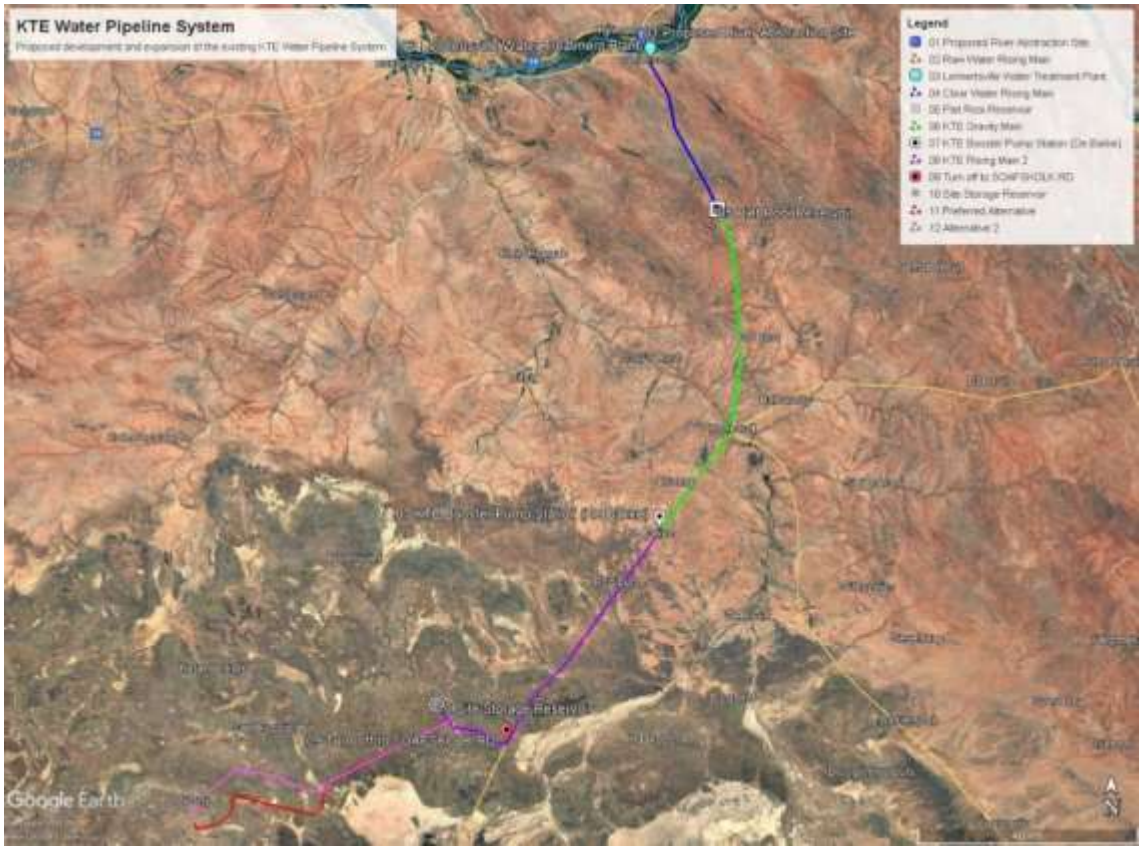

Figure 1. Proposed development and upgrade of the existing KTE Water Pipeline System.

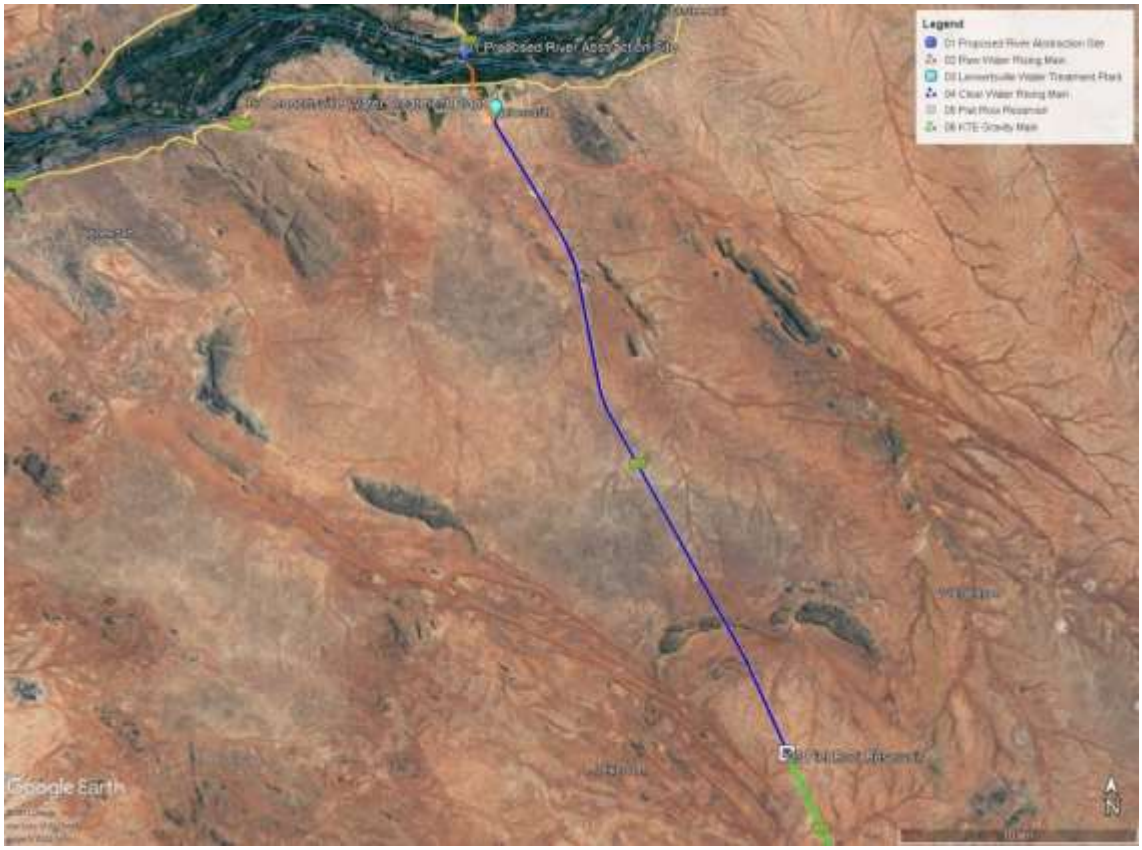

Figure 2. Close up view of the pipeline from the Abstraction point at the Orange River to the Piet Rooi Reservoir.

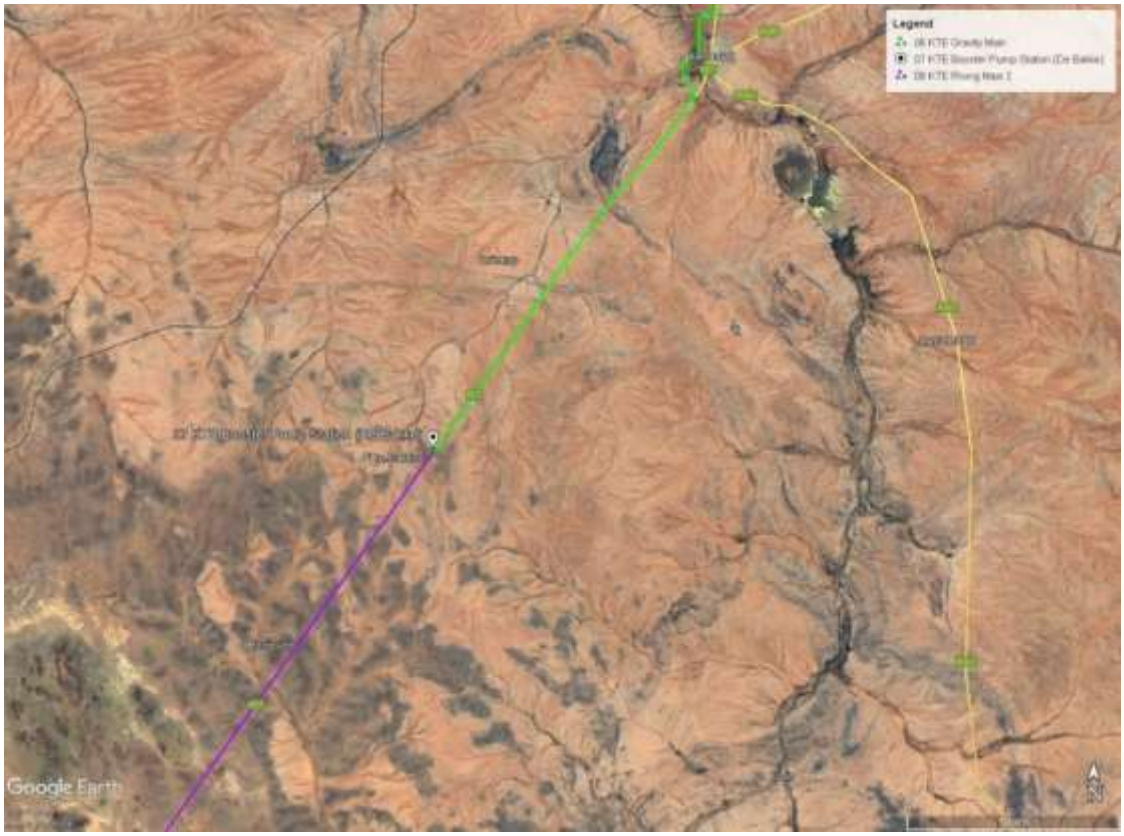

Figure 3. Close up view of the pipeline from Kenhardt to the De Bakke Booster Pumpstation.

Figure 4. Close up view of the pipeline from the Booster Pump station to the proposed evaporation ponds at the end of the pipeline route.

1.1.4 THE RECEIVING ENVIRONMENT

Biodiversity and Vegetation

- **Bushmanland Arid Grassland** and **Bushmanland Basin Shrubland** dominate the vegetation along the pipeline route, with patches of **Lower Gariep Broken Veld** and **Bushmanland Vloere** near salt pans. These vegetation types are adapted to the arid conditions but vary in ecological sensitivity
- Key biodiversity features include scattered **Vachellia erioloba** (camel thorn) trees, several **Prosopis** infestations, and endemic shrub species such as **Lycium cinereum, Phaeoptilum spinosum**, and **Rhigozum trichotomum**. Sensitive species and habitats, such as salt-tolerant vegetation near pans, are present and require specific mitigation to avoid degradation
- Critical Biodiversity Areas (CBAs) are intersected, necessitating careful planning and mitigation to minimize habitat fragmentation and biodiversity loss

Avifaunal

- The route intersects habitats that support various bird species, including **threatened species** such as raptors and ground-nesting birds. The **floodplains near Kenhardt** are particularly sensitive, as they provide important breeding and foraging grounds.

Hydrology and Freshwater Features

- The pipeline will cross major watercourses, including the **Orange River** (a perennial river), **Hartbees River**, and intermittent drainage lines. The floodplain areas and salt pans along the route are sensitive hydrological zones, supporting unique ecosystems.
- Sedimentation, water quality degradation, and habitat disruption are key risks during construction.

Cultural and Heritage

- The area is rich in archaeological and heritage resources. The Phase 1 Heritage Impact Assessment identified several features near the route, including historical furrows, gravesites, and old military structures. Most of these sites can be avoided with appropriate buffers, but chance discoveries during construction must be managed under the guidance of heritage authorities

Socio-Economic and Visual

- The pipeline traverses the **Kai! Garib** and **Hantam Local Municipalities**, which are largely rural and reliant on agriculture and emerging renewable energy projects. Improved water infrastructure is critical to supporting socio-economic growth in these areas, which are constrained by arid conditions and water scarcity. The project aligns with local and regional development goals, addressing water demand and contributing to economic resilience

The receiving environment along the pipeline route is diverse, with areas of high ecological, hydrological, and cultural sensitivity. While potential impacts are significant, especially in undisturbed floodplains, careful alignment, management, and mitigation measures can reduce these risks. The project presents an opportunity to enhance water security while balancing environmental and socio-economic priorities.

1.1.5 VEGETATION TYPES EXPECTED

According to the Botanical & Terrestrial Compliance statement (Appendix D3 of the Pre-Application Basic Assessment Report (BAR)), the vegetation assessment follows the pipeline route from its extraction point at the Orange River southwards until it reaches the reservoir located on the Farm Uitkyk, No. 899.

1) Orange river extraction point to WTW

   The proposed extraction point, and its associated pump station will be located just north of Neilersdrif (Keimoes), at the same location as the existing pump station for the Kenhardt pipeline (the footprint of the existing pump station will be enlarged). Lower Gariep Alluvial Vegetation (Figure 5) was expected in this

area, however, the riparian vegetation along the river in this area, had been totally compromised as a result of past and present agricultural activities (vineyards) and associated anthropogenic activities. No natural veld remains in this area. The only plants remaining in this area were several planted Palm trees,a few weedy indigenous species such as *Convolvulus sagittatus* (bobbejaantou), *Salsola kali* and weedy invader species such as *Argemone ochroleuca* (white Mexican poppy), *Nicotiana glauca* (tabakboom), *Melia azedarach* (seringboom).

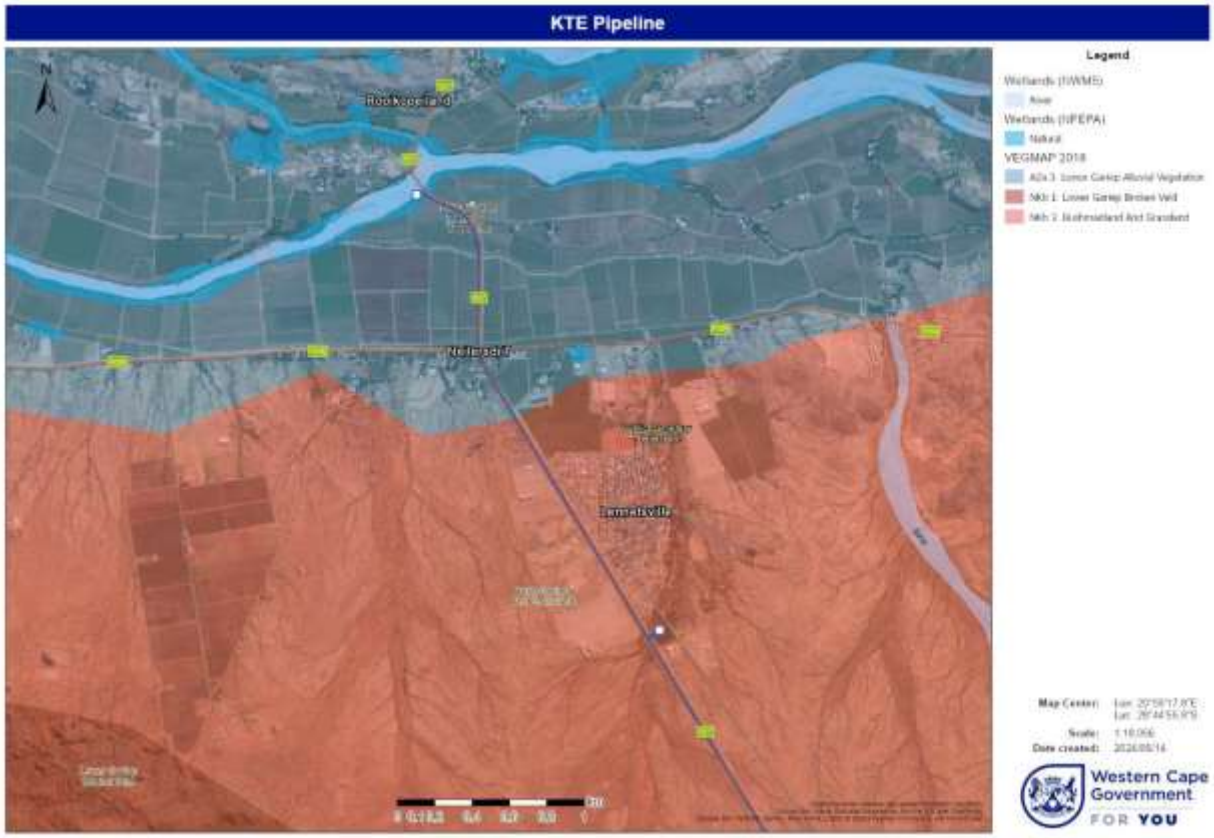

Figure 5. Vegetation map of South Africa (2018) showing the first section of the pipeline route (CapeFarmMapper).

Because of agricultural and urban development, the first section of the pipeline route up to the Lennertsville WTW can only be described as transformed with no natural veld. However, two Vachellia erioloba (camelthorn) trees are located within the road reserve within which the pipeline will be placed. One of these trees are a magnificent specimen of 10-12m in height. All efforts should be made to avoid impacting this tree.

2) Lennertsville WTW

According to the Botanical & Terrestrial Compliance statement (Appendix D3 of the BAR), raw water will be extracted from the Orange River and pumped to a Water Treatment Works (WTW) that will be located next to the existing Kenhardt WTW, just north of Lennertsville. Here, the raw water will be treated to potable water standards before being pumped to a balancing reservoir at Piet Rooi's Puts. The area that will be impacted by the new WTW & Reservoir at Lennertsville will be between 2 – 3 ha in size. Two potential locations for the proposed WTW were evaluated, one to north of the existing Kenhardt WTW, next to Lennertsville (the preferred location) and the other to the south of the Kenhardt WTW (Figure 6).

Figure 6. Google image showing the study area (yellow) for the proposed WTW, the routes walked (light blue) and the locations of species of potential conservation concern (marked by waypoints). The waypoints refers to: Euphorbia = Euphorbia braunsii; Bfoet = Boscia foetida individuals (Derived from the Botanical and Terrestrial Biodiversity Compliance Statement).

A large portion of the area to the north of the existing Kenhardt WTW was characterized by dense stands of *Senegalia mellifera* and alien invasive *Prosopis* trees, in the wetter areas that seems to receive overflow water spilling from the evaporation ponds from the Kenhardt WTW. The site itself showed various signs of disturbance, which includes physical disturbances and illegal dumping. In general, this area was quite disturbed as a result of continual human impact and included many weedy species such as *Erigeron sumatrensis* (tall fleabane), *Tribulus zeyheri* and *Senecio* species. The occasional *Chascanum garipense*, *Tetraena decumbens*, *Phaeoptilum spinosum*, and *Aptosimum indivisum* were observed in between the grass dominated bottom layer (e.g. *Stipagrostis ciliata* and *Fingerhuthia africana*), but no species of conservation concern was observed in this area. The area to the south of the Kenhardt WTW includes several fenced-off local dwellings (which might be illegal settlement), which had resulted in a disturbance footprint impacting about three quarters of this area.

3) Bushmanland arid grassland section of the R27

According to the Botanical & Terrestrial Compliance statement (Appendix D3 of the BAR), from the Lennertsville WTW the proposed BWS pipeline will be placed in the western road reserve of the R27, running south, towards the balancing reservoir at Piet Rooi's Puts, past Kenhardt and onto the De Bakke pump station and reservoir. The De Bakke pump station and reservoir is located almost at the point where Bushmanland Arid Grassland is replaced by Bushmanland Basin Shrubland vegetation (Figure 7). This section of discusses the vegetation encountered along the R26 covered by Bushmanland Arid Grassland.

Figure 7. Vegetation map of South Africa (2018), showing the expected vegetation types along the pipeline route (CapeFarmMapper).

The R27 road reserve (for its whole length) is purposely cleared of larger vegetation to improve visibility and in so doing lowering the risk of road accidents (e.g. larger animals sheltering and grazing within the road reserve). As a result, all along the R27 the vegetation is generally short and the only larger shrubs remaining are mainly protected *Boscia* species and the *Botanical* occasional indigenous tree, including quite a number of protected *Vachellia erioloba* (camelthorn) trees, some of them magnificent individuals reaching up to 10 m as well as the occasional other indigenous tree such as *Ziziphus mucronata* (blinkblaar wag-'n-bietjie). Whereas the *Boscia albitrunca* and *Boscia foetida* individuals are scattered all along the R27 road reserve in areas associated with Bushmanland Arid Grassland, the *Vachellia erioloba* trees are associated with deeper sandy soils of the Gordonia Duneveld or larger watercourses. The first patch of these trees are found about 7.5 km south of Lennertsville (Gordonia Duneveld), the second area (about 3 trees) about 33km further south. The greatest concentration of these trees are within the last 27 km going south towards Kenhardt (most of which were associated with the various watercourse in the N'Rougas North and South areas).

The vegetation assessment identified over 70 Vachellia erioloba (camel thorn) trees within the road reserve along the R27, stretching from the Orange River to south of Kenhardt, with only three trees observed south of Kenhardt. Among these, 40–45 individuals exceed 6m in height, including 17 significant, large specimens. Importantly, the pipeline can be positioned to avoid impacting these trees. Additionally, one dead individual of Sensitive Species 144 was noted, with no other living individuals observed within the road reserve.
Due to regular brush-cutting in the road reserve, the natural shrub layer has been largely compromised, favoring grasses and disturbance-tolerant annual plants. Observed low shrubs and herbs include species such as Aizoon burchellii, Aptosimum indivisum, Blepharis mitrata, Justicia australis, and Tetraena chrysopteron. In proximity to watercourses or sheltered areas, larger shrubs such as Lycium cinereum, Senegalia mellifera, and Phaeoptilum spinosum may be encountered, providing additional ecological diversity in these microhabitats.

4) Reservoir: Piet Roois Puts

According to the Botanical & Terrestrial Compliance statement (Appendix D3 of the BAR), a balancing reservoir will be constructed approximately 30 km south of Lennertsville on Farm Piet Rooi's Puts 56/3. Water will be pumped from the Lennertsville Water Treatment Works (WTW) to this reservoir, referred to as Piet Rooi's Puts Reservoir, before gravitating to the De Bakke Reservoir and Pump Station located south of Kenhardt. The proposed location for the reservoir is adjacent to the existing Kenhardt Bulk Water Supply (BWS) Reservoir, within a previously disturbed area used as an old road camp during the construction of the R27.

The site visit confirmed that the proposed reservoir footprint will not impact any significant natural veld, as it lies entirely within this disturbed area. The vegetation in the area is limited to grasses and weedy species, with no indigenous species of conservation concern present. Five Boscia albitrunca individuals were identified along the northern edge of the study area, with only one near the proposed site. These plants can be protected with proper environmental controls, avoiding any direct impact.

On the outer edge of the disturbed site, a few indigenous shrubs were observed, including Senegalia mellifera, Aptosimum lineare, Dicoma capensis, Dimorphotheca species, Pentzia incana, and Tetraena chrysopteron, among others.

5) Kenhardt by-pass route

According to the Botanical & Terrestrial Compliance statement (Appendix D3 of the BAR), the proposed pipeline route bypasses Kenhardt to the west, primarily following existing roads and tracks to minimize disturbance. The route crosses under the Sishen-Saldanha railway line using an existing bridge before traversing a saline alluvial floodplain between the Hartbees River and Kenhardt. The pipeline continues south toward the Hope Street gravel road, turning west-southwest to cross the Hartbees River at a right angle, then following gravel roads and tributaries to the R27. It finally aligns with the eastern road reserve of the R27, running south toward the De Bakke Reservoir and Pump Station.

