ENVIRONMENTAL MANAGEMENT PROGRAMME

SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE (SANBI) OFFICE AND EXHIBITION CENTRE, PRETORIA NATIONAL BOTANICAL GARDEN, GAUTENG PROVINCE

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1. INTRODUCTION

An Environmental Management Programme (EMP) must consist of a set of mitigation, monitoring and institutional measures to be taken during implementation and operation to eliminate adverse environmental and social impacts, offset them, or reduce them to acceptable levels. The programme also includes the actions needed to implement these measures.

1.1. Environmental Management Programme

An EMP can be defined as, “an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented; and that the positive benefits of the project are enhanced”.

EMP’s are very important tools in the sound environmental management of projects, provided the specifications are implemented and the user understands the contents of the report and the reasons for the implementation of certain specifications.

The EMP has the following objectives:

- To state standards and guidelines which are required to be achieved in terms of environmental legislation.
- To set out the mitigation measures and environmental specifications which are required to be implemented for all phases of the project in order to minimise the extent of environmental impacts, and to manage environmental impacts and where possible to improve the condition of the environment.
- To provide guidance regarding method statements which are required to be implemented to achieve the environmental specifications (refer to Annexure 1 for an example of the method statement).
- To define corrective actions, this must be taken in the event of non-compliance with the specifications.
- To prevent long-term or permanent environmental degradation.

The following principles have been used in the preparation of the EMP:

- Compliance with relevant legislation, standards, codes, and practices in the application of safe technologies;
- Minimisation of impacts on the environment and human beings;
- Performance of all activities in a safe and effective manner and maintenance of all equipment in good operating condition for the protection of the health and safety of all persons and to conserve the environment and property;
- Focus on environment risk prevention;
- Focus on occupational and public health, safety; and
- The undertaking of all necessary precautions to control, remove, or otherwise correct any leaks and/or spills of hazardous materials, or other health and safety hazards.

There are essentially four broad categories of EMP’s: Design EMP, Construction EMP, Operational EMP and Decommissioning EMP. The objectives of these EMP’s are all the same and include; identifying the possible environmental impacts of the proposed activity, and developing measures to minimise, mitigate and manage the negative impacts while enhancing the positive ones. The difference between these EMP’s is related to the different mitigation measures required for the different stages of the project life cycle. Each category of EMP is discussed in more detail below.
1.1.1. Design EMP\(r\)

The Design EMP\(r\) is an integral component of the project life cycle and requires interaction between the design engineers and environmental consultants to ensure that the engineers are aware of the environmental constraints that must be considered and incorporated into the final design of the project.

The format of this design EMP\(r\) is checklist in nature to ensure that all specifications are included in the design phase. The design EMP\(r\) phase requires ongoing and in-depth discussions between the final design team and the environmental control officer. The engineer will have to cost for, and be available for, ongoing discussions with the environmental officer at all stages of final design.

The majority of the work is undertaken at a desktop level and thus impacts are negligible and will not be discussed in further detail.

1.1.2. Construction EMP\(r\)

The Construction EMP\(r\) details the environmental management system/framework within which construction activities will be governed for the Construction Phase. The Construction EMP\(r\) consists of various actions, initiatives and systems that the contractor will have to ensure are in place and are undertaken. The Construction EMP\(r\) consists of both a management system and environmental specifications which contain detailed specifications that will need to be undertaken or adhered to by the contractor.

The Construction EMP\(r\) will need to be developed in parallel with the Final Design Stages, and constructive input should be invited from the selected contractor. Sound environmental management is orientated around a pragmatic, unambiguous but enforceable set of guidelines and specifications, and for this reason it is imperative that the contractor, while being bound by the EMP\(r\), fully understands it and has had input into its final development. For this reason the final construction EMP\(r\) will need to be signed off after input from the selected contractor prior to the initiation of construction activities. It should, however, be noted that the contractor must tender on the existing document and that in areas of uncertainty, a precautionary approach to the environmental guidelines and specifications must be adopted.

