FINAL ENVIRONMENTAL MANAGEMENT PROGRAMME

PROPOSED DEVELOPMENT OF ERF 2006, PARSONSVLEI, GQEBERHA, EASTERN CAPE

Prepared by:
Engineering Advice & Services

Prepared for:
Singi Properties (Pty) Ltd

November 2024

PROPOSED DEVELOPMENT OF ERF 2006, PARSONSVLEI, GQEBERHA, EASTERN CAPE FINAL ENVIRONMENTAL MANAGEMENT PROGRAMME

Prepared for:
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ACRONYMS AND DEFINITIONS

DEDEAT	Department of Economic Development, Environmental Affairs and Tourism
DMR	Department of Mineral Resources
DWS	Department of Water and Sanitation
ECDOT	Eastern Cape Department of Transport
ECO	Environmental Control Officer
EO	Environmental Officer
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
Environment	The surroundings within which humans exist could be made up of: the land, water and atmosphere of the earth; microorganisms, plant and animal life; any part of combinations of the aforementioned and the interrelationships among and between them as well as the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing
Environmental Impact	The change to the environment, whether desirable or undesirable, that will result from the effect of a construction activity. An impact may be the direct or indirect consequence of a construction activity
Invasive Alien Vegetation	An undesirable plant growth which shall include, but not be limited to, all declared category 1 and 2 listed invader species as set out in the Conservation of Agricultural Resources Act (Act 43 of 1983).
MSDS	Material Safety Data Sheets
NO-GO Areas	Generally, those areas outside the designated working areas, including but not limited to: existing services and infrastructure, occupied property; grave sites; cultivated lands, wetland areas, 'Special or Sensitive Environments' as defined in the EMP
RE	Resident Engineer
Topsoil	Natural soil covering, including all the vegetation and organic matter, with variable depth
Working Areas	Working areas are those areas required by the Contractor to construct the works, as approved by the Resident Engineer

EMPR REQUIREMENTS

EMPr Requirements		
1.	**An EMPr must comply with section 24N of the Act and include--**	
a)	details of	
i.	The EAP who prepared the EMPr; and	√
ii.	the expertise of the EAP to prepare an EMPr, including a curriculum vitae;	√
b)	a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	√
c)	a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;	√
d)	a description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including—	√
i.	planning and design	√
ii.	pre-construction activities	√
iii.	construction activities	√
iv.	rehabilitation of the environment after construction and where applicable post closure; and	√
v.	where relevant, operation activities;	√
f)	a description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraph (d) will be achieved, and must, where applicable, include actions to —	√
i.	avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;	√
ii.	comply with any prescribed environmental management standards or practices;	√
iii.	comply with any applicable provisions of the Act regarding closure, where applicable; and	√
iv.	comply with any provisions of the Act regarding financial provision for rehabilitation, where applicable;	√
g)	the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	√
h)	the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	√
i)	an indication of the persons who will be responsible for the implementation of the impact management actions;	√

j)	the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	
k)	the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	√
l)	a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	√
m)	an environmental awareness plan describing the manner in which—	√
i.	the applicant intends to inform his or her employees of any environmental risk which may result from their work; and	√
ii.	risks must be dealt with in order to avoid pollution or the degradation of the environment; and	√
n)	and specific information that may be required by the competent authority.	√
2.	**Where a government notice gazette by the Minister provides for a generic EMPr, such generic EMPr as indicated in such notice will apply.**	

1 INTRODUCTION

1.1 Project Background

Introduction

Engineering Advice and Services (EAS) has been appointed by the applicant, Singi Properties (Pty) Ltd, to undertake a Basic Assessment application for the residential development of Erf 2006, Parsonsvlei located within Ward 12 in Gqeberha, Eastern Cape (Figure 1).

Erf 2006, Parsonsvlei measures approximately 3.107 Ha in extent and is zoned Special Purposes No 232 (Warehouse/Workshop). The site is currently vacant and is not currently utilised for this purpose. An application to rezone the property to General Residential purposes will be submitted by the appointed professional town planner in due course. The site for the proposed development is situated on undeveloped land west and south of the Francis Evatt Park residential suburb in Parsonvlei, Port Elizabeth. The property abutting the site to the north across the narrow-gauge railway line is vacant and is earmarked for residential development in the near future. The property to the east across Burchell Drive is residential and to the south is industrial and commercial (the NMBM Burchell Road depot and other related uses). The Curro Westbrook school is situated to the northeast on the corner of Burchell Road and Salerno Road. In general, further residential areas are situated to the northeast (Westbrook) and the northwest (Bridgemead).

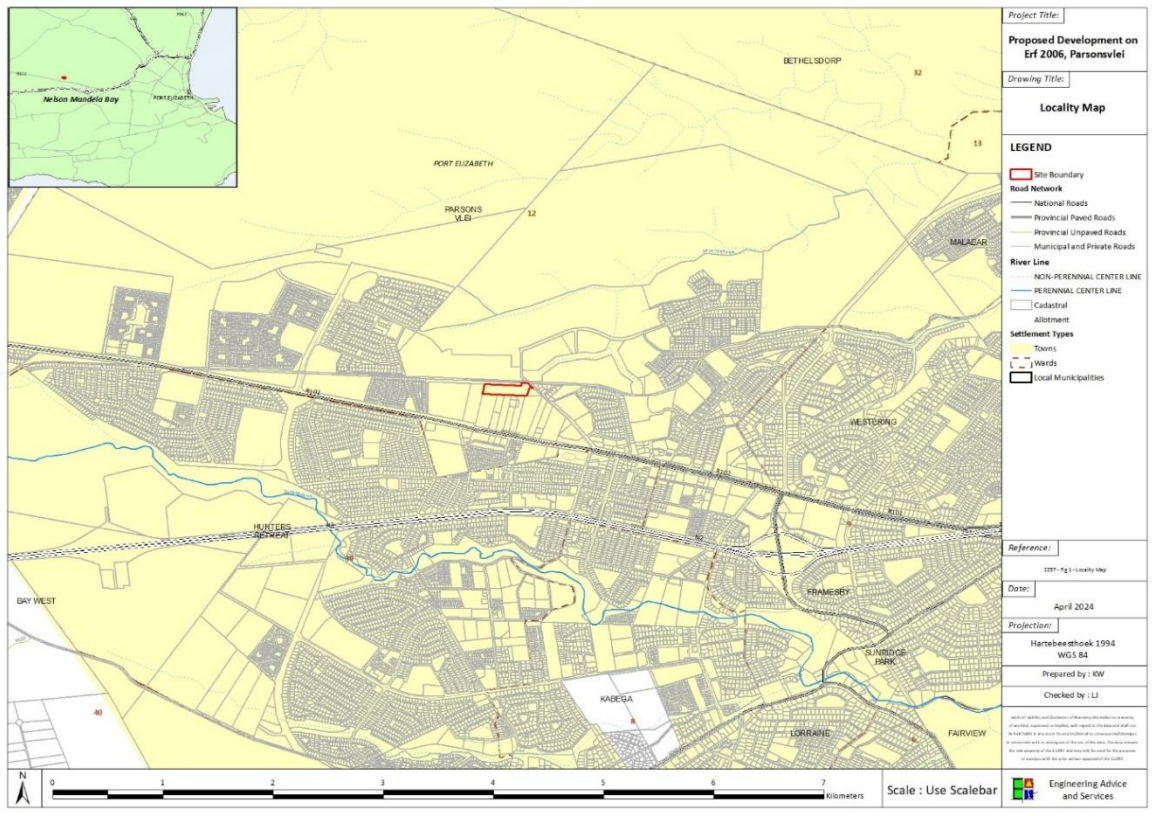

Figure 1 - Locality Map

The site is currently vacant, unoccupied land with a flat topography, gradually sloping towards the northeast. Vegetation cover comprises a mixture of grasses not indicative of Algoa Sandstone Fynbos with the majority of the site infested with alien invasive vegetation (Port Jackson, Black Wattle and Blue Gums). There are no structures on the site, and disturbance is limited to the edges of the site and the vehicle track paths and footpaths with some dumping observed. Surrounding land uses include residential, vacant land, commercial, roads and infrastructure.

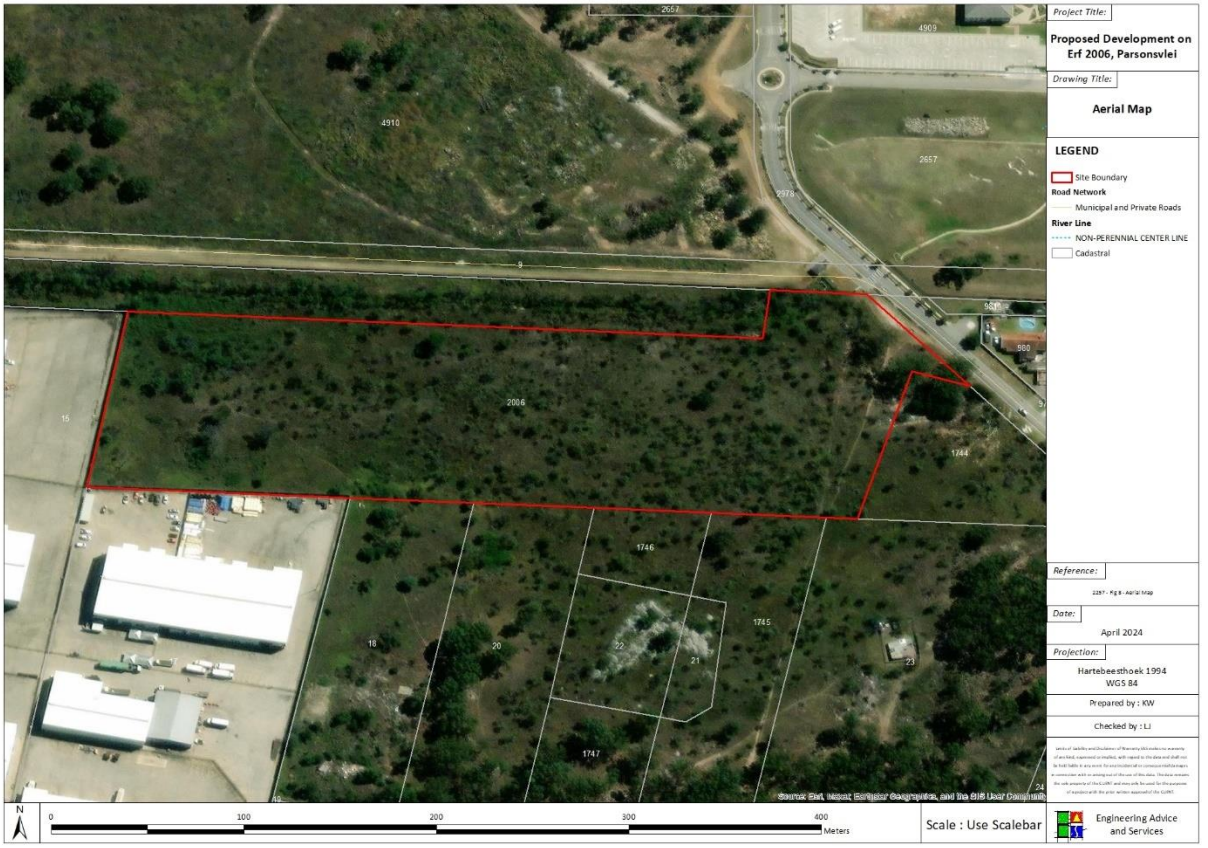

Figure 2 – Aerial map

Zoning

The site is currently zoned for Special Purposes No. 232 (Warehouse/Workshop) but is not currently utilised for this purpose. The proposed site is currently vacant. An application to rezone the property to General Residential Zone 1 has been applied for.

Terrestrial Environment

The site is situated within the Algoa Sandstone Fynbos vegetation unit and is Critically Endangered (NSBA, 2018) and thus listed as a Threatened Ecosystem. Further, the site is located within a Wetland Cluster catchment of the Papenkuils River, but not within any National Freshwater Ecosystem Priority Areas (NFEPAs) or listed Internal Bird Areas. The study area is not located within any Strategic Water Resource Areas. The study area spans one vegetation type defined by Mucina and Rutherford (2007), as amended in the National Vegetation Map 2012 and 2017/18 spatial information. This vegetation unit, known as Algoa Sandstone Fynbos (FFs 29), a form of Algoa

Grassy Fynbos, is listed as Critically Endangered and is therefore considered a Threatened Ecosystem (Figure 3), as per the National Environmental Management: Biodiversity Act.

The typical species associated with Algoa Sandstone Fynbos are dominated by a variety of grasses, Ericas and Proteas, and are only located within a narrow coastal belt between the Van Stadens River in the West and Summerstrand in the East, within NMBM. A potential species checklist is included in Appendix 4 of the Biodiversity Assessment Specialist Report, however, the species observed did indicate that disturbance had taken place within the site in the past, evidenced by the high number of invasive plant species listed above, illegal solid waste / building rubble disposal and presence of old building foundations. None of the dominant Protea or Erica species were observed.

Plant species that remained, therefore included mostly grasses, and forbs, as shown in **Error! Reference source not found.** below, with the site mostly dominated by the presence of the alien tree species in particular and are shown strong regrowth after the last fire. Figure 4 indicates finer scale mapping of the site, concerning vegetation and bioregional assessment conducted by SRK (2014) for NMBM. The associated mapping detail indicates that the site could contain Rowallan Park Grassy Fynbos and Malabar Grassy Fynbos. The latter was found to be dominated by the alien Acacia Thickets, while the former is comparable to the Algoa Sandstone Fynbos in species.

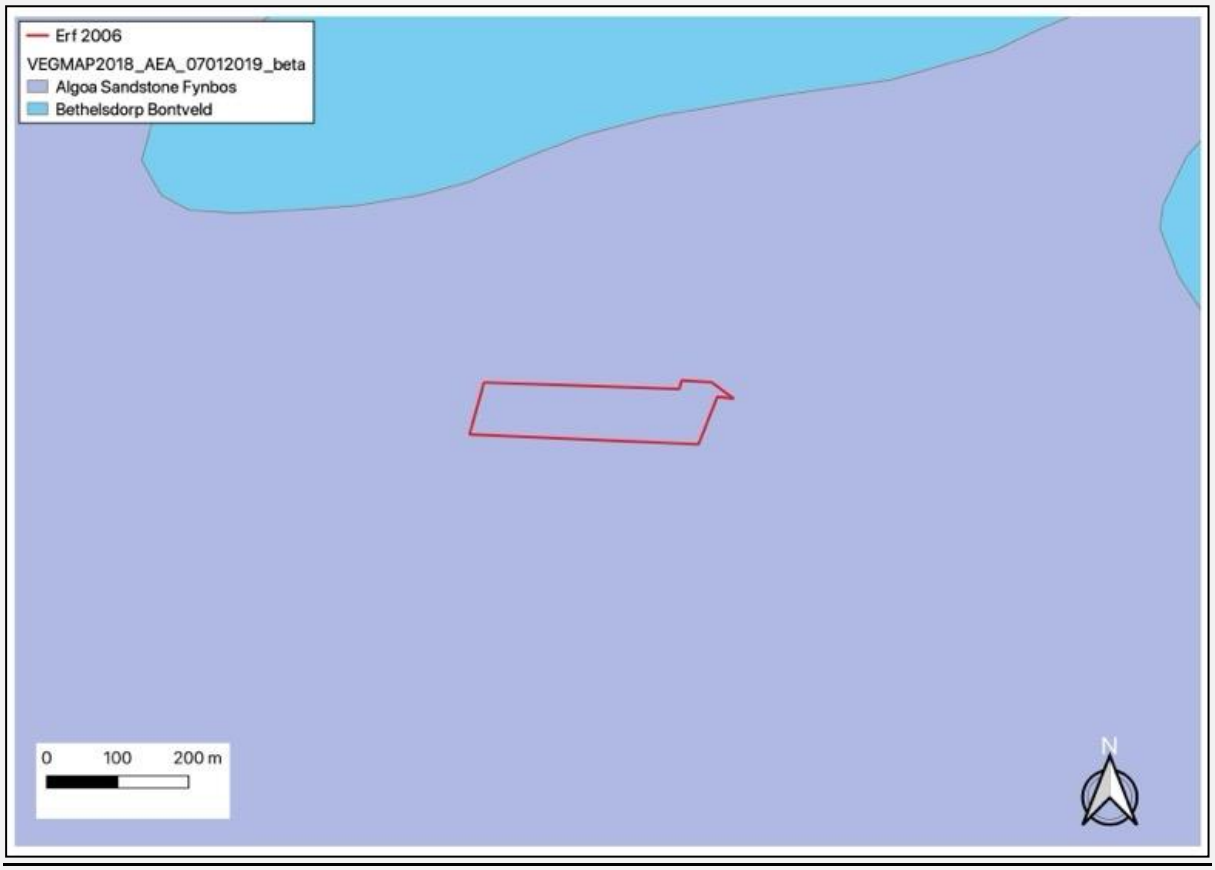

Figure 3 – Vegetation South Africa VegMap as per Mucina & Rutherford (2007) revised 2018

Figure 4 – NMBM Vegetation map (SRK, 2014)

Current State of Site

The site is currently vacant, unoccupied land with a flat topography, gradually sloping towards the northeast. Vegetation cover comprises a mixture of grasses not indicative of Algoa Sandstone Fynbos with the majority of the site infested with alien invasive vegetation (Port Jackson, Black Wattle, and Blue Gums). There are no structures on the site, and disturbance is limited to the edges of the site and the vehicle track paths and footpaths with some dumping observed. Surrounding land uses include residential, vacant land, commercial, roads, and infrastructure. There are no wetlands and only a small number of valley bottom systems are located in the Papenkuils River, but more than 1km from the proposed site. The remaining features near the site are man-made stormwater features such as the detention pond and the adjacent channel.