The vegetation north of Kenhardt is typical Bushmanland Arid Grassland, dominated by white grasses and scattered shrubs like Senegalia mellifera and Boscia albitrunca, which are mostly located away from the pipeline footprint. One Vachellia erioloba tree near an intermittent stream north of the railway bridge is within proximity but can easily be protected. Dense stands of invasive Prosopis trees are common near watercourses, interspersed with native species such as Tamarix usneoides, Vachellia karroo, and Ziziphus mucronata.

As the pipeline enters the floodplain, vegetation transitions to salt-tolerant species similar to those in Bushmanland salt pans, such as Salsola cf. aphylla, Mesembryanthemum spp., Galenia africana, and Atriplex vestita. Riparian zones along intermittent streams and the Hartbees River feature deeper sandy soils and dense tree borders, primarily invasive Prosopis, along with patches of Vachellia karroo, Tamarix usneoides, and Ziziphus mucronata. Larger shrubs like Lycium cinereum, Phaeoptilum spinosum, and Rhigozum trichotomum are also present in these areas.

The eastern road reserve of the R27, where the pipeline will cross, includes two Vachellia erioloba trees located just outside the proposed footprint and marked for protection. While the larger indigenous trees along the route are of botanical significance and must be safeguarded, the overall vegetation associated with the Kenhardt bypass route is considered to have low botanical importance. Efforts will be made to minimize impacts on these trees and preserve the ecological integrity of the area.

6) Bushman Basin Shrubland

According to the Botanical & Terrestrial Compliance statement (Appendix D3 of the BAR), about 20 km south of Kenhardt, near the De Bakke Reservoir and Pump Station, the vegetation transitions from Bushmanland Arid Grassland to Bushmanland Basin Shrubland, which becomes the dominant vegetation type impacted along the pipeline route up to the balancing reservoir on Farm Uitkyk. The route also crosses patches of Lower Gariep Broken Veld, associated with rocky dolerite outcrops, and Bushmanland Vloere, linked to salt pans. Soils in this area are shallower and darker, derived from mudstones and shales, resulting in a shift toward drought-resistant shrubs and a less prominent grassy component. The terrain becomes visibly drier moving southward, with species such as Vachellia karroo and Ziziphus mucronata persisting near watercourses, while Vachellia erioloba is absent.

The Bushmanland Basin Shrubland is characterized by sparse and dry vegetation, requiring minimal maintenance to retain its low shrub layer. South of the De Bakke Pump Station, the vegetation is often dominated by Galenia africana (kraalbos) and various Mesembryanthemum species, alongside other drought-resistant plants such as Aptosimum spinescens, Lycium cinereum, and Rhigozum trichotomum. Occasional rocky outcrops feature Lower Gariep Broken Veld, though road maintenance has diminished vegetation differences in these areas. Wildlife, such as dassies, is frequently observed near these outcrops.

In watercourses and wetlands, larger trees like Vachellia karroo, Searsia lancea (karee) with Tapinanthus oleifolius (mistletoe), and Parkinsonia africana are found, along with shrubs such as Argyrolobium cf. argenteum and Berkheya annectens (disseldoring). Along the edges of salt pans associated with Bushmanland Vloere, dense stands of Prosopis trees dominate the vegetation. These changes reflect the arid and saline-adapted ecosystems that characterize the southern sections of the pipeline route.

7) De Bakke Reservoir and Pump Station

According to the Botanical & Terrestrial Compliance statement (Appendix D3 of the BAR), the proposed site for the De Bakke Reservoir and Pump Station, located east of the R27, covers an area of approximately 1–2 hectares. The vegetation within the site is sparse, dominated by a low grassy layer interspersed with occasional shrubs. Shrubs observed include Galenia africana, Aptosimum spinescens, Augea capensis, Eriocephalus cf. microphyllus, Kleinia longiflora, Lycium cinereum, Monsonia umbellata, Phaeoptilum spinosum, Pteronia cf. leucoclada, Rhigozum trichotomum, and Salsola tuberculata. The overall vegetation reflects the arid conditions of the region.

8) Soafskolk turn-off to Uitkyk Reservoir

According to the Botanical & Terrestrial Compliance statement (Appendix D3 of the BAR), the pipeline route from the Soafskolk turn-off to the reservoir at Farm Uitkyk follows secondary gravel roads, crossing farms such as Styns Vley, Dagab, and Bysteek 423/0, before crossing under the Sishen-Saldanha railway via an existing culvert. The route primarily impacts Bushmanland Basin Shrubland, with occasional proximity to salt pan areas that are often heavily invaded by dense stands of invasive Prosopis trees. The pipeline largely remains within the road reserve, minimizing additional disturbance, and avoids regular brush cutting observed along the R27, resulting in a more pronounced shrub layer along this section.

The vegetation along the route is dominated by “white” grasses (Stipagrostis species) with hardy shrubs such as Rhigozum trichotomum (driedoring), Lycium cinereum (kriedoring), and Phaeoptilum spinosum (brosdoring). Near salt pan edges, sparse vegetation includes Salsola tuberculata, Eriocephalus cf. microphylla, and occasional hardy species like Aptosimum spinescens and Augea capensis. Watercourses and intermittent drainage lines are marked by Parkinsonia africana, denser shrub cover, and species like Cadaba aphylla (swartstorm) and Gomphocarpus filiformis (lammerlat). Larger trees, such as Searsia lancea (karee) and Royena lycioides (Karoo-bloubos), were observed sporadically, particularly near the R27.

The shrubland becomes progressively drier toward Farm Uitkyk, with grasses diminishing and shrubs such as Rhigozum trichotomum and Lycium cinereum dominating. In addition to the primary vegetation, scattered smaller shrubs were observed along the route, including Acanthopsis disperma, Galenia africana, Mesembryanthemum species, and Tetraena species, reflecting the arid and saline-adapted ecosystems of the region. This vegetation composition underscores the resilience of the landscape to arid conditions and occasional watercourse activity.

9) Reservoir on Farm Styns Vley 280

According to the Botanical & Terrestrial Compliance statement (Appendix D3 of the BAR), the proposed reservoir on Farm Styns Vley will be located to the south of the farm near the Soafskolk road, with a disturbance footprint of less than 1 hectare. The site is situated in the lower part of the farm, which remains actively used for sheep grazing. The vegetation at the site features a fair grassy cover, primarily Stipagrostis

obtusa, interspersed with scattered shrubs. Larger shrubs include Parkinsonia africana, Lycium cinereum, Phaeoptilum spinosum, and Rhigozum trichotomum, while smaller shrubs such as Cadaba aphylla, Salsola tuberculata, Tetraena chrysopteron, and Aptosimum spinescens were also observed, reflecting the arid shrubland ecosystem typical of the region.

10) Reservoir on Farm Uitkyk 899/1

According to the Botanical & Terrestrial Compliance statement (Appendix D3 of the BAR), the proposed reservoir on Farm Uitkyk is located at a significant distance from the proposed KTE plant site. The site was strategically chosen for its higher elevation, which enables gravity-fed water distribution back to the plant, offering substantial long-term energy savings. The disturbance footprint for the reservoir will be approximately 1 hectare and is currently used for sheep grazing. During the site visit, the vegetation was observed to be very dry, with sparse cover. The area features a low grassy layer, primarily Stipagrostis obtusa, with occasional shrubs such as Rhigozum trichotomum, Lycium cinereum, and Tetraena chrysopteron, indicative of the arid conditions and limited vegetation in the region.

Flora Encountered

Table 1 gives a list of the plant species encountered during the Botanical and Terrestrial study. It is important to note that the species list is not based on long term repetitive sampling, and it is likely that species might have been missed. However, the terrestrial specialist is confident that a good understanding of the vegetation was achieved and confidence in the findings is high.

Table 1. List of plant species observed within the proposed development footprint (derived from the Botanical & Terrestrial Compliance Statement).

NO.	SPECIES NAME	FAMILY	STATUS	LOCATION
1.	*Acanthopsis disperma*	ACANTHACEAE	LC	Small, spiny shrub - occasional in granite slopes
2.	*Aizoon burchellii (=A asbestinum)*	AIZOACEAE	LC NCNCA, Schedule 2 Protected	A widespread species, occasionally observed in the road reserve – Bushmanland Arid Grassland
3.	*Aloe claviflora*	ASPHODELACEAE	LC NCNCA, Schedule 2 Protected	Only observed in the Lennertsville WTW (southern portion).
4.	*Amellus* cf. *tridactylus*	ASSTERACEAE	LC	Occasionally in Bushmanland Basin Shrubland
5.	*Amellus epaleaceus*	ASSTERACEAE	LC	A small annual herb – occasionally observed.
6.	*Aptosimum indivisum*	SCROPHULARIACEAE	LC	Occasionally observed – Bushmanland Arid Grassland.
7.	*Aptosimum lineare*	SCROPHULARIACEAE	LC	Occasionally observed – Bushmanland Arid Grassland.
8.	*Aptosimum spinescens*	SCROPHULARIACEAE	LC	Doringviooltjie – a very hardy plant occasionally observed.
9.	*Argemone ochroleuca*	PAPAVERACEAE	**Alien invasive plant species.**	White Mexican poppy: Disturbed areas next to the Orange River
10.	*Argyrolobium* cf. *argenteum*	FABACEAE	LC	Only one patch observed, near a saltpan area along the R27.
11.	*Atriplex vestita*	AMARANTHACEAE	LC	Vaalbrak. Occasional in salt pans and floodplain areas.
12.	*Augea capensis*	ZYGPHYLLACEAE	LC	Occasionally observed, often forming patches.

NO.	SPECIES NAME	FAMILY	STATUS	LOCATION
13.	*Berkheya* cf. *annectens*	ASTERACEAE	LC	Disseldoring – occasionally observed (near water).
14.	*Blepharis mitrata*	ACANTHACEAE	LC	Occasionally throughout.
15.	*Boscia albitrunca*	BRASSICACEAE (CAPPARACEAE)	LC NFA protected species. NCNCA, Schedule 2 Protected	Shepperd's tree. Bushmanland Arid Grassland
16.	*Boscia foetida*	BRASSICACEAE (CAPPARACEAE)	LC NCNCA, Schedule 2 Protected	Small shrubby individuals occasionally observed.
17.	*Cadaba aphylla*	CAPPARACEAE	LC	Bloustorm – occasional near watercourses.
18.	*Chascanum garipense*	VERBENACEAE	LC	Lennertsville WTW (Bushmanland Arid Grassland)
19.	*Convolvulus sagittatus*	CONVOLULACEAE	LC	Bobbejaantou: On the fence next to the Orange River
20.	*Cynanchum viminale*	APOCYNACEAE	LC NCNCA, Schedule 2 Protected	Occasionally – Bushmanland Basin Shrubland.
21.	*Dicoma capensis*	ASTERACEAE	LC	Occasionally – Bushmanland Arid Grassland
22.	*Dimorphotheca polyptera*	ASTERACEAE	LC	Jakkalsblom – Occasional along the R27.
23.	*Erigeron sumatrensis (=Conyza albida)*	ASTERACEAE	Naturalized weed.	Tall fleabane: Weedy alien in disturbed areas near Lennertsville.
24.	*Eriocephalus* cf. *microphyllus*	ASTERACEAE	LC	Kapokbos: Observed in rocky area in Bushmanland Basin Shrubland
25.	*Euphorbia braunsii*	EUPHORBIACEAE	LC NCNCA, Schedule 2 Protected	A small succulent only observed near Lennertsville.
26.	*Euphorbia spinea*	EUPHORBIACEAE	LC NCNCA, Schedule 2 Protected	A small succulent only observed near Piet-Rooi-se reservoir.
27.	*Fingerhuthia africana*	POACEAE	LC	Fingerhoedgrass.
28.	*Galenia africana*	AIZOACEAE	LC NCNCA, Schedule 2 Protected	Kraalbos – common and often associated with disturbed areas.
29.	*Geigeria ornativa*	ASTERACEAE	LC	Vermeerbos: Occasionally in Bushmanland Basin Shrubland.
30.	*Gomphocarpus filiformis*	APOCYNACEAE	LC	Lammerlat – occasionally near watercourses.
31.	*Helichrysum cf. argyrosphaerum*	ASTERACEAE	LC	Rarely observed – Bushmanland Basin Shrubland
32.	*Helichrysum herniarioides*	ASTERACEAE	LC	Rarely observed – Bushmanland Basin Shrubland
33.	*Hirpicium* species	ASTERACEAE	LC	Small herb, occasionally observed in Bushmanland Basin Shrubland
34.	*Justicia austalis*	ACANTHACEAE	LC	Occasionally observed – Bushmanland Arid Grassland.
35.	*Justicia divaricata (=Monechma)*	ACANTHACEAE	LC	Occasionally observed along the R27.
36.	*Justicia spartioides*	ACANTHACEAE	LC	Occasionally observed at Piet Rooi's Puts Reservoir.
37.	*Kewa salsoloides*	KEWACEAE	LC	Small succulent occasionally observed.

NO.	SPECIES NAME	FAMILY	STATUS	LOCATION
38.	*Kleinia longiflora*	ASTERACEAE	LC	A medium succulent observed throughout.
39.	*Lessertia frutescens*	FABACEAE	LC NCNCA, Schedule 2 Protected	Kankerbossie; Occasionally throughout.
40.	*Limeum aethiopicum*	MOLLUGINACEAE	LC	Aarbossie – Low shrub, occasionally in Bushmanland Basin Shrubland
41.	*Limeum argute-carinatum*	MOLLUGINACEAE	LC	Koggelmandervoetkaroo – prostrate annual herb Bushmanland Arid Grassland
42.	*Lycium cinereum*	SOLANACEAE	LC	Kriedoring- Medium large shrub occasional throughout.
43.	*Maerua gilgii*	BRASSICACEAE (CAPPARACEAE)	LC	Single individuals – Lennertsville WTW
44.	*Melia azedarach*	MELIACEAE	**Alien invasive plant species.**	Seringboom: Disturbed areas next to the Orange River.
45.	*Mesembryanthemum coriarium (=Psilocaulon)*	AIZOACEAE	LC NCNCA, Schedule 2 Protected	Asbos: A widespread and hardy species relatively common throughout.
46.	*Mesembryanthemum crystallinum*	AIZOACEAE	LC NCNCA, Schedule 2 Protected	Soutslaai: A weedy species often observed in disturbed areas.
47.	*Mesembryanthemum dinteri (=Psilocaulon)*	AIZOACEAE	LC NCNCA, Schedule 2 Protected	A widespread and hardy species occasionally observed along the R27.
48.	*Mesembryanthemum noctiflorum*	AICOACEAE	LC NCNCA, Schedule 2 Protected	Vleisbos: Occasional in Bushmanland Basin Shrubland
49.	*Mesembryanthemum tetragonum*	AIZOACEAE	LC NCNCA, Schedule 2 Protected	Succulent species occasionally observed in floodplain areas.
50.	*Monsonia umbellata*	GERANIACEAE	LC	Rhabas: Occasional throughout.
51.	*Nicotiana glauca*	SOLANACEAE	**Alien invasive plant species.**	Tabakboom: Disturbed areas next to the Orange River.
52.	*Parkinsonia africana*	FABACEAE	LC	Small tree, rarely observed next to drainage lines.
53.	*Peliostomum virgatum*	SCHROPHULARIACEAE	LC	Occasional near watercourses in Bushmanland Basin Shrubland
54.	*Pentzia incana*	ASTERACEAE	LC	Karoobossie – occasionally observed Bushmanland Basic Shrubland.
55.	*Phaeoptilum spinosum*	NYCTAGINACEAE	LC	Brosdoring – Relatively common throughout.
56.	*Prosopis* species	FABACEAE	**Alien invasive plant species.**	Common near watercourses or wetland areas.
57.	*Pteronia* cf. *leucoclada*	ASTERACEAE	LC	Bleekbossie: Small shrub – only just starting to flower.
58.	*Pteronia* species	ASTERACEAE		Medium shrub, no flowers.
59.	*Rhigozum trichotomum*	BIGNONIACEAE	LC	Driedoring – dominant throughout.
60.	*Rogeria longiflora*	PEDALIACEAE	LC	Only the dried out inflorescence observed.
61.	*Rosenia humilis*	ASTERACEAE	LC	Medium/small spiny shrub – Bushmanland Basin Shrubland
62.	*Royena lycioides (=Diospyros)*	EBENACEAE	LC	Karoo-boubos: Occasional next to larger watercourses.
63.	*Ruschia divaricata*	AIZOACEAE	LC	Occasional near Piet Rooi's Puts Reservoir.

NO.	SPECIES NAME	FAMILY	STATUS	LOCATION
			NCNCA, Schedule 2 Protected	
64.	*Salsola* cf. *aphylla*	AMARANTHACEAE	LC	Ganna: medium shrub associated with salt panne and floodplain areas.
65.	*Salsola kali*	AMARANTHACEAE	**Alien invasive plant weed**	Tumbleweed: An annual unpalatable weed in disturbed areas.
66.	*Salsola* tuberculata	AMARANTHACEAE	LC	Blomkoolganna: Bushmanland Basin Shrubland.
67.	*Searsia lancea*	ANACARDIACEAE	LC	Karee – occasional along larger watercourses.
68.	*Senecio niveus*	ASTERACEAE	LC	Medium shrub with succulent stems – Bushmanland Basin Shrubland.
69.	*Senecio* species	ASTERACEAE	LC	Weedy indigenous species – disturbed areas.
70.	*Senegalia mellifera*	FABACEAE	LC	Swarthaak: Bushmanland Arid Grassland
71.	*Sensitive species 144*	ASPHODELACEAE	**VU** NCNCA, Schedule 1 Protected	One dead individual along the R27. Remainder well outside the footprint.
72.	*Stipagrostis ciliata*	POACEAE	LC	Langbeenboesmangrass.
73.	*Stipagrostis namaquensis*	POACEAE	LC	River bushman grass.
74.	*Stipagrostis* obtusa	POACEAE	LC	Kortbeenboesmangrass.
75.	*Tamarix usneoides*	TAMARICACEAE	LC	Wild tamarisk – Next to larger watercourses.
76.	*Tapinanthus oleifolius*	LORANTHACEAE	LC	Stem parasite – occasionally within larger shrubs.
77.	*Tetraena chrysopteros*	ZYGOPHYLACEAE	LC	Kleinskilpadbos – dwarf shrub occasionally observed.
78.	*Tetraena decumbens*	ZYGOPHYLACEAE	LC	Small succulent shrub in Bushmanland Arid Grassland
79.	*Tetraena microcarpa*	ZYGOPHYLACEAE	LC	Armoedsbossie. Small succulent shrub in Bushmanland Arid Grassland
80.	*Tetraena simplex*	ZYGOPHYLACEAE	LC	Vostruisdruiwe: Often on disturbed road verges.
81.	*Tetragonia* species	AIZOACEAE		A succulent species, Bushmanland Basin Shrubland
82.	*Tetragonia species*	AIZOACEAE	LC NCNCA, Schedule 2 Protected	Disturbed areas along the R27 – Bushmanland Arid Grassland
83.	*Tribulus zeyheri*	ZYGPHYLACEAE	LC	Dubbeltjie: Bushmanland Arid Grassland – R27 Road reserve.
84.	*Vachellia erioloba*	FABACEAE	LC NFA protected species	Camelthorn: Near watercourses and deeper sandy areas.
85.	*Vachellia karroo*	FABACEAE	LC	Soetdoring: Near watercourses.
86.	*Ziziphus mucronata*	RHAMNACEAE	LC	Blinkblaar wag-'n-bietjie: Occasionally near watercourses.

Plant Species

According to the DFFE Environmental Screening Tool and the Botanical & Terrestrial Compliance statement (Appendix I and D3, respectively of the Pre-Application BAR), the **plant species theme sensitivity is considered Medium Sensitive**, because of the potential for or encountering the following species:

- ***Tridentea virescens* (Apocynaceae):** It is a widespread but rare succulent that occurs on stony ground, or hard loam in floodplains, in sporadic small subpopulations of up to six plants. It might occur in the northern part (Keimoes area) of the study area, but it was not observed. Because of the disturbed nature of the R27

road reserve in this area, the changes that this species will be impacted is considered low to very low.

- ***Sensitive species 144:*** Refer to **Error! Reference source not found.**. This species is not expected to be impacted by the proposed development.
- ***Dregeochloa calviniensis* (Poaceae):** This plant normally occurs on limestone outcrops in arid succulent karoo shrubland. Neither the plant nor prominent limestone outcrops were observed within the study area.

In addition, 17 NCNCA, protected species were observed, also including Sensitive Species 144 (Refer to **Error! Reference source not found.**). However, almost all of these species, especially the Aizoaceae, are widespread species or hardy pioneer species. The only species of conservation concern (SoCC) are:

- ***Sensitive Species 144***, which will not be impacted;
- One ***Aloe*** species;
- Two ***Boscia*** species; and
- Two ***Euphorbia*** species.

Table 2. An evaluation of the protected plant species with impact mitigation recommendations (derived from the Botanical & Terrestrial Compliance Statement).