1.1.3. Operational and Maintenance EMP\(r\)

The operational phase EMP\(r\) provides specific guidance related to operational activities associated with a particular development. Operational EMP\(r\)'s are sometimes referred to as Environmental Management Systems (EMS).

Impacts during the operational phase of a development of this nature will be few in number and low in intensity. By taking pro-active measures during the construction phase, potential environmental impacts emanating during the operational phase will be minimised. Monitoring of certain issues such as the success of vegetation re-establishment and erosion control will be required to continue during operation.

The final Operational EMP\(r\) should be developed in conjunction with any other relevant stakeholders prior to the adoption thereof.

1.2. Contents of the EMP\(r\)

The contents of the EMP\(r\), as it is defined the Amended Environmental Impact Assessment (EIA) Regulations 2014 (as amended) published as Government Notice (GN) No R. 326 of 7 April 2017 in terms of Chapter 5 of the National Environmental Management Act (NEMA) (Act No. 107 of 1998, as amended), must be consistent with requirements included in Appendix 4 of the Regulations (Table 1.1)
Table 1.1: Contents of an EMPr

<table>
<thead>
<tr>
<th>EMPr REQUIREMENTS ACCORDING TO APPENDIX 4 OF GNR 982 OF 2014, AS AMENDED IN GNR 326 OF 2017</th>
<th>SECTION OF REPORT</th>
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<tbody>
<tr>
<td>1</td>
<td>An EMPr must comply with section 24N of the Act and include-</td>
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<tr>
<td></td>
<td>a. Details of:</td>
</tr>
<tr>
<td></td>
<td>i. the EAP who prepared the EMPr; and</td>
</tr>
<tr>
<td></td>
<td>ii. the expertise of that EAP to prepare an EMPr, including a curriculum vitae.</td>
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<td></td>
<td>b. a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;</td>
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<td></td>
<td>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;</td>
</tr>
<tr>
<td></td>
<td>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-</td>
</tr>
<tr>
<td></td>
<td>i. Planning and design</td>
</tr>
<tr>
<td></td>
<td>ii. Pre-construction activities</td>
</tr>
<tr>
<td></td>
<td>iii. Construction activities</td>
</tr>
<tr>
<td></td>
<td>iv. rehabilitation of the environment after construction and where applicable post closure; and</td>
</tr>
<tr>
<td></td>
<td>v. where relevant, operation activities;</td>
</tr>
<tr>
<td></td>
<td>f. description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraphs (d) will be achieved, and must, where applicable, include actions to -</td>
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<tr>
<td></td>
<td>a. avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;</td>
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<tr>
<td></td>
<td>b. comply with any prescribed environmental management standards or practices;</td>
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<td></td>
<td>c. comply with any applicable provisions of the Act regarding closure, where applicable; and</td>
</tr>
<tr>
<td></td>
<td>d. comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;</td>
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<td></td>
<td>g. the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);</td>
</tr>
<tr>
<td></td>
<td>h. the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);</td>
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<tr>
<td></td>
<td>i. an indication of the persons who will be responsible for the implementation of the impact management actions;</td>
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<td></td>
<td>j. the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;</td>
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<td></td>
<td>k. the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);</td>
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<td></td>
<td>l. a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;</td>
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<td></td>
<td>m. an environmental awareness plan describing the manner in which-</td>
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<td></td>
<td>a. the applicant intends to inform his or her employees of any environmental risk which may result from their work; and</td>
</tr>
<tr>
<td></td>
<td>b. risks must be dealt with in order to avoid pollution or the degradation of the environment; and</td>
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<tr>
<td></td>
<td>n. any specific information that may be required by the competent authority.</td>
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Provided in the chapters that follow is the EMPr for the proposed development, based on the requirements of Appendix 4 of the 2014 EIA Regulations (as amended in 2017) as detailed above.
2. DEFINITIONS

For the purposes of this EMP, the following definitions and abbreviations shall apply:

**Alien Vegetation**: Alien vegetation is defined as 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 (CARA) regulations. Other vegetation deemed to be alien shall be those plant species that show the potential to occupy in number, any area within the defined construction area and which are declared to be undesirable. This includes plant species identified as Alien and invasive species in the National environmental Management Biodiversity Act of 2004, Alien and Invasive Species Regulations, 2014.