There are no Nature Reserves within 5 km of the site and no National Parks or World Heritage Sites within 10 km of the site. The nearest non-perennial drainage line is located approximately 180m northeast of the site and no wetlands are located within 500m of the site.

Proposed Activities

In total, the proposed development will consist of 155 residential units aimed at the middle-income residential market. The area of the site is approximately 3.107 Ha. Private open space areas of 0.32 Ha will be provided.

Access to the subject site is proposed from Burchell Road. Table 1 below shows the different types of residential units that are proposed for the development.

Table 1 – Extent of the development

UNIT	AREA	TYPE
22 x 3 Bedroom Townhouse	142m²	Double storey
22 x 3 Bedroom Townhouse	114m²	Single storey
32 x 2 Bedroom Townhouse	103m²	Single storey
24 x 2 Bedroom Townhouse	54m²	2- Storey Blocks
47 x 2 Bedroom Apartments	50m²	2- Storey Blocks
8 x 1 Bedroom Apartments	35m²	2- Storey Blocks

The proposed development will entail the following activities on the site:

- Clearing of vegetation from the proposed site for the development.
- Levelling and landscaping the site for roads, units, and on-site parking,
- The construction of a boundary fence/wall spanning the property boundary,
- Construction of internal roads to provide access to buildings and on-site parking.
- Construction of walkways and related pathways,
- Construction of residential units, gatehouse, and related infrastructure,
- Installation of stormwater infrastructure,
- Installation of sewer reticulation,
- Connections to existing municipal services,
- Construction activity related to access to the site from Burchell Road, and
- Landscaping of the site to provide private open space between the buildings

Engineering Services

a) Roads

Access to the proposed residential development on Erf 2006 Parsonsvlei will be off the existing public road Burchell Road near the northeastern boundary of the site.

The structural design of the main internal roads will have to be done in accordance with the TRH4 Specifications: Structural design of inter-urban and rural road pavements. The structural layer works of the main internal roads have been preliminary designed to accommodate the repetitive axle loads associated with post-development light vehicles and occasional heavier commercial vehicles. The private roads of Erf 2006, Parsonsvlei could also be designed as follows:

- 150mm in-situ silty sandy material compacted to 90% to 98% Modified American Association of State Highway Traffic Officials (MOD AASHTO) density.
- Depending on the insitu Californian Bearing Ratio (CBR) of the insitu layer, a 200mm to 300mm crushed overburden material compacted to 92% MOD AASHTO density can be instructed by the Engineer.
- 150mm G5 material compacted to 95% MOD AASHTO density.
- 80mm deep Class 40/2.6 and/or 60mm deep concrete Class 30/2.0 with an 80mm high mountable kerb on each side of the road.
- 100mm high precast Barrier kerbs at bellmouths on the minimum 6.4m wide entrance road and/or parking areas as dictated by applicable safety and mobility guidelines.

In certain instances, speed humps can also be designed to act as traffic calming measures as well as the mechanisms to retard and/or divert storm water overland flow.

According to Appendix 4: Roads and Wet Services Report, development should have at least two lanes in and two lanes out for a development of this magnitude to effectively regulate access/ exit of visitors as well as residents conveniently subject to security requirements. The main internal entrance road should have a minimum width of 6.0m wide. The internal ring road will vary between 6.0m and 4.5m wide. The roads will also act as shallow overland stormwater channels. Considering the flat to mild topography of the site from south-west to north-east, the roads will have to be designed to fall within the allowed minimum and maximum gradients (self-cleansing flow and maximum stormwater flow velocities) to the catch pit inlets, but also with overall fall towards the proposed stormwater ponds on and/or near the Private Open Spaces at the north-eastern part of the site.

b) Storm Water System

Where practically possible, the controlled storm water outflow from Erf 2006, Parsonsvlei will be limited to a maximum of the discharge resulting from a 1 in 5-year recurrence interval pre-development rainstorm. To accomplish the stormwater management objectives, the following major and minor stormwater control mechanisms will have to be introduced:

- Design and construct the piped stormwater system including the roads and parking on Erf 2006, Parsonsvlei to intercept and also act as stormwater channels and overland flow routes, sloping north and northeast to the stormwater attenuation ponds. The outflow from the respective ponds will be directed northeast towards the existing stormwater channel.
- The attenuation stormwater ponds A and B on Erf 2006, Parsonsvlei has been preliminary designed to retain post-development major design storm inflows up to 1 in 100-year recurrence interval with a 1 in 5-year pre-development discharge. In accordance with our calculations, the effective storage capacity of the proposed ponding system should be 0.342Ml and 0.664Ml respectively.
- The embankments to the ponding facilities should preferably be constructed at a gradient of 1 vertical to 3 horizontal (maximum 1 vertical to 2 horizontal).
- The surface areas of the ponds must be effectively grassed and maintained.
- Erosion protection measures must be implemented at inlet-, outlet- and overflow structures including overland flow routes. This can be done by the effective design and construction of semi-rigid Gabion/Reno mattress/geo-textile structures and establishment of effective ground cover.
- To limit the possibility of mosquito problems in the major pond areas, construct 600mm wide concrete "V" channels combined with grassing to act as low-flow channels from each inlet- to the outlet structure of the ponds.
- The surface run-off from minor post-development rainstorms (up to a maximum 1 in 5-year recurrence interval) has been preliminary designed to be conveyed and intercepted by the piped stormwater system.
- The stormwater pipes should mainly consist of Class 50D concrete pipes SABS 677 (Class 100D under roads) with respective diameters from 300mm up to 450mm depending on the available gradients of the road reserves as calculated during the detailed design stage, hard rock conditions and general topography of the stormwater routes. All pipes are to be laid to SANS 1200 LE standards.
- All final formation levels of the proposed development shall be shaped to fall towards the roads and stormwater system. The floor level of all buildings shall be a minimum of 255mm above the adjacent final formation level.

c) <u>Water Supply System</u>

The supply reservoir for the proposed development will be the Chelsea Reservoir with a top water level (TWL) of 234m above mean sea level (MSL). There is an existing NMBM 400mm diameter uPVC water main in Burchell Road near the northeastern corner of Erf 2006 Parsonsvlei. Under normal circumstances, the provision of water to the proposed development on Erf 2006, Parsonsvlei will be off the mentioned 400mm diameter NMBM reticulation main in Burchell Road for a high-density residential project subject to the conditions as dictated by NMBM.

d) <u>Foul Sewer System</u>

The effluent of the proposed residential development consisting of 155 units on Erf 2006 Parsonsvlei, will be treated at the Fishwater Flats Treatment Works (FWFTW). The preliminary total design Average Dry Weather Flow (ADWF) of the proposed Residential development under discussion has been calculated to be 68.60kl per day. The capacity

of the existing Fishwater Flats Treatment Works is 132Ml per day. The FWFTW is currently treating less than 109Ml per day. Under the current conditions it should be possible for the existing Fishwater Flats Treatment Works to handle the additional post- development effluent of 0.070ML per day (68.60kl/day) generated by the proposed residential development.

1.2 Sensitivity Maps

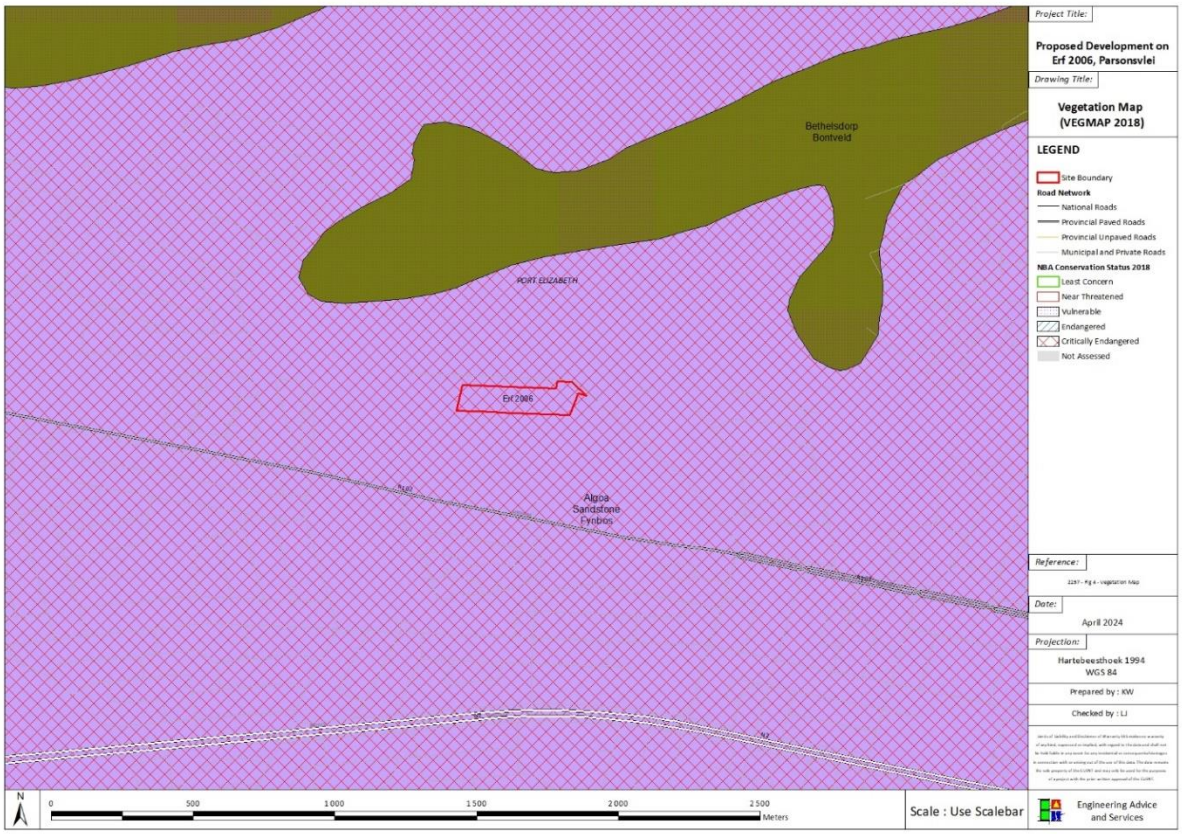

Figure 5 – Vegmap and Vegetation Types 2018

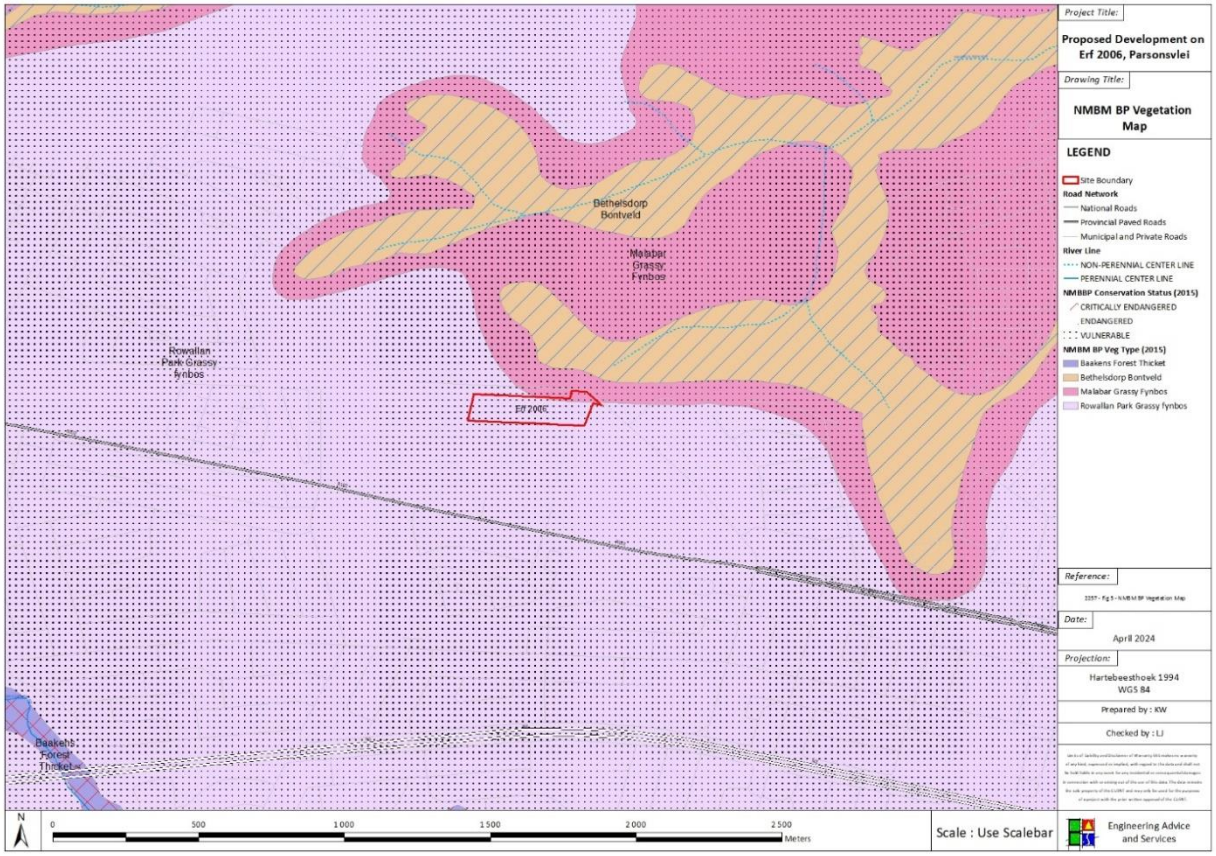

Figure 6 – NMB Bio-regional Plan Vegetation Map (2015)