NO.	SPECIES NAME	STATUS & COMMENTS	IMPACT MITIGATION RECOMMENDATIONS
1.	*Aizoon burchellii (=A asbestinum)* **Schedule 2 protected.** **(All plants in this Family)**	This plant was occasionally observed within the road reserve of the R27 between Lennertsville & the De Bakke Reservoir It is a widespread species not endemic to South Africa with a red-list status of Least Concern.	No Search & rescue proposed. Topsoil conservation and re-use during rehabilitation should result in seed store protection. **A NCNCA Permit application must be submitted.**
2.	*Aloe claviflora* **Schedule 2 protected.** **(All plants in this Family)**	A few individuals were observed in the southern alternative for the Lennertsville WTW. This is a widespread species with a red-list status of Least Concern.	**Search & rescue** It is unlikely that these plants will be impacted, because the preferred location is to the north. However, all *Aloe* species that might be impacted by the proposed development must be transplanted outside of the footprint. **A NCNCA Permit application must be submitted.**
3.	*Boscia albitrunca* **Schedule 2 protected** **(All plants in this Genus)**	Just over 100 shrubs and small trees were observed within the R27 road reserve. But only about 11 were larger single stem individuals (most were multi-stemmed shrubs).	No search & rescue is proposed. *Boscia* species seldom transplant successfully, because of their extensive and deep root system. Efforts should be made to protect all the larger trees and as many of the shrubs as possible. **A NFA & a NCNCA Permit application must be submitted for the removal of these plant.**
4.	*Boscia foetida* **Schedule 2 protected** **(All plants in this Genus)**	A few individuals were observed in the southern alternative for the Lennertsville WTW. This is a widespread species with a red-list status of Least Concern	No search & rescue is proposed. Boscia species seldom transplant successfully, because of their extensive and deep root system. It is unlikely that these plants will be impacted, because the preferred location is to the north. **A NCNCA Permit application must be submitted for the removal of these plant.**
5.	*Cynanchum viminale* **Schedule 2 protected (All plants in this Family)**	A widespread plant with a red-list status of Least Concern.	No Search & rescue proposed. Topsoil conservation and re-use during rehabilitation should result in seed store protection. **A NCNCA Permit application must be submitted.**
6.	*Euphorbia braunsii* **Schedule 2 protected** **(All plants in this Genus)**Error! Reference source not found.	A few individuals were observed in the southern alternative for the Lennertsville WTW. This is a widespread species with a red-list status of Least Concern.	**Search & rescue.** It is unlikely that these plants will be impacted, because the preferred location is to the north. However, all plants that might be impacted by the proposed development should be transplanted outside of the footprint. **A NCNCA Permit application must be submitted.**

NO.	SPECIES NAME	STATUS & COMMENTS	IMPACT MITIGATION RECOMMENDATIONS
7.	*Euphorbia spinea* **Schedule 1 protected (All plants in this Genus)**	A few individuals were observed within the R27 road reserve (Bushmanland Arid Grassland section). Although never common, this is a relatively widespread species with a red-list status of Least Concern.	**Search & rescue**. Any plants that might be impacted by the proposed development should be transplanted next to or within the study area. **A NCNCA Permit application must be submitted.**
8.	*Galenia africana* **Schedule 2 protected (All plants in this family)**	A very widespread plant, often found in disturbed areas. It has a red-list status of Least Concern.	No Search & rescue proposed. This is a hardy pioneer species. **A NCNCA Permit application must be submitted.**
9.	*Lessertia frutescens* **Schedule 2 protected (All plants in this Genus)**	A widespread and hardy plant often associated with watercourses or disturbed roadsides. It has a red-list status of Least Concern.	No Search & rescue proposed. Topsoil conservation and re-use during rehabilitation should result in seed store protection. **A NCNCA Permit application must be submitted.**
10.	*Mesembryanthemum coriarium* **Schedule 2 protected (All plants in this Family)**	A widespread, hardy plant often associated with disturbed areas. It has a red-list status of Least Concern.	No Search & rescue proposed. Topsoil conservation and re-use during rehabilitation should result in seed store protection. **A NCNCA Permit application must be submitted.**
11.	*Mesembryanthemum crystallinum* **Schedule 2 protected (All plants in this Family)**	A widespread hardy plant, often found in disturbed areas. It has a red-list status of Least Concern.	No Search & rescue proposed. This is a hardy pioneer species. **A NCNCA Permit application must be submitted.**
12.	*Mesembryanthemum dinteri* **Schedule 2 protected (All plants in this Family)**	A widespread hardy plant with a red-list status of Least Concern.	No Search & rescue proposed. Topsoil conservation and re-use during rehabilitation should result in seed store protection. **A NCNCA Permit application must be submitted.**
13.	*Mesembryanthemum noctiflorum* **Schedule 2 protected (All plants in this Family)**	A widespread hardy plant with a red-list status of Least Concern.	No Search & rescue proposed. Topsoil conservation and re-use during rehabilitation should result in seed store protection. **A NCNCA Permit application must be submitted.**
14.	*Mesembryanthemum tetragonum* **Schedule 2 protected (All plants in this Family)**	A widespread species, not endemic to South Africa with a red-list status of Least Concern.	No Search & rescue proposed. Topsoil conservation and re-use during rehabilitation should result in seed store protection. **A NCNCA Permit application must be submitted.**
15.	*Ruschia divaricata* **Schedule 2 protected (All plants in this Family)**	A widespread species, not endemic to South Africa with a red-list status of Least Concern.	No Search & rescue proposed. Topsoil conservation and re-use during rehabilitation should result in seed store protection. **A NCNCA Permit application must be submitted.**
16.	*Tetragonia species* **Schedule 2 protected (All plants in this Family)**	A widespread pioneer species.	No Search & rescue proposed. Topsoil conservation and re-use during rehabilitation should result in seed store protection. **A NCNCA Permit application must be submitted.**
17.	*Vachellia erioloba* **NFA protected species**	About 70 trees were observed, mainly within the road reserve of the R27 in the deeper sands associated with Gordonia Duneveld and most particularly the first 27km north of Kenhardt. About 40 – 45 individuals are over 6m in height of which about 17 are magnificent trees. A list of these trees with their GPS co-ordinates are given in Appendix 3.	**Protect *in-situ*** Because of the size of the pipe, it is expected that some of these trees will be impacted during construction, but with care, most of them can be protected. All efforts should be made to avoid these trees when planning the pipeline route, especially all trees larger than 6m in height. **A NFA Permit application must be submitted (if any tree were to be impacted).**
18.	*Sensitive species 144* **Schedule 1 protected species**	This is a vulnerable plant with a with a broad distribution range, but showing a distinct population decline and is expected to be vulnerable to climate change. Only one dead individual was observed within the footprint area.	It is not expected that any of these plants will be impacted. **A NCNCA Permit application must be submitted** *(if any tree were to be impacted).*

From a botanical viewpoint the most significant impact on plant species is considered the potential impact on the two NFA protected species namely:

- ***Boscia albitrunca*** (Sheppard's tree):
  - Most of the Boscia albitrunca individuals are multi-stemmed shrubs, but it also include several larger trees in good condition. Almost all of these occur from 10 km south of Lennertsville to Kenhardt (associated with Bushmanland Arid Grassland & Gordonia Duneveld vegetation types).

- ***Vachellia erioloba*** (camelthorn tree), especially in the following locations:
  - A patch of about 13 camelthorn trees, about 7-8km south of Lennertsville, associated with the intrusion of Gordonia Duneveld;
  - The patch of about 4 camelthorn trees (including one magnificent tree of about 10-12m in height) about 40km south of Lennertsville, associated with the intrusion of Gordonia Duneveld; and
  - The large number of camelthorn trees encountered within or along the R27 road reserve in the 27 km section just north of Kenhardt.

Because of the length of the pipeline and the difference in vegetation types of the plant species sensitivity theme are discussed as part of the terrestrial sensitivity assessment for each section of the proposed route/infrastructure (Refer to Heading 3.1).

1.1.6 SURFACE WATER

As outlined in the Freshwater Report (Appendix D4 of the Pre-Application BAR), the proposed pipeline will follow the R27 trunk road, running within the road reserve alongside an existing pipeline. Water will be abstracted from the Orange River south of Keimoes, specifically from the southern braided stream, referred to as Orange River 3.

The pipeline is expected to have a diameter of 750 to 800 mm and will be constructed from ductile iron. It will be installed underground along the proposed route. The existing water treatment works located south of Keimoes will either be upgraded or replaced. Since this facility is located away from any rivers or drainage lines, no further discussion on it is necessary.

Similarly, an existing reservoir (Piet Rooi Reservoir) is planned to be upgraded to increase its capacity, and a new booster pump station will be constructed at De Bakke. Both of these are located away from any drainage lines and therefore do not require additional consideration.

Drainage Lines

The landscape near the Lower Orange River and Sak River is characterized by an extensive network of drainage lines, including numerous smaller tributaries that spread throughout the region. The presence of iron oxides in the sands creates a red hue, particularly visible in satellite imagery, where these lines appear even more distinct. Most drainage lines remain dry, only carrying water during rains or shortly thereafter. Periodic flooding caused by thunderstorms scours the drainage lines, maintaining their morphological structure by moving sediment and clearing debris.

These drainage systems have developed over millennia due to the sporadic and scant rainfall, interspersed with long droughts. The shallow groundwater along the lines supports sparse, drought-resistant vegetation, allowing larger plants to establish roots in an otherwise harsh climate. Ecologically, these drainage lines are critical for creating habitat variation, supporting biodiversity, and providing migration routes in a largely barren

environment. While the upper sub-catchments of these drainage lines remain near-pristine and are primarily used for grazing, the lower portions have been heavily altered by agriculture and sand mining, especially around the Orange, Hartbees, and Sak Rivers. Here, drainage lines have been transformed into channels interwoven with agricultural fields, while areas further from the rivers are less disturbed due to the absence of water access.

Sheet Wash Plains

Smaller drainage lines across the landscape, marked by dense stands of Rhigozum trichotonum (driedoring) rather than iron oxide deposits, indicate the presence of sheet wash plains. These woody shrubs thrive along the drainage lines due to higher soil moisture levels, resulting in denser vegetation in these areas. The interconnected lines create continuous fans with no clear demarcation, visible both on the ground and in satellite imagery. During rainfall events, stormwater spreads laterally across these plains, slowing down and depositing sediment to form sandy or gravelly surfaces. Larger sheet wash plains are observed where multiple drainage lines converge in the lower sub-catchments.

Sub-Catchments

The proposed pipeline traverses 13 sub-catchments, ranging in size from 1,589 hectares to over 70,000 hectares, with lengths varying from 12 km to more than 100 km. These sub-catchments can be delineated using satellite imagery, with their boundaries marked by red-stained drainage lines and prominent watershed features. In flatter areas such as Bushmanland, delineation becomes more challenging due to the intertwining of numerous tributaries.

Sub-catchments No. 1 and No. 2 discharge into the Orange River, while sub-catchments No. 3 to No. 8 drain into the Hartbees River. The upper Hartbees River, south of Kenhardt, receives water from sub-catchments No. 9 to No. 12, and sub-catchment No. 13 flows into the Grootvloer Pan, a notable instream pan of the Sak River. The average slope of the sub-catchments was calculated, excluding rocky ridges to provide a more accurate representation of the flat terrain.

South of Soafskolk toward Brandvlei, larger drainage lines transition into smaller wash plains. This area features numerous small pans aligned with stormwater flow paths. One prominent feature along the pipeline route is the Grootvloer Pan, a significant landmark in the Boesmanland landscape.

1.1.7 ARCHAEOLOGICAL, HERITAGE AND PALAEONTOLOGICAL RESOURCES

According to the Heritage Impact Assessment (HIA) (Appendix D5 of the Pre-Application BAR), there are culturally and historically significant elements, as defined in Section 2 of the National Heritage Resources Act, 1999 (Act No. 25 of 1999), located close to the development site. These include historical features such as irrigation furrows dating back to the early 1900s, which are situated near the pipeline route but outside the immediate 20-meter zone.

Additionally, a British military observation post, has been identified near the proposed alignment, necessitating the implementation of safety buffers to protect it during construction activities.

The HIA also identified a grave and a fenced off cemetery near the development footprint. These sites are considered to be of importance and worthy of conservation. The presence of these elements highlights the importance of implementing mitigation measures, including heritage monitoring during construction. Should any previously unidentified heritage resources be discovered during excavation, they must be reported to the South African Heritage Resources Agency (SAHRA) for further investigation and management.

1.2 RECOMMENDATIONS ON IMPACT MITIGATION/MINIMISATION

The following are site/project specific impact mitigation measures recommended by the Specialists and must be enforced if the proposed development were approved.

Agriculture:
No specific mitigation measures required.

Avifauna:

- Construction activities should commence during the dry winter months as far as possible to minimise the impacts on breeding fauna.
- An experienced, independent Environmental Control Officer (ECO) must be appointed to oversee the construction activities and compliance with the EMPr
- The natural vegetation and habitat associated with features such as rocky outcrops, drainage lines, and pans must be avoided as far as possible, especially in areas where the road reserve is narrow
- Rocky outcrops, drainage lines, and the natural vegetation in the surrounding areas must be designated no-go areas for construction camps and crews. Construction camps must be placed within the footprint or within disturbed areas that are already modified as far as possible
- Crossing the Hartbees River floodplain in a currently undisturbed area should be avoided. If technically feasible, the suggested route change shown in the impact table above (blue lines) must be considered. This suggested route follows existing tracks that are already disturbed, rather than disturbing the floodplain in new areas. This will also help avoid repeating impacts during the operational phase whenever repairs or maintenance is required
- The alternative route for 750 mm rising main to the final storage reservoir is not preferred from a faunal perspective as it is routed through natural arid shrubland, impacts on undisturbed drainage lines and floodplain habitat, and natural dolerite outcrops. This alternative will therefore impact negatively on natural faunal habitat. This can be avoided by opting for the preferred route in this section. This will also help avoid repeating impacts during the operational phase whenever repairs or maintenance is required
- During construction, no wild animal may under any circumstance be handled, removed, or be interfered with by construction workers. No wild animal may under any circumstance be hunted, snared, captured, injured, or killed. This includes animals perceived to be vermin
- Alien plant eradication and control must be undertaken throughout the construction phase and the operational phase.

Biodiversity:
Impact minimisation should focus on the protection of the National Forest Act, protected trees, especially the larger trees as described below. During construction the overriding goal should be careful planning of the pipeline route to minimise the impact on these trees.

- All construction must be done in accordance with an approved construction and operational phase Environmental Management Plan (EMP), which must be developed by a suitably experienced Environmental Assessment Practitioner
- A suitably qualified Environmental Control Officer must be appointed to monitor the construction phase in terms of the mitigation recommendations pertaining to specialist studies
- The route for each section of the pipeline must be clearly marked and approved by the ECO.
    - The aim must be to minimise the impact on all NFA protected trees, wherever possible.
    - Special care must be taken to protect as many as possible of the single stem Boscia albitrunca individuals over 1.5 m in height (marked in green in Appendix 3 of the Biodiversity Assessment (Appendix D3 of the Pre-Application BAR))

  - Special must be taken to protect as many as possible of the larger Vachellia erioloba trees over 6 m in height and the protection of the magnificent thick stem individuals over 8 m should be non-negotiable
- The pipeline route and disturbance footprint must stay within the road reserve (to control the construction footprint and minimise the impact on the adjacent natural vegetation).
- The "Search & Rescue" recommendations given in Table 2 must be implemented along the pipeline route as well as for the associated infrastructure footprints (reservoirs and pump station locations)
  - All ***Aloe*** species encountered within the footprint area, must be replanted outside the footprint area
  - ***Euphorbia braunsii* & *E. spinea*** individuals encountered within the footprint area must be replanted outside the footprint area
  - Search & Rescue must include an aftercare period, during which the plants are watered from time to time to give them the best possible chance of survival
- A **NFA Permit application** must be obtained should any of the protected trees be impacted
- A Northern Cape Nature Conservation Act permit must be obtained for the "Search & Rescue" and other impacts on the protected species listed in Table 2
- All alien invasive species within the footprint and its immediate surroundings must be removed responsibly
  - Care must be taken with the eradication method to ensure that the removal does not impact or lead to additional impacts (e.g., spreading of the AIP due to incorrect eradication methods)
  - Care must be taken to dispose of alien plant material responsibly
- Indiscriminate clearing of any area outside of these footprints may not be allowed
- An integrated waste management approach must be implemented during construction
  - Construction related spoil, general- and hazardous waste must be disposed to approved waste disposal sites

<u>Freshwater:</u>

- Construction:
  - Do not disturb any land outside of designated trenching area in the reserve of existing roads
  - Construct outside of rainy season
  - Ensure that the new pipeline is trenched deep enough as appropriate for various water ways.
  - Carefully replace backfill in layers and compact to resemble permeability prior to construction
  - Level and landscape wherever the pipeline is trenched
  - Remove divots and bumps as not to encourage deposition or erosion
  - Take measures to ensure that the pipeline is not denuded in drainage lines and the river
- Rehabilitation following construction:
  - Repair the stormwater infrastructure in the road reserve to effectively prevent erosion and excessive runoff
- Operational phase:
  - Budget for the maintenance of the pipeline and the road reserve
  - Inspect according to schedule and repair if leaking, prevent denuding of pipeline, cover when denuded.
  - Maintain and repair stormwater infrastructure if required

<u>Heritage:</u>

- Field Rating IVB (KTE-037: 29°21'18.7"S, 21°08'58.2"E; KTE-038: 29°20'53.2"S, 21°08'56.1"E; KTE-039: 29°20'51.7"S, 21°09'03.0"E; KTE-041: 29°21'10.2"S, 21°08'54.0"E; KTE-006: 29°57'24.8"S, 20°09'08.2"E) (Appendix D5 of the Pre-Application BAR)
  - No further mitigation is recommended since KTE-037, 038, 039, and 041 are outside the proposed footprint

  - A 100 m buffer/safety zone is recommended to negate the negative impact on the British campsite (KTE-006). The buffer/safety zones implemented should be clearly demarcated during the project's construction phase and completely avoided by personnel and equipment
- Field Rating IVA (KTE-002: 29°57'33.5"S, 20°09'13.9"E; KTE-003: 29°57'34.1"S, 20°09'12.5"E; KTE-004: 29°57'32.7"S, 20°09'11.5"E; KTE-005:29°57'28.6"S, 20°09'07.1"E; KTE-033: 29°58'28.3"S, 20°22'40.8"E)
  - A 200 m buffer/safety zone is recommended to negate the negative impact on these resources. The buffer/safety zones implemented should be clearly demarcated during the project's construction phase and wholly avoided by personnel and equipment
- Graves with Field Rating IIIA (KTE-011: 29°57'10.2"S, 20°15'46.2"E; KTE-014: 29°57'26.3"S, 20°09'04.8"E)
  - It is recommended that a buffer/safety zone of 100 m should be implemented around KTE-011 and a 50 m buffer/safety zone around KTE-014. In addition, KTE-014 should be fenced
  - off. The buffer/safety zones implemented should be clearly demarcated during the project's construction phase and wholly avoided by personnel and equipment
- Loss of fossil heritage by destruction, movement or sealing of fossil heritage in or below the earth's surface
  - Although no further mitigation is recommended, it is recommended that if Palaeontological Heritage is uncovered during surface clearing and excavations, the Chance Find Protocol attached should be implemented immediately (Butler 2024)

Palaeontological:

It is the responsibility of the project's Environmental Site Officer (ESO) or site manager to train the workers and foremen on what to do if a fossil is accidently discovered. In the absence of the ESO, a member of staff must be designated to be accountable for the effective application of the chance discovery protocol so that the conservation of fossil material is not jeopardized.

Chance Find Procedure:

- If a chance find is made, the person responsible for the find must immediately stop working, and all work in the immediate vicinity of the find must stop as well
- The individual who discovered the item must immediately notify his or her direct supervisor, who must then notify his or her management and the ESO or site manager. The ESO or site manager must notify the relevant Heritage Agency (South African Heritage Resources Agency, SAHRA) of the discovery. (Contact information: SAHRA, 111 Harrington Street, Cape Town, South Africa. PO Box 4637, Cape Town 8000, South Africa. Fax: +27 (0)21 462 4509. Tel: 021 462 4502. Web address: www.sahra.org.za). Photographs of the find from various perspectives, as well as GPS coordinates, must be submitted to the Heritage Agency
- Within 24 hours of the discovery, a preliminary report must be sent to the Heritage Agency, which must include the following: 1) the date of finding; 2) a description of the discovery; and 3) a description of the fossil and its context (depth and position of the fossil), as well as GPS coordinates
- Photographs of the discovery (the more the merrier) must be of high quality, in focus, and accompanied by a scale. Photographs of the vertical part (side) where the fossil was discovered are also required
- Upon receipt of the preliminary report, the Heritage Agency will notify the ESO (or site manager) whether a palaeontologist rescue excavation or collection is required
- The place must be guarded to prevent future damage. There should be no attempt to remove material from their environment. Stabilize the exposed items and cover them with a plastic sheet or sand bags. The Heritage organization will also be able to advise on the best way to protect the find
- If the fossil cannot be stabilized, the ESO (site manager) may carefully collect the fossil
- Once the Heritage Agency has received the written authorization, the developer may continue with the development on the affected area
- Fossil finds must be placed in tissue paper and in an appropriate box while necessary care must be taken to remove any fossil material from the rescue site

Socio-economic:

Construction

- Employment of Workforce and Contractors (Enhancement Measures):
  To enhance the local employment, skills development and business opportunities associated with the construction phase, the following measures should be implemented:
  - The developers be committed to involving and benefiting the communities surrounding the development, contributing to their development and growth
  - It is recommended to conduct structured and proactive engagement sessions within the municipal district, to expose local small, micro, and medium enterprises which will benefit from the proposed development
  - Training and skills development programmes should be offered to employees of the development prior to the commencement of the construction phase
  - The communities which are most in need of employment on a local level should be considered for employment before outsourcing
  - Engage proactively with local stakeholders and implement transparent hiring practices to ensure equitable distribution of employment opportunities
- Economic Multiplier Effects (Enhancement Measures):
  - Preference is given to suppliers that are local to the operation where the service will be consumed.
  - Establishing liaison and communication structures with the district and local government structures
  - Liaise with the local governmental structures and municipal authorities in the labour-sending communities to ensure that group development initiatives are integrated into the economic and development plans of those areas
  - The continuous review of the economic development of the Project during the implementation process will ensure that the Project does not become static but is revised in terms of changing needs and also to ensure sustainability
  - Prior to the start of the construction contractor procurement, a database of local companies, specifically Historically Disadvantaged (HD) companies, that qualify as potential service providers (e.g., construction companies, catering companies, waste collection companies, security companies, etc) should be identified and informed about the tender process and invited to bid on Project-related work, if applicable.
  - Engage with local authorities and business organisations to investigate the feasibility of obtaining construction materials, goods, and products from local suppliers, where possible
- Influx of Jobseekers and Change in Population:
  - A Community Liaison Officer should be appointed
  - A method of communication should be implemented whereby procedures to lodge complaints are set out in order for the local community to express any complaints or grievances with the construction process
  - Regular community meetings and information campaigns to manage expectations regarding employment opportunities, fostering understanding between local residents and incoming job seekers
  - Prioritising local hiring to reduce the influx of external job seekers and support community development
  - Implementing training programs for local residents to enhance employability in the project, thereby reducing reliance on external semi-skilled and unskilled labour.
  - Collaborating with local authorities to strengthen infrastructure and service provision (like healthcare, education, and public utilities) to accommodate population growth and increased demand
  - Establishing monitoring systems to track socio-economic impacts and setting up conflict resolution platforms to address any emerging issues between local and newcomer communities.
  - Working with local law enforcement to implement crime prevention strategies and ensure public safety