**Cement laden water**: Means water containing cement or concrete arising from the Contractor’s activities.

**Contaminated water**: Means water contaminated by the Contractor’s activities such as with hazardous substances, hydrocarbons, paints, solvents and runoff from plant, workshop or personnel wash areas but excludes water containing cement/ concrete or silt.

**Construction Camp**: Construction camp (site camps) refers to all storage and stockpile sites, site offices, container sites, workshops and testing facilities and other areas required undertaking construction activities.

**Environment**: Environment means the surroundings within which humans exist and that could be made up of:-
- The land, water and atmosphere of the earth;
- Micro-organisms, plant and animal life;
- Any part or combination of (i) and (ii) and the interrelationships among and between them; and
- The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

**Environmental Aspect**: An environmental aspect is any component of a contractor’s construction activity that is likely to interact with the environment.

**Environmental Authorisation (EA) (formerly known as, Record of Decision)**: A written statement from the relevant environmental authority, with or without conditions, that records its approval of a planned undertaking to construct the proposed infrastructure and the mitigating measures required to prevent or reduce the effects of environmental impacts during the life of a contract.

**Environmental Control Officer (ECO)**: A suitably qualified and experienced person or entity appointed for the construction works, to perform the obligations specified in the EA.

**Environmental Site Officer (ESO)**: An ESO is the site-based designated person responsible for implementing the environmental provisions of the construction contract and is appointed by the service provider that carries-out construction activities.

**Environmental Impact**: An impact or environmental impact is 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.

**Environmental Impact Assessment**: The process of examining the environmental effects of a development. The assessment requires detailed/specialist studies of significant issues that have been identified during the environmental scoping.

**Environmental Management Programme**: An environmental management tool used to ensure that
undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented; and that the positive benefits of the projects are enhanced.

**Environmental Management System**: The internationally accepted and recognized environmental management system (EMS) which enables companies, organizations and operations to systematically manage, prevent and reduce environmental problems and associated costs. In terms of ISO 14001 and EMS is defined as, “that part of the overall management system includes organizational structure, planning activities, responsibilities, procedures, processes and resources for developing, implementing, reviewing and maintaining the environmental policy.”

**Environmental Policy**: A statement by the organisation of its intentions and principles in relation to its overall environmental performance which provides a framework for action and for the setting of its environmental objectives and targets.

**External Auditor**: A suitably qualified and experienced independent expert as per the required auditor qualifications (ISO 14012).

**His**: Means his or her, as applicable.

**Independent Environmental Consultant**: A suitably qualified and experienced independent environmental consultant (IEC) appointed by the Engineer to perform the obligations specified in the Contract. The IEC shall provide reports to the regulatory authority, the Engineer and any other parties as specified by the regulatory authority.

**Interested and Affected Party (I&AP)**: Refers to an I&AP party contemplated in section 24(4)(d) of the NEMA (1998, Act No. 107) and which, in terms of that section, includes –

a) Any person, groups of persons, organisation interested in or affected by an activity, and;

b) Any organ of state that may have jurisdiction over any aspect of the activity.

**ISO 14001 Environmental Management System (ISO 14001)**: The internationally accepted and recognised Environmental Management System as reflected in the document SABS ISO 14001: 1996.

**Method Statement**: Is a written submission by the Contractor to the ECO in response to the EMP or to a request by the ECO, setting out the plant (construction equipment), materials, labour and method the Contractor proposes using to carry out an activity, identified by the relevant specification or the ECO when requesting the Method Statement. The Method Statement shall be in such detail that the ECO is able to assess whether the Contractor’s proposal is in accordance with the EMP and/or will produce results in accordance with the EMP.

**Mitigate**: The implementation of practical measures to reduce the adverse impacts, or to enhance beneficial impacts of a particular action.