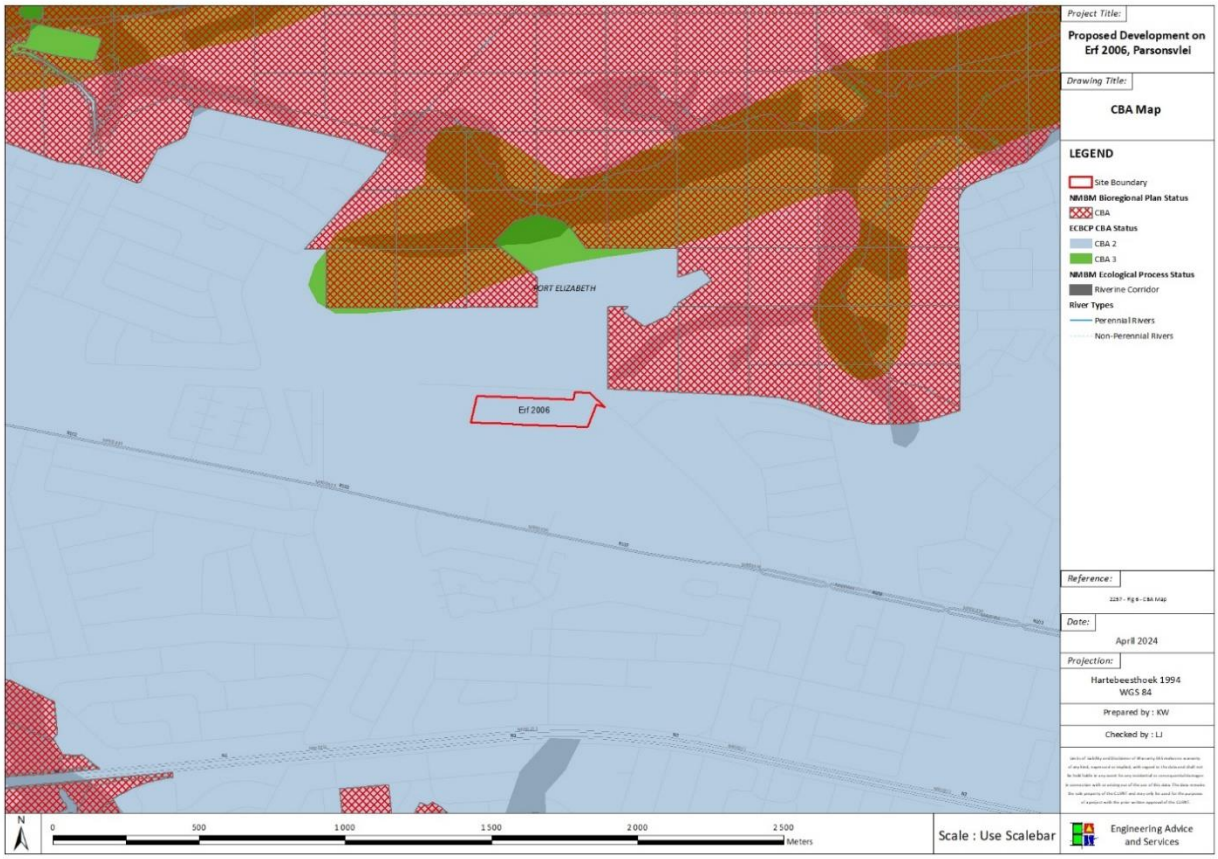

Figure 7 – Critically Biodiversity Areas and Nature Reserves (ECBCP 2007)

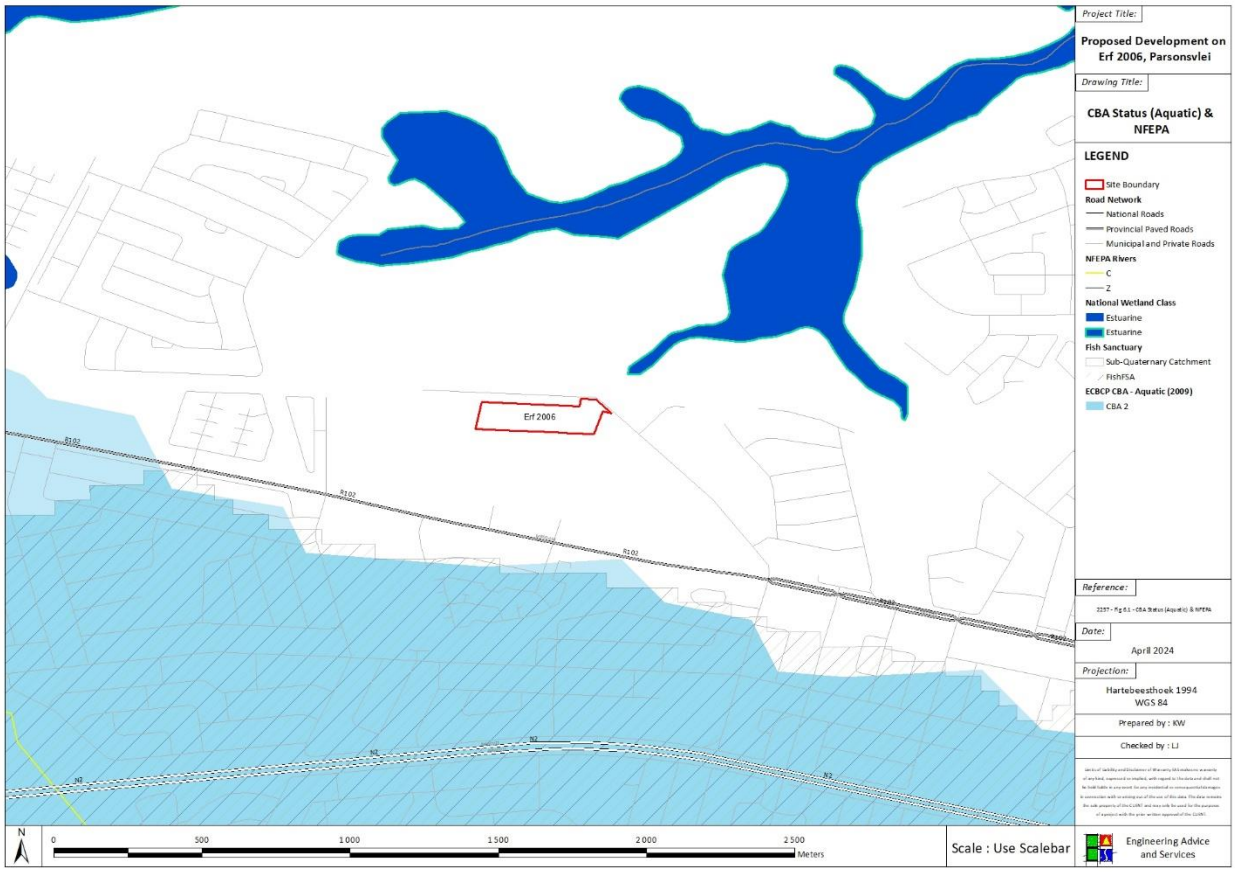

Figure 8 – Critically Biodiversity Areas (Aquatic) and NFEPA

Figure 9 – Rivers and Wetlands (NFEPA 2018)

2 INTERPRETATIONS

2.1 Details of the EAP

Lea's graduate qualifications include geology in sedimentology, structural geology and petrography as well as Environmental Sciences.

Lea has been instrumental in compiling and editing environmental reports for a range of projects in the Eastern Cape within the roads and transport, mining, housing, and agricultural sectors. Lea's primary experience since joining EAS has been related to facilitation of application processes for environmental authorisations for borrow pits in the different areas of the Eastern Cape through site assessments; research and report writing. Most of the processes include the facilitation of the formal basic assessment applications through facilitating public participation processes, and managing environmental studies as well as interpreting and compiling specialist reports relating to these studies with the availability of spatial tools and technologies.

She has experience in borrow pit screening and assessing the feasibility and environmental impacts surrounding the activities related to mining as well as public consultation. She has been involved with, and helped to facilitate licensing applications for more than 200 borrow pits throughout the Eastern Cape. Her responsibilities relating to environmental compliance auditing for road maintenance projects and borrow pit assessments were included during these operations. She assisted with ecological assessments, search and rescue operations, facilitating Environmental Management Programmes, and applications.

Through competent mentoring Lea has become familiar with the applicable legislation for different projects' required application formats and procedures. Lea has gained valuable knowledge of the National Environmental Management Act (NEMA) and its related Regulations, The Mineral and Petroleum Resources Act (MPRDA), the National Water Act (NWA), and the Spatial Planning and Land Use Management Act (SPLUMA). Lea is a registered member of the International Association for Impact Assessment South Africa (6471) and has recently attended a SACNASP Accredited two-day Online EIA Law Course as well as a Continuing Professional Development accredited Introductory EIA Report Writing Course hosted by IAIAsa. She is a Certified Natural Scientist with the South African Council for Natural Scientific Professions (Reg No. 129284).

2.2 Supporting Documents

The following documents shall inter alia be read in conjunction with this document:

1. Statutory requirements of the National Environmental Management Act (Act No 107 of 1998) (NEMA) and regulations promulgated in terms of Section 24 of NEMA;
2. Statutory requirements of the Regulation Notice 983 and 985 respectively, as per regulations 19 and 20 of the NEMA 2014 EIA Regulations (as amended 2017) and Regulation Notice 984 as per regulation 21, 22, 23 and 24 of the NEMA 2014 EIA Regulations (as amended 2017);
3. Statutory requirements of the National Water Act (Act No 36 of 1998) (NWA);
4. Statutory requirements of the National Forests Act (Act No 84 of 1998) (NFA);
5. Statutory requirements of the National Heritage Resources Act (Act No 25 of 1999) (NHRA); and
6. Statutory requirements of the National Environmental Management: Waste Act (Act No 59 of 2008) (NEMWA):

Note 1: In the Eastern Cape Province, the NEMA falls under the authority of the Department of Economic Development, Environment Affairs and Tourism (DEDEAT).

2.3 Applications

The provision of this EMP shall apply in respect of all Contractors, Sub-contractors and any of their site personnel, workforce or suppliers, who are engaged in the execution of the works.

3 STATUTORY REQUIREMENTS

The Environmental Management Programme should be read in conjunction with the conditions of any environmental authorisation issued by the Department of Economic Development, Environmental Affairs and Tourism (DEDEAT) as well as licenses issued and any permits that may be required for the proposed project. It should be noted that the authorisations and licenses and conditions attached to these are legally binding. The following list describes legislation, policies and/or guidelines of any sphere of government that are applicable to the application as contemplated in the EIA regulations:

Title of legislation, policy or guideline:	Administering authority:
GN R.327: Listing Notice 1 (24) The development of a road— (i) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or (ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; but excluding a road— (a) which identified and included in activity 27 in Listing Notice 2 of 2014; or (b) where the entire road falls within an urban area; or (c) which is 1 kilometre or shorter.	Department of Economic Development, Environmental Affairs and Tourism (DEDEAT)
GNR 327: Listing Notice 1 (27) The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for— (i) the undertaking of a linear activity; or maintenance purposes undertaken in accordance with a maintenance management plan.	Department of Economic Development, Environmental Affairs and Tourism (DEDEAT)
GN R 324: Listing Notice 3 (12) The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. (a) Eastern Cape i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; ii. Within critical biodiversity areas identified in bioregional plans;	Department of Economic Development, Environmental Affairs and Tourism (DEDEAT)
National Water Act 36 of 1998 Not applicable. No watercourses were identified on-site	Department of Water and Sanitation (DWS)
National Heritage Resources Act 25 of 1999 The proposed site for development activities and material are not older than 60 years. An application will not be needed to be submitted for a permit from SAHRA. Permits may be required if archaeological resources are uncovered during construction activities.	South African Heritage Resources Agency
Eastern Cape Nature and Environmental Conservation Ordinance 19 of 1974 and Provincial Nature Conservation Ordinance 19 of 1974 ***Not applicable***	Department of Economic Development,

Title of legislation, policy or guideline:	Administering authority:
	Environmental Affairs and Tourism (DEDEAT)
National Forests Act 84 of 1998 with Amendments *Not Applicable.* ***No NFA-protected trees were identified on-site.***	Department of Forestry, Fisheries and the Environment (DFFE)
Conservation of Agricultural Resources Act 43 of 1993 ***Not applicable.***	Department of Forestry, Fisheries and the Environment (DFFE)

The Contractor is furthermore required to comply with other relevant legislation which may apply to the proposed activities. This may include, but not be limited to:

1. An environmental authorisation from the Department of Economic Development, Environmental Affairs and Tourism (DEDEAT), issued in terms of the National Environmental Management Act (NEMA), EIA Regulations for the implementation of listed activities. *Construction may only commence once this has been granted.*

4 OBJECTIVES OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME

The Environmental Management Programme, which is in accordance with the Environmental Policy of the Client, is intended primarily as a management tool, for the guidance of the Consulting Engineers, the Contractor and his subcontractors. The EMPr has been compiled to provide recommendations and guidelines according to which compliance monitoring can be done during the construction and operation of the proposed development. The development will entail the construction of 9 different unit types, which equal a total of 650 units, excluding “other buildings” for recreation, refuse, maintenance, entrance area, and security. The objective of the EMPr is also to ensure that all relevant factors are considered to ensure for environmentally responsible development. The purpose of the EMPr is to provide specifications for "good environmental practice" applicable during the construction and operational phases.

The Environmental Management Programme outlines structures and procedures to be implemented by the Contractor and his subcontractors to minimise and manage potential environmental impacts which the Contractor's construction-related activities might have on the receiving environment.

An independent Environmental Control Officer (ECO) will be appointed by the Client to ensure that the Environmental Management Programme and approved EMPr is being effectively implemented. The ECO shall undertake monthly site inspections, the results of which will be reported to the Client, the Consulting Engineer, the Contractor and the relevant government departments.

This EMPr informs all relevant parties (the Engineer, the Contractor, the Designated Environmental Officer (DEO), the Environmental Control Officer (ECO) and all other staff employed by the contractor at the site as to their duties in the fulfilment of the legal requirements for the construction and operation of the project with particular reference to the prevention and mitigation of anticipated potential environmental impacts. All parties should note that obligations imposed by the EMPr are legally binding in terms of the environmental authorisation, should one be granted by the relevant environmental permitting authority.

The objectives of an EMPr are to:

- Ensure compliance with regulatory authority stipulations and guidelines which may be local, provincial, national and/or international;
- Ensure that there is sufficient allocation of resources on the project budget so that the scale of
- EMPr-related activities are consistent with the significance of project impacts;
- Verify environmental performance through information on impacts as they occur;

- Respond to unforeseen events;
- Provide feedback for continual improvement in environmental performance;
- Identify a range of mitigation measures which could reduce and mitigate the potential impacts to minimal or insignificant levels;
- Detail specific actions deemed necessary to assist in mitigating the environmental impact of the project;
- Identify measures that could optimize beneficial impacts;
- Create management structures that addresses the concerns and complaints of I&APs with regards to the development;
- Establish a method of monitoring and auditing environmental management practices during all phases of the activity;
- Ensure that safety recommendations are complied with;
- Specify time periods within which the measures contemplated in the final environmental management programme must be implemented, where appropriate;

5 ROLES AND RESPONSIBILITIES

5.1 Responsibilities of the developer

The Project Developer is accountable for ensuring compliance with the EMPr and any conditions of approval from the competent authority. An independent environmental control officer (ECO) must be contracted by the developer to objectively monitor the implementation of the EMPr according to relevant environmental legislation, and the conditions of environmental authorization (EA). The developer is further responsible for providing and giving mandate to enable the ECO to perform responsibilities, and he must ensure that the ECO is integrated as part of the project team while remaining independent.