- Safety and Security Impacts:
  - Conduct thorough safety and security training for all construction workers and staff involved in the Project to reinforce the importance of adhering to safety protocols and secure practices
  - Enhance site security measures, including installing surveillance cameras, lighting, and fencing around the construction areas to deter unauthorized access and reduce theft
  - Implement strict access controls, requiring identification checks for anyone entering the construction site to ensure only authorized personnel are on-site
  - Develop and distribute safety guidelines to local communities, informing them of the construction activities, potential hazards, and safety precautions to minimize accidents and misunderstandings.
  - Appoint a Community Liaison Officer to act as a bridge between the Project and the community, addressing any safety and security concerns that may arise promptly
  - Provide adequate firefighting equipment on-site and conduct regular training sessions on fire safety and emergency response for the construction team
- Increased Pressure on Local Services / Resources:
  - Appointment of a Community Liaison Officer to facilitate communication between the Project and the community, ensuring any concerns related to increased demand on services are promptly addressed
  - Strategic Planning with local authorities to anticipate service needs and develop plans to enhance local services in preparation for the construction phase
  - Investment in local infrastructure where feasible, such as upgrading roads or utilities, to benefit both the Project and the community, thereby reducing the Project's impact on local services
  - Establish temporary facilities, such as mobile healthcare units or temporary housing, to accommodate the needs of the construction workforce without overly burdening local services.
  - Implement traffic management plans to minimize the impact of construction-related vehicle movements on local transportation systems, reducing congestion and potential safety hazards
- Increased Probability of Fire Risk:
  - Ensure training is given to employees on the risks of fires
  - Ensure that firefighting equipment is present and working
  - No fires are to be made on site for any reason
  - No hunting or cooking of any animals or plants in or around the development footprint
- Nuisance Impacts (Noise and Dust):
  - During construction, care should be taken to ensure that noise from construction vehicles and plant equipment does not intrude on the farms and residential areas nearby. Plant equipment such as generators, compressors, concrete mixers, and vehicles should be kept in good working order and, where possible, equipped with effective exhaust mufflers
  - The movement of construction vehicles on the site should be confined to agreed access road/s
  - Heavy vehicle movement during the construction phase should be timed (where possible) to avoid times of the week, such as weekends, when the volume of traffic on the access roads may be higher
  - Dust suppression measures must be implemented on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers

Operational phase:

- Direct and Indirect Employment Opportunities (Enhancement Measures):
  - Local Hiring: Prioritise hiring from the local community for all available positions. This will ensure that the benefits of employment are directly felt within the local community
  - Skills Transfer: In cases where highly skilled expertise is required, provide provisions for skills transfer. This will facilitate knowledge sharing within the local workforce and enhance the overall skill level of the community
  - Support for Local Businesses: Encourage the involvement of local businesses in providing materials, goods, and services during the operational phase of the project. This can stimulate entrepreneurial growth and create indirect job opportunities

- Community Engagement: Maintain open lines of communication with the local community through the development's existing community liaison officer. This will ensure that job opportunities are communicated effectively and that local residents are given fair consideration in the hiring process
- Fair Labour Practices: Align the project with the development's socio-economic labour plan to ensure fair labour practices and safe working conditions for all workers

- Economic Multiplier Effects (Enhancement Measures):
  - Local Supplier Engagement and Development: Actively engage with local suppliers to understand their capabilities and limitations. Offer support and development programs to help them meet the project's needs. This could include training in specific skills, quality standards, or business management
  - Community Liaison Officers (CLOs): Employ CLOs to facilitate communication between the project and local businesses, ensuring that the needs of both are met and that opportunities are fairly distributed
  - Investment in Local Capacity Building: Invest in local infrastructure and capacity building to enable local businesses to scale up and meet the operational or maintenance demands of the project, where feasible. This could include financial support, technology transfer, or infrastructure improvements
  - Long-term Community Development Plans: Work with local authorities and community groups to develop and implement long-term economic development plans that align with the project's long-term presence and potential for economic stimulation
  - Transparent Procurement Processes: Establish transparent and fair procurement processes that give local businesses a fair chance to compete for services required such as maintenance contracts, ensuring equitable opportunity distribution
- Enhanced Water Supply and Security:
  - Infrastructure Upgrades: Implement advanced water treatment and monitoring technologies to ensure water quality and sustainability
  - Stakeholder Engagement: Work closely with local communities and stakeholders to manage water resources effectively and address concerns related to water distribution and access
  - Water Conservation Initiatives: Promote water conservation through community education programs and the introduction of water-saving technologies in homes and industries

Cumulative:

- An increase in employment opportunities, skills development, and business opportunities (Enhancement Measures):
  - Adopt local employment policies to ensure that job creation benefits the community surrounding the Proposed Project
  - Utilize local service providers for construction, maintenance, and operational needs to enhance business opportunities in the area
  - Implement skills development programs in partnership with local educational institutions and technical training centers to prepare the local workforce for opportunities arising from the Project and other similar developments in the region
- Negative impacts and change to the local economy with an in-migration of labourers, businesses, and jobseekers:
  - Develop and enforce a local recruitment policy to prioritize hiring from the surrounding communities, thereby reducing the need for extensive in-migration
  - Collaborate with local government agencies and community organizations to align the Project's development with the local area's needs, ensuring that service provisions meet the requirements of both existing residents and newcomers

- Establish joint ventures or partnerships with community organizations, potentially through Trusts, to provide tangible benefits to local communities, including employment opportunities and essential services
- Formulate and distribute a clear recruitment protocol in partnership with the local municipality and community leaders, ensuring transparent communication about employment processes

Visual:

- Comprehensive restoration plans that utilise native vegetation for recovery post-construction, alongside sensitive siting and underground placement of the pipeline to minimise visibility
- Construction management practices are rigorously implemented, featuring dust suppression techniques and limiting operations to daylight hours to reduce disturbances. Controlled lighting is designed to minimise light pollution, and community engagement ensures that the project aligns with local aesthetic values. All temporary structures and debris are promptly removed post-construction to restore the site's visual integrity

1.3 ENVIRONMENTAL AUTHORISATION

The Conditions of approval of the Environmental Authorisation (EA) and other relevant approvals/licences from other authorities will be included as Appendix 2 in the final EMP. The conditions of approval must be adhered to as part of the EMP.

2. DEFINITIONS AND ABBREVIATIONS:

2.1 DEFINITIONS

Applicant:	The person or responsible person from an organization who applied for the proposed activity described in the Environmental Authorisation.
Audit (Site Completion):	Environmental Site Inspection and verification of construction activities to EMP
Bund:	Enclosure under / around a storage facility to contain any spillage
Batch plant:	A concrete or plaster mixing facility and associated equipment and materials.
Construction:	Means the period of the project during which the actual works are carried out, deemed to include site establishment, site preparation, the works, maintenance period and decommissioning.
Construction phase:	The construction phase period of a cellular communications Construction site is defined as from the commencement of site establishment up to and including the practical site handover.
Construction site:	Means the area influenced and affected by the construction activities or under the control of the Contractor often referred to as "the Site".
Construction Supervisor:	The person responsible (appointed by the owner) to ensure that the construction is carried out to completion on time, within budged and that the Contractor fulfils his obligations in terms of the EMP.
Contaminated water:	Means water contaminated by the Contractor's activities, e.g. concrete water and runoff from plant/ personnel wash areas.
Contractor:	The principal persons / company and all other sub-contractors involved in the construction of the project.
Contractor's camp:	Means the designated and suitably demarcated areas on the Site within which all site offices and staff facilities are situated and within which equipment will be stored, for instance, batching plant, crusher plant, sand washing plant, workshop, offices, rest areas, ablution areas, etc., whichever is applicable.
Contaminated water:	Means water contaminated by the Contractor's activities, e.g. concrete water and runoff from plant/ personnel wash areas.
Declaration of understanding:	Form that is signed by all contractors involved in the construction works of their understanding and acceptance of the EMP and site-specific additions to the EMP.
Development site:	Boundary and extent of development works and infrastructure.
Environment:	Means the surroundings within which humans exist and that are made up of: • the land, water and atmosphere of the earth; • micro-organisms, plant and animal life; • any part of the combination of the above two bullets and the interrelationships between them;

- the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being

Environmental Aspect:	Any element of any construction activity, product or services that can interact with the environment
Environmental Audit Report:	Report done by the ECO and submitted by the Applicant to the satisfaction of the Chief Directorate Environmental Affairs, within six months after construction has been completed and also after the site(s) has been rehabilitated
Environmental Control Officer:	The registered Environmental Scientist (*in terms of section 20(3) of the Natural Scientific Professions Act, 2003 (Act 27 of 2003)*) responsible for overseeing the environmental aspects of the Construction phase of the EMP.
Environmental Completion Statement:	A report by the ECO to the relevant authorities stating completion of the project and compliance with the EMP and its conditions.
Environmental Impact:	Any change to the environment, whether adverse or beneficial, wholly or partially resulting from any construction activity, product or services.
Method statement:	A statement by the Contractor, describing the scope of intended construction works step-by-step, in order for the ECO and Construction Supervisor to understand the Contractors intentions and be able to comment on, so that they could assist with devising mitigating measures should it be necessary to avoid environmental impact.
No-Go Area(s):	An area of such (environmental/aesthetical) importance that no person or activity are allowed within a designated boundary surrounding this area.
Owner:	The owner, or dedicated person, responsible for the management of the property on which the proposed activity (in terms of the ROD) will be performed.
Stop Works Order:	An order which can be issued either by the ECO or Construction Supervisor to the Contractor (or any sub-contractor) if serious environmental damage is about to happen or is happening as a result of construction activities. On receiving such an order the Contractor must immediately stop all activities (or planned activities) relevant to the specific issue until an environmentally friendly resolution has been approved by the ECO.
Site:	The area and extent of the development works and infrastructure, including any areas off the main site on which works are to be carried out in order to allow the development to proceed successfully.
Site meetings:	Periodic (weekly or monthly) meetings between the ECO, Construction Supervisor and Contractor to discuss construction activities that relate to the environment or any other environmental issues that might arise.
Works:	The works to be executed in accordance with a contract.
On-site start-up meeting:	A start-up meeting held on site, before any construction has begun to discuss EMP and determine site specific additions that will be included as the basis for the EMP.

Potentially hazardous substance:	A substance, which, in the reasonable opinion of the Engineer, can have a deleterious (detrimental) effect on the environment.
Method statement:	A written submission by the Contractor to the Engineer or relevant responsible person.
Reasonable:	Means unless the context indicates otherwise, reasonable in the opinion of the Engineer/Project Leader after he has consulted with a person, not an employee of the client, suitably experienced in "environmental implementation plans" and "environmental management plans", both as defined in the Environmental Management Act (Act No 107, 1998).
Solid waste:	Means all solid waste, including construction debris, chemical waste, excess cement/concrete, wrapping materials, timber, tins and cans, drums, wire, nails, food and domestic waste (e.g. plastic packets and wrappers).

2.2 ABBREVIATIONS

CA Competent Authority

CARA Conservation of Agricultural Resources Act, 1983 (Act no. 43 of 1983)

CEMP Construction phase Environmental Management Plan

DENC Department of Environment and Nature Conservation

DFFE Department of Forestry, Fisheries and the Environment

ECO Environmental Control Officer: Must be a suitably qualified independent environmental consultant appointed to ensure compliance to the EMP

EMP Environmental Management Plan or Programme

ESO Environmental Site Officer - Must be a person with adequate environmental knowledge to understand and implement the EMP by conducting on-site inspections determined by the ECO and the client

ER Engineers' representative or Main contractors' representative

EA Environmental Authorisation (Record of Decision) issued by relevant authority for the authorisation to commence construction under certain environmental compliances

MSDS Material Safety Data Sheet(s)

NEMA National Environmental Management Act, 1998 (Act no. 107 of 1998)

OEMP Operational Environmental Management Plan

OSSM On-site Start-up Meeting

SAHRA South African Heritage Resources Agency

3. CONSTRUCTION PHASE EMP

3.1 STRUCTURE AND RESPONSIBILITY

Implementation of the EMP and environmental control and management of the construction phase will be achieved through the responsibility structure set out below. The role players include the Owner, the Construction Supervisor, the Environmental Control Officer and the Contractor. All role players must familiarize themselves with the prescriptions of the EMP.

3.2 THE CLIENT / APPLICANT / OWNER

The client (or the designated responsible person appointed by him) is responsible for:

- Appointing a suitably experienced ECO, the Construction Supervisor and the Contractor for the duration of the construction contract, and
- Ensuring that the Construction Supervisor and Contractor fulfil their obligations in terms of this EMP

3.3 THE CONSTRUCTION SUPERVISOR

The Construction Supervisor is responsible to ensure that the construction is carried out to completion on time, within budget and that the Contractor fulfils his obligations in terms of the EMP. In addition, the Construction Supervisor and the ECO are expected to develop a close working relationship and to stay in contact with each other.

The responsibilities of the Construction Supervisor include:

- To issues site instructions to the Contractor
- To serve as conduit for all communication between the ECO and the Contractor [The only exception is where the ECO or the Construction Supervisor needs to issue a "**STOP WORKS**" order to the Contractor if serious environmental harm is about to happen or is happening as a result of construction activity. The "STOP WORKS" order must be confirmed by the other party as soon as reasonably possible]
- Discussing any problems that might lead to environmental damage with the ECO
- When the ECO is not on site the Construction Supervisor will be responsible for the implementation of the EMP

3.4 THE CONTRACTOR

The Contractor shall be responsible to:

- Ensure that all sub-contractors, employees, suppliers, agents etc. are fully aware and adhere to the environmental conditions detailed in the EMP
- Liaise closely with the Construction Supervisor and the ECO
- Ensure that works on the site are conducted in an environmentally sensitive manner and in full accordance with the EMP
- Carry out instructions issued in the site instruction book
- Assist with solutions to environmental problems that may arise during the construction phase
- Ensure that all "**No-Go**" areas are adequately fenced off
- Will report any deviation from the requirements of this EMP to the Principal Agent, and any pollution or environmental contaminant spill events

- Agrees to work stoppage and/or payment of penalties as required by this EMP and directed by the ECO/Construction Supervisor
- Agrees to bear full costs for any work stoppage resulting from contravention of the requirements of this EMP, and/or the costs of remedying environmental damage resulting from their or their sub-contractors or employee's contravention of the requirements of this EMP

NB: All Contractors must sign the "Declaration of understanding" (Appendix 1) of this Environmental Management Plan before construction commences.

3.5 THE ENVIRONMENTAL CONTROL OFFICER (ECO)

ECO will be responsible for overseeing the environmental aspects of the Construction phase and will work in close coordination with the Construction Supervisor.

3.5.1 ECO QUALIFICATIONS

The ECO must be independent and suitably qualified (a diploma or degree in environmental management with at least 2 or more years of environmental site management experience) and must have a sound knowledge of the environment in which the activity will take place.

3.5.2 ECO DUTIES

An ECO must be appointed for the duration of the construction phase (or as required by the EA) and:

- Will be primarily responsible for ensuring the implementation of the EMP and will perform regular site inspections/audits with the specific aim to ensure environmental conformance by the Contractor
- Will be appointed for the duration of the construction period for the project. Due to the size of the project the independent ECO will appoint a full-time independent ESO (Environmental Site Officer). The ESO will report to the ECO. The ECO will visit the site every 2 weeks to attend the monthly site meeting and the monthly technical meeting and meet with the ESO
- Will keep environmental records (including photographs) of the construction activities
- Must ensure that "No-Go" areas are adequately protected and adhered to
- Must approve and be present during the demarcation of the necessary areas for storage of materials, ablutions, eating areas of contract workers etc.
- Will conduct a start-up meeting before construction commences, will provide environmental training at the beginning of the project and provide environmental awareness training throughout the life of the project
- Must be informed of site and technical meetings to be able to comment and report on environmental issues
- Will call for, and approve, method statements for construction activities that might pose an environmental impact and must ensure that method statements are approved before commencement of the work
- Must implement immediate mitigating action in the case of critical environmental impacts
- Must deal with public complaints/queries regarding environmental issues
- Will record his findings and all environmental non-conformances in an environmental completion report on a monthly basis (which will be forwarded to the Client and the Construction Supervisor)
- Will conduct a closing down visit as soon as possible after completion of the Development
- Will commission an independent Environmental Compliance Audit within 6 months after completion of the contract

3.5.3 ECO AUTHORITY

The ECO has the authority to stop works if there is a serious threat to or impact on, the environment as a direct cause of construction. However, this authority is limited only to emergency situations where immediate consultation with the Construction Supervisor is not possible.

- The ECO is to inform the client/developer and site representative of the reasons for the stoppage as soon as possible. A relevant reason should be supplied as soon as possible after stoppage of such works
- Upon failure by the Contractor or his employee to show adequate consideration to the environmental aspects of this contract i.e. wilful destruction of the environment, the ECO may recommend to the client/developer or site representative to have the Contractor's representative or any employee(s) removed from the site or work suspended until the matter is remedied
- No extension of time will be considered in the case of such suspensions and all costs will be borne by the Contractor

3.5.4 HEALTH AND SAFETY OFFICER

A Health and Safety (H&S) Officer for the project must be designated or appointed by the Contractor or Principal Agent, and his/her role is to support the successful implementation of the EMP through:

- Site evaluation on a regular basis
- Identifying issues relating to day-to-day construction activities and that can have a detrimental effect on the environment
- Subcontractor audits to ensure compliance
- Assist in the direct implementation of the EMP
- Ensure that the requirements of the EMP are communicated understood by personnel on site via induction sessions
- Ensure that the Contractors on site develop, implement and monitor the required H&S management functions
- Evaluate the applicability and accuracy of the EMP and the method statements throughout the construction phase
- Coordinate all statutory requirements including permit authorisation and license requirements
- Conduct or have conducted a hazard analysis and take the necessary corrective action
- Where it is not possible to remove any remaining hazard's, inform employees thereof and what precautionary action is to be taken
- Detail mitigation measures required to be taken, and the procedures for their implementation to the project manager
- Representing H&S issues at the production meetings
- Coordinate H&S training of personnel
- Coordinating spill response personnel
- The H&S officer shall inspect the integrity of the hazardous waste containers/bins/skips on a weekly basis

3.5.5 HEALTH AND SAFETY OFFICER QUALIFICATIONS

The Health and Safety Officer must be independent and suitably qualified, with a sound knowledge of the Occupational Health & Safety Act (Act no. 85 of 1993) and must have experience of the implementation of the act with regards to the construction and environmental environments in which the activity will take place.

3.6 COMMENCEMENT OF WORKS

The site project Contractors must promptly receive a copy of the construction phase EMP (CEMP) and any other further additional information that pertains to site conditions/amendments or deviations from original site plan.

- This EMP must be included to form part of the Contractors site specification documentation
- A copy of the EMP must be on site at all times and available for presentation to any authority requesting to see such document.

NO WORK ON SITE MAY TAKE PLACE UNTIL:

- The Declaration of Understanding/Environmental Contract is signed between the relevant parties
- At least one week's written notice (or as specified in the EA) given to the Department before commencement of any construction activity
- On-Site Start-Up Meeting has been held
- Site and No-Go areas have been identified **and demarcated**
- Contractors are in possession of the EMP and other relevant documentation
- Contractors/Subcontractors have signed the Declaration of Understanding
- All mandatory site equipment is in place
- On Site Environmental Education and Awareness training session has taken place with all relevant construction personnel present

NB: Work refers to Camp Establishment, Earthmoving activities and any preliminary construction activities.

3.7 ISSUES OF CONCERN

Issues of concern that were identified in the Environmental Impact Assessment process and included in the EA or detailed in the Basic Assessment Report, must be addressed during the "On Site Start-Up Meeting" and must be included in the On-Site Start-Up Report. Issues of Concern include but shall not be limited or restricted to the following:

- Site demarcation
- Demarcation and protection of any "no-go areas"
- Establishment of temporary laydown areas
- Waste management and disposal
- Mandatory site equipment
- Establishment of construction site compound
- Ablution & Toilet Facilities
- Concrete works & batching plant facilities (if required)
- Soil erosion and sediment control
- Firefighting equipment & emergency fire reaction plan
- Rehabilitation

3.8 SITE SPECIFIC ARRANGEMENTS & CONSTRUCTION PROCEDURES

Please note that all recommendations summarized in the Basic Assessment Report, must be addressed and read as part of the site-specific arrangements & construction procedures which will include:

- General recommendations
- Site specific mitigations

- Conditions of approval of the Environmental Authorisation (if required)

3.8.1 ON-SITE START-UP MEETING

The mandatory **On-Site Start-Up Meeting** must be conducted at least **14 days but not less than 5 working days** prior to commencement of any site/camp establishment, earthworks and/or construction activities and will relate to additional discussed information that must be complied with during the entire construction phase.

On-Site Start-Up Meeting points of discussion are:

- The Construction EMP & other relevant site documents
- Project to be discussed and all uncertainties are cleared
- Method statement/s to be discussed
- Power line upgrade access routes
- Road and construction area to be demarcated
- Materials stockpile and lay down areas to be demarcated
- Method of stockpiling to be discussed
- Firefighting procedures
- Mandatory firefighting equipment & fire preventative measures
- Solid waste removal intentions
- Placement, type and service of toilets to be agreed on
- Placement and type of rubbish bins and removal of rubbish to be agreed on
- Labour camp to be demarcated and services agreed on
- Environmental Education and awareness training session to all contractors & onsite staff/labour
- Location & establishment of concrete batching plant facility

3.8.2 START-UP MEETING PARTICIPANTS

Minutes of the onsite Start-Up Meeting will be condensed to a report format and circulated to all attendees of the above-named meeting for their perusal and comments. The On-site Start-up Meeting report will form part of this EMP. If any discrepancies between the start-up report and the EMP arise then the EMP will take precedence until clarification on the discrepancy is clarified. If any discrepancies between the EMP and the EA arise, then the EA will take precedence until clarification on the discrepancy is clarified.

Participants to the start-up meeting can include:

- Applicants Representative
- Main Contractor's Representative
- Resident Engineer
- Site foreman
- Environmental Consultant
- Environmental Control Officer

NB: It is the responsibility of the main contractors to ensure that all sub- contractors, that work on the site during and after the civils contract, are informed of the environmental conditions pertaining to the site.

3.9 ENVIRONMENTAL- & AWARENESS TRAINING

3.9.1 ENVIRONMENTAL AWARENESS COURSE

Environmental awareness training courses shall be run for all personnel on site. The ECO will be responsible for the initial awareness course which shall include all relevant management, the Construction Supervisor, the Contractor and all foremen. All attendees shall remain for the duration of the course.

The Contractor shall be responsible to ensure that all his personnel and subcontractors (if applicable) are informed and made aware of the environmental constraints and shall also supply the ECO with a monthly report indicating the number of employees used. If refresher courses are deemed necessary, for instance, where personnel disregard the requirements of the EMP, the time lost and the cost of the course would be for the account of the Contractor.

3.9.2 SPECIFIC TRAINING

All contractors and workers shall be informed about any special habitat, biodiversity feature, vegetation and/or rare plant species that might be present on the specific construction site (if applicable).

3.10 METHOD STATEMENTS

Method statements from the contractor will be required for specific sensitive actions on request of the authorities, the Applicant and/or ECO.

A method statement forms the base line information on which sensitive area work takes place and is a "live document" in that modifications are negotiated between the Contractor and ECO/applicant, as circumstances unfold.

All method statements will form part of the EMP documentation and are subject to all terms and conditions contained within the EMP main document.

These documents must be available to the authorities for inspection or on request.

A method statement describes the scope of the intended work in a step-by-step description in order for the ECO and Applicant to understand the contractors' intentions. This will enable them to assist in devising any mitigation measures, which would minimize environmental impact during these tasks.

The Contractor must submit the method statement before any construction activity is due to start. Work may not commence until the ECO and applicant have approved the method statement.