**No-Go Area**: Areas where construction activities are prohibited.

**Pollution**: According to the NEMA (Act No. 107 of 1998), pollution can be defined as, “Any change in the environment caused by (i) substances; (ii) radioactive or other waves; or (iii) noise, odours, dust or heat emitted from any activity, including the storage or treatment of waste or substances, construction and the provision of services, whether engaged in by any person or an organ of state, where that change has an adverse effect on human health or well-being or on the composition, resilience and productivity of natural or managed ecosystems, or on materials useful to people, or will have such an effect in the future”.

**Potentially hazardous substance**: Is a substance, which, in the reasonable opinion of the ECO, can have a deleterious effect on the environment. Hazardous Chemical Substances are defined in the Regulations for Hazardous Chemical Substances published in terms of the Occupational Health and Safety Act.
**Reasonable**: Means, unless the context indicates otherwise, reasonable in the opinion of the ECO, after he has consulted with ESO.

**Rehabilitation**: To re-establish or restore to a healthy, sustainable capacity or state.

**Silt laden water**: Means water containing sand and silt arising from the Contractor’s activities and/or as a result of natural run-off.

**Site**: The area in which construction is taking place.

**Solid waste**: Means all solid waste, including construction debris, chemical waste, excess cement/concrete, wrapping materials, timber, tins, cans, drums, wire, nails, food and domestic waste (e.g. plastic packets and wrappers).

**Species of Special Concern**: Those species listed in the rare, indeterminate, or monitoring categories of the South African Red Data Books, and/or species listed in globally near threatened, nationally threatened or nationally near threatened categories (Barnes, 1998).

**Threatened species**: Threatened species are defined as: a) species listed in the endangered or vulnerable categories in the revised South African Red Data Books or listed in the globally threatened category; b) species of special conservation concern (i.e. taxa described since the relevant South African Red Data Books, or whose conservation status has been highlighted subsequent to 1984); c) species which are included in other international lists; or d) species included in Appendix 1 or 2 of the Convention of International Trade in Endangered Species (CITES).

**Topsoil**: The top 100 mm of soil and may include top material e.g. vegetation and leaf litter.
Appendix G: Environmental Management Programme

3. BACKGROUND INFORMATION

3.1. Introduction

The South African National Biodiversity Institute (SANBI) has proposed the development of a new office block, near to their existing Environmental Education Centre, within the Pretoria National Botanical Garden (NBG), situated within the City of Tshwane Metropolitan Municipality. The development is aimed at addressing the needs of SANBI in terms of expanded administrative, research, educational and tourism activities and will be known as the Collections Facility Hub. The proposed development of the Collections Facility Hub, associated structures and supporting service infrastructure, requires that an Environmental Authorisation (EA) be applied for in terms of the National Environmental Management Act (NEMA) (Act No. 107 of 1998, as amended). Coastal & Environmental Services (CES) has been appointed by SANBI to undertake the Basic Assessment (BA) process required in terms of NEMA and the Environmental Impact Assessment (EIA) Regulations (2014, as amended in 2017), for the proposed development.

3.2. Project Location

The proposed site for this development is situated in the suburb of Silverton, Pretoria, within Region 6 of the City of Tshwane Metropolitan Municipality. The project area is located along Cussonia Avenue, which is currently used to access the site (Figure 1.1). The Pretoria NBG is 76 hectares in size (Vibescout, 2018) and is divided into two areas by a central ridge comprised of a quartzite rock formation. The garden is home to the headquarters of SANBI within which their offices are housed.

![Figure 1.1: Aerial image of the location of the project adjacent to the existing Education Centre and parking lot.](image)

The proposed project will be located directly adjacent to the existing Environmental Education (EE) Centre, currently located within the office complex zone of the Pretoria NBG. The office complex area can be accessed via Cussonia Avenue and then via the existing traffic circle and access road.
which runs parallel to Cussonia Avenue. Thereafter, an existing access control point allows for entrance into the office complex. The proposed Collections Facility Hub (CFH) will be located immediately east of that access control point. Figure 1.1 and 1.2 below indicate the footprint of the proposed structure, in relation to the existing infrastructure on site. Figure 1.3 further shows the project in the broader context of the Pretoria NBG and surrounding streets.