Responsibilities

- Be fully conversant with the conditions of the EA;
- Ensure that all stipulations within the EMPr are communicated and adhered to by the developer and its Contractor(s);
- Monitor the implementation of the EMPr throughout the project by means of site inspections and meetings. Overall management of the project and EMPr implementation; and
- Ensure that periodic environmental performance audits are undertaken on the project implementation

5.2 Responsibilities of the Resident Engineer

Specific to environmental management, the role of the Resident Engineer (RE) will be to ensure enforcement of the Environmental Management Programme, approved EMPr and supplementary recommendations made by the ECO; review and approve the Method Statements submitted by the Contractor; and liaise with the Contractor, the ECO and DEDEAT on environmental matters as necessary.

Responsibilities of the RE will include, but not be limited to:

- communicating the advice of the ECO and/or contents of the ECO's reports;
- issuing site instructions where applicable;
- communicating to the ECO any new/amended construction activities;
- informing the ECO of any infringements/accidents or incidents that have occurred on/off site;
- implementing any Temporary Work Stoppages where serious environmental infringements and non-compliances have occurred;
- issuing penalties as and when necessary; and
- maintaining a record of complaints and communicating these to the Contractor and ECO.

Should the RE be of the opinion that the environmental management measures are not being adhered to, and that the appropriate corrective action is not being implemented, the RE, advised by the ECO, will be at liberty to instruct the Contractor to cease the related operations until the Contractor complies with the relevant requirements. The Contractor will not be entitled to any extension of time for such stoppages.

5.3 Responsibilities of the Environmental Control Officer (ECO)

The role of the ECO will be to independently monitor, review and verify the implementation of the EMPr and liaise with the RE and/or Client, and DEDEAT to confirm the level of compliance achieved and make appropriate recommendations on improvements/actions required.

The responsibilities of the ECO will include, as a minimum:

- The responsibility of the pre-commencement audit of the conditions of the EA, which must be submitted prior to the notice of commencement,
- advising the RE on the interpretation and enforcement of the Environmental Specifications;
- assisting with the review of Method Statements;
- ECO is to attend monthly progress meetings in order to report on the outcomes of the audits;
- demarcating particularly sensitive areas;
- monitoring any basic physical changes to the environment as a consequence of the construction works - e.g. evidence of erosion, dust generation and littering;
- undertaking monthly site inspections on the level of compliance to the EMPr demonstrated by the Contractor and submitting reports to the Client, Consulting Engineer, Contractor and to the relevant government departments;
- undertaking any damage assessments with the RE where incidents, accidents and/or serious infringements have occurred on/off site, and advising on remedial actions required; and
- appropriate and communicating these changes to the Resident Engineer and Contractor.

5.4 Responsibilities of the Contractor

The Contractor will be contractually required to undertake his activities in an environmentally responsible manner. The role of the Contractor will include the following, at a minimum:

- to implement the Environmental Management Programme (and any subsequent revisions) and any environmental authorisations and permits (and any subsequent revisions) for the duration of the construction related activities;
- to appoint an Environmental Officer for the daily implementation and monitoring of activities and liaison with ECO;
- to provide reasonable resources for the effective control and management of environmental risks associated with the construction related activities, as per the EMP;
- to assign tasks to personnel as necessary and ensure appropriate accountability and responsibility is assigned to enable the carrying out of these duties;
- to maintain incident training and other relevant administrative records; and
- to ensure all personnel, sub-contractors and other workers appointed by the Contractor are aware of the environmental responsibilities on site.

These roles will, at a minimum, translate into the following environmental responsibilities:

- be familiar with the contents of all the respective environmental authorizations and permits, as well as the approved EMPr and to comply with the EMP;
- submit the necessary Method Statements and plans to the RE for approval;
- review the ECO Reports and undertake corrective actions for non-compliance and take cognisance of the information/recommendations made;
- notify the RE immediately in the event of any accidental infringements of the Environmental Management Programme and ensure appropriate remedial action is taken;

- Identify the need and be responsible for the implementation of an environmental awareness training programme for the construction staff;
- notify the RE in advance of any amendments/changes to the proposed work activities to enable environmental impacts to be confirmed and mitigation measures to be identified; and
- ensure that any problems identified during environmental audits or inspections, are addressed and rectified as soon as reasonably possible; and
- maintain records - e.g. photographic records, complaints records, training records and incident records.

5.5 Sub-Contractor

- The Contractor shall supervise the Sub-Contractor's operation.
- The Sub-Contractor is held liable for any issues associated with their actions.

5.6 Responsibilities of the Environmental Officer

The Contractor shall on commencement of the Project appoint an Environmental Officer who, in addition to his normal duties, shall have direct responsibility for the implementation and monitoring of the Environmental Management Programme and the approved EMPr. The Environmental Officer cannot be the Site Agent (Contract Manager).

The Environmental Officer shall liaise with the RE, the ECO, and the Contractor, in order to ensure effective implementation of the EMPr at the site level. The Environmental Officer will be responsible for the practical implementation and daily monitoring of the EMPr and shall report to the Contractor and RE in this regard. The Environmental Officer shall inspect daily and monitor operations on and off-site and shall take the necessary action where required to ensure compliance with the environmental management requirements. The Environmental Officer shall attend all regular site works meetings for reporting, discussing, and reviewing the performance of the Contractor (which shall be a standard item on the agenda).
The EO will compile and maintain an environmental file, to be checked on a regular basis by the ECO. The audit reports should be made available to the DEDEAT to ensure compliance with the Environmental Authorisation. The findings of the audits are to be consolidated and submitted to DEDEAT on a quarterly basis. A final post-construction and rehabilitation audit should be conducted and submitted to DEDEAT.

6 METHOD STATEMENTS

The Contractor shall be required to submit Method Statements to the RE outlining proposed construction activities, phasing, procedures and methods to comply with the targets stipulated in the Environmental Management Programme and any EMP's. Method Statements shall, where applicable, include Site Establishment Drawings with sufficient detail to assess the potential impact of the site facilities or to assess the degree of safeguarding provided against pollution.

Method Statements shall indicate how the procedures will be applied in order to meet the relevant targets and are central to the proper implementation of the EMPr. It is anticipated that in addition to assessing the systems and performance of the Contractor, the ECO will monitor the Contractor's adherence to Method Statements.

Method Statements must be submitted at least 10 days prior to the proposed commencement of related activities and must be approved by the RE, in consultation with the ECO. The Environmental Officer shall keep copies of these Method Statements and letters of approval (including conditions attached) in an Environmental file.
Any deviations from the approved Method Statements must be submitted to the RE for approval and in consultation with the ECO.

The following Method Statements shall be submitted by the Contractor 14 days prior to commencement:

1. Layout and preparation of the construction camp including facilities required for personnel and plant;

2. Storage and handling of materials, including cement/concrete, and hazardous substances;
3. Waste management and pollution prevention, including solid waste, hazardous waste and contaminated water;
4. Operational activities, including stockpiling, dust control, control of erosion during bulk earthwork operations, and construction water;
5. Construction methods including vegetation clearing, removal and replacement of an existing municipal water line, internal roads, walkways, stormwater, sewer and irrigation network installation, material sources, construction of and site rehabilitation;
6. Statutory requirements including obtaining relevant permits;
7. Public and Worker Health and Safety;
8. Environmental Awareness and Training; and
9. Emergency Procedures for spillage procedures, including hydrocarbons, compounds to be used, and fire prevention/management.

7 ENVIRONMENTAL AWARENESS TRAINING

Before any work is commenced on the Site, the Contractor's site staff including foremen shall attend an environmental awareness training course as approved by the ECO. The Contractor shall furthermore provide ongoing environmental awareness training for the duration of the contract to all employees. The information presented at the course shall be communicated to the Contractors employees on the site, to any new employees coming onto site after the initial training course and to his suppliers as required by the Project Specification. The Contractor shall ensure that all attendees sign an attendance register and shall provide the ECO with a copy of the attendance register the day after each course.
The Contractor shall erect and maintain information posters for the information of his employees depicting actions to be taken to ensure compliance with aspects of the Specifications. These information boards shall be erected at the locations, agreed upon by the RE and should contain the following symbols:

- At working areas: Use drip trays, use toilets, no eating, no littering, no swimming, no picking of flowers or any indigenous vegetation, no dogs, no veld fires, no loud noise, smoking only in designated areas.
- At eating areas: Use toilets, no littering, no loud noise and no veld fires.

As a minimum, training shall include:

- explanation of the importance of complying with the EMPr;
- identification of sensitive environmental systems;
- discussion of the potential environmental impacts of construction activities;
- the benefits of improved personal performance;
- employees' roles of responsibilities, including emergency preparedness;
- explanation of the mitigation measures that must be implemented when carrying out their activities;
- explanation of the specifics of the EMPr and its specifications; and
- explanation of the management structure of individuals responsible for matters pertaining to the EMPr.

8 EMERGENCY PROCEDURES

The Contractor's procedures for the following emergencies shall include:

8.1 Fire

The Contractor shall advise the relevant authority of a fire as soon as one starts and shall not wait until he can no longer control it. The Contractor shall ensure that his employees are aware of the procedure to be followed in the event of a fire. Emergency numbers must be clearly displayed at the sites.

- The Contractor shall take all reasonable steps to avoid increasing the risk of fire through activities on site.
- The Contractor shall ensure that basic fire-fighting equipment is available at all construction activities on site and that the equipment is easily accessible.

- The Contractor shall appoint a Fire Officer who shall be responsible for ensuring immediate and appropriate action in the event of a fire.
- The Contractor shall ensure that all site personnel are aware of the procedure to be followed in the event of a fire.

8.2 Fire Emergency Procedure

In the unlikely event of a fire occurring on site during construction the emergency procedures stipulated in the Occupational Health and Safety File would need to take place which would be overseen by the appointed H&S officer or fire officer on site. The health and safety inductions as well as the environmental awareness training should have been clearly communicated (with signed registers) to all staff on site in which it would explain the emergency procedures to follow and one's responsibilities.

8.3 Accidental Leaks and Spillages

The Contractor shall ensure that his employees are aware of the procedure to be followed for dealing with spills and leaks, which shall include notifying the RE and the relevant authorities.

The Contractor shall ensure that the necessary materials and equipment for dealing with spills and leaks is available on-site at all times.

Treatment and remediation of the spill areas shall be undertaken to the reasonable satisfaction of the RE and ECO.

In the event of a hydrocarbon spill, the source of the spillage shall be isolated, and the spillage contained. The area shall be cordoned off and secured. The Contractor shall ensure that there is always a supply of absorbent material readily available to absorb/break down and where possible be designed to encapsulate minor hydrocarbon spillage. The quantity of such materials shall be able to handle a minimum of 200 litres of hydrocarbon liquid spill.

In the event of a fire or accidental leak/spillage, the Contractor shall notify the RE as soon as possible, but at least within 48 hours of the incident being noticed.

The telephone numbers for the closest Hazmat service provider's offices should be prominently displayed, as bitumen and diesel spillage on construction and road building sites are fairly common. The clean-up procedure is critical to prevent contamination.

Hydrocarbon material that is cleaned up must be stored in a hazardous waste facility on-site and then removed and disposed of at a licensed hazardous waste facility (i.e. Aloes landfill site)

8.4 Standard Environmental Emergency Response

	Type of Incident	Action to be taken	Notify the following
Minor	**Minimal environmental impact** • No disruption of the project • No public concern or attention • Low risk of compliance and legal issues • Immediate remediation	• Ensure spillage/fire is contained • Ensure that no further damage takes place • Record all details of the incident • Take photographs • Consult Safety Data Sheets • Clean up spill with spill kit • Contaminated material to be disposed of correctly • Follow-up training & awareness	**Within 24 hours:** • Supervisor • Environmental Officer • Safety Officer • Environmental Control Officer (ECO)

Moderate	**Moderate environmental impact** • Brief/partial disruption to the project • Local public attention and concern • Minor legal issues, non-compliance, and breach of law • Short term remediation	• Ensure spillage/fire is contained • Ensure that no further damage takes place • Record all details of the incident • Take photographs • Consult Safety Data Sheets • Clean up spill with spill kit • Contaminated material to be disposed of correctly • Contact a specialist spill response company if spill kit is inadequate • Follow-up training & awareness	**Within 24 hours:** • Supervisor • Safety Officer • Environmental Officer • Site management • HSE Director • Environmental Control Officer (ECO) • Spill response company (if required)
Major	**Serious environmental impact** • Partial or total shutdown of project or part thereof • Regional/national public attention and concern • Medium to long-term remediation	• Ensure no further spillage or damage • Cordon off and evacuate area • Notify specialist spill response company • Notify relevant authorities. • Record all details of the incident • Take photographs • Consult Safety Data Sheets • Follow-up training & awareness	**Within 12 hours:** • Supervisor • Safety Officer • Environmental Officer • Site management • HSE Director • Environmental Control Officer (ECO) • Spill response company (if required)

9 EXTERNAL AUDITING AND EVALUATION

In order to ensure that the EMPr is effectively implemented, it is important that monthly external audits of the EMPr are conducted. An ECO will be appointed by the Client to undertake these audits. The RE shall arrange that these external audits do take place and that a system for addressing any problems identified during these audits is formulated. The relevant documentation shall be kept and shall be available to the public.

9.1 Pre-commencement requirements

Before works commence, the following will need to be undertaken by the appointed ECO in liaison with the Contractor and Engineer:

1. Any necessary permits must be obtained prior to the removal of protected and threatened species (fauna and flora)
2. A two-week notification of commencement of the respective department (DEDEAT) will be required. This may include a pre-commencement audit by the ECO.
3. Contractors EMP and/or Method Statements to be submitted and approved by ECO, at least 3 weeks before commencement – this may require submission to DEDEAT with the 2-week commencement notification.
4. Contractor to undertake pre-commencement environmental awareness and training and induction of all staff.
5. Ward councilors, tribal leaders, and representatives of the affected communities must be consulted before commencement to address any issues raised in the authorisation processes.

9.2 Environmental Management during Closure/Decommissioning

Environmental Management associated with the closure of this project will ensure that the following items are addressed at closure and during the defects liability period:

- All cleared sites are rehabilitated with Indigenous grass material with a cover of at least 80%;
- All visible alien plants are removed from disturbed sites;
- All recyclable rubble and waste (for example: scrap metal, bottles, cans, and plastics) are collected and disposed of through a registered recycling company;

- All non-recyclable rubble and non-recyclable solid waste be collected and disposed of at a registered waste disposal facility;
- Provision will made for stormwater control to prevent erosion from taking place post-construction;

10 TOLERANCES

Environmental management is concerned not only with the final results of the Contractor's operations to carry out the works; but also with the control of how those operations are carried out. Tolerance with respect to environmental matters applies not only to the finished product; but also to the standard of the day-to-day operations required to complete the works. It is thus required that the Contractor shall comply with the environmental requirements on an ongoing basis.

11 MEASUREMENT AND PAYMENT

The Contractor shall not be separately reimbursed or compensated in respect of his compliance with the provisions of this Section. All costs so incurred is deemed to be included in the rates tendered for the various items of work listed in the Bill of Quantities.

12 WORK STOPPAGES

The RE shall have the right to order work to be stopped in the event of significant infringements of the Environmental Management Programme, until the situation is rectified in compliance with the Specifications. In this event, the Contractor shall not be entitled to claim for delays or incurred expenses. Any failure on the part of the Contractor to comply with the EMPr will entitle the RE to certify work stoppage subject to the details set out.