Method statements need to be compiled by the contractor for approval by Applicant and the ECO. The contractor must submit written method statements to Applicant for the purposes of the environmental specification, a "Method Statement" is defined as a written submission by the contractor to Applicant setting out the plant, materials, labour and method the contractor proposes using to carry out an activity, in such detail that Applicant and the ECO is able to assess whether the contractor's proposal is in accordance with the specifications and/ or will produce results in accordance with specifications.

The method statement must cover applicable details with regard to:

- Construction procedures
- Materials and equipment to be used
- Getting the equipment to and from site
- How the equipment/ material will be moved while on site

- How and where material will be stored
- Location & establishment of concrete batching plant facility
- The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material (of any potential hazardous material) that may occur
- Timing and location of activities
- Compliance/ non-compliance with the Specifications, and
- Any other information deemed necessary by the Applicant and the ECO

The Contractor must abide by these approved method statements, and any activity covered by a method statement must not commence until the Applicant and the ECO has approved of such method Statement.

NB: No work may commence or take place before the Method Statement has been approved by all relevant parties.

List of possible Method statements include but shall not be limited or restricted to:

- Demarcation
- Demarcation and protection of "no-go areas"
- Entrance and Haul Road
- A traffic management plan for the site access road
- A storm water management plan
- An erosion management plan
- Clearing of vegetation and topsoil removal
- Clearing and disposing of alien vegetation
- Stockpiling
- Temporary storage facilities
- Construction camp and site offices
- Fuel storage
- Labourer's facilities
- Mandatory site equipment
- Waste control
- Cement mixing & batching areas
- Construction vehicle maintenance
- Heavy earthmoving equipment
- Dust control
- Noise control
- Rehabilitation

3.10.1 ADDITIONAL METHOD STATEMENTS

Any additional method statements (with regards to a specific aspect of construction) that may be required must be **submitted** and approved before commencement of the specific works and must be available at the site offices.

3.11 AUDITING PROGRAMME

In terms of Regulation 34 of the NEMA EIA Regulations, 2014 (as amended), the holder must conduct environmental audits to determine compliance with the conditions of the Environmental Authorisation, and/or other authorizations, the EMPr, and any other statutory requirements that may be applicable when undertaking the listed activities and must submit Environmental Audits report to the Competent Authority. The Environmental Audit Report must be prepared by an independent person and must contain all the information required in Appendix 7 of the NEMA EIA Regulations (as amended).

A post-construction Environmental Audit, as defined above, must be conducted not less than one month after completion of construction, with the final construction audit report being submitted to the Competent Authority not more than 6 months after construction is completed, or as stated by the Competent Authority.

The holder of the license must within 7 days of the submission of the above-mentioned report to the Competent Authority, notify all potential and registered I&APs of the submission, and make the report available to anyone on request and a publicly accessible website.

3.12 NON-COMPLIANCE

Applicant (on recommendation by the ECO) reserves the right at all times for the duration of this agreement to impose restrictions and associate penalties on the contractor with respect to the specific nature, timing and extent of construction activities on environmentally sensitive sites.

3.12.1 CORRECTIVE ACTION INSTRUCTION

The ECO may issue an onsite corrective action instruction to the site agent, or, by means of an entry into the Site Instruction Register for remedial work to be carried out to rectify any non-compliance that has been carried out within a reasonable agreeable time frame to carry out and complete the remedial work.

3.12.2 WRITTEN WARNING

In instances of non-compliance with the EMP by the contractor (or any of their employees) or sub-contractor/s (or any of their employees) that move on or off the site, the ECO must issue a written warning indicating the non-conformance to the contractor.

If repeated instructions by the ECO to the site agent to respond to the corrective action instruction have not been carried out, the ECO can issue a written warning notation instructing the site agent to promptly carry out the corrective measures as per the original non-compliance.

3.12.3 PENALTY FINES

In the event of the site agent negligence to respond and correct the noted non-compliance the ECO may in collaboration with the relevant parties recommend that a penalty fine be imposed on the contractor.

- The applicant, in consultation with the ECO must determine the amount of the penalty applicable in accordance with the penalties for Non-Compliance Schedule of Tariffs
- Such penalty amount must be in writing and presented to the contractor within seven (7) days of the written warning
- Applicant may recover penalties by deducting the fine from the offending contractor
- The contractor will be responsible for all costs incurred where emergency procedures are implemented to deal with accidents impacting on the environment as well as the rehabilitation of such damage in conjunction with the ECO and site engineer

- In serious cases, at the discretion of Applicant and the Environmental Consultant/ECO, any multiple offences can be added together

3.12.4 STOP WORKS

The ECO (after consultation with Environmental Consultant/Applicant/Engineer) may also stop the works or part thereof until the situation is resolved; no extension of time is claimable by the contractor. These penalties do not preclude any prosecution under any law or regulation.

3.13 CHANGES TO EMP

Although care has been taken to address all known relevant environmental issues for the construction phase, it may become necessary to add or amend certain procedures or instructions to improve the efficiency of the Environmental Management Plan (EMP).

- Only those additions or amendments of this EMP that will either improve environmental protection or can be proved not to have any negative effect to the immediate and surrounding environment will be considered
- Changes or deviations have to be motivated in writing by means of a Method Statement and the same procedures for a standard Method Statement have to be followed
- Any additions or amendments must be submitted by the ECO to the Competent Authority (if so requested and required) after the ECO has consulted with the Environmental Consultant and Applicant
- No deviation from the contents of the EMP is allowed without the above-named prescribed procedures

3.14 RECORD KEEPING

All records relating to the implementation of this Environmental Management Plan must be kept together, be readily retrievable and available for scrutiny by any relevant authority. Records include the following:

- Declarations of understanding
- ECO Checklist, audits and/or diary
- Method Statements
- Environmental incident reports
- Photographs (must be taken before, during and immediately after construction as a visual reference)
- The Environmental completion statement

These records must be available for scrutiny by any relevant authorities.

3.15 STANDARD MANAGEMENT PROCEDURES

3.15.1 ACCESS AND HAUL ROUTES

The Contractor must control all access (vehicles and plant) to and from the construction site, including that of suppliers used, to ensure that they remain on the Pre-Applicationroved designated routes. In addition, such vehicles and plant must be so routed and operated as to minimise disruption to regular users of the routes.

- Where heavy duty vehicles and construction plant are required, both the type of vehicles/machinery and the area/s these are to access shall be specified in a Method Statement and/or Traffic Management Plan
- Access routes/haul roads will utilise only existing roads or tracks, unless such routes are not available or new routes are to be constructed as part of the project, in which case a Method Statement must be submitted for the construction of any new access/ haul roads (including temporary routes)

- No new roads or tracks may be created except where such routes are specifically approved by the ECO, in the EA or in this EMP
- Any new access roads/haul roads must be designed to minimise erosion and must run across slopes and not directly up-hill
- All vehicles and access to the site must remain within demarcated access routes and working areas on site
- All reasonable measures must be implemented to minimize impacts on road users
- On gravel or earth roads on site, the vehicles of the Contractor and his suppliers may not exceed a speed of 25 km/h
- On public roads adjacent to the site, vehicles will adhere to municipal and provincial traffic regulations
- Any temporary access routes must be rehabilitated at the end of the contract to the satisfaction of the ECO
- All vehicles used for transportation or construction purpose must be limited to the designated routes to avoid unnecessary compaction of topsoil or to prevent disturbance of animals and plants outside of construction areas
- If required, access roads must be covered with gravel to minimize dust pollution and the gravel must be extracted from a permitted quarry

If required by the owner of the land the following may also apply with regard to access and vehicular movement on site:

- All Contractors, subcontractors and staff shall be identified by clothing with company logos and be in possession of valid SA identity documents
- Deliveries, removals etc. to be completed during normal working hours (unless otherwise agreed upon by the Construction Supervisor)
- No personnel shall stay permanently on site, unless permission to stay on site provided as part of the construction contract
- Access route diversions must be clearly demarcated by orange twine/danger tape on steel posts or temporary fencing
- The Contractor shall at their own cost document the existing condition of all access roads prior to commencement
- Should any damage occur to the access road as a result of the upgrade activities, the road will be rehabilitated to its original state with all costs borne by the contractor

3.15.2 APPROPRIATE USE OF MACHINERY

Contractor must always carefully consider what machinery is appropriate to the task while minimizing the extent of environmental damage.

- The contractor may not operate any machinery including a fuel driven compressor outside the demarcated area
- All vehicles and equipment must be routinely inspected for fuel and oil leaks and kept in good working order and serviced regularly. Leaking equipment must be repaired immediately or removed from the Site. When servicing equipment, drip trays must be used to collect the waste oil and other lubricants. Drip trays must also be provided in construction areas for stationary plant (such as compressors) and for "parked" plant (such as scrapers, loaders, vehicles). Drip trays will be kept free of water that will float the oil to overspill. All drip trays/bungs to attain a 120% capacity of the plant fuel/oil capacity

- Where practical, all maintenance of plant and machinery on site must be performed in workshops. If it is necessary to do maintenance outside of a workshop area, the Contractor must obtain the approval of the Engineer and the ECO prior to commencing activities
- Appropriate 4.5 kg (minimum requirement) dry powder SABS approved and service certified fire extinguisher must be a mandatory item on all vehicles working and moving on or off the construction site
- The servicing, repairs and maintenance of all construction machinery must take place at the designated service and maintenance yard and not along the proposed new road construction route

3.15.3 "NO-GO" AREAS

Specifications of the Environmental Authorisation (EA), the Environmental Management Plan (EMP) or the On-Site Start-Up Meeting (OSSM) can require that certain areas are to be considered as "No go" areas as a result of their environmental significance or proximity to environmental significant features.

- Any and all areas identified in site sensitivity overlays as "no-go" areas are to be considered as such, and appropriately demarcated as such
- All areas of natural vegetation and streams/rivers outside of the development footprint should be considered "no-go" areas
- A Method Statement is to be submitted to the ECO by the Contractor, detailing the method of demarcation for protection of such conservation areas
- No-Go areas are out of bounds to the Contractor and staff, sub-contractors and staff or suppliers and staff or any other person involved in the project, without the written permission specified by the ECO
- The Contractor must ensure that, insofar as he has the authority, no person, machinery, equipment or material enters the designated "No Go" areas at any time
- All contractors must be made aware of the importance of these features and the consequences of non-compliance. All staff are to be made aware of the "no–go" areas in the induction and environmental awareness training
- Any areas identified by the applicant/landowner within the property outside of the development footprint
- All private property/farms outside of the works area are considered "no-go" areas, unless permission has been received from the ECO and written permission has been received from the landowner
- Natural vegetation outside of the development area will be considered no-go areas, unless for the purpose of alien vegetation clearing

3.15.4 RESTRICTION OF WORKING AREAS

The approved layout plans will be used to establish the site demarcation (footprint). All relevant parties responsible for the day-to-day activities on the site will be present and made aware of the implication of the site demarcation. They include the:

- Environmental Consultant: EnviroAfrica
- Principle Agent
- Main Contractor: Project Site Manager
- Sub-contractor: Project contractor
- ECO: Environmental Control Officer

The proposed site will be demarcated prior to the commencement of any construction whatsoever, this includes site establishment, the moving of construction material or any other items onto the site, etc.

- The site will be demarcated with appropriate dropper poles. A single strand of orange baler twine is to be attached to the dropper poles to indicate boundaries and no-go areas for site personnel and vehicular movement (Alternative fencing may be decided upon dependent on-site requirements). Other demarcation measures can be used if approved by the ECO
- The construction area i.e. road, stockpile areas and development footprint etc. must be demarcated and fenced off with dropper poles and orange baler twine approximately 1m high is considered adequate. **The demarcation will be agreed on during the start-up meeting**
- All fencing and fence placement/positioning must be approved by the ECO on site
- Work areas and access routes must be clearly demarcated to minimise environmental impact
- In the event that sensitive features are threatened by construction activities, temporary fencing off of these areas (for individual areas such as trees or rocks) or the construction area (when working in a mainly natural environment) is recommended
- NB: Also note the requirements discussed under the following paragraphs: 3.15.5; 3.15.6; 3.15.7; 3.15.8
- The Contractor must maintain in good order all demarcation, fencing and barriers for the duration of construction activities, or as otherwise instructed
- Demarcation may not be moved, re-located or altered or changed without the approval of the ECO
- Any temporary fencing removed for the execution of any portion of the works is to be reinstated by the Contractor as soon as practicable.
- The Contractor at the end of the contract must remove all demarcation, fencing or barriers not forming part of the final works on site

3.15.5 PROTECTION OF NATURAL VEGETATION

Habitat fragmentation is usually defined as a landscape-scale process involving both habitat loss and the breaking apart of habitat. Habitat loss has large, consistently negative effects on biodiversity. Habitat fragmentation per se, has much weaker effects on biodiversity, but could be just as negative. As such the construction activities must endeavour to minimise its impact on any remaining natural features and natural corridors.

- All remaining natural corridors identified as significant during the environmental assessment stage, must be mapped and identified as “No-Go” areas on the site plans and protected measures must be installed (demarcated). Only alien vegetation clearing may take place within the natural areas outside the demarcated works area
- Except to the extent necessary for the carrying out of the works, no natural indigenous flora may be removed, damaged or disturbed
- Trapping, poisoning and/or shooting of animals is strictly forbidden. No domestic pets or livestock are permitted on Site
- Where the use of herbicides, pesticides and other poisonous substances are to be used, the Contractor must submit a Method Statement
- The Contractor may not deface, paint, damage or mark any natural features, if these should occur (e.g. trees, rock formations, buildings, etc.) situated in or around the Site for survey or other purposes unless agreed beforehand with the Engineer and the ECO. Any features affected by the Contractor in contravention of this clause must be restored/rehabilitated to the satisfaction of the Engineer and the ECO
- All incidents of harm to any animal or natural vegetation (apart from the agreed upon areas) must be reported to the ECO

3.15.6 PROTECTION OF FAUNA AND AVI-FAUNA

Trapping, poisoning and/or killing of animals and birds is strictly forbidden. No domestic pets or livestock are permitted on site. Many slow-moving animals, local amphibian and other species follow instinctive movements along roadside corridors where they travel from place to place.

- Every effort must be implemented on a daily on-going basis by the contractor to ensure that the construction areas have been checked for any animals and to ensure their removal and protection from direct and in-direct impacts during the construction activities. Special cognisance of tortoises must be taken on site
- The removal of fauna from the site must be done in accordance with the requirements of the Nature Conservation Ordinance regulating these activities
- Environmental corridors and "No-Go" areas must be demarcated and protected

3.15.7 CLEARING OF VEGETATION, STRIPPING AND CONSERVATION OF TOPSOIL

The contractor shall take all reasonable steps to minimise the impact of his activities on the environment. If natural vegetation must be removed for construction purposes, the natural vegetation shall be rescued, re-used (e.g. stabilizing the area after construction or re-vegetating other impacted areas) in such a way that it enhances the remaining natural veld. By the same principle, topsoil (which contains the remaining natural seeds as well as possibly many bulb species) must be carefully removed and stored or re-used for rehabilitation or impacted areas in the immediate vicinity.

Vegetation clearing:

- A Method Statement must be submitted detailing the methods to be used for vegetation clearing
- All cleared areas must be stabilised as soon as possible
- Burning of cleared vegetation on site is prohibited
- The burying of cleared vegetation or use as part of backfill or landscape shaping is prohibited unless written approval is obtained from the ECO
- Cleared vegetation may be used for mulch or slope stabilisation of the Site
- Should bulk vegetation be removed from the designated working areas (footprint area) then tall vegetation shall first be removed through brush cutting and chipping of larger shrub material; this may be added to the topsoil material stockpiles as mulch
- Unless otherwise agreed upon, only indigenous plant material shall be used for this purpose

Topsoil removal

- Prior to any activities within the demarcated work areas, topsoil material shall be removed to a depth of 300 mm or deeper if specified by the engineer in consultation with the ECO, and stockpiled in a designated area for use in rehabilitation of the site post construction. Only sufficient topsoil is to be stored for rehabilitation purposed
- Topsoil from the still relatively natural area (the top 15 -20 cm) should be removed and be used for rehabilitation after construction on site or in the immediate vicinity of the site
- Any area where the topsoil will be impacted by construction activities, including the construction offices and storage areas, must have the topsoil stripped and removed and covered with herbaceous vegetation (other than alien species), overlying grass and other fine organic matter and stockpiled for subsequent use in rehabilitation

- Topsoil storage areas must be convex and should not exceed 2 m in height. The Contractor must ensure that the material does not blow or wash away. The use of a bund wall should be considered, if appropriate, for the storage of the topsoil
- The topsoil should be stored outside the 1:50 flood level within demarcated area
- Topsoil shall be kept separate from overburden and shall not be used for building or maintenance of access roads
- Topsoil must be treated with care, must not be buried or in any other way be rendered unsuitable for further use (e.g. by mixing with spoil) and precautions must be taken to prevent unnecessary handling and compaction
- In particular, topsoil must not be subject to compaction greater than 1 500 kg/m² and must not be pushed by a bulldozer for more than 50 m. Trucks may not be driven over the stockpiles
- Topsoil from different soil types must be stockpiled separately and replaced in the same areas from which they were taken if this proves to be the case. Specific attention should be given to the areas that may house rare and threatened species
- Topsoil areas must be demarcated in order to ensure the safekeeping of topsoil and to separate different stockpile types

3.15.8 EROSION AND SEDIMENTATION CONTROL

The Contractor must take appropriate on-going and active measures to prevent erosion resulting from his own construction activities and operations as well as storm water control measures to the satisfaction of the ECO. During construction the Contractor must protect areas susceptible to erosion by installing all the necessary temporary and permanent drainage works as soon as possible.

In order to achieve erosion and sediment control, the following are applicable to all sites:

- No new development, without written authority approval, will be allowed on slopes greater than 12% (CARA, regulation 3). If applicable terraces will be made in accordance with agricultural regulations
- Install erosion and sediment controls before work starts and maintain these features throughout the construction and operational phases (as applicable)
- Leave as much vegetation as possible
- Install temporary fences to define “No Go” areas in those areas that are not to be disturbed.
- Divert run-off from upslope away from the site, but ensure that it does not cause downstream erosion For example, dig drainage channels (catch drains sized to accommodate the upslope catchment)
- Install sediment controls down slope of the site to catch sediment (if applicable)
- Inspect and maintain erosion and sediment controls regularly
- Limit vehicle movement to the site and control access points. Clearly mark such access points and inform all suppliers
- Save and re-use topsoil during revegetation. Never store topsoil around trees as this may kill them. Spread the topsoil back when the work is finished and revegetate the site as soon as possible to control erosion. Remove the sediment and erosion controls only after revegetation was successfully implemented
- Store all stockpiles and building materials behind sediment fences. Cover them with plastic to prevent erosion by wind
- It is illegal to discharge water into a public stream if the quality does not conform to the required health or water standards. Other measures as may be necessary must be taken to prevent the surface water from being concentrated in streams and from scouring the slopes, banks or other areas. Any potential

hazardous fluids / materials must be protected from the rain to prevent them being washed into storm water channels. All such measures must be discussed with and approved by the ECO
- Fill in all trenches immediately after services have been laid
- As far as possible, work must be done during the dry season, low flow conditions
- Downstream placement of sediment containing measures
- Due diligence to limit sediments washing down the river
- Vegetation of ramps and shoulders

Please also refer to the method statements of the river maintenance and management plan. Please note that these Method statements only serve as guidelines and any changes to the method statements should be communicated to the Department of Environment and Development Planning.

3.15.9 ALIEN INVASIVE MANAGEMENT PLAN

In accordance with Regulation 15 and 16 of the Conservation of Agricultural Resources Act, 1983 (Act no. 43 of 1983) (CARA) as amended, all listed alien invasive plant species must be managed on any land in SA. As such an alien invasive management plan may be required to be implemented during construction and operation phase of the project. If such a plan is required, it must include mitigation measures to reduce the invasion of alien species and ensure that the removal of alien species is undertaken. Wetlands and rivers are especially susceptible to many of species.

- In accordance with CARA all identified alien invasive plants encountered on the property and its immediate surroundings must be controlled
- All alien invasive species must be identified and removed from each site and its immediate surroundings. This is especially true for any remaining natural corridor on site
- No vegetation may be buried or burned on site
- Where the use of herbicides and other poisonous substances are to be used, the Contractor must submit a Method Statement

The invader status of the various invasive alien species in South Africa is described in accordance with Regulation 15 and 16 of the Conservation of Agricultural Resources Act, 1983 (Act no. 43 of 1983) (CARA) as amended (the 3 categories and its control are summarised underneath).

Category 1 (Declared Weed)
- Prohibited on any land or water surface in South Africa
- Must be controlled or eradicated (except in biological control reserves)

Category 2 (Declared Invader – commercial value)
- Allowed only in demarcated areas under controlled conditions
- Outside of controlled areas invaders must be controlled or eradicated where possible
- Prohibited within 30 m off the 1:50 year flood line of watercourses or wetlands unless authorization has been obtained

Category 3 (Plant Invaders – ornamental value)
- Allowed only in areas where they were already in existence with the promulgation of the regulations.
- Prohibited within 30 m of the 1:50 year flood line of watercourses or wetlands unless authorization has been obtained.
- All reasonable steps must be taken to ensure that they do not spread.

- Propagative materials of these plants (e.g. seeds or cuttings) may no longer be planted, propagated, imported, bought, sold or traded in any way.

3.15.10 PROTECTION OF ARCHAEOLOGICAL & PALEONTOLOGICAL REMAINS

Archaeological remains are ancient man-made objects, structures, or ancient burials that have been preserved on the earth's surface, underground, or underwater and serve as the historical sources that make it possible to reconstruct the past history of human society, including mankind's prehistory. Palaeontology, on the other hand, is the study of prehistoric life. It includes the study of fossils to determine organisms' evolution and interactions with each other and their environments (their paleoecology). Palaeontology lays on the border between biology and geology, and shares with archaeology a border that is difficult to define.