Figure 1.2: Location of the project adjacent to the existing Education Centre and parking lot.

Figure 1.3: Locality Map with road networks shown.
3.3. Project Description and Scope

The project entails the development of a new 427m² office and exhibition centre, i.e. the Collections Facility Hub (CFH) and will include:

- A steel framed structure with a corrugated roof;
- A combination of shop fronts;
- Brick and mortar walls, with face brick and plaster and paint finish;
- Vinyl floor finishes to all the spaces;
- Bathroom;
- Reception area; and
- Paved walkway leading to the building from both sides (the walkway will be approximately 130m long and between 2m and 10m wide).

The building comprises of:

- 78m² of exhibition space; and
- 136m² of office space.

The following order of works will be required to develop the building:

i. Clearing and grubbing;
ii. Minor excavations (for foundations);
iii. Foundation and concrete pouring;
iv. Installing of utilities, connecting sewers, electrical and water to the municipal mains;
v. Framing: Sheathing, roof, stairs, windows;
vi. Cladding and outer surfaces;
vii. Final finishes and internal plumbing.

Support Facilities

The proposed development is located on Koedoespoort 325 Portion 97, which is managed by the applicant (SANBI) and will therefore make use of existing infrastructure currently used to service the existing building and developments already situated within the property.

Access Road – The site will be accessed via the National Route 4 (N4) highway from the south or via the R104 regional road from the north and then via Cussonia Avenue (M16). The proposed development site will be accessed via the existing internal access roads currently located within the Pretoria NBG and therefore new access roads will not be required. However, the proposed development will consist of a new paved walkway which will be approximately 10m wide (at its widest point) and approximately 130m in length.

Site Camp – An area that was used as a site camp during previous construction activities will be used for this development as it was previously cleared and thus already impacted. The site camp site is accessible via existing access roads, and located north-west of the proposed site (Figure 1.4 and Plate 1.1 below). Materials will be moved to the proposed building site with tipper trucks, over a relatively short distance of 60m.

Water Supply – Water will be required during the construction and operational phases of the proposed development and will be sourced from an existing municipal connection. Approximately 60 000 litres of water will be required for the proposed six (6) month construction period. Approximately 180 000 litres per year will be required for the operational phase.

Solid Waste, Wastewater and Sewage – The construction phase of the proposed development will include temporary onsite ablution facilities which will be emptied and serviced by an external service provider. Such ablution facilities are already available at the proposed site camp. Solid waste generated will be collected and stored in a designated area within the site camp and will be removed to a licenced landfill facility by the contractor or an external service provider on a regular basis.
During the operational phase, wastewater and sewage will feed into the existing municipal sewer system currently connected to the Pretoria NBG. Solid waste will be removed via municipal collection currently servicing the site on a weekly basis.

**Figure 1.4.** Location of the existing site camp (blue outline) in relation to the proposed infrastructure (yellow).

**Plate 1.1.** View of the inside of the existing site camp, facing the camp entrance.
Appendix G: Environmental Management Programme

3.4. The Environmental Policy

The contractor is required to compile an Environmental Management Policy, which must consider the following:

- The contractor's mission, vision and core values;
- Guiding principles;
- Requirements of, and communication with I&APs;
- The environmental specifications and intentions of the specifications must be upheld;
- The need to work towards continual improvement;
- The obligation to prevent pollution and ecological degradation;
- The importance of coordination with other organisational policies (e.g. quality, occupational health and safety, etc.);
- Site activities will be conducted in a manner that does not create a nuisance, risk or hazard to the natural environment;
- Reference to specific local and/or regional conditions;
- Employee and public health and safety must be considered a priority;
- A commitment to compliance with relevant environmental laws, regulations, by-laws and other criteria to which the contractor subscribes.