The RE shall be the judge as to what constitutes a transgression subject to the provisions of the General Conditions of Contract. In the event that transgressions continue, the Contractor's attention is drawn to the provisions of the General Conditions of Contract, under which the Contract Supervisor and/or Client may cancel the Contract.
In addition to work stoppage, penalties may be issued where there is damage to the natural or human environment, as a consequence of the transgression(s) and/or non-compliance(s). In such an event, the Contractor may be liable to pay a penalty at the instruction of the RE. A list of incidents that may lead to work stoppage is indicated below and this list is regarded as non-exhaustive:

- Failure to submit Method Statements timeously.
- Failure to stockpile topsoil properly or materials in designated areas.
- Pollution of water bodies, which includes increased sediment loads.
- Failure to maintain basic safety measures on-site.
- Animal poaching (wildlife or domestic).
- Failure to provide waste disposal facilities or services.
- Excess dust or excess noise levels emanating from the Contractor's Camp and construction areas.
- Any person, vehicle, plant, or item related to the Contractor's activities causing a public nuisance.
- Failure to carry out liaison with adjacent landowners; causing damage to property without prior negotiation and/or compensation and/or causing other social infringements.
- Failure to control the pollution risks from dispensing fuel or the storage of vehicles and plant (drip trays).
- Failure to mitigate/remediate an environmental incident timeously.

The Contractor shall be responsible for the costs associated with repairing any damage to the natural or human environment that may result from the transgression and/or the result of the work stoppage.

13 PLANT AND FACILITIES (PLANNING, DESIGN & PRE-CONSTRUCTION)

13.1 Site Camp

The construction, layout, and extent of the construction site and its components shall be planned, designed, and managed in such a manner that environmental impacts are minimised. Temporary structures and facilities shall be decommissioned to the satisfaction of the Employer and clean-up after construction shall be effectively undertaken.

- The position of the site camp must take note of any important microhabitats within/near the development footprint and should try to avoid these as far as possible.
- All site establishment components (as well as equipment) shall be positioned to limit visual intrusion on neighbours and the size of the area disturbed.
- The Contractor shall provide the RE with a plan of the site camp showing the layout and the positioning of all infrastructure including wash bays, fuel storage areas, materials storage areas, sewage infrastructure, and buildings. The Contractor shall maintain a map of the site layout that indicates where the wash bays, fuel storage areas, topsoil sites, etc are located. The RE must approve this in consultation with the ECO.
- Where site camps are to be established the feasibility of removing topsoil from the site before site establishment, shall be investigated by the ECO. Removed topsoil should then be stockpiled for use in rehabilitation of the site camp.
- The site camp shall not be located in an environmentally sensitive area.
- All water requiring discharge, including wastewater from the kitchen (should one be present) and ablution facilities should be led to soak pits or discharged in a manner approved by the RE and in compliance with the National Water Act. No wastewater shall be discharged into rivers or streams.
- Site camps and surrounds shall be maintained in a clean, tidy, and orderly condition at all times.
- The Contractor shall restore the site camp to its former condition upon completion of the works. This will include removal of all rubble and foundations, loosening of compacted soils and re-establishing groundcover. Where a homestead has been used as a site camp, the Contractor may be required to renovate the buildings to their former or better condition as agreed with the landowner once the works are complete.

13.1.1 Drinking water

Water for drinking purposes should be obtained from a designated supply or an approved source of treated water.

13.1.2 Ablution Facilities

- A sufficient number of chemical toilets shall be provided by the Contractor in the construction camp area and at appropriate locations agreed by the RE. The ratio of toilets to site staff shall not exceed 1:20, and the closest toilet shall never be further than 200 m away from the area where work is currently underway.
- Toilets shall not be located within 50 m of the proposed project.
- Washing, whether of the person or personal effects and acts of excretion and urination are strictly prohibited other than at the facilities provided.
- All temporary/portable toilets shall be secured to the ground to the satisfaction of the RE to prevent them from toppling due to wind or any other cause.
- All toilets are to be maintained in a clean, sanitary condition. The Contractor shall be responsible for cleaning, maintenance, servicing, and emptying the toilets on a regular basis. The Contractor shall supply adequate toilet paper at all toilets.
- The Contractor shall ensure that no spillage occurs when the toilets are cleaned or emptied and that the contents are properly stored and removed from the site.
- Discharge of waste from toilets into the environment and burial of waste is strictly prohibited. Conservancy tanks may be used only once the soil conditions have been checked and found to be suitable. Septic tanks may not be used.

13.1.3 Personal hygiene

- Hand washing facilities with soap and running water must be available for use at all times by any staff on site.
- Staff should be made aware of the need for washing hands and other personal hygiene practices.
- If possible, hand sanitizers should be made available for use by on-site staff.
- Sanitation and waste management facilities should be properly disinfected on a regular basis by following environmental cleaning and decontamination procedures.

13.1.4 Workshop, Equipment Maintenance and Storage

- All vehicles and equipment shall be kept in good working order to maximise efficiency and minimise pollution.
- All maintenance, including washing and refuelling of the plant on site shall take place at designated locations in the workshop area.
- The Contractor shall ensure that no contamination of soil or vegetation occurs around workshops and plant maintenance facilities.
- All machinery servicing areas shall be bunded.
- Drip trays shall be used to collect used oil, lubricants, etc. during maintenance.
- Drip trays shall be provided for all stationary plant.
- Washing of equipment shall be restricted to urgent maintenance requirements only.
- Adequate wastewater collection facilities shall be provided.

13.1.5 General Aesthetics

- All construction areas must be kept neat and tidy at all times. Different materials and equipment must be kept in designated areas and storing/stockpiling shall be kept orderly.
- Lighting shall be of the downward-facing spill-off type.
- The residential units should be in a manner that compliments the general aesthetic of the site.

13.2 Lights

The Contractor shall ensure that any lighting installed on the Site for his activities does not interfere with road traffic or cause a reasonably avoidable disturbance to the surrounding community or other users of the area. The lighting installed shall be down lighting. Lighting used in the development area for roadside must make use of a soft light that is directed downwards rather than scattered into the night sky. Solar-powered lights are recommended.

13.3 Workshop, Equipment Maintenance and Storage

- Where practical, all maintenance, including servicing and repairs of equipment and vehicles on Site shall be performed in the workshop. If it is necessary to do maintenance outside of the workshop area, the Contractor shall obtain the approval of the RE prior to commencing activities.
- The Contractor shall ensure that in his workshop and other plant maintenance facilities, including those areas where, after obtaining the RE's approval, the Contractor carries out emergency plant repairs to ensure there is no contamination of the soil or vegetation.
- The workshop shall have a smooth impermeable concrete floor. The floor shall be bunded and sloped towards an oil trap or sump to contain any spillages of substances (e.g. oil).
- When maintaining and servicing equipment, drip trays shall be used to collect the waste oil and other lubricants.
- Drip trays shall also be provided in construction areas for stationary plant (such as compressors) and for "parked" plant (such as scrapers, loaders, and vehicles).
- All vehicles and equipment shall be kept in good working order and serviced regularly. Leaking equipment shall be repaired immediately or removed from the Site.
- The washing of equipment shall be restricted to urgent or preventative maintenance requirements only. All washing shall be undertaken in a wash bay area which must be equipped with a suitable impermeable floor and

sump/oil trap. The use of detergents for washing shall be restricted to low phosphate and nitrate-containing, low sudsing-type detergents.

- All maintenance, including washing and refuelling of plant on site shall take place at designated locations at the workshop area.
- All machinery servicing areas shall be bunded.
- Drip trays shall be used to collect used oil, lubricants, etc. during maintenance.
- Washing of equipment shall be restricted to urgent maintenance requirements only.

14 MATERIAL HANDLING AND STORAGE

14.1 Materials Handling, Use and Storage

- The Contractor shall ensure that any delivery drivers are informed of all procedures and restrictions required to comply with the EMPr.
- The Contractor shall ensure that these delivery drivers are supervised during off-loading by the Contractor's Environmental Officer.
- Materials shall be appropriately secured to ensure safe passage between destinations. Loads include but are not limited to sand, stone chip, fine vegetation, refuse, paper and cement, shall have appropriate cover to prevent them spilling from the vehicle during transit. The Contractor shall be responsible for any clean-up resulting from the failure by his employees or suppliers to properly secure transported materials.
- All lay down areas for manufactured/imported material shall be incorporated inside the construction camp as approved by the RE. In the event that additional areas outside of the construction camp are required, this shall be subject to the RE's approval (in consultation with the ECO), which shall not unreasonably be withheld.
- Fuel lubricants, solvents, paints, and other chemicals must be stored within the Contractor's camp in a facility secured with lock and key. Storage should be on an impervious bunded site (secondary containment).

14.2 Storage and Handling of Hazardous Substances

Hazardous chemical substances (as defined in the Hazardous Chemical Substances Regulations, Regulation 1179 of 1995 in terms of the Occupational Health and Safety Act) used during construction shall be stored in secondary containers and in an impermeable bunded area that has a roof and is under lock and key. The relevant Material Safety Data Sheets (MSDS) shall be available on Site. Procedures detailed in the Method Statement for Emergency Incidents shall be followed in the event of an emergency situation. Potentially hazardous substances shall be stored, handled, and disposed of in a suitable manner.

14.3 Fuel (petrol and diesel), Oil and Hydraulic fluids

- The Contractor shall ensure that all fuels and chemicals are handled and stored in a manner so as to minimise the risk of spills, leaks, or structural failures and in compliance with SANS 10089.
- Only small volumes of fuel may be stored as required for a generator (25 litres). Fuel must be stored away from ignitable materials and on a bunded and sealed surface. Signage must be in place, and a fire extinguisher available at the site camp.
- The Contractor shall ensure that all liquid fuels (petrol and diesel) are stored in tanks with lids, which are kept firmly shut or in bowsers.
- The tanks/bowsers shall be situated on a smooth impermeable surface (sealed concrete) base with an impermeable bund (no plastic may be used). The impermeable lining shall extend to the crest of the bund and the volume inside the bund shall be 110 % of the total capacity of all the storage tanks/bowsers.
- The bunded area shall have a roof covering to prevent the ingress of rainwater. The Contractor shall prevent unauthorised access into the fuel storage area.
- The Contractor shall have on Site all the necessary materials and equipment (i.e. spill kits) to deal with spills of any of the substances stored on Site.

- The Contractor shall set up a procedure to deal with a spillage or pollution event; this is to include immediate communication with the RE and ECO. A number of the Contractor's staff shall be appropriately trained to deal with any minor spills or pollution threats.
- No smoking shall be allowed within the vicinity of the fuel storage area.
- The Contractor shall ensure that there is adequate fire-fighting equipment at the fuel stores. Gas and fuels shall not be stored in the same storage area.
- Where reasonably practical the plant shall be refuelled at the depot or at the workshop as applicable. If it is not reasonably practical then the surface under the refuelling area shall be protected against pollution to the reasonable satisfaction of the RE prior to any refuelling activities.
- The Contractor shall ensure that there is always a supply of absorbent material readily available to absorb/break down and where possible be designed to encapsulate minor hydrocarbon spillage. The quantity of such materials shall be able to handle a minimum of 200 litre of hydrocarbon liquid spill. This material must be approved by the RE prior to any refuelling or maintenance activities.
- Drip trays shall be inspected and emptied daily into a hazardous waste container and serviced when necessary. Drip trays shall be closely monitored during rain events to ensure that they do not overflow and a small spill absorbent sock should be placed within the drip tray for such occasions.
- The appropriate signage must be erected at the diesel bowser and workshops.

15 STORMWATER MANAGEMENT

Storm water management assists in channelling water properly and efficiently preventing water build-up that may lead to flooding, structural damage, soil erosion, and other issues. For this reason, storm water management is advisable to be implemented. Prior to, or at the start of the preliminary design phase, the field investigation should be undertaken to confirm the position of the existing water reticulation line, and thus, confirm proposed connection points within the site and to municipal lines.

15.1 Materials and Equipment

- The type of drainage pipe a contractor chooses will often be based on the project's drainage situation.
- The qualities contractors will utilize to determine the type of drainage pipe used are in relation to strength, size, leak, and ease of installation.
- The design of installation should be able to adapt to the environment it's placed on and the design of the proposed development.
- A reticulation system will be required to provide potable water, as well as water for firefighting purposes.
- A proposed offtake pipe size is should be sufficiently sized such that a fire ring main with fire hydrants can be adequately supplied.
- Multiple pipelines can be placed to run along the site to collect and convey the generated runoff in the municipal drains.
- Before pipes are laid into the trench, re-inspect the pipes for any damage and clean any debris that may have accumulated on the inside of the pipes or sealing surfaces.
- The material used for the structure of the storm water should be able to function in both dry and wet seasons.
- Stormwater conveyance systems should be able to remove water efficiently enough to meet flood protection criteria and level of service requirements.
- The storm water systems should complement the ability of the site design and structural stormwater controls to mitigate the major impacts of the proposed development
- The backfill and pipe function together as a structural system post construction forming the pipe/soil envelope, to support the soil overburden and sustain vehicular loads.

15.2 Rainwater Harvesting

- The roof area can be used to maximum to provide noteworthy rainwater harvesting potential.
- The rainwater harvesting systems should be planned and designed so as to generally conform to natural drainage patterns and discharge to natural drainage paths within the site. .
- Rainwater harvesting should be implemented on the site in line with Sustainable Drainage Systems.
- The stormwater management plan should be consulted during the installation of stormwater infrastructure and should be one of the first factors considered during the finalisation.
- Rainwater that undergoes purification can be used on site and ultimately lower the daily water demand of the property.

16 WASTE MANAGEMENT

16.1 Prevention of Pollution

The Contractor should ensure that pollution of the soil or water (i.e. surface and ground) does not occur as a result of any activities on Site. Pollution could result from the release, accidental or otherwise, of chemicals, oils, fuels, sewage, wastewater containing kitchen waste, detergents, solid waste and litter, etc. Specific measures to be taken to prevent the pollution of the environment include:

- Immediately report and manage any leakage or spillage with appropriate spill contingency equipment and measures.
- All fuels, oils, lubricants and other petrochemical products must not be stored within 100 m of any wetlands and/or rivers.
- Maintenance of vehicles must only take place in a designated workshop with a concrete base and drip trays for the collection of waste lubricants. Emergency maintenance vehicles must be equipped with drip trays and absorbent material, such as spillsorb to collect and contain waste oils.
- No rock, silt, cement, grout, asphalt, petroleum product, timber, vegetation, domestic waste, or any deleterious substance should be placed or allowed to disperse into any stream, river, pond, storm, sanitary sewer, or any other watercourse.
- Ensure all construction equipment is free of oil, fuel or hydraulic fuel leaks and is cleaned in an area with a suitable controlled runoff.
- Refuelling activities should not be conducted where runoff could carry contaminants into drainage pathways, which includes stormwater drains, trenches and sewers.
- Washing of vehicles must be kept to a minimum and must only take place in a designated area on an impervious surface which drains into an oil sump.
- Cleaning of concrete mixers and trucks must take place on a properly designated site where there is no opportunity for the pollution on site.
- The developments are encourgaed not to produce significant amounts of greenhouse gasses.

16.2 Solid Waste Management

- The Contractor shall ensure that all facilities are maintained in a neat and tidy condition and the site shall be kept free of litter. Measures shall be taken to reduce the potential for litter and negligent behaviour with regard to the disposal of all refuse
- No on-site burying or dumping of any waste materials, vegetation, litter or refuse shall occur.
- The contractor shall practice responsible waste management and utilise the “Reduce, Reuse, Recycle” ethos where appropriate.
- All recyclable rubble and waste (for e.g. scrap metal, bottles, cans and plastics) are collected and disposed of through a registered recycling company.

- Recyclable waste, including: glass, paper and plastic must be separated at the construction camp, stored and recycled, where economically feasible.
- Waste must be appropriately stored in secure and sealed receptacles that are emptied often enough so as not to overflow.
- Solid waste may be temporarily stored on site in a designated area approved by the ER prior to collection and disposal in a responsible manner.
- All non-recyclable rubble and solid waste will be collected and disposed of at a registered waste disposal facility.
- The Contractor shall provide sufficient bins with secure lids on Site to store the solid waste produced on a daily basis. These bins shall not be allowed to become overfull and shall be emptied a minimum of once daily.
- The waste may be temporarily stored on Site in a central waste depot area that is weatherproof and scavenger-proof, and which the RE has approved.
- No burning of refuse is permitted.
- All solid waste shall be disposed of off-site at least once weekly at a registered landfill site.
- The Contractor shall supply the RE with a certificate of disposal.
- All records of collection and disposal are to be kept on file on site.