- Basic archaeological remains include work tools, weapons, domestic utensils, clothing, and ornaments; settlements including campsites, fortified and unfortified settlements, and separate dwellings; ancient fortifications; the remains of ancient hydraulic structures; ancient agricultural fields; roads; mining pits and workshops; ancient burial grounds and various burial and religious structures (stelae, stone figurines, stone fish monoliths (vishaps), menhirs, cromlechs, dolmens, sanctuaries); drawings and inscriptions carved into individual stones and cliffs; and architectural monuments. Archaeological remains also include ancient ships and their cargoes that sank in rivers and seas and settlements that came to be underwater as a result of shifts in the earth's crust
- Should any archaeological remains or palaeontological resources (including but not limited to fossil bones and fossil shells, coins, indigenous and/or colonial ceramics, any articles of value or antiquity, stone artefacts and bone remains, structures and other built features, rock art and rock engravings) are discovered during construction they must immediately be reported to Heritage Western Cape and/or SAHRA and must not be disturbed further until the necessary approval has been obtained from SAHRA
- Should any human remains/burial or archaeological material be disturbed, exposed or uncovered during construction, these should immediately be reported to the South African Heritage Resources Agency. The ECO and ER are also to be informed. An archaeologist will be required to remove the remains at the expense of the developer
- Note that the Contractor may not, without a permit issued by the responsible heritage resource authority; destroy, damage, excavate, alter, deface or otherwise disturb any archaeological site or archaeological material. The latter is a criminal offence under the Heritage Resources Act
- A Fossil Find Procedure must be implemented, should any fossil material be discovered during construction, this must be safeguarded (preferably *in situ*) and the Environmental Control Officer (ECO) should alert SAHRA so that appropriate mitigation (*e. g.* recording, sampling, or collection) can be taken by a professional palaeontologist

SAHRA contact details:
PO Box 4637, CAPE TOWN, 8000
111 Harrington Street, Cape Town
Tel: (021) 462 4502
Website: www.sahra.org.za

3.15.11 STORAGE OF CONSTRUCTION MATERIAL AND STOCKPILING

New construction material will be stored in demarcated areas on the affected properties prior to commencement of construction. The Contractor must provide a method statement (for approval by the ECO) of the construction activities which will indicate:

- The type and quantity of material to be stored
- Whether any oil contaminated/containing equipment will be stored
- How (including what type of vehicles will be required) it will deliver the material on site at the necessary storage area
- Whether there is any risk of spill or runoff of any building materials or chemicals and how this is to be mitigated

In addition:

- The Contractor must ensure that any delivery drivers are informed of all procedures and restrictions (including "no-go" areas) required to comply with the Specifications. The Contractor must ensure that these delivery drivers are supervised during off-loading, by someone with an adequate understanding of the requirements of the Specifications
- All manufactured and/or imported material must be stored within the demarcated area, and, if so required, out of the rain. All lay down areas outside of the construction camp must be subject to the Engineer and the ECO's approval in such a way as not to cause a nuisance or environmental damage
- All building materials are to be prepared at the batching plant, to enable the effects of cement and other substances, and the resulting effluent to be more easily managed
- It is essential that any imported material i.e. base material for road works, building sand, bedding base sand for pipe / cable lines etc. must be screened and of which the origins must be identified prior to arriving at the receiving environment, this must be approved by the Engineer/ECO
- Special care must be taken to prevent bringing in materials contaminated with seed of Invasive Alien Plants. Contractors shall not import construction materials such as sand, gravel or fill contaminated with seed of Invasive Alien Plants, or quarried from areas surrounded by Invasive Alien plant species such as Port Jackson or Rooikrans
- The Contractor must negotiate appropriate space on for this purpose on an area away from natural vegetation and any wetland habitat with the ECO
- The Contractor must ensure that all staff, contractors and subcontractors are aware of and keep material within these designated storage areas. The Construction Supervisor shall ensure that the consultant team is familiar with same
- Contractors will not be allowed to store new construction material on the sides of the access road, or within natural vegetation or next to the existing access road
- Stockpiling of gravel, cut, fill or any other material including spoil should only be allowed in degraded areas or areas within the development footprint.
- Any area used for stockpiling and not covered by building development must be returned to at least the state they were in before stockpiling and it must be ensured that the erosion potential of these areas is not increased
- The Contractor must ensure that the material does not blow or wash away (especially into riparian zones) or mix with each other. If the stockpiled material is in danger of being washed or blown away, the Contractor must cover it with a suitable material, such as hessian, netting or plastic

3.15.12 OIL STORAGE AND MANAGEMENT

An important potential environmental impact is oil spills from any oil filled equipment and machinery that may occur during transportation, operation or storage. The following conditions shall apply:

- Vehicles must be checked for oil leaks prior to going on site

- Care should be taken to prevent any potential oil spillage during upgrading activities
- Sufficient measures should be put in place to ensure that any potential oil spills are mitigated
- An oil spill kit should be available on site at all times during the construction activities
- Oil containment facilities should be provided for any oil filled equipment onsite
- All oil spills must be reported to the ECO within 24 hours, indicating the containment and rehabilitation measures implemented

3.15.13 STORING OF PETROLEUM PRODUCTS

Although no petroleum products will be stored on-site, it is important to know that petroleum fuels contain harmful substances known to cause health problems and can easily have adverse effects on water quality, and the environment. Petroleum spills can move rapidly into the soil and quickly contaminate drinking water. In order to prevent pollution, it is important to use proper methods when handling, using, and storing diesel fuel, gasoline, kerosene, or other petroleum products.

The South African National Standards pertaining to the installation of a storage tank include:

- Sans 310, which requires that an aboveground storage tank be of sufficient structural strength, based on sound engineering practices, to withstand normal operations and use
- Sans 1668, for fibre-reinforced plastic tanks for the underground storage of petroleum products
- Sans 10089-1, which deals with the storage and distribution of petroleum products in aboveground bulk installations
- Sans 1535, for glass- reinforced polyester-coated steel tanks, for the underground storage of hydro-carbons and oxygenated solvents, which are intended to be buried horizontally

Above ground fuel storage tanks (if required)

Any fuel storage proposals must be cleared by the ECO before any storage or stockpiling takes place. If the contractor proposes to install above-ground fuel storage tanks for use during the construction phase of the project, the following basic requirements must be adhered to:

- A Method Statement, explaining the method of storage and mitigation measures to prevent spillages must be submitted to the ECO and accepted prior to the installation of such a fuel storage facility (please note that storage of any dangerous goods/fuel of 30 cubic meters or more require environmental authorisation)
- The fuel tank must be placed within a completely sealed concrete bund (containment structure) which must be able to contain at least 120% of the total capacity of the fuel tank
- The bunded area should be built to be at least a third wider (on all sides) than the base of the fuel tank in order to maximise its capability to contain spillages and leakages
- The fuel distributor must also be located within bunded area to better prevent against accidental spillages during refuelling
- In addition, drip trays are to be used during refuelling
- All vehicles, equipment, fuel and petroleum services and containers must be maintained in a good condition that prevents leakage and possible contamination of soil or water supplies
- Fuel storage areas must comply with general fire safety requirements
- Fuel storage areas must be at least 100m from any watercourses

Storing of smaller quantities of fuel or oil

Any fuel storage proposals must be cleared by the ECO before any storage or stockpiling takes place. If the contractor proposes to use only small fuel storage facilities (<200 Liters) the following basic requirements must be adhered to:

- Fuels and oils must be safely located out of harm's way from the elements and safety and fire prevention must be strictly adhered to
- All fuel oil containers must be placed within suitable drip trays to prevent accidental spillage of oils and fuels
- A suitable leak proof container for the storage of oiled equipment (filters, drip tray contents and oil changes etc.) must be established
- All spills are to be recorded in the ECO diary

3.15.14 STORING OF HAZARDOUS SUBSTANCES

Although no potentially hazardous substances will be stored on-site it is important to understand how it is important to know how potentially hazardous substances are to be stored on site, the Contractor must submit a Method Statement detailing the substances and/or materials to be used, together with the storage, handling and disposal procedures of the materials to the ECO.

- Hazardous materials must be stored under lock and key in designated areas with properly displayed and visible warning signs
- No works related to the submitted Method Statement may commence until the Method Statement has been studied and approved in writing
- An effective monitoring system to detect any leakage or spillage of all hazardous substances during their transportation, handling, use and storage must be implemented. This must include precautionary measures to limit the possibility of oil and other toxic liquids from entering the soil or storm water systems
- Measures to protect hydrological features such as streams, rivers, pans, wetlands, dams and their catchments, and other environmental sensitive areas from construction impacts including the direct or indirect spillage of pollutants must be implemented
- **Paints:** No paint products may be disposed of on Site and brush/roller wash facilities must be established to the satisfaction of the Engineer and the ECO. Oil based paints and chemical additives and cleaners such as thinners and turpentine must be strictly controlled. A Method Statement detailing the paint management procedures is required
- **Hazardous building materials:** Hazardous building materials must be identified and dealt with in accordance with the relevant safety and health legislation. All such material must be separated on Site and disposed of at appropriate licensed disposal sites. The Contractor must supply the ECO with a certificate of disposal

3.15.15 USE OF CEMENT OR CONCRETE

The Contractor is advised that cement and concrete are highly hazardous to the natural environment because of the high pH levels of the material, and the chemicals contained therein. Wash-out water with high pH is the number one environmental issue for the ready-mix concrete industry. The alkalinity levels of wash water can be as high as pH 12, which is toxic to fish and other aquatic life.

The Site Supervisor or Contractor must indicate the need for and the proposed location of concrete batching plants which includes the location of cement stores, sand and aggregate stockpile areas. A Method Statement indicating the layout, type of concrete batching preparation (dry or wet mix). The site agent must indicate on the Method Statement proposed total volume of concrete that is needed for the completion of the entire project.

Concrete/cement mixing (if applicable):

- Concrete and cement may only be mixed on existing hard surfaced areas, or edged mortar boards or a suitable container. Concrete may not be mixed or stored directly on the ground under any circumstances
- The visible remains of the batch and concrete, either solid, or from washings, must be physically removed immediately and disposed of as hazardous waste
- Washing of equipment shall be done in a container to prevent any runoff of contaminated washing water
- Extreme care must be taken to limit the amount of water contaminated by washing equipment. Water from concrete washing can be re-used in concrete mixes or must be stored in drums, then removed from the site and disposed of at a licensed municipal dump site

Concrete batching plants (if applicable)

The following procedures must be implemented to control wastewater run-off from concrete batching plant locations:

- The location of concrete batching areas must be approved by the ECO (if possible/appropriate, the use of ready-mix concrete is preferred)
- Concrete batching facilities must have suitable bunding methods in place to ensure minimal wastewater run-off occurs during batching operations
- Contaminated water may not enter a natural or man-made (e.g. trench/sloot or dam) water system. Preventative measures include establishing sumps from where contaminated water can be either treated in situ or removed to an appropriate waste site
- Dry mixing batching areas to be carefully placed in consultation with the ECO
- Cement bags are to be stored securely out of harm's way from the elements (wind and rain). Bags have to be covered and placed on plastic sheeting. Used cement bags must be disposed of on a regular basis via the solid waste management system, and must not be used for any other purpose
- Sand and stone used for cement or concrete batching must be stored on plastic layers (or on ECO approved disturbed areas) in order to prevent contamination of the natural environment
- Cleaning of equipment and flushing of mixers must not result in pollution of the surrounding environment. All wastewater resulting from batching of concrete must be disposed of *via* the contaminated water management procedure
- Excess or spilled concrete must be confined within the works area and all visible remains of excess concrete must be physically removed and disposed of on completion of cement work. Washing the remains into the ground is not acceptable. All excess aggregate must also be removed
- Wash-down areas must be confined to within the concrete batching areas only

3.15.16 FIREFIGHTING

Adequate firefighting equipment according to the fire hazard during the construction period must be available on site and in good working order (at least one type of ABC (all purpose) minimum 4.5 kg extinguisher and 3 fire beaters per working area). The persons on site must be trained in the use of such equipment.

- The main contractor must provide a list of all authorities involved in firefighting in the region. This list must include emergency contact numbers and must be visible at the site office
- Welding, gas cutting or cutting of metal will only be permitted inside the working areas
- The Contractor must pay the costs incurred to organizations called to put out any fires started by him. The Contractor must also pay any costs incurred to reinstate burnt areas as deemed necessary by the landowner
- It is required that contractors have available the emergency telephone numbers of the nearest local Fire Fighting Station and that an emergency firefighting re-action plan has been drawn up with on-site workers and the resident landowner/farmer
- No on-site fires are permitted
- No firewood may be collected on site or from the surrounding natural area

3.15.17 EMERGENCY PROCEDURES

It is the responsibility of the contractor to assess the potential risks to the environment as a result of the project. As such, the contractor must have the necessary standard emergency operating procedures in place to deal with any potential emergency such as oil spills or fire.

- All staff should be made aware of the necessary basic emergency procedures in the event of an emergency including injuries to staff. The appropriate equipment and identified personnel to deal with such basic emergencies should be available on site
- All staff on site should wear hi-viz vests when on site
- **Fire:** The Contractor must advise the relevant authority of a fire as soon as one starts and must not wait until he can no longer control it. The Contractor must ensure that his employees are aware of the procedure to be followed in the event of a fire
- **Hazardous Material Spills**: The Contractor must ensure that his employees are aware of the procedure to be followed for dealing with spills and leaks, which must include notifying the Engineer, the ECO and the relevant authorities. Treatment and remediation of the spill areas must be undertaken to the reasonable satisfaction of the ECO and Local Authority

3.15.18 SOLID WASTE MANAGEMENT

Waste refers to all solid waste, including domestic waste, hazardous waste and construction debris. The Contractor is responsible for the establishment of a refuse control system (which must consider recycling wherever possible) that is acceptable to the ECO. Disposal arrangements must be made in advance and cleared with the ECO before construction starts.

- No littering or on-site burying or dumping of any waste materials, vegetation, litter or refuse may occur.
- All solid waste must be disposed of offsite at an approved landfill site in terms of section 20 of the Environment Conservation Act (Act No. 73 of 1989). The Contractor must supply the ECO with a certificate of disposal

- The Contractor must provide problem animal- and weatherproof bins with lids of sufficient number and capacity to store the solid waste produced on a daily basis. The lids must be kept firmly on the bins at all times. Bins must not be allowed to become overfull and must be emptied regularly
- Waste from bins may be temporarily stored on Site in a central waste area that is weatherproof and scavenger proof and which the Engineer and the ECO has approved
- Any hazardous waste must be disposed of at a registered hazardous waste disposal site and certificates of safe disposal must be obtained
- All waste generated during the decommissioning and reconstruction activities must be removed by the Contractor as soon as possible, and within the period specified in the EMP and disposed of at a registered landfill site
- The Contractor must make provision for workers to clean up the Contractor's camp and working areas on a daily basis so that no litter is left lying around and so that the site is in a neat and tidy state. The Contractor must remove from site the refuse collected at least once a week

3.15.19 TOILETS AND ABLUTION FACILITIES

The Contractor must provide suitable sanitary arrangements at designated points of the construction site for all site employees. A minimum of one toilet must be provided per 15 persons at each working area (station) or as stipulated in the Management plan.

- The toilet must be within easy reach (max 300 m) of the working area and be in good working condition and cleaned on a daily basis. Toilet paper must be provided. The toilets must be emptied on a weekly basis or when full or when instructed by the ECO on site
- Toilets should be placed at least 50m from any watercourses
- Toilets should be adequately screened from any public areas or residences
- Disposal arrangements must be made in advance and cleared with the ECO before construction starts. Sanitation provision and servicing must be to the satisfaction of the ECO
- The Contractor must ensure that toilets are emptied prior to any builders' holidays, and/or weekends
- Toilets must be of a neat construction and must be provided with doors and locks and must be secured to prevent them blowing over
- NB: No burying of any waste material on or near the construction site nor anywhere on the surrounding property is permitted
- Eating areas that are allocated for workers must be established in an environmentally acceptable manner and in line with all Environmental Health & Safety Act regulations. All on site and on route workers temporary eating areas must have acceptable toilet and refuse management systems in place and these areas must have suitable refuse receptacles' available for the containment and disposal of general litter and refuse

3.15.20 DISCHARGE OF CONSTRUCTION WATER

Potential pollutants of any kind and in any form must be kept, stored, and used in such a manner that any escape can be contained and the water table not endangered. This particularly applies to water emanating from runoff from construction areas/fuel depots/workshops/truck washing areas.

- The contractor, being responsible for the construction and effective containment and maintenance of settlement ponds must ensure that the surrounding environment is not adversely affected as a result of construction activities

- Wash down areas must be placed and constructed in such a manner so as to ensure that the surrounding areas are not polluted. Contaminated water includes water that is carrying excess sediment due to construction activities
- Contaminated water storage facilities must not be allowed to overflow and appropriate protection from rain and flooding must be implemented
- Contaminated water that is removed from site must be disposed of at a facility approved by the ECO and Local Authority
- No contaminated water that does not meet the water quality standards and criteria under the National Water Act may be released into a natural system, whether it is to surface or groundwater
- All cement effluent from mixer washings, and run-off from batching areas and other work areas must be contained in suitable sedimentation ponds
- Sedimentation ponds must be allowed to dry out on a regular basis to allow for solid material to be removed
- This material must be disposed of in a suitable manner, depending on the nature of the material, and to the discretion of the ECO

3.15.21 EATING FACILITIES

The Contractor must designate eating areas for the approval of the ECO, which must be clearly demarcated. No eating of meals must take place outside these designated areas without the approval of the Contractor/ESO.

- The feeding, or leaving of food for animals are strictly prohibited
- Sufficient waste bins must be present in this area and emptied regularly
- The contractor must supply cooking facilities that are suitable for the environment and are not liable to cause the outbreak of fires
- The contractor must supply all construction staff with adequate clean water, and may not be sourced from surrounding farms/ landowners, unless written permission is granted by the landowner
- No overnight camping/stay on site allowed. If overnighting is necessary for security purposes then it must be cleared with the ECO on site
- No washing in dams or streams is allowed

3.15.22 DUST CONTROL

The Contractor must take all reasonable measures to minimize the generation of dust as a result of construction activities (but must also take into account possible water constrictions of the area).

- The onsite construction site agent must take into account prevailing wind strength and wind direction and must have preventative measures on standby to minimize dust pollution that may cause damage to people and property
- The liberation of dust into the surrounding environment shall be effectively controlled by the use of, inter alia, water spraying and/or other dust-allaying agents. The speed of haul trucks and other vehicles must be strictly controlled to avoid dangerous conditions, excessive dust or excessive deterioration of the road being used
- In agricultural areas, earth-works should be done after the harvest season, or as agreed upon by the landowner

3.15.23 RESTORATION AND REHABILITATION

The Contractor must ensure that all structures, equipment, materials and facilities used or created on site for or during construction activities are removed once the project has been completed. On completion of the project or phase, all areas impacted by the construction activities must be reinstated and/or rehabilitated to the satisfaction of the ECO with emphasis on the following:

- Immediately after the demolition of the camp site or once construction has been completed, the contractor shall restore the site to its original state, paying particular attention to its appearance relative to the general landscape.
- The contractor's procedure for rehabilitation shall be approved by the ECO and Engineer
- Site offices must be removed and the areas rehabilitated or reinstated to the satisfaction of the ECO
- Labourer's facilities (if applicable) must be removed and the areas rehabilitated or reinstated to the satisfaction of the ECO
- All construction site areas must be rehabilitated or reinstated to the satisfaction of the ECO
- All temporary fencing and demarcation must be removed and the areas reinstated to the satisfaction of the ECO
- Temporary storage areas must be rehabilitated or reinstated to the satisfaction of the ECO
- All remaining construction material must be removed and the areas rehabilitated or reinstated to the satisfaction of the ECO

Any additional **disturbed** areas must be rehabilitated or reinstated to the satisfaction of the ECO. This shall include but not be limited to:

- Earthworks to reinstate the physical characteristics of the site. Here attention to the natural vertical and lateral heterogeneity in landform shall guide the reinstatement of natural areas
- Replacement of topsoil material – care shall be taken to ensure that the same material that was removed from each area is replaced there, since this will carry the seed complement appropriate for re-establishment of each plant community type
- Final landscaping by machine, but landscaping by hand may be required in many areas under rehabilitation
- Re-seeding and / or replanting of rehabilitated areas
- The Contractor shall not be permitted to use fertilisers or pesticides
- It is imperative that any potential erosion problems are addressed. This may require subsequent site visits to monitor the efficacy of erosion control measures

3.15.24 LAND MANAGEMENT

- Vehicles accessing the construction site must be made aware of driving in hazardous road conditions, sharp bends, narrow roads, bad weather, on or near children or domestic animals along the road
- Vehicle movements should be kept to a minimum during rain to avoid damage to access roads
- No fences or gates on the relevant construction property must be damaged. All access gates to the property (construction site) to be kept closed at all times to prevent domestic and or wild animals from getting out. Access by unauthorised personnel should be controlled. The access gates to the construction areas must always be closed
- Soil erosion must be prevented at all times along the access roads and around construction areas

3.15.25 SOCIO-CULTURAL ISSUES

- Neighbouring community, adjacent landowners and occupiers etc. must be treated with respect and courtesy at all times
- The cultural lifestyles of the communities living in close proximity to the construction areas must be respected
- Hours of work on the site shall be limited to normal working hours, as accepted by the local authority
- Should construction be required outside of these times, permission is to be obtained from the local municipality, in consultation with the ECO and the surrounding landowners

3.16 EMERGENCY PREPAREDNESS & RESPONSE

The following potential emergency situations have been identified and include the procedure for responding to, and for preventing and mitigating the environmental impacts that may be associated with them (also refer to Penalties and Fines).

3.16.1 ACCIDENTAL FIRES

Fire safety is a very real risk and must be stringently controlled. No fires will be permitted on site for any reason. If required, a designated smoking area will be provided, and clearly demarcated and signposted, with a facility for safe containment and disposal of cigarette butts.

The following measures must be implemented:

- Adequate firefighting equipment must be available on site and in good working order (including at least one type of ABC (all purpose) minimum 4.5 kg fire extinguisher and 3 fire beaters per working area). The persons on site must be trained in the use of such equipment
- The main contractor must provide a list of all authorities involved in firefighting in the region. This list must include emergency contact numbers and must be visible at the site office
- The contractors must establish an emergency procedure (with contact numbers) to the satisfaction of ECO (whenever work is done in any fire prone areas)

3.16.2 HYDROCARBON SPILLS

Since the project is relatively small, no fuel storage or distribution facilities are expected to be established. As a result, the significance of any spill is much reduced. The following must be observed:

- Vehicles will arrive on site already fuelled for the project
- If additional fuel is needed, it will be brought in as needed (minimal volumes) and refuelling will be done using a pump and not a funnel (to minimize the risk of spills)
- Spill trays shall be used during re-fuelling
- In the case of accidental spillages or leakage, the contractor will be responsible for immediate containment and corrective action (e.g. stopping the leakage), and to inform the Construction Supervisor and ECO
- The ECO will recommend the best possible environmental solution
- The Contractor will be liable for any costs incurred

3.16.3 CONCRETE/CEMENT SPILLAGES

The Contractor/supplier will be liable for the safe and correct deliverance of substantial loads of concrete or cement. Should a spill occur the Contractor/supplier will be liable for all costs of the rehabilitation needed.

4. OPERATIONAL EMP (OEMP)

The most important part of the operational phase will be to ensure that the site is meticulously maintained and that the operations are carefully monitored. The Applicant will remain overall responsible for the environmental performance of the site and must be aware of the legal requirements and obligations. The applicant must also be aware of the legal action that can be taken against **him/her as a person** with regards to negligence leading to environmental pollution.