The contractor (contractor is defined as principal contractor, sub-contractors and any employees retained on this project) is required to be familiar with the environmental policy (to be developed by the applicant) and all that it implies, and to adopt and implement the policy throughout the course of construction. The policy must be communicated to all employees (and sub-contractors) of the contractor, and made available to the public, if requested.

3.5. Environmental Objectives and Targets

In order to meet the commitments detailed within the Environmental Management Policy, as well as those included within the environmental specifications of this EMPr, the contractor shall develop environmental objectives and targets. The objectives and targets must conform to, and comply with, the following criteria:

- The objectives and targets shall constitute the overall goals for environmental performance identified in the environmental policy and strategy;
- When establishing objectives and targets, the contractor shall take into account the identified environmental aspects and associated environmental impacts, as well as the relevant findings from environmental reviews and audits;
- The targets must be set to achieve objectives within a specified timeframe;
- Targets should be specific and measurable;
- When the objectives and targets are set, the contractor must establish measurable Key Performance Indicators (KPIs). The latter will be used by the contractor as the basis for an Environmental Performance Evaluation System, and can provide information on both the environmental management and the operational systems;
- Objectives and targets need to apply broadly across the contractor's operations, as well as to site-specific and individual activities;
- Objectives and targets must be reviewed from time to time in view of changed operational circumstances and/or changes in environmental legal requirements, and need to take into consideration the views of the I&APs.

3.6. Environmental Legislation and Guidelines

The Contractor must ensure that all South African legislation concerning the natural environment, pollution and the built environment is strictly enforced. Such legislation must include, but is not limited to the:

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- National Environmental Management: Biodiversity Act 10 of 2004
- National Environmental Management: Air Quality Act 39 of 2004
- National Environmental Management: Waste Management Act 59 of 2008
- The Environment Conservation Act No 73 of 1989
- National Water Act, No 36 of 1998
- National Forest Act, No 84 of 1998
- Occupational Health and Safety Act 85 of 1993
- Provincial Nature Conservation Ordinance of 1974
- National Environmental Management: Biodiversity Act, 2004 (Act no. 10 of 2004) – Alien and Invasive Species (AIS) Regulations
- All relevant provincial legislation, Municipal by-laws and ordinances

3.7. Details of the Environmental Assessment Practitioner (EAP)

EAP: Dr Ted Avis
Contact Person: Mr Roberto Almanza
Company: Coastal & Environmental Services (CES)
Physical Address: 13 Stanley St, Richmond Hill, Port Elizabeth, 6001
Telephone: +27 (41) 585 1715
Website: www.cesnet.co.za
Email: r.almanza@cesnet.co.za

CES was established in 1990, and is an independent specialist environmental consultancy with offices in Grahamstown and East London and satellite offices in Maputo, Mozambique and Port Elizabeth. Our principal area of expertise is in assessing the impacts of development on the natural, social and economic environments through, among other instruments, the environmental impact assessment process, and in so doing contribute towards sustainable development.

We adopt a scientific approach to our studies, underpinned by an informed and holistic view of the environment and a pragmatic approach to sustainable development. We believe that a balance between development and environmental protection can be achieved by skilful and careful planning. Our success rate in achieving this balance in a variety of approved developments is evidence of our capability. CES has offices in Grahamstown, East London, Port Elizabeth, Cape Town, Johannesburg and Maputo, Mozambique. Our staff is usually comprised of between 25 to 30 consultants and 11 support staff. All our staff is well qualified in the biological, social and environmental sciences, and produce scientifically robust, defensible reports and EIAs.

In addition, CES has a number of permanent associates that can be drawn on to provide additional expertise, including Rivers for Africa (who specialise in the determination of environmental water requirements), and Nomad Consulting (who specialise in social impact assessments and resettlement action plans). We also have well-developed working relationships with a number of other specialist consulting companies who provide expertise in areas such as air quality emission studies, visual impacts, noise impacts, heritage assessments, radiation hazard assessments, and soil and agricultural assessments.