16.2.1 Construction Rubble/Waste

Inert construction rubble and waste materials shall be disposed of at a registered landfill site. Asphalt residue does not constitute "inert construction rubble or waste materials". It is classified as a hazardous waste and must be disposed of at a registered landfill site that has the capacity to deal with hazardous waste should any be used.

16.2.2 Scrap Metal

Scrap metal shall be disposed of at a recycling facility where possible or if need be off-site at registered landfill site.

16.3 Disposal of Hazardous Waste Material

The objectives of the Minimum Requirements for the disposal of a Hazardous Waste are to:

- ensure that any adverse impact on the environment is minimised;
- prevent hazardous substances leaching or moving into the environment, in particular the ground and surface waters;
- ensure that Hazardous Waste is disposed of in accordance with the class and the Hazard Rating;
- to act as a mechanism ensuring the disposal of Hazardous Waste in an orderly manner, thus avoiding detrimental effects both in the short- and long-term to man and to the environment.

The following minimum requirements must be adhered to:

- Hazardous materials used on site may include cement, shutter oil, asphalt, retro-reflective road paint, lime, petrol/diesel/lubricants/hydraulic fluids, used oil, creosote (pre-treated poles), herbicides and ant poison, epoxies and epoxy resins, coatings and grouts.
- The Contractor shall have in place a hazardous waste management system, which shall include collection facilities to be used to prevent pollution, as well as suitable methods of disposal of hazardous waste.
- No hazardous material shall be disposed of on site or left behind on completion of works.
- Any waste hazardous material shall be disposed of in an appropriate manner as per the material safety data sheet specifications.
- All records of hazardous waste collection and disposal to be kept.

16.4 Contaminated Water

- The Contractor shall set up a contaminated water management system, which shall include collection facilities to be used to prevent pollution, as well as suitable methods of disposal of contaminated water.
- The Contractor shall notify the RE immediately of any pollution incidents on Site.
- The Contractor shall prevent discharge of any pollutants, such as cements, concrete, lime, chemicals and fuels into any watercourses or stormwater channels.

- Water that has been contaminated with suspended solids, like soils and silt may be released into natural watercourses or stormwater channels provided that the minimum regulatory requirements in terms of the NWA are met. However, all suspended solids shall be removed from water before it is discharged by settling out these solids in settling ponds.

16.4.1 Wastewater

- The Employer's approval shall be required prior to the discharge of any contaminated water, contaminated water should be collected and disposed of at an approved wastewater treatment facility.
- Water from kitchens, showers, laboratories and other washing areas shall be discharged into a conservancy tank for removal from the site by a registered service provider.
- Runoff from fuel depots, workshops, machinery washing areas and concrete batching areas shall be collected into a conservancy tank and disposed of by a registered service provider at a hazardous landfill facility or other registered landfill sites capable dealing with waste of this nature.

17 CONSTRUCTION ACTIVITIES

17.1 Working Areas

The development and associated activities may only be conducted in designated working areas. Limitation of these activities to specific working areas minimises the impact on the surrounding environment and facilitates control of the works. Sites should be divided into working areas and "no go" areas:

- Working areas are those areas required by the Contractor to undertake the works and as approved by the RE. These areas include the area of works, borrow areas and haul roads between the working site and borrow areas. If necessary, the working areas may be demarcated during the period. The Contractor and his staff are not permitted to move around outside the designated working areas. The Contractor shall ensure that, insofar as he has the authority, no person, machinery, equipment or material enters the "no go" areas (if any are indicated) at any time.
- "No-go" areas are those areas outside of working areas. The Contractor shall erect and maintain permanent and/or temporary fences of the type and in the locations directed by the RE. Such fences shall, if so specified, be erected before undertaking designated activities.
- Within the overall working area, the RE shall designate specific areas for the following:
- Site Camp.
- Stockpiling and storage of construction materials.
- Stockpiling of topsoil for rehabilitation purposes.
- Spoiling of cleared vegetation (alien invasive species).
- Sites for spoil materials.

17.2 Site Security During Construction

- Ensure appropriate security measures implemented at all times.
- On call staff should be available 24 hours of the day in case of emergencies.
- Likely disturbance to neighbours as well as security implications shall be considered.

17.3 Protection of Flora and Fauna

Natural features, indigenous flora and fauna in the vicinity of the project works should be protected, and damage or disturbance should be prevented or minimised, specifically:

- No plant species may be removed without the proper approvals from the relevant authorities unless agreed by the ECO or unless they are listed as alien invasive species.
- The minimum amount of vegetation must be removed. Excessive clearing of a site must be avoided if possible. Disturbance outside of the immediate construction area must be avoided.
- No construction staff may have access to indigenous vegetation outside of the working corridor.

- The use of indigenous plants as firewood is prohibited.
- Where protected or Red Data Species are encountered and require removal, the ECO should be consulted and the plant(s) then replanted in a nearby 'safe' area of similar habitat. Permits are to be obtained from the DEDEAT regarding protected plant species and the Department of Forestry, Fisheries and the Environment (DFFE, Eastern Cape) regarding protected trees.
- All fauna (including domestic livestock) within and surrounding the site shall be protected; they shall not be caught, poisoned, trapped, snared or killed.
- Site and surrounding areas to be inspected regularly for signs of poaching, if snares are found they are to be reported and removed.
- No domestic animals shall be brought onto the site.
- No deep trenches/excavations must be left open overnight. Trenches/excavations must be inspected daily to check if fauna have been trapped. Provision must be made for fauna to pass over open trenches or excavations by means of a ramp.

17.4 Clearing of Vegetation

The Contractor shall minimise the extent of any vegetation removal other than that necessary to complete the works. The contractor shall ensure that clearing of vegetation on verges and within road reserves is not done in a manner that will result in excessive environmental damage or result in erosion. The contractor shall ensure that no unnecessary blanket clearing of vegetation is undertaken.

- Where areas become compacted during works, they shall be lightly scarified to ensure that vegetation regrowth will occur and suitable cover will be obtained.
- Where protected species are present the relevant permits must be obtained for removal or relocation before any works are undertaken in consultation with the RE and ECO.
- When removing alien trees, the contractor shall ensure that any stumps are removed, as these may resprout. Alien tree control must be undertaken in consultation with the ECO. The contractor shall ensure that when alien trees and weeds are removed it is undertaken in a manner that does not result in excessive spreading of seed or other material that will spread.
- Where reshaping or earthworks is required, topsoil with vegetation matter should be reapplied and spread on completion to maximise stabilisation and rehabilitation.
- Where steep slopes or embankments are present that may be susceptible to erosion, appropriate stabilising methods should be implemented, including gabions, benching, hydroseeding, planting of sods, contouring and scarifying.
- All indigenous cleared vegetation to be shredded where possible and used as mulch during rehabilitation.
- All alien invasive vegetation to be stockpiled separately and disposed of at a registered landfill facility.

17.4.1 Mulch

- Mulch can be used in all areas where landscaping has to take place. Mulch shall be obtained from all areas where vegetation is cleared, after removal of alien vegetation and search and rescue of conservation-worthy species. To be undertaken in consultation with the ECO.
- Mulch shall be free of alien species.
- Plant material shall be reduced by either mechanical means (chipper) or by hand-axing to pieces no longer than 100 mm.
- No harvesting of mulch vegetation outside of construction areas shall be allowed.
- Bush-cut mulch shall be stored for as short a time-period as possible.
- Wood chips (including bark), which are half composted and have not been treated with preservatives can also be used as mulch during landscaping. Wood chips shall only be obtained from indigenous species removed during site clearing of construction areas. Chips shall be no longer than 50 mm in length or breadth and the RE shall approve the source of the chips.

17.5 Conservation and Stockpiling of Topsoil

The Contractor shall remove topsoil from all areas where topsoil will be impacted on by construction activities, including temporary activities such as storage and stockpiling areas; including the following areas:

- All areas to be excavated;
- Areas to be occupied by roads or buildings including the temporary haulage roads;
- Areas for the storage of fuels;
- Areas to be used for batching/mixing of concrete:
- Areas for stockpiling of construction materials;
- Areas for stockpiling of crushed rock; and
- Areas for spoiling material.

The following should be implemented:

- Topsoil shall be excavated to a minimum depth of 150 mm or to a maximum depth of 300 mm. Compaction of these topsoil stockpiles is not permitted. Where topsoil has been stored for longer than 12 months the Contractor shall turn the soils to maintain viability of the seeds and the soil properties.
- The topsoil stockpiles shall be clearly demarcated and vehicle access restricted. The topsoil shall not be contaminated with any fuels, oils or other construction waste or materials.
- Topsoil shall not be mixed with any other material (construction rubble, subsoils etc) and wind erosion of the topsoil stockpiles must be prevented.
- Topsoil stockpiles shall not be higher than 2 m with slopes of 1 m vertical to 2 m horizontal and convex (rounded) at the top.
- Topsoil stockpiles shall be monitored regularly to identify any alien plants. If any occurs, they must be removed before they germinate to prevent contamination of the indigenous seed bank. Before topsoil is to be re-used the stockpiles shall be analysed by a suitably qualified Landscape Contractor/Horticulturalist and, if necessary, be fertilised before use.
- Any topsoil contaminated by hazardous substances shall not be used but shall be disposed of at a registered landfill site.
- The Contractor shall be held responsible for the replacement, at his/her expense, for any unnecessary loss of topsoil due to his/her failure to work according to the approved Method Statement and the requirements of this EMPr.

17.6 Erosion Control

- Temporary soil stabilization measures must be used in areas susceptible to erosion until vegetation is established. These include use of gravel bags, hydro seeding and straw mulching.
- Soil erosion shall not be tolerated on the Site. Uncontrolled erosion will cause siltation and pollution and result in loss of valuable topsoil. The Contractor should take all reasonable measures to prevent soil erosion and protect areas susceptible to erosion. Erosion prevention measures must be implemented to the satisfaction of the RE.
- Areas affected by construction related activities must be monitored regularly for evidence of erosion. Areas particularly susceptible to erosion include: areas stripped of topsoil, soil stockpiles and steep slopes (gradients > 8 %).
- Soil erosion may result from a diversion, a restriction, or an increase in the flow of stormwater or river flow caused by the presence of temporary/permanent works, operations and activities. Where evidence of erosion appears, the construction of contour berms, cut-off drains or planting of indigenous grass species may be necessary.
- The Contractor shall take reasonable measures to control the erosive effects of stormwater runoff. Cut-off drain(s) or low berm(s) will be constructed where necessary to lead run-off rain water away from steep exposed slopes ensuring that the water does not flow over the slopes and cause erosion. Water from these drain(s) will be disposed of in such a way that the erosive force of the water in the drain(s) is dissipated and erosion does not occur at the drain discharge point(s).

- The Contractor shall reinstate areas where erosion took place and/or where areas are damaged as a result of erosion at his own cost to the satisfaction of the RE and ECO. Topsoil that has been washed away shall be replaced at the Contractor's expense.
- After ripping the access and/or haul roads must be topsoiled and hydroseeded with an appropriate hydroseeding mix and the same specifications apply as in the other areas that require hydroseeding.
- The order for the seeds must be placed timeously to ensure availability at the time required.

17.7 Dust Control

Dust is regarded as a nuisance when it reduces visibility, and may retard plant growth. It is also aesthetically displeasing.

- The Contractor shall be responsible for the control of dust arising from his operations and activities at all times. Control measures could include regular spraying of working and/or bare areas with water at an application rate that will not result in soil erosion or runoff.
- Dust control is to be undertaken in compliance with SANS 69 and SANS 1929.
- A water cart should be available on site to assist with dust control especially on windy days.
- Stockpiles should be covered or wetted regularly.
- All construction vehicles must stay on demarcated access tracks and must not exceed a speed limit of 30 km/hr on site to reduce dust.
- Demarcated access roads to be temporarily gravelled/lined with a material that will reduce dust.
- Excavation machine operators to work cautiously during high winds to reduce dust.
- Tipper trucks to not be over filled in order to reduce dust.
- Vegetation should be cleared in a phased manner to avoid large areas of unconsolidated soils.
- Topsoil and soil stockpiles should be covered, wetted or otherwise stabilised to prevent wind erosion and dust generation.
- Construction vehicles to obey speed limits of no faster than 30 km/h.
- Cover construction material if they are a source of dust.
- Cover skips to prevent windblown litter.
- Wet stockpiled soils to prevent dust generation (should water be available).
- Stockpile heights to be kept below 2 m in height as far as practically possible.
- A water cart or sufficient watering equipment should be available to wet soils during windy days if wind-blown sand and dust becomes a problem.

17.8 Noise Control

The Contractor shall limit noise levels (e.g. install and maintain silencers on machinery). The Contractor's attention is drawn to the applicable regulations framed under the Occupational Health and Safety Act (Act 85 of 1993), especially Regulation 307 – OHS Noise Reduced Hearing Loss, as well as the requirements of the Occupational Health and Safety Specification which forms part of these documents. All activities with high noise level should be restricted to daylight hours in the residential areas and in the proximity of villages. The Contractor shall inform the residents of any high noise events. Contractor's camps should be located away from tourist operations and quiet residential homes.

Measure to be implemented by the contractor to reduce noise associated impacts

- Encourage labourers to not make unnecessary noise.
- Signage with the contact details of the responsible person should be provided at the site for people with complaints in this regard.
- All plant and equipment must meet acceptable noise level standards and be serviced regularly.
- Noise generated as a result of construction activities must be within the limits assigned by the municipal bylaws.
- A complaints register should be kept to document complaints and the corrective action taken.

- No loud music to be allowed on site.
- A boundary wall must be constructed to mitigate noise generated by the vehicular movement.
- Noise-barrier fences could be used to reduce noise.
- Construction activities to only occur during the stipulated working hours (Monday – Saturday between 07:00 and 17:00)

17.9 Fire Prevention and Control

- Firefighting requirements for the site must be confirmed with the NMBM prior to development.
- The Contractor shall take all the necessary precautions to ensure that fires are not started as a consequence of his activities on Site. The Contractor, subcontractors and all employees are expected to be conscious of fire risks. The Contractor shall hold fire prevention training sessions with his staff to create an awareness regarding the risks of fire. Regular reminders to his staff on this issue are required.
- A Fire Management Plan must be developed.
- The Contractor shall ensure compliance with the National Veld and Forest Fire Act (Act 101 of 1998). Smoking shall not be permitted in those areas where it is a fire hazard. Such areas shall include the workshop and fuel storage areas and any areas where the vegetation or other material is such as to make liable the rapid spread of an initial flame. In terms of the National Environmental Management: Air Quality Act (Act No 39 of 2004), burning is not permitted as a disposal method.
- No fires to be allowed on site
- The Contractor shall appoint a Fire Officer who shall be responsible for ensuring immediate and appropriate actions in the event of a fire and shall ensure that employees are aware of the procedure to be followed. The Contractor shall forward the name of the Fire Officer to the RE for his approval.
- The Contractor shall ensure that there is adequate fire-fighting equipment (i.e. fire extinguishers and fire beaters) on Site and in all major working areas.
- Emergency numbers must be clearly displayed on site.
- The Contractor shall be liable for any expenses incurred by any organisations called to assist with fighting fires and for the costs involved in the rehabilitation process of burnt areas, properties and persons should the fire be the result of the Contractor's activities on Site.
- Removed plant material shall not be dumped across the fence-line or along the fence-line onto private property. If an abutting land owner request this the Client must be indemnified.