The owner or delegated responsible person must implement an operational and maintenance management plan for the lodge development. This plan must include:

- Access management and monitoring
- Erosion management
- Waste and pollution management
- Fire Management
- Minimise dust and air emissions
- Protection of indigenous natural vegetation and fauna
- Specific monitoring and operational instructions
- Emergency plans which will cover all reasonable aspects of the operations which might lead to environmental pollution or degradation

4.1 TRAFFIC ACCESS ROUTES & HAUL ROADS

The Operator of the site must control the movement of all vehicles and plant including that of his suppliers so that they remain on designated routes. In addition, such vehicles and plant must be so routed and operated as to minimize disruption to regular users of the routes not on the Site.

- On gravel or earth roads on Site, the vehicles of the Contractor and his suppliers must not exceed a speed of 25 km/h.
- On public roads adjacent to the Site vehicles will adhere to municipal and provincial traffic regulations
- Only approved access roads may be used
- All measures must be implemented to minimize impacts on local commuters e.g. limiting construction vehicles traveling on public roadways during the morning and late afternoon commute time and avoid using roads through densely populated built-up areas so as not to disturb existing retail and commercial operations.

4.2 ENERGY MANAGEMENT

All reasonable steps must be taken to ensure the efficient management of energy. Energy management and conservation measures must be propagated and encouraged. The objective of energy management will be to encourage the conservation of energy, for example:

- Ensure that cooling units are located and operated to conserve energy
- Install energy-efficient ~~appliances~~ equipment
- Install energy efficient lighting

4.3 WATER MANAGEMENT (IF APPLICABLE)

- Ensure that all additional water uses are correctly registered with the Department of Water and Sanitation (if required)
- Water conservation measures such as low flow taps, high pressure hoses, duel flush toilets, water wise gardens, rainwater harvesting and tanks etc. must be encouraged and implemented
- Every reasonable effort must be made to reduce the long-term water demand
- Environmental training of personnel must include water conservation awareness
- A monthly water monitor program with the aim of ever reducing the water usage must be implemented (records must be kept)

4.4 EROSION AND SEDIMENT CONTROL

Soil erosion (through wind & water) removes valuable topsoil which is the most productive part of the soil profile (containing plant nutrients, seeds and bulbs). Development disturbs and loosens soils which can easily lead to erosion. The plants and animals that depended on that soil can no longer survive, and the plants that once grew that cannot re-establish itself because the seed store is gone. Soil may then have to brought back from elsewhere, increasing the cost of the project and the risk of importing weeds and other waste or toxic material. In accordance with the Conservation of agricultural Resources Act, 1983 (Act No. 43 of 1983) (CARA), the aim of erosion management is to prevent any form of soil erosion through proactive thinking and prevention as well as immediate rehabilitation.

In order to achieve erosion and sediment control, the following are applicable to all properties:

- Inspect and maintain erosion and sediment controls on a regular basis and ensure that it can accommodate the upslope catchment
- Leave as much vegetation as possible
- Install permanent fences to define 'no go' areas in those areas that are not to be disturbed
- Install sediment catchment controls down slope of the site to catch sediment (if applicable). This must be done as soon as possible by the Applicant and should be permanent
- Driving off road, or over the edge of the road to avoid puddles, or obstacles, should be avoided. Obstacles should be removed to avoid vehicles from having to drive off the road surface
- The road surface must be maintained
- Maintain storm water management infrastructure
- Due diligence to limit sediments washing down the river
- Limit vehicle movement to the site and control access points. Mark such access points and inform all suppliers

4.5 WASTE & POLLUTION MANAGEMENT

An integrated waste management approach based on waste minimisation (e.g. reduction, recycling, re-use and disposal) must be encouraged. Poor waste management can lead to adverse environmental impacts (e.g. odours, pollution and visual impact) as well as health risks. Sound waste management is thus non-negotiable.

- No on-site burying or dumping of any waste materials, vegetation, litter or refuse may be allowed
- Domestic waste must be stored in approved containers (e.g. bins with removable lids)
- All solid waste will be disposed of at a landfill licensed in terms of section 20 of the Environment Conservation Act (Act No. 73 of 1989)
- No material should be disposed into any riparian zone, including organic waste

- All possible pollution sources must be identified and all reasonable steps taken to prevent pollution or accidental spillages
- Ensure that all concentrated potential sources of pollution are protected (bunded) in order to minimise the risk of accidental spillage or pollution. Storage tanks should be bunded in such a way to contain at least 120% of the storage tank's capacity

4.5.1 RECYCLING

Whenever possible, a suitable recycle arrangement must be negotiated with a local recycle agent to ensure the re-use of recyclable material. Recycling should aim at sorting as much of the following materials as practical:

- Paper and cardboard
- Aluminium
- Copper
- Metals (other than aluminium and copper)
- Glass
- Organic waste
- Batteries
- Electronic equipment

4.5.2 POLLUTION MANAGEMENT

All possible pollution sources must be identified and all reasonable steps are taken to prevent pollution or accidental spillages.

- Ensure that all concentrated potential sources of pollution are protected (bunded) to minimize the risk of accidental spillage or pollution. Storage tanks should be bunded in such a way as to contain at least 120% of the storage tank's capacity.

4.6 MINIMISE DUST

Refer to erosion and sedimentation control paragraph 4.4.

4.7 MANAGEMENT OF NATURAL AREAS

The objective regarding the management of natural areas is to identify critical or conservation worthy features and to manage such areas and gardens in such a manner as to promote biodiversity and ecological processes.

- Natural areas must be managed as close to natural as possible (no interference wherever possible)
- Alien vegetation should be removed from the remaining natural areas and disturbed areas that are within or adjacent to any riparian zone and the areas should be kept clear of alien vegetation. This should be implemented as soon as possible, and the alien vegetation removal programme be in place permanently to address any new growth which may occur. The landowner is responsible for the implementation of the alien vegetation removal and control on the site and the property
- All listed invasive alien vegetation must be removed in accordance with CARA legislation (The Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983)) as revised

4.8 EMERGENCY PREPAREDNESS AND RESPONSE

The following potential emergency situations have been identified and include the procedure for responding to, and for preventing and mitigating the environmental impacts that may be associated with them.

4.8.1 ACCIDENTAL FIRES

The following measures must be implemented:

- Adequate firefighting equipment must be available at an area where works or maintenance is taking place and in good working order (including at least one type of ABC (all purpose) minimum 4.5 kg fire extinguisher and 3 fire beaters per working area). The persons on site must be trained in the use of such equipment
- The main contractor must provide a list of all authorities involved in firefighting in the region, including neighbouring landowners. This list must include emergency contact numbers and must be visible at the office
- The contractors must establish an emergency procedure (with contact numbers) to the satisfaction of the ECO
- Accidental fires are to be dealt with in terms of the local fire protection association or local regulations

4.8.2 HYDROCARBON SPILLS

Since the project is in proportion relatively small, no fuel storage or distribution facilities will be established. As a result, the significance of any spill is much reduced. The following must be observed:

- Vehicles will arrive on site already fuelled for the project. If additional fuel is needed, it will be brought in as needed (minimal volumes) and refuelling will be done using a pump and not a funnel (to minimize the risk of spills). Spill trays shall be used during re-fuelling.
- In the case of accidental spillages or leakage, the client will be responsible for immediate containment and corrective action (e.g. stopping the leakage) and will be liable for any costs incurred.

4.9 MAINTENANCE OF THE PIPELINE AND ASSOCIATED INFASTRUCTURE

Maintenance activities must be conducted taking the mitigation measures and recommendations in Sections 4 and 6 into consideration.

- All structures, equipment, materials and facilities used or created on site for or during maintenance activities are removed once the project has been completed. On completion of the project or phase, all areas impacted by the maintenance activities must be reinstated and/or rehabilitated to the satisfaction of the ECO
- Immediately after the demolition of the camp site or once maintenance activities have been completed, the contractor shall restore the site to its original state, paying particular attention to its appearance relative to the general landscape. This must be done as soon as possible after maintenance activities has ended to ensure no possible environmental degradation of the site as a result of erosion, alien vegetation establishment etc.
- The contractor's procedure for rehabilitation shall be approved by the ECO and Engineer
- Site offices must be removed and the areas rehabilitated or reinstated to the satisfaction of the ECO
- Earthworks to reinstate the physical characteristics of the site. Here attention to the natural vertical and lateral heterogeneity in landform shall guide the reinstatement of natural areas
- Replacement of topsoil material – care shall be taken to ensure that the same material that was removed from each area is replaced there, since this will carry the seed complement appropriate for re-establishment of each plant community type
- Final landscaping by machine, but landscaping by hand may be required in many areas under rehabilitation

5. ENVIRONMENTAL AUDIT PROGRAMME

A Final Construction Phase Audit Report is to be undertaken 6 months post construction. This must be undertaken by a qualified Independent Environmental Auditor and is to be submitted to the Competent Authority.

In terms of the 2014 EIA Regulations (as amended), Audit Reports must be submitted to the registered Interested & Affected Parties within 7 days of submission to the competent authority.

6. DECOMMISIONING PHASE

The facility is expected to have an indefinite lifespan. It is considered unlikely that the facility will be decommissioned. However, it is likely that the facility will may be upgraded or enlarged as part of maintenance and the replacement of individual components with more appropriate technology/infrastructure available at that time.

- **The relevant mitigation measures contained under the construction section should be applied during decommissioning and therefore are not repeated in this section**
- Site preparation activities will include confirming the integrity of the access to the site to accommodate required equipment, preparation of the site (e.g. lay down areas, construction platform), and the mobilization of construction equipment
- Disassembled components will be reused, recycled, or disposed of in accordance
- Specific consideration must be given to ways to minimize waste and wastage in maintenance and the decommissioning phase of the proposed development
- Equipment used in the plant must be recycled and reused where possible to avoid the filling of already limited landfill space

7. IMPACT MANAGEMENT OUTCOMES

Impact Management Outcomes

Planning, Design and Pre-Construction					
Impact	**Management Outcomes**	**Management Actions**	**Responsible Person/Party**	**Implementation Monitoring Method**	**Monitoring Frequency**
Demarcation of work areas	Prevent impacts on "no-go areas", including undisturbed areas, drainage lines and/or natural vegetation	• The site will be demarcated with appropriate dropper poles. Alternative fencing may be decided upon dependent on site requirements). Other demarcation measures can be used if approved by the ECO • Work areas and access routes must be clearly demarcated to minimise environmental impact	Contractor	Method Statement	Once-off
Demarcation of no-go areas	Prevent impacts on sensitive features on site, seasonal streams and natural vegetation on or adjacent to the site	• No-Go areas will be demarcated and indicated on a site plan • Natural vegetation outside of the development area will be considered no-go areas, unless for the purpose of alien vegetation clearing	Contractor	Method Statement	Once-off
Site camp establishment and access roads	Prevent unnecessary impacts on natural vegetation through the establishment and operations of the site camp and access roads.	• The site camp, lay down areas, and access roads must be clearly defined on a plan, taking no-go areas into consideration, as well as proximity to water resources	Contractor	Method Statement	Once-off

Fuel Storage (if required)	Prevention of fuel spillages and contamination of the soil and/or water resources	• The fuel tank must be placed within a completely sealed concrete bund • All fuel oil containers must be placed within suitable drip trays to prevent accidental spillage of oils and fuels • A suitable leak proof container for the storage of oiled equipment (filters, drip tray contents and oil changes etc.) must be established • Fuel storage areas must be at least 100m from any watercourses	Contractor	Method Statement	Once-off
Mandatory site equipment	Ensure the correct equipment is on site to meet environmental requirements as per the EMP	• Adequate firefighting equipment must be available on site and in good working order (including at least one type ABC (all purpose) minimum 4.5 kg fire extinguisher and 3 fire beaters per working area • Drip trays to be used during refuelling or storage of small quantities of fuel on site • Adequate toilet and ablution facilities must be provided on site. Toilets should be placed at least 50m from any watercourses. Toilets are to be serviced and cleaned on a regular basis • Adequate waste bins to be provided on site	Contractor	Method Statement	Once-off
Waste Management	To prevent and minimise waste generation and contamination of the site and surrounding areas	• No littering or on-site burying or dumping of any waste materials, vegetation, litter or refuse may occur • All solid waste, except for the organic waste from the removed vineyards and natural vegetation, must be disposed of offsite at an approved landfill site in terms of section 20 of the Environment Conservation Act (Act No. 73	Contractor	Method Statement	Once-off

		of 1989). The Contractor must supply the ECO with a certificate of disposal • The Contractor must provide problem animal- and weatherproof bins with lids of sufficient number and capacity to store the solid waste produced on a daily basis. The lids must be kept firmly on the bins at all times. Bins must not be allowed to become overfull and must be emptied regularly			
Fire Management	Prevent unnecessary fires which may cause damage and risk to the environment, property and human health, and adequately deal with any fires that may occur on site	• Adequate firefighting equipment according to the fire hazard during the construction period must be available on site and in good working order (at least one type ABC (all purpose) minimum 4.5kg extinguisher and 3 fire beaters per working area). The persons on site must be trained in the use of such equipment • The main contractor must provide a list of all authorities involved in firefighting in the region. This list must include emergency contact numbers and must be visible at the site office	Contractor	Method Statement	Once-off

Construction					
Impact	**Management Outcomes**	**Management Actions**	**Responsible Person/Party**	**Implementation Monitoring Method**	**Monitoring Frequency**
Topsoil removal	Topsoil to be removed (if necessary), protected and stockpiled for rehabilitation after construction	• Prior to any activities within the demarcated work areas, topsoil material shall be removed to a depth of 300mm or deeper if specified by the engineer in consultation with the ECO, and stockpiled in a designated area for use in rehabilitation of the site post construction	Contractor	Method Statement	Once-off
Stockpile Management	Avoid impacts on natural areas and watercourses from stockpiling of material, waste etc.	• Topsoil stockpiles to be separated from waste, building material etc. stockpiles. • Stockpile areas to be demarcated prior to construction	Contractor	Method Statement	Once-off
Erosion Management	Prevent erosion as a result of construction activities on site	• Install erosion and sediment controls before work starts and maintain these features throughout the construction and operational phases • Leave as much vegetation as possible • Implement the Stormwater Management Plan. Adherence to the EMP & Implementation of Standard Management Procedures in terms of erosion and sedimentation.	Contractor	Method Statement	Continually during construction
Cement mixing	Prevent contamination from cement mixing and cement waste water on the natural environment,	• Concrete and cement may only be mixed on existing hard surfaced areas, or edged mortar boards or a suitable container	Contractor	Method Statement	Continually during construction

	particularly water resources. Due to the high alkaline pH of cement, it is highly hazardous to the natural environment	• The visible remains of the batch and concrete, either solid, or from washings, must be physically removed immediately and disposed of as hazardous waste • Washing of equipment shall be done in a container to prevent any runoff of contaminated washing water • Extreme care must be taken to limit the amount of water contaminated by washing equipment. Water from concrete washing can be re-used in concrete mixes or must be stored in drums, then removed from the site and disposed of at a licensed municipal dump site. • Concrete batching facilities must have suitable bunding methods in place to ensure minimal waste water run-off occurs during batching operations • Cleaning of equipment and flushing of mixers must not result in pollution of the surrounding environment. All wastewater resulting from batching of concrete must be disposed of *via* the contaminated water management procedure.			
Socio-Economic	Employment of Workforce and Contractors	• Monitor the number and proportion of local hires vs. total workforce. • Review adherence to labour policies and worker rights. • Assess the impact of employment on local economic development.	EA Holder	Method Statement	Monthly Monthly Quarterly
	Economic Multiplier Effects	• Track local procurement of goods and services.	EPC	Method Statement	Bi-Monthly

		• Assess the impact on local business growth. • Evaluate the development of new local enterprises related to the project.	EPC EA Holder		Bi-Monthly Quarterly
	Influx of Jobseekers, Change in Population and Increased Pressure on Local Services	• Monitor changes in local population and employment levels. • Assess the impact on local services (health, education, etc.). • Evaluate social cohesion and potential for conflict due to population change.	Community Liaison Officer Community Liaison Officer EA Holder	Method Statement	Quarterly
	Safety and Security Impacts	• Record incidents of theft, vandalism, or other criminal activities. • Conduct regular security assessments, access control to the sites and review of monitoring tools and update measures as needed. • Collaborate with local law enforcement and community watch groups.	EPC	Method Statement	Weekly Monthly Monthly
	Increased Probability of Fire Risk	• Monitor and record any fire incidents. • Ensure adherence to fire safety protocols. • Conduct fire risk assessments and update prevention strategies.	EPC	Method Statement	As incidents occur As incidents occur Bi-monthly
	Nuisance Impacts (Noise and Dust)	• Regular monitoring of noise and dust levels. • Assess impact on residents and ecosystems. • Implement and evaluate effectiveness of noise and dust control measures.	ECO	Method Statement	Monthly

Operational					
Impact	**Management Outcomes**	**Management Actions**	**Responsible Person/Party**	**Implementation Monitoring Method**	**Monitoring Frequency**
Socio-Economic	Direct and Indirect Employment Opportunities	• Monitor employment levels and assess direct and indirect employment generated by the project. • Assess local business growth and impact on local businesses providing services. • Review effectiveness of skills development and training programs.	EA Holder	Method Statement	Quarterly
	Economic Multiplier Effects	• Track local procurement of goods and services. • Evaluate broader economic impact on local and regional economy. • Maintain communication with local businesses for emerging needs/opportunities.	EPC	Method Statement	Bi-Monthly
	Enhanced Water Supply and Security	• Monitor improvements in water supply reliability and reach. • Assess socio-economic benefits from improved water security. • Monitor impact on agricultural productivity due to improved water supply.	EA Holder	Method Statement	Bi-annualy

APPENDIX 1: DECLARATION OF UNDERSTANDING

KTE PIPELINE

DECLARATION OF UNDERSTANDING

I _____

Representing: _____

Declare that the conditions of the EMP were brought to my attention and that I have read and understood the contents of this Environmental Management Plan as prepared by EnviroAfrica, of which a copy has been made available to me.

Site: _____

Date: _____

I also declare that I understand my responsibility in terms of enforcing and implementing the Environmental Specifications as set out in this Environmental Management Programme.

I also undertake to inform all persons under my supervision of these specifications and the contents of the Environmental Management Programme.

Signed: _____

Place: _____

Date: _____

Witness 1: _____

APPENDIX 2: ENVIRONMENTAL AUTHORISATION

To be included on approval (before construction begins).

APPENDIX 3: Maps & Drawings

APPENDIX 4: START-UP REPORT

To be included after start-up meeting.

APPENDIX 5: PENALTIES FOR NON-COMPLIANCE

PENALTIES FOR NON-COMPLIANCE

The contractors / sub-contractors must contact the ECO at any stage if unsure about any matter, or if a pollution incident occurs, or vegetation or animals are damaged.

ECO = Environmental Control Officer ESO= Environmental Site Officer

PHASE	**Penalty for Non-compliance**	
PRE-CONSTRUCTION PHASE	**Bottom range**	**Top Range***
Construction area to be marked off before construction starts.		5000
The demarcated area must be maintained throughout the construction phase	500	1000
Site area for stock piling of building material must be demarcated	500	5000
Site area for storing of waste material must be demarcated	500	5000
Fencing off the construction site with mesh fencing of 1.8m, where necessary or other suitable material as agreed on by ECO	500	1000
Sitting of access road/s to be approved by ECO & demarcated with stakes before any construction starts (if applicable)		5000
Temporary route used for construction must be determined on site with ECO (if applicable)	1000	5000
Telecommunications & AC power routes must be determined with the ECO (if applicable)	1000	5000
Sensitive features that may be harmed must be clearly marked or demarcated.	500	2000
Vegetation that may not be removed must be clearly marked or demarcated.	500	5000
Contractor must make the Construction team and all sub-contractors aware of all environmental aspects that could lead to imposition of penalties	100	5000
Contractor to sign Declaration of understanding (DOU) before construction starts		5000
Contractor to assure that all subcontractors be informed and signed DOU	1000	5000
Method statements must be provided on request by the ECO. No work may commence until the Method Statement is accepted by the ECO and Engineer	1000	5000
CONSTRUCTION PHASE		
Information		

A copy of the EMP & Record of Decision with all the conditions of approval, and the relevant Method Statements must be at site at all times.	200	5000
Construction crew behaviour		
Construction crews may not overnight on site.	200	5000
No amplified music allowed on site	100	200
Construction crew must stay within the demarcated construction area. (Applicable in sensitive sites)	50	500
Eating of meals only allowed in demarcated area	50	500
No pets permitted on site		100
Driving, Parking & Storing of machinery and vehicles are only allowed inside demarcated areas and existing roads	1000	5000
Machinery may only be used on the road and may not disturb the vegetation on the sides of the road except if cleared by ECO. Machinery used must be carefully considered to limit environmental damage	500	5000
No vegetation other than that agreed on may be damaged - i.e. no access to areas outside construction area.	500	2000
No individual may cause unnecessary damage to flora and fauna on, around or near the site	20	2000
No littering allowed (incl. cigarette butts)	50	500
Excavations		
No topsoil may be removed or altered outside the demarcated area and/or which was not specified.		2000
Commercial sources of sand, rock and gravel to be cleared with ECO	200	5000
All surplus material to be taken off-site and be disposed of at approved site	500	5000
Toilets		
Sufficient ablution facilities must be provided		3000
Toilets to be secured to prevent them from falling or blowing over.	100	1000
They must be serviced regularly, (according to the manufacturer's instructions) and kept clean.	100	1000
Everybody on site must make use of ablution facilities	50	1000
Fire Prevention		

All mandatory firefighting equipment (s specified at start-up) must be on site at all times	500	4000
Firefighting equipment to be in good working order and serviced.	500	2000
No fires, including cooking fires, allowed on site	1000	5000
Cement		
Concrete may only be mixed within the boundaries of the demarcated area and/or where was agreed on by the ECO.	500	5000
All excess cement & concrete mixes to be contained on construction site prior to disposal off site	200	5000
Any cement / concrete spillage to be cleaned up immediately.	500	5000
Ready-mix delivery trucks must not carry out the wash down of their trucks on or around the site unless arranged with ECO.	1000	3000
Dust pollution control		
Ensure that loose building material is covered to prevent dust pollution	100	1000
Water run-off		
Contamination of water bodies, rivers, dams or wetlands must be prevented at all cost	500	5000
Rainwater from construction & building site/s must be channelled, contained & allowed to dry out, so as not to transport any pollutants into the surrounding area. Temporary trenches, straw stabilising, brush cutting can be used	500	5000
Waste control		
Sufficient refuse bins must be placed on site	500	2000
Refuse bins must be cleaned on a regular basis	100	1000
General litter / building refuse must be cleaned up on a regular basis from the site	500	3000
Cement-contaminated water; paint; oil; cement slurries etc must be stored in watertight containers or as agreed with ECO	500	5000
Store all refuse & waste material in wind & animal proof containers	100	1000
Waste must be disposed of at an official waste deposit site on a regular basis.	500	5000
The absence of or inadequate drip trays or bunding facilities	500	5000

Failure to address oil/fuel leaks from on-site machinery	200	5000
Herbicides		
No herbicides or pesticides whatsoever may be used.	200	2000
Construction road		
Road must be upgraded to prevent degradation and erosion of the road and surrounds.	500	5000
Power and Telecommunications supply		
Demarcate power supply route	500	5000
No vehicles to drive through vegetation unless authorised by ECO	500	5000
Storage of equipment may only take place at an area demarcated by the ECO.	500	5000
Working must be done in phases to prevent trampling of vegetation	N/A	
Use of generators and fuel powered equipment		
A watertight cover must be place under the power generator equipment to prevent accidental spillage of fuel & oil seeping into the soil.	500	5000
Drip tray must be able to take 120% of fuel on site	500	5000
All waste material generated from the use of this equipment must be contained and removed from the site	500	5000
Mobile fuel powered equipment must be well maintained and must not have any fuel or oil leaks.	200	5000
Soil Stabilisation		
Ensure that soil material for filling and stabilisation comes from a source that does not contain seeds alien to the area. The source must be cleared with the ECO.	100	2000
Rehabilitation		
Remove rocks and stones and stock pile in area recommended by ECO	500	5000
Remove all plants that can be used for rehabilitation and store on- or off-site in appropriate manner as agreed with ECO	200	5000
Removal of all old concrete and alien materials from site	500	5000
Site must be cleared of all waste and building material	500	5000

*(Large scale / repeated offence)

APPENDIX 6: INFO ON METHOD STATEMENTS

INFORMATION ON METHOD STATEMENT

Method Statements are to be completed by the person undertaking the work (i.e. the Contractor). The Method Statement will enable the potential negative environmental impacts associated with the proposed activity to be assessed.