17.10 Water Abstraction and Construction Water

- Water for construction purposes should be obtained from an approved source. Unless approved by the local authority, the DWS or the landowner, water should not be extracted from nearby dams, rivers or groundwater sources, and construction activities should not be conducted in or directly adjacent to rivers and dams.
- Water is a scarce resource throughout South Africa and certain parts of the Eastern Cape Province which are prone to water shortages during periods of drought. Water, whether drinking or for operational purposes must be used in a responsible manner.

17.11 Earthworks

All earthworks shall be undertaken in such a manner so as to minimise the extent of any impacts caused by such activities. No equipment associated with earthworks shall be allowed outside of the site and defined access routes unless expressly permitted by the RE. earthworks are to be restricted to the development footprint only.

17.12 Road Bed Preparation and Blading

All road bed preparation and blading shall be undertaken in such a manner so as to minimise the extent of any impacts to the environment caused by such activities.

- Stockpiled material shall be done in an appropriate manner in consultation with the RE and ECO and stockpiles along the road shall not be left for excessive periods of time, especially during rainy periods where fine material contained within the stockpile may wash into drains and watercourses.
- Any excess material shall be spread evenly on completion of works or removed from the site.
- Fine material accumulating in drains should be removed in areas where it may wash into watercourses and wetlands.
- Windrows shall be appropriately sited and shaped on completion of works.

17.13 Stockpiling and Spoiling of Materials

- The RE and ECO shall approve all stockpiling and spoiling sites and confirm the end-use or rehabilitation for these sites.
- The stockpiles should be located within demarcated areas within the construction site. Material stockpiled should be done in such a way as to minimise the spread of materials and the impact on the natural vegetation. The Contractor should ensure that no materials 'creep' into 'no-go' areas.
- No stockpiling permitted within 50 m of watercourses.
- No spoiling of material should take place below the 1:100 year floodline of any river, stream, wetland or water course.
- The Contractor upon completion of the project shall reinstate areas used for stockpiling to their former states.

17.14 Cement and Concrete Batching

The permitted location of the batching plant (including the location of cement stores, sand and aggregate stockpiles) will be indicated by the RE and approved by the ECO. The concrete/cement batching plant shall be kept neat and clean at all times.

- The batch plant should not be located closer than 100 m from any water course or wetland and not below the 1:100 year floodline of any water course or wetland.
- The batching plant shall be located on a smooth impermeable surface (concrete). The area shall be bunded and sloped towards a sump to contain any spillages of substances.
- No batching activities shall occur directly on the ground. All wastewater resulting from batching of concrete shall be disposed of via the wastewater management system and shall not be discharged into the environment.
- Used cement bags shall be stored in weatherproof containers to prevent windblown cement dust and water contamination. Used cement bags shall be disposed of on a regular basis via the solid hazardous waste management system, and shall not be used for any other purpose.
- Unused cement bags shall be stored so as not to be affected by rain or runoff events. In this regard, closed steel containers should be used for the storage of cement powder and any additives.
- The Contractor shall ensure that sand, aggregate, cement or additives used during the mixing process are contained and covered to prevent contamination of watercourses, the surrounding vegetation and natural rock through wind or water dispersion.
- All runoff from the batching plant shall be strictly controlled, and cement-contaminated water shall be collected, stored and disposed of off-site, at a location approved by the RE.
- Contaminated water storage areas shall not be allowed to overflow and appropriate protection measures from rain and flooding shall be implemented.
- All visible remains of excess concrete shall be physically removed on completion of the plaster or concrete pour section and disposed of. Washing the remains into the ground is not acceptable. All excess aggregate shall also be removed and disposed of in an approved landfill site.

17.15 Site Rehabilitation

The Contractor shall be responsible for complete rehabilitation of the site and areas demarcated for rehabilitation, including spoil sites, access roads, haul routes, site camp, stockpile, crusher area, ablution facilities and storage areas.

- The Contractor shall undertake full rehabilitation under no extra cost to the Client, other than that allowed for in the Bill of Quantities. Provision for rehabilitation must be made in tender documents for the project so that adequate budget is set aside by the contractor.
- The Contractor should implement progressive rehabilitation once works are complete in a particular area, so that the rehabilitation and/or re-vegetation can begin. This would provide the opportunity to assess whether or not the methods employed are suitable, successful and would help prevent erosion in impacted areas.
- Where re-vegetation of an area is not successful the Contractor will replant these areas at no additional cost to the Client.
- Only indigenous vegetation that occurs naturally on site is to planted in site rehabilitation and landscaping activities
- The Contractor shall provide the ECO and RE with a comprehensive Method Statement for rehabilitation of the entire site. This Method Statement must meet the approval of the ECO and RE.
- A suitable cover is to be planted timeously after completion of site preparation and installation of services.
- All plants/trees used in revegetation shall be locally indigenous species only.
- No construction equipment, vehicles or unauthorised personnel shall be allowed onto areas that have been revegetated.

The following points must be taken into account when drawing up the Rehabilitation Method Statement:

- The Method Statement should be flexible - where measures are found to be inefficient, the plan shall be modified at no additional cost to the Client.
- The Contractor shall be responsible for successful rehabilitation and re-vegetation of any no-go areas which have been disturbed where necessary, for a minimum period of 12 months after construction is complete.
- The Method Statement shall include the eradication of alien invasive plant species that may become established during the construction and defects notification period in the impacted and rehabilitated areas.
- The growth of alien invasive plant species shall be monitored and removed during the 12-month period following construction.
- The Method Statement shall include endemic grass seed mixes applicable to summer and winter.
- The Method Statement shall include suitable fertilisers and application rates.
- Successful re-vegetation means 80 % of the seeded area is covered with grass and ground cover.
- Consideration should be given to using established seedlings of indigenous grasses to augment the re-vegetation of bare areas.

17.16 Sites of Archaeological and/or Cultural Interest

The Contractor shall take responsible precautions to prevent any person from removing or damaging any items and infrastructure of heritage importance, such as fossils, coins, articles of value or antiquity, structures (older than 60 years), and other remains of archaeological interest if discovered on the Site, immediately upon discovery thereof and before removal.

- Should any archaeological sites be identified, they must be demarcated with safety netting and placed out of bounds. Should disturbance of these sites be unavoidable, then an application must be made to the South African Heritage Resource Agency (SAHRA) via a qualified archaeologist.
- Should an archaeological or cultural significance be identified during construction or any associated infrastructure, it should immediately be reported to the SAHRA. Failure to report a site of archaeological and/or cultural significance is a contravention of the National Heritage Act (Act No 25 of1999).
- All construction site staff must be briefed to immediately report any potential sites which are encountered during the construction. In the event of finding what appears to be an archaeological site or a cultural and/or historic site or object, work should be temporarily suspended and/or terminated until a qualified archaeologist or historian can examine the item or find.

- The Contractor must check the area carefully for any graves. The relocation of graves must be undertaken in consultation with the affected families and through the Project Steering Committee. The correct procedures for the exhumation and reburial of the remains must be strictly adhered to.
- The contractor and construction site employees must be informed of any cultural importance of any archaeological sites found. It must be emphasized that the works on the structures must be done with care in order to preserve the architectural integrity.

17.17 Protection of Natural Features

The Contractor shall not deface, paint, damage or mark any natural features (e.g. rock formations) situated in or around the Site for survey or other purposes. Any features affected by the Contractor in contravention of this clause shall be restored and/or rehabilitated to the satisfaction of the RE. The Contractor shall not permit his employees to make use of any natural water sources (e.g. springs, streams and open water bodies) for the purposes of swimming, personal washing and the washing of machinery or clothes.

17.18 Alien Invasive Vegetation

Alien invasive vegetation shall be removed from any working areas and the site camp. These vegetation species shall also be eradicated when they begin to establish themselves in disturbed areas (disturbance of the natural vegetation will encourage the establishment of invasive species). In order to discourage the spread of alien species, soil should not be moved from one part of the site to another without the consent of the ECO.
The ECO shall assist in the identification of alien plant species. The Contractor is responsible for the removal and eradication of alien plant species. Methods of removal and eradication may involve hoeing by hand or the controlled application of herbicides.

17.19 Aesthetics

The Contractor shall take reasonable measures to ensure that construction activities do not have an unreasonable impact on the aesthetics of the area.

18 OPERATIONAL ACTIVITIES

18.1 Maintenance

It is not anticipated that the proposed project will require decommissioning in the near future Regular maintenance of the facilities will be required to ensure the longevity thereof.

18.2 Open Space Maintenance

- Alien vegetation management must be implemented in the Open Space areas, and the fynbos vegetation should be protected from operational activities.
- Regular gardening services should be employed to maintain these areas and ensure weed control is implemented.
- The open space areas may not be mowed, cut or any plant species may not be removed from these areas.

18.3 Alien Management Control

Invasive alien plants are species introduced (either deliberately/accidentally) into a natural environment where they are not normally found and have a serious negative impact on the receiving environment by not only outcompeting indigenous species, but also impacting on water resources, health of the ecosystem and posing a fire hazard. Invasive species especially become prominent after disturbance and construction related activities and pose a serious threat to natural endemic vegetation. Therefore, proper action must take place to ensure invasive species do not become prominent due to the development of the proposed project. The purpose of alien management control around the proposed site will be to:

- to ensure that alien plants do not become established on site (by removing alien species regularly);
- to ensure that alien plant species do not become dominant in all or parts of the landscape; and
- to implement a monitoring programme to detect the presence of alien plant species as well as to monitor the success of the alien management plan.

TYPES OF ALIEN VEGETATION

According to the National Environmental Management: Biodiversity Act, 2004 (Act No.10 of 2004) the following categories of invasive plants exist:

- Category 1a: Invasive species requiring compulsory control and removal. Any specimens of Category 1a listed species need, by law, to be eradicated from the environment. No permits will be issued.
- Category 1b: Invasive species requiring compulsory control as part of an invasive species control programme. Remove and destroy. No permits will be issued.
- Category 2: Invasive species regulated by area. A demarcation permit is required to import, possess, grow, breed, move, sell, buy or accept as a gift any plants listed as Category 2 plants. No permits for riparian zones.
- Category 3: Invasive species regulated by activity. An individual plant permit is required to undertake any of the following restricted activities (import, possess, grow, breed, move, sell, buy or accept as a gift) involving a Category 3 species. No permits will be issued for Cat 3 plants to exist in riparian zones.

The Project Manager and ECO must have a full list of each plant in the different categories and information on how to remove them.

ALIEN CONTROL MUST OCCUR THROUGH

Rehabilitation must involve control of invasive species. Alien species on site must be identified, categorized and removed, using one or a combination of methods. Invasive alien plant species are difficult to control. Methods should be used that are appropriate for the species concerned, as well as to the ecosystem in which they occur. When controlling invaders, damage to the environment must be limited to a minimum. There are three basic methods by which encroachers or weeds are controlled:

Physical (mechanical):

- Uprooting (hand pulling);
- Cutting back;
- Chopping, slashing and felling; and
- Ring-barking (girdling).

Chemical:

- Foliar application;
- Stem notching and application;
- Stump treatment; and
- Soil treatment.

Biological treatment:

- Involves the use of host-specific natural enemies of weeds or invaders from the plant's country of origin, to either kill or remove the invasive potential of these plants.

During the construction and operational phase of the proposed project, alien invasive plants must be actively identified and removed as per the identified methods above.

19 FIRE MANGAMENT PLAN

Fire is highly destructive in habitat types that are not adapted to fire including developed sites. Uncontrolled fires can also lead to damage of infrastructure, property or a loss of lives. In view of the above it is important that fire risk is managed in such a manner that fire risk is reduced in areas prone to fire damage.
The fire risk at the site is expected to be closely related to the fuel load in the area, which creates a potential source of ignition. The management of these factors, in addition to the adequate fire response capability form part of the on-site fire management strategy.

A. Minimise Fuel Load
- Eradicate and control exotic vegetation on the site, and dispose of the felled material in the appropriate fashion.
- Keep litter (cleared vegetation) piles, dumping and general waste on site to a minimum.
- Grass within Open space areas must be maintained and/mowed on a regular basis to reduce moribund vegetation.

B. Minimise Ignition Risk
- All firebreaks must be maintained as required by the local Fire Chief.
- A fire break around the outer perimeter of the site must be maintained to ensure that external fires do not spread over the development, until such time as surrounding areas are developed, in order to minimise the fire risk.
- No open fires should be allowed on site.
- Fireplaces are to be located as far as possible away from any dwellings or potentially fire prone areas.
- Avoid making fires during very windy days.
- Fireplaces and braai's must be suitably designed, constructed and shielded to minimise fire risk.
- No open fires are to be permitted on site. If necessary, appropriately designed and designated public braai areas must be incorporated in the Open Space system.
- Smoking outside of designated safe areas or smoking areas is not permitted. Flicking of cigarette butts into adjacent vegetation will not be permitted.
- Designated smoking areas to be established with cigarette butt bins, which will be placed in strategic places to minimize ignition risk.
- Suitable signage must be provided on site, including entrance, warning of fire risk and warnings not to flick cigarette butts into vegetated areas.

C. Fire Response
- Fire Hydrants have been accommodated within the development site.
- Fire hydrants to have a London round thread outlet with rising spindle, closing clockwise and a maximum overall hydrant height of 320 mm or as per local municipal specification.
- Fire hydrant spacing conforms to the guidelines for human settlement planning and design (red book) - low risk group 1.

20 PUBLIC, WORKER HEALTH AND SAFETY

20.1 Vehicles and Access Roads

Site vehicles should be permitted access only within the demarcated construction sites or on existing roads, as would be required to complete their specific tasks. Vehicles are not permitted on revegetated areas. Site vehicle traffic should be limited to specific access roads to prevent unnecessary damage to the natural environment. On the Site the Contractor shall control the movement of all vehicles and plant including that of his suppliers so that they remain on designated routes, are distributed so as not to cause an undue concentration of traffic and that all relevant laws are complied with. In addition, such vehicles and plant shall be so routed and operated, so as to minimise disruption to regular users of the routes and not on the Site. All construction vehicles must stay on demarcated access tracks to avoid compaction of soil and roots. A speed limit of 30 km/hr on site must be set. On gravel or earth roads on Site and within 500 m of the Site, the vehicles of the Contractor and his suppliers shall not exceed a speed limit of 30 km/hr.

20.2 Traffic Control and Temporary Deviations

Access points to the construction site and demarcated work area must be strictly controlled. Increased traffic, especially heavy vehicle traffic, has the potential to draw complaints from nearby residents. The Contractor is expected to address any complaints received. The Contractor shall comply with all the applicable local, regional and national laws with regard to road safety and transport. The Contractor shall instruct his drivers and plant operators that vehicles will be expected to comply with all road ordinances, such as speed limits, roadworthiness, and load securing or covering. Where sections of the road are closed for construction/bridge refurbishing, barricades shall be constructed to prevent unauthorised access at all times. Suitable signage should be erected informing drivers of the road closure and warning of the possible dangers involved in trespassing within the closed areas. The safety of motorists should remain paramount at all times.

20.3 Community Relations

The Contractor shall erect and maintain information boards in the position, quantity, design and dimensions specified. Such boards shall include contact details for complaints by members of the public in accordance with details provided by the RE.

The Contractor shall keep a "Complaints Register" on Site. The Register shall contain all contact details of the person who made the complaint, information regarding the complaint itself and measures taken to address the complaint.

20.4 Social Disruption

Where construction activities require the removal of fences from around private land, the occupants shall be warned at least three days in advance and alternative fencing should be put in place. These fences and/or boundary markers shall be reinstated as soon as construction is complete. Care should be taken not to damage private property. No access to homesteads and farms or other such areas is permitted without permission of the resident and on agreement with the RE. The Contractor shall take measures to reduce disruption to users of the area abutting the Site.

20.5 Existing Services and Infrastructure

The Contractor shall ensure that existing services (road, rail, pipelines, power lines and telephone services) are not disrupted or damaged, unless required by the contract and with the permission of the RE.

20.6 Protection of the Public

The Contractor shall be responsible for the protection of the public and public property from any dangers associated with the development and associated activities, as well as for the safe and easy passage of pedestrians and traffic in areas affected by project activities. Any excavation material, spoil sites and other obstructions or excavations shall be suitably barricaded and/or demarcated with hazard tape.

20.7 Staff Safety and Education

All staff shall be given an induction course before beginning work on the site. Part of the induction course will be to make the staff aware of the potential dangers of the road construction activities. The Contractor must maintain a suitable First Aid Kit at the site office and will have a list of the emergency service contact numbers readily available. Telephone numbers of emergency services (including the local firefighting service and HAZMAT service providers)

shall be posted conspicuously in the Contractor's office near the telephone. No authorised firearms are permitted on Site.

21 NON-COMPLIANCE

The contractors must act immediately when notice of non-compliance is received and take corrective action. Complaints received regarding activities on the construction site pertaining to the environment must be recorded in a dedicated register and the response noted with the date and action taken. The ECO should be made aware of any complaints.

- Any non-compliance with the agreed procedures of the EMPr is a transgression of the various statutes and laws that define the manner by which the environment is managed. Failure to redress the cause must be reported to the relevant authority for them to deal with the transgression, as it deems fit.
- The Contractor is deemed not to have complied with the EMPr if, inter alia:
- There is evidence of contravention of the EMPr specifications within the boundaries of the construction site, site extensions and roads;
- There is contravention of the EMPr specifications which relates to activities outside the boundaries of the construction site.
- Environmental damage ensues due to negligence;
- Construction activities take place outside the defined boundaries of the site; and/or
- The Contractor fails to comply with corrective or other instructions issued by the Engineer within a specific time period.

21.1 Penalties

The imposition of penalties will be at the discretion of the Client. The value of any penalty imposed shall be determined in light of the consequential damage caused and the costs required to rehabilitate the damaged area. Payment of any penalty in terms of the Contract shall not absolve the Contractor from being liable from prosecution in terms of the any appropriate law. Fines may also be imposed by the relevant authority (DEDEAT or DMR) in terms of NEMA if the Contractor is found to have unlawfully and intentionally or negligently committed any act or omission which causes significant pollution or degradation of the environment. The following list of fines should be used as a guideline for non-compliances:

RECOMMENDED FINES FOR TRANSGRESSION OR RESULTANT ENVIRONMENTAL DAMAGE	**MIN. FEE**	**MAX. FEE**
Failure to report environmental damage or transgressions to the ECO or RE.	R 1 000	R 2 000
Failure to carry out instructions of the ECO or RE regarding the environment	R 2 000	R 4 000
Failure to comply with prescriptions for the storage of imported materials within a designated contractors yard	R 500	R 1 000
Failure to comply with prescribed administration, storage or handling of hazardous substances	R 500	R 1 000
Failure to comply with fuel storage, refuelling, or clean-up prescriptions	R 500	R 1 000
Failure to comply with prescriptions for the use of ablution facilities	R 500	R 1 000
Failure to comply with prescriptions for the use of designated eating areas, heating sources for cooking or presence of fire extinguishers	R 500	R 1 000
Failure to comply with prescriptions regarding water provision	R 500	R 1 000
Failure to comply with prescriptions regarding fire control	R 500	R 1 000
Failure to comply with prescriptions for solid waste management (incl. paint chips, cement and concrete)	R 500	R 1 000
Failure to comply with prescriptions to prevent water pollution	R 500	R 1 000
Failure to comply with prescriptions regarding workshop equipment maintenance and storage	R 500	R 1 000

RECOMMENDED FINES FOR TRANSGRESSION OR RESULTANT ENVIRONMENTAL DAMAGE	MIN. FEE	MAX. FEE
Failure to comply with prescriptions regarding lighting and aesthetics	R 500	R 1 000
Failure to comply with prescriptions regarding silt, debris and other obstruction removal	R 500	R 1 000
Failure to comply with prescriptions regarding water diversion and drainage	R 500	R 1 000
Failure to comply with prescriptions regarding erosion and scour protection	R 500	R 1 000
Failure to comply with prescriptions regarding tree and vegetation removal/damage and permit application	R 5 000	R 20 000
Failure to comply with prescriptions regarding method statements	R 500	R 5 000
Failure to comply with prescriptions regarding environmental awareness training	R 500	R 5 000
Failure to comply with prescriptions regarding appointment of an Environmental Officer and monitoring of compliance	R 500	R 1 000
Failure to comply with prescriptions regarding site demarcation and erection of fences	R 500	R 5 000
Failure to comply with prescriptions regarding information posters	R 500	R 1 000
Failure to comply with prescriptions regarding procedures for emergencies and spills	R 1 000	R 5 000
Failure to comply with prescriptions regarding protection of natural features	R 500	R 5 000
Failure to comply with prescriptions regarding erosion and sedimentation control	R 500	R 5 000
Note: The maximum fine for any environmental damage will never be less than the cost of applicable environmental rehabilitation. For each subsequent similar offence committed by the same individual, the fine shall be doubled in value to a maximum value of R50 000.		

22 CLOSURE PLANNING

Final site cleaning - the contractor must clear and clean the site and ensure that all equipment and residual materials not forming part of the permanent works is removed from site before issuing the completion certificate or as otherwise agreed.

Rehabilitation - the contractor (landscape architect/horticulturist) must be responsible for rehabilitating and re-vegetation of all areas disturbed/areas earmarked for open space or landscaping areas during construction to the satisfaction of the engineer and ECO.

Post-construction audit

A post-construction environmental audit must be carried out and submitted to DEDEAT at the expense of the developer so as to fulfil conditions of the Environmental Authorisation granted. Objectives should be to audit compliances with the key components of the EMPr, to identify main areas requiring attention and recommend priority actions. The audit should be undertaken annually and should cover a cross section of issues, including implementation of environmental controls, environmental management and environmental monitoring. Results of the audits should inform changes required to the specifications of the EMPr or additional specifications to deal with any environmental issues which arise on site and have not been dealt with in the current document.

Management review and revision of the EMPr

The EMPr is to be reviewed annually for the first three years and then once every five years thereafter, by an independent environmental consultant, unless otherwise specified by the authorities. The auditor is to highlight issues to be addressed in the EMPr or changes required during the annual audit. These points are to be included as an annexure to the EMPr and to be considered during the review process. Recommended changes to the EMPr must be forwarded to DEDEAT for approval and comment, before subsequently being incorporated into the EMPr.

General review of EMPr

The EMPr will be reviewed by the ECO on an ongoing basis. Based on observations during site inspections and issues raised at site meetings, the ECO will determine whether any procedures require modification to improve the efficiency and applicability of the EMPr on site. Any such changes or updates will be registered in the ECO's record, as well as being included as an annexure to this document. Annexure of this nature must be distributed to all relevant parties.

Assumptions and Limitations:

The following assumptions apply:

It has been assumed that the information provided by the Applicant is comprehensive, accurate and unbiased. The report assumes that the Applicant will comply with the outcome of the assessments undertaken, particularly in terms of implementation of the mitigation measures and the recommendations indicated in the EMPr to limit any adverse impacts;

The conditions stipulated in the EA can only be effective if the Applicant or persons in control continually monitors and enforces compliance during the construction and operational phases of the project.

Due in part to a rigorous public participation process being undertaken, it is the opinion of the EAP that there should not be uncertainties in terms of the compilation of this report, or regarding the impact management, mitigation and monitoring measures proposed.

APPENDIX A: EAP Curriculum Vitae

Name of firm	Engineering Advice & Services (Pty) Ltd
Name of staff	LEA JACOBS
ID Number	9205230103083
Profession	Environmental Scientist
Years with firm	4 years
Nationality	South African
Membership to Professional Societies	International Association for Impact Assessment South Africa (IAIAsa Member Number 6471) EAPASA Registered EAP

KEY QUALIFICATIONS

Lea's graduate qualifications include geology in sedimentology, structural geology and petrography as well as Environmental Sciences.

Since Lea joined EAS in 2016 she has been instrumental in compiling and editing environmental reports for a range of projects in the Eastern Cape within the roads and transport, mining, housing, and agricultural sectors. Lea's primary experience since joining EAS has been related to facilitation of application processes for environmental authorisations for borrow pits in the different areas of the Eastern Cape through site assessments; research and report writing. Most of the processes include the facilitation of the formal basic assessment applications through facilitating public participation processes, and managing environmental studies as well as interpreting and compiling specialist reports relating to these studies with the availability of spatial tools and technologies.

She has experience in borrow pit screening and assessing the feasibility and environmental impacts surrounding the activities related to mining as well as public consultation. She has been involved with, and helped to facilitate licensing applications for more than 200 borrow pits throughout the Eastern Cape. Her responsibilities relating to environmental compliance auditing for road maintenance projects and borrow pit assessments were included during these operations. She assisted with ecological assessments, search and rescue operations, facilitating Environmental Management Programmes, and applications.

Through competent mentoring Lea has become familiar with the applicable legislation for different projects' required application formats and procedures. Lea has gained valuable knowledge of the National Environmental Management Act (NEMA) and its related Regulations, The Mineral and Petroleum Resources Act (MPRDA), the National Water Act (NWA), and the Spatial Planning and Land Use Management Act (SPLUMA). Lea is a registered member of the International Association for Impact Assessment South Africa (6471) and has recently attended a SACNASP Accredited two-day Online EIA Law Course as well as a Continuing Professional Development accredited Introductory EIA Report Writing Course hosted by IAIAsa. Lea is registered with the South African Council for Natural Scientific Professions (Reg No. 129284).

EDUCATION

Stellenbosch University	Bachelor of Science (Earth Science)	2011-2016

EMPLOYMENT RECORD

March 2016 – Present	Engineering Advice and Services	Environmental Scientist

LANGUAGES

	Speak	**Read**	**Write**
Afrikaans	Excellent	Excellent	Excellent
English	Excellent	Excellent	Excellent

PROJECT EXPERIENCE

MINING PERMIT ENVIRONMENTAL MANAGEMENT PLAN APPLICATIONS

2016
- Mining BAR/EMP's for Nkonkobe LM Borrow Pits – (SANRAL)
- Mining BAR/EMP's for Mbhashe LM Borrow Pits – (SANRAL)
- Mining BAR/EMP's for Mbizana LM Borrow Pits – (SANRAL)
- Mining BAR/EMP's for Senqu LM Borrow Pits – (SANRAL)
- Mining BAR/EMP's for Elundini LM Borrow Pits – (SANRAL)
- Mining BAR/EMP's for Emalahleni LM Borrow Pits – (SANRAL)
- Mining BAR/EMP's for Emalahleni LM Borrow Pits – (DRPW)
- Mining BAR/EMP's for Ikwezi/Baviaans LM Borrow Pits – (DRPW)

2017
- Mining BAR/EMP's for Ingquza Hill LM Borrow Pits – (SANRAL)
- Mining BAR/EMP's for Baviaans LM Borrow Pits – (DRPW)
- Mining BAR/EMP's for Senqu LM Borrow Pits – (DRPW)
- Mining BAR/EMP's for Kouga/Koukamma LM Borrow Pits – (DRPW)
- Mining BAR/EMP's for Inkwanca (Enoch Mgijima) LM Borrow Pits – (DRPW)
- Mining BAR/EMP's for Kouga/Koukamma LM Borrow Pits – (DRPW)
- Mining BAR/EMP's for Sakhisizwe/Engcobo LM Borrow Pits – (DRPW)
- Mining BAR/EMP's for Raymond Mahlaba LM Borrow Pits – (DRPW)
- Mining BAR/EMP's for Camdeboo LM Borrow Pits – (DRPW)
- Mining BAR/EMP's for Elundini LM Borrow Pits – (DRPW)
- Mining BAR/EMP's for Emalahleni/Intsika Yethu LM Borrow Pits – (DRPW)

2018
- Mining BAR/EMP's for 24 Borrow Pits in 6 districts within the Eastern Cape– (SANRAL)

2019
- Mining BAR/EMP's for Blue Crane Route LM Borrow Pits – (DoT)
- Mining BAR/EMP's for Blue Crane Route LM Borrow Pits – (DoT)
- Mining BAR/EMP's for Sakhisizwe LM Borrow Pits – (DoT)
- Mining BAR/EMP's for Engcobo LM Borrow Pits – (DoT)
- Mining BAR/EMP's for Kouga & Kou-Kamma LM's Borrow Pits – (DoT)
- Mining BAR/EMP's for Senqu LM Borrow Pits – (DoT)
- Mining BAR/EMP's for Elundini LM Borrow Pits – (DoT)
- Mining BAR/EMP's for Blue Crane Route LM Borrow Pits – (DoT)
- Mining BAR/EMP's for Engcobo LM Borrow Pits – (DoT)

2020

- Mining BAR/EMP's for Makana LM Borrow Pits – (DoT)
- Mining BAR/EMP's for Dr Beyers Naude LM Borrow Pits – (DoT)
- Mining BAR/EMP's for Blue Crane Route LM Borrow Pits – (DoT)

BASIC ASSESSMENT REPORT PROJECTS

2017
- Basic Assessment Application for Erf 14 Kabega, NMBM
- Basic Assessment Application for Hankey Housing, Kouga District Municipality
- Basic Assessment Application for Fairwest Rental Housing, Nelson Mandela Bay

2018
- Basic Assessment Application for South-End Precinct Mixed Use Development, Nelson Mandela Bay

2019
- Basic Assessment Application for Nelson Mandela University Access Road, NMB
- Basic Assessment Application for Erf 599 Walmer Mixed Use Development, Nelson Mandela Bay
- Basic Assessment Application for Cookhouse Bridge rehabilitation
- Basic Assessment Application for Parsonsvlei Erf 984 & 1134 Parsonsvlei
- Basic Assessment Application for Little Chelsea No. 10 Port Elizabeth

2020
- Basic Assessment Application for Proposed Crossflow Hydroelectrical Turbine Generators installation: Farm Klipfontein (29/76), Cookhouse
- Basic Assessment Application for Proposed Development on Erf 11667, Walmer for Bidfood Port Elizabeth
- Basic Assessment Application for Proposed Refurbishment of a Damaged Low-level Watercourse Structure Along the DR01812, Hankey, Eastern Cape
- Basic Assessment Application for Proposed Reconstruction of Undermined Bridge and Temporary Bypass Construction along the MR00391, Hankey, Eastern Cape
- Basic Assessment Application for Proposed Replacement of Four Damaged Watercourse Structures and Temporary Bypass Construction along the MR00388, Tsitsikamma, Eastern Cape

SCREENING REPORTS

2016
- Report compilation, editing for: Marina Martenique Rezoning, Aston Bay

2020
- Site assessment, report compilation for Herbetsdale Pipeline, Mosselbay, Western Cape
- Site assessment, report compilation for Summerstrand Erf 2399, Port Elizabeth
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WATER USE LICENSE APPLICATIONS

2019
- Water Use License Application for Cookhouse Bridge rehabilitation

2020
- Water Use License Applications for Proposed Crossflow Hydroelectrical Turbine Generators installation: Farm Klipfontein (29/76), Cookhouse
- Water Use License Application for Proposed Development on Erf 11667, Walmer for Bidfood Port Elizabeth
- Water Use License Application for Proposed Refurbishment of a Damaged Low-level Watercourse Structure Along the DR01812, Hankey, Eastern Cape
- Water Use License Application for Proposed Reconstruction of Undermined Bridge and Temporary Bypass Construction along the MR00391, Hankey, Eastern Cape

- Water Use License Application for Proposed Replacement of Four Damaged Watercourse Structures and Temporary Bypass Construction along the MR00388, Tsitsikamma, Eastern Cape

23 ENVIRONMENTAL AUTHORISATION

To be included on the issue from DEDEAT before commencement.

24 LAYOUT PLANS

Approved SDP to be included once obtained.