The Method Statement can only be implemented once approved by the ECO

The Contractor (and, where relevant, any sub-contractors) must also sign the Method Statement, thereby indicating that the works will be carried out according to the methodology contained in the approved Method Statement.

The ECO will use the Method Statement to audit compliance by the Contractor with the requirements of the approved Method Statement.

Changes to the way the works are to be carried out must be reflected by amendments to the original approved Method Statement; amendments require the signature of the ECO denoting that the changed methodology or works are necessary for the successful completion of the works, and are environmentally acceptable. The Contractor will also be required to sign the amended Method Statement thereby committing him/herself to the amended Method Statement.

This Method Statement MUST contain sufficient information and detail to enable the ECO to apply their minds to the potential impacts of the works on the environment. The Contractor will also need to thoroughly understand what is required of him/her in order to undertake the works.

THE TIME TAKEN TO PROVIDE A THOROUGH, DETAILED METHOD STATEMENT IS TIME WELL SPENT. INSUFFICIENT DETAIL WILL RESULT IN DELAYS TO THE WORKS WHILE THE METHOD STATEMENT IS REWRITTEN TO THE ER'S AND ESO'S SATISFACTION.

The page overleaf provides a *pro forma* method statement sheet, which needs to be completed for each activity requiring a method statement in terms of the EMP.

APPENDIX 7: EXAMPLE OF METHOD STATEMENT

PRO-FORMA METHOD STATEMENT

CONTRACT:…….. **DATE:**……..

PROPOSED ACTIVITY (give title of method statement and reference number):

WHAT WORK IS TO BE UNDERTAKEN (give a brief description of the works):

WHERE ARE THE WORKS TO BE UNDERTAKEN (where possible, provide an annotated plan and a full description of the extent of the works):

START AND END DATE OF THE WORKS FOR WHICH THE METHOD STATEMENT IS REQUIRED:

Start Date:	End Date:

HOW ARE THE WORKS TO BE UNDERTAKEN (provide as much detail as possible, including annotated maps and plans where possible):

Note: please attach extra pages if more space is required

DECLARATIONS

1) ENVIRONMENTAL CONSULTANT AND/OR ENVIRONMENTAL CONTROL OFFICER

The work described in this Method Statement, if carried out according to the methodology described, is satisfactorily mitigated to prevent avoidable environmental harm:

_____ _____

(Signed) (Print name)

_____ _____

(Signed) (Print name)

Dated: _____

2) PERSON UNDERTAKING THE WORKS

I understand the contents of this Method Statement and the scope of the works required of me. I further understand that this Method Statement may be amended on application to other signatories and that the ESO will audit my compliance with the contents of this Method Statement

_____ _____

(Signed) (Print name)

Dated: _____

3) THE APPLICANT

The works described in this Method Statement are approved.

_____ _____ _____

(Signed) (Print name) (Designation)

Dated: _____

METHOD STATEMENT REGISTER		Principle Site Agent:			Project Name:		
		Main Contractor:			Project location:		
No.	METHOD STATEMENT ACTIVITY REFERENCE	DATE CREATED	DATE RECEIVED	CREATED BY	ACCEPTED / REJECTED	DATE approved	Approved By
1	Demarcation						
2	Clearing of vegetation and topsoil removal						
3	Stockpiling						
4	Temporary storage facilities						
5	Construction camp and site offices						
6	Fuel storage						
7	Labourer's facilities						
8	Entrance and haul roads						
9	Mandatory site equipment						
10	Waste management/control						
11	Cement mixing and batching areas						
12	Construction vehicle maintenance						
13	Dust control						
14	Erosion control						
15	Noise control						
16	Archaeological and heritage finds						
17	Rehabilitation						
18							
19	**Additional MS (Waste Licence requirements)**						
20							
21							
22							

APPENDIX 8: CONTACTOR ENVIRONMENTAL CHECKLIST

CONTACTOR/S REPRESENTATIVE: ENVIRONMENTAL WEEKLY CHECKLIST

SITE: _____

PHASE OF WORK AND % OF COMPLETION: _____

ENVIRONMENTAL ASPECT	YES/ NO (✓ or X)	COMMENTS
How many workers are on site		
All new personnel on site are aware of the contents of the EMP and have been through the environmental awareness course.		
Contractor's camp is neat and tidy and the labourers' facilities are of an acceptable standard.		
Sufficient and appropriate fire fighting equipment is visible and readily available.		
Waste control and removal system is being maintained.		
Refuse bins in place and maintained		
Toilets are in place and clean		
Demarcation and other fences are being maintained.		
What machinery are on site		
Drip trays are being utilised where there is a risk of incidental spillage		
Bunds/ drip trays are being emptied on a regular basis (especially after rain).		
No leakages (oil & fuel) are visible from construction vehicles		
No go areas, remaining natural features and trees have not been damaged.		
Dust control measures (if necessary) are in place and are effectively controlling dust.		
Noise Control measures (if necessary) is in place and is working effectively.		
Erosion control measures (if necessary) are in place and are effective in controlling erosion. (Access road, site areas etc.)		
Stockpiles are located within the boundary of the site, do not exceed 2 m in height and are protected from erosion.		

Completed by:…… Sign:…….. Date:……

To be submitted at the end of each week to the Environmental Site Officer (ESO)

Received by:

Environmental Site Officer: :…… Sign: Date:……

APPENDIX 9: BASIC RULES OF CONDUCT

BASIC RULES OF CONDUCT

The following list represents the basic Do's and Don'ts towards environmental awareness, which all participants in this project must consider whilst carrying out their tasks. These are not exhaustive and serve as a quick reference aid.

NOTE: **ALL new site personnel must** attend an environmental awareness presentation. Please inform your foreman or manager if you have not attended such a presentation or contact the ESO.

DO:

- Use the toilet facilities provided – report dirty or full facilities
- Clear your work areas of litter and building rubbish at the end of each day – use the waste bins provided and ensure that litter will not blow away.
- Report all fuel or oil spills immediately & stop the spill continuing.
- Dispose of cigarettes and matches carefully. (Littering is an offence.)
- Confine work and storage of equipment to within the immediate work area.
- Use all safety equipment and comply with all safety procedures.
- Prevent contamination or pollution of streams and water channels.
- Ensure a working fire extinguisher is immediately at hand if any "hot work" is undertaken e.g. welding, grinding, gas cutting etc.
- Report any injury of an animal.
- Drive on designated routes only.
- Prevent excessive dust and noise.

Do not:

- Remove or damage vegetation without direct instruction.
- Make any fires.
- Injure, trap, feed or harm any animals – this includes birds, frogs, snakes, lizards etc.
- Enter any fenced off or marked area.
- Allow cement or cement bags to blow around.
- Speed or drive recklessly
- Allow waste, litter, oils or foreign materials into the stream
- Swim in the dam.
- Litter or leave food laying around

Notes:

If any animals such as tortoises, chameleons or snakes be encountered then do not harm them. The ECO or Site Supervisor must be contacted to remove these safely. The harming of any animal will result in disciplinary action.

Construction and heavy machine operators must be particularly sensitive to staying within access routes and prevention of unnecessary damage. Dust and noise is also of particular concern. Ensure that vehicles and machinery do not leak fuel or oils. Refuelling or maintenance must be done within the maintenance camp area only.

Alien plant clearing and control work teams must be closely supervised.

BASIESE GEDRAGSKODES

Die volgende lys vertenwoordige die moets en moenies vir omgewingsbewustheid wat alle deelnemers aan hierdie projek in ag moet neem tydens die uitvoer van hul take. Hierdie lys is nie volledig nie en dien slegs as 'n vinnige verwysing.

Nota: **alle nuwe terreinpersoneel moet** 'n aanbieding ten opsigte van omgewingsbewustheid bywoon. Indien u nog nie so 'n aanbieding bygewoon het nie, lig asseblief u voorman of bestuurder in of kontak die omgewings terreinbeampte.

Moets:

- Gebruik die beskikbare toilet-geriewe – rapporteer vuil of vol geriewe.
- Maak u werkplek skoon van rommel of bourommel aan die einde van elke dag – gebruik beskikbare vullisdromme en verseker dat rommel nie rondwaai nie.
- Rapporteer alle brandstof- en olie stortings onmiddellik – stop verdere storting.
- Wees versigtig met die wegdoen van sigarette en vuurhoutjies. (rommelstrooi is 'n oortreding.)
- Beperk werkaktiwiteite en die stoor van toerusting tot die onmiddellike werkarea.
- Gebruik veiligheidstoerusting en voldoen aan alle veiligheids-maatreëls.
- Voorkom besoedeling van strome en waterbane
- Verseker dat 'n brandblusser in werkende toestand byderhand is wanneer "warm" werk verrig word bv. Sweis, wegslyp, gasny, ens.
- Rapporteer beseerde diere.
- Ry slegs op aangewese roetes.
- Voorkom oormatige stof en geraas.

Moenie:

- Plantegroei verwyder of beskadig sonder direkte instruksie nie.
- Enige vure maak nie.
- Enige diere dood, beseer, vang of voer nie, insluitende voëls, paddas, slange, akkedisse, ens.
- Enige omheinde of afgesperde areas binnetree nie.
- Sement of sementsakke laat rondwaai nie.
- Vinnig of roekeloos bestuur nie.
- Enige rommel, afval, olie or enige vreemde materiaal in strome laat beland nie.
- In die dam swem nie.
- Rommelstrooi of kos laat rondlê nie.

Notas:

Indien enige diere soos skilpaaie, verkleurmannetjies of slange teëgekom word, moet hulle nie beseer of dood nie. Kontak die otb of ri om hulle veilig te verwyder. Die besering van diere sal lei tot dissiplinêre optrede.

Operateurs van konstruksie- en swaar masjiene moet veral versigtig wees om binne toegangsroetes te bly en om enige onnodige skade te voorkom. Verseker dat voertuie en masjiene nie olie of brandstof lek nie. Brandstofaanvulling en voertuigonderhoud mag slegs binne die onderhoudsarea gedoen word.

Streng toesig moet gehou word oor indringerplantbeheerspanne.

EZIPPHAMBILI EKUNYANZELEKILEYO UKUBA ZENZIWE

Zonke ezi zinto zilandelayo zizinto ekufuneka zenziwe nekufuneka zingenziwanga.

Wonke umntu ofikayo kufuncka afundiswe ngemigaqo kupala. Needa yazisa iforman yakho ikuba awukhange uye kufundiswa.

Izinto emazenziwe

- Sebenzisa izindlu zangasese, yazisa xa kukho umonakalo.
- Zama ukucoca apho ubusebenza khona.
- Sebenzisa imigqomo yenkukuma ungayeki iphaphtieke.
- Yazisa xa ubona ioil echithskalayo okanye ipetrol.
- Cima lozoli cigarette xa ugqibibile ukutshaya
- Zonke izixhobo usebenza zibuyisele apho zihlaka khona xa ucgibile apho zihlala khona xa ugqibile ukuzisebenzisa.
- Zisebenzise izikhuselixa uzinkiwe.
- Sukugalela izinto emlanjeni.
- Masibekho isicima mlilo xausebenza ngomlilo.
- Yazisa msinyane xa ubone isilwanyana ezonzakeleyo.
- Xauqhuba isithuthi hamba endleleni qha ungafathulinje.
- Naphina zamaungenzi thuli okanye ingxolo xa usebenza.

Emazingenziwa

- Sukususa nesiphina isityalo ungakhange uxelelwe
- Sukwenza mlilo nokuba sekubanda
- Amagqara ukubulala izilwanyana nokuzifida akuvumelekanga
- Sukungena xa kuvaliwe ngaphandle kwe mvume
- Ingxowa zesamente mazincedwe zingalahlwa nje
- Sukuqhuba ngesantya esiphakamileyo
- Sukugalele nayiphi into phaya emlanjeni

Sukuqubha edameni q oqosha yonk inkukuma

APPENDIX 10: ECO/ESO REPORT/CHECKLIST

ECO / ESO SITE VISIT CHECKLIST / REPORT:

PROJECT NAME: DATE

PROJECT & PHASE: LOCATION

ENVIRONMENTAL ASPECT		COMMENTS
Note: 1 = Poor, 2 = Average, 3 = Good NA = Not Applicable		
DEMARCATION **METHOD STATEMENT** **Boundaries of "no go" areas, construction sites, offices, temporary storage areas as well as labourer's facilities must be demarcated (EMP and ECO requirements) and maintained for the length of the construction period.**		
NO-GO AREAS/PROTECTION OF FAUNA & FLORA **Identified "No-Go Areas", remaining natural veld and indigenous- or significant trees are protected features and must be demarcated for protection from construction damage (including secondary impact).** **All areas outside of the demarcated construction sites and access roads to be regarded as NO-GO areas unless otherwise agreed upon with the client and ECO.** **All flora identified to be rescued must be removed and placed in an area specifically allocated and taken care off until re-used in Pre-Applicationroved way.** **Identified areas with significant vegetation must be protected as NO-GO areas.**		
CLEARING OF VEGETATION & TOPSOIL REMOVAL **METHOD STATEMENT** **Before any construction or earthworks, topsoil must be stripped (>150mm) and stockpiled for rehabilitation/ landscaping.** **Stockpiles:** **must be protected (may not blow or wash away or gets compacted) and stored separately.** **may not be moved further than 50m or mixed with any other soil.** **must be convex and should not exceed 2m in height.** **In addition:** **Cleared areas must be stabilized.** **Burning or burying of cleared vegetation is prohibited, but may be used for mulch or slope stabilisation on site.**		
STOCKPILING **METHOD STATEMENT** **Top- and subsoil's from trenches must be located within site boundaries, stabilised and may not exceed 2m in height.**		
TEMPORARY STORAGE FACILITIES **METHOD STATEMENT** **Must be demarcated, organised, neat and tidy and of acceptable standards.**		
CONSTRUCTION CAMP & SITE OFFICES **METHOD STATEMENT** **Must be demarcated, organised and free of day-to-day litter (maintaining good housekeeping standards).**		

ENVIRONMENTAL ASPECT		COMMENTS
Note: 1 = Poor, 2 = Average, 3 = Good NA = Not Applicable		
FUEL STORAGE **METHOD STATEMENT** **Fuel storage areas must be situated within the demarcated construction camp site (or an area approved by the ECO).** **Bunds must be built (EMP and ECO requirements) around larger fuel storage areas (accidental spillages).** **Drip trays must be used (in accordance with EMP) at all fuel and oil storage and refilling sites and must be cleaned regularly, especially after rain.**		
LABOURER'S FACILITIES **METHOD STATEMENT** **Facilities must be of acceptable standards suitably demarcated, well maintained, neat and tidy and with adequate ablution facilities.**		
ENTRANCE AND HAUL ROADS **METHOD STATEMENT** **Only approved entrance and haul roads may be used (existing roads and infrastructure). No new roads or parking areas may be developed without written approval from the ECO.**		
MANDATORY SITE EQUIPMENT **METHOD STATEMENT** **Mandatory site equipment must be in place, well maintained and in accordance with EMP and ECO requirements.** **Sufficient refuse bins must be on site (well placed and conspicuous) and must be cleaned regularly.** **Fire extinguishers must be readily available, maintained and functional.** **Drip trays must be used (in accordance with EMP) at all fuel and oil storage and refilling sites and must be cleaned regularly, especially after rain.** **Toilets and sanitation facilities must be kept clean neat and hygienic (toilet paper must be available).**		
WASTE CONTROL **METHOD STATEMENT** **The contractor is expected to control all construction related waste material and general litter on actual construction sites and its immediate surroundings.** **Waste management must be in accordance with the EMP, of acceptable standards, with regular removal of general waste, hazardous waste as well as construction waste (e.g. concrete waste and spoil).**		
CEMENT MIXING & BATCHING AREAS **METHOD STATEMENT** **Mixing areas must be approved by the ECO, suitably demarcated and may not result in pollution.** **Polluted cement water may only be released into sedimentation ponds.** **Sedimentation ponds must be maintained and cleaned regularly (and reinstated after use).**		

ENVIRONMENTAL ASPECT		COMMENTS
Note: 1 = Poor, 2 = Average, 3 = Good NA = Not Applicable		
CONSTRUCTION VEHICLE MAINTENANCE **METHOD STATEMENT** **Construction vehicles must be in good working order and well maintained to prevent oil and fuel leakages and to reduce noise levels.** **Maintenance areas must be approved by ECO.** **Refuelling must be done in accordance with the EMP, using drip trays.**		
HEAVY EARTHMOVING EQUIPMENT **Construction vehicles and equipment may only operate <u>within</u> the demarcated site boundaries (and approved access roads), especially heavy earthmoving vehicles.**		
DUST CONTROL **METHOD STATEMENT** **Adequate control measures must be in place to prevent dust pollution as a result of construction activities (especially with regard to entrance-, haul roads and exposed surfaces).** **Areas of concern must be watered regularly during construction AND periods of strong winds, BUT must take water saving into account.**		
EROSION CONTROL **METHOD STATEMENT** **Erosion resulting from works must be controlled.** **Temporary and permanent drainage works must be maintained. Erosion damage and damage in drainage courses must be reinstated.**		
NOISE CONTROL **METHOD STATEMENT** **Effective noise control measures must be in place and acceptable working hours must be kept (deviations must be approval by the ECO).**		
ENVIRONMENTAL CONDUCT **Environmental conduct of construction personnel must be acceptable (e.g. no burning or burying of refuse; no littering and no cement bags or other construction waste material lying around).**		
ARCHAEOLOGICAL & HERITAGE FINDS **METHOD STATEMENT** **Should any archaeological or heritage remains be exposed during excavations or any activity on site, these must immediately reported to The site agent/engineer, the ECO or SAHRA.**		
REHABILITATION **METHOD STATEMENT** **On completion of the project or phase, all areas impacted by the construction activities must be reinstated and/or rehabilitated to the satisfaction of the ECO with emphasis on the following:** **Site offices must be removed and the areas rehabilitated or reinstated to the satisfaction of the ECO.** **Labourer's facilities must be removed and the areas rehabilitated or reinstated to the satisfaction of the ECO.**		

ENVIRONMENTAL ASPECT		COMMENTS
Note: 1 = Poor, 2 = Average, 3 = Good NA = Not Applicable		
All construction site areas must be rehabilitated or reinstated to the satisfaction of the ECO. **All temporary fencing and demarcation must be removed and the areas reinstated to the satisfaction of the ECO.** **Temporary storage areas must be rehabilitated or reinstated to the satisfaction of the ECO.** **All remaining construction material must be removed and the areas rehabilitated or reinstated to the satisfaction of the ECO.** **Any additional disturbed areas must be rehabilitated or reinstated to the satisfaction of the ECO.**		
ADDITIONAL METHOD STATEMENTS **Method statements must be submitted and approved before commencement of the works and must be available at the site offices.**		
ENVIRONMENTAL CHECKLIST **The contractor must ensure that the weekly environmental checklist is completed at the end of each week and it must be available at the site offices.**		
SPOT FINES & PENALTIES **Spot fines and penalties must be recorded and documented by the ECO (in accordance with the EMP).**		
FIXED POINT PHOTOS **Photographs must be taken by the ECO, Site Engineer and or Site Manager, prior to, during and immediately after construction as visual reference. These photographs must be stored with other records relating to the EMP.**		

ECO:

ECO OBSERVATION SHEET

APPENDIX 11: METHOD STATEMENT REGISTER

METHOD STATEMENT REGISTER		Principle Site Agent:			Project Name:		
		Main Contractor:			Project location:		
No.	METHOD STATEMENT ACTIVITY REFERENCE	DATE CREATED	DATE RECEIVED	CREATED BY	ACCEPTED / REJECTED	DATE approved	Approved By
1	Demarcation						
2	Clearing of vegetation and topsoil removal						
3	Stockpiling						
4	Temporary storage facilities						
5	Construction camp and site offices						
6	Fuel storage						
7	Labourer's facilities						
8	Entrance and haul roads						
9	Mandatory site equipment						
10	Waste management/control						
11	Cement mixing and batching areas						
12	Construction vehicle maintenance						
13	Dust control						
14	Erosion control						
15	Noise control						
16	Archaeological and heritage finds						
17	Rehabilitation						
18							
19	**Additional MS (Waste Licence requirements)**						
20							
21							
22							

APPENDIX 12: ENVIRONMENTAL INCIDENT REPORT FORM

ENVIRONMENTAL INCIDENT REPORT

PROJECT NAME: _____

PROJECT LOCATION: _____

SITE AGENT: _____

DATE OF INCIDENT: _____ **TIME:** _____

BRIEF DESCRIPTION AND CAUSE OF INCIDENT:

WHAT IMMEDIATE ACTIONS/CONTROL MEASURES WERE TAKEN:

WHAT CORRECTIVE ACTIONS WERE TAKEN TO ENSURE NO REPEATS OF THE INCIDENT:

ECO/ESO RESPONSE TO INCIDENT AND RECOMMENDATIONS:

IS THIS INCIDENT A: o **FIRST OFFENCE** o **SECOND OFFENCE** o **THIRD OFFENCE**

SIGNATURE OF SITE AGENT: _____ **DATE:** _____

SIGNATURE OF ECO/ESO: _____ **DATE:** _____

REMEMBER: TO BE FACTUAL WHEN DESCRIBING THE INCIDENT.

APPENDIX 13: COMPLAINTS REGISTER FORM

COMPLAINTS REGISTER FORM

(To be completed by Site Agent/Supervisor)

NO.	DATE	NAME OF COMPLAINANT	CONTACT NO.	NATURE OF COMPLAINT	ACTION TAKEN TO RECTIFY COMPLAINT