Dr Ted Avis (Role: EAP)
Ted Avis is a leading expert in the field of Environmental Impact Assessments, having project-managed numerous large-scale ESIA to international standards (e.g. International Finance Corporation). Ted was principle consultant to Corridor Sands Limited for the development of all environment aspects for the US$1billion Corridor Sands Project. He has managed ESIA studies and related environmental assessments of similar scope in Kenya, Madagascar, Egypt, Malawi, Zambia and South Africa. Ted has worked across Africa, and also has experience in large scale Strategic Environmental Assessments in southern Africa, and has been engaged by the International Finance Corporation (IFC) on a number of projects. Ted was instrumental in establishing the Environmental Science Department at Rhodes University whilst a Senior lecturer in Botany, based on his experience running honours modules in EIA practice and environmental. He is an Honorary Visiting Fellow in the Department of Environmental Sciences at Rhodes. He was one of the first certified
Environmental Assessment Practitioner in South Africa, gaining certification in April 2004. He has delivered papers and published in the field of EIA, Strategic Environmental Assessment and Integrated Coastal Zone Management and has been a principal of CES since its inception in 1990, and Managing Director since 1998. Ted holds a PhD in Botany, and was awarded a bronze medal by the South African Association of Botanists for the best PhD adjudicated in that year, entitled “Coastal Dune Ecology and Management in the Eastern Cape”. Ted is a Certified Environmental Assessment Practitioner (since 2002) and a professional member of the South African Council for Natural Scientific Professionals (since 1993).

Mr Roberto Almanza (Role: Report Production)
Roberto obtained his BSc (Environmental Sciences) from Nelson Mandela Metropolitan University majoring in Geology and Geography and obtained his BSc Honours in Geology in 2012. Roberto then went on to complete his MSc (Geology) while working as a geology consultant on a number of exploration projects across South Africa. Roberto joined CES in 2015 and has been involved in several projects from Basic Assessments to Full Scoping and Environmental Impact Reports. He has also assisted with Environmental Auditing, Site Remediation, Water Use Applications and GIS mapping. Roberto now manages a number of small projects from the CES Port Elizabeth office and is becoming involved in several waste-related studies conducted by CES.

Mr Roy de Kock (Role: Report Review)
Roy is a Principal Consultant holding a BSc Honours in Geology and an MSc in Botany from the Nelson Mandela Metropolitan University in Port Elizabeth. He is currently busy with his PhD in soil and vegetation contamination in the Karoo through the Nelson Mandela University in Port Elizabeth. His MSc thesis focused on Rehabilitation Ecology using an open-cast mine as a case study. He is based at the East London branch where he focuses on Ecological and Agricultural Assessments, Geological and Geotechnical analysis, Environmental Management Plans, mining applications and various environmental impact studies. Roy has worked on numerous projects in South Africa, and Africa.

Ms Tarryn Martin (Role: Report Review)
Tarryn holds a BSc (Botany and Zoology), a BSc (Hons) in African Vertebrate Biodiversity and an MSc with distinction in Botany from Rhodes University. Tarryn’s Master’s thesis examined the impact of fire on the recovery of C3 and C4 Panicoid and non-Panicoid grasses within the context of climate change for which she won the Junior Captain Scott-Medal (Plant Science) for producing the top MSc of 2010 from the South African Academy of Science and Art as well as an Award for Outstanding Academic Achievement in Range and Forage Science from the Grassland Society of Southern Africa. Tarryn specialises in conducting vegetation assessments including vegetation and sensitivity mapping to guide developments and thereby minimise their impacts on sensitive vegetation. She has conducted a number of vegetation and impact assessments in Mozambique (to IFC standards) which include the Lurio Forestry Project in Nampula, the Baobab Iron Ore Mine in Tete and the Syrah Graphite Mine, Metals of Africa Graphite Mine, Triton Anguabe Graphite Mine and Nicanda Hills Graphite Mine in Cabo Delgado. She has also worked on a Critical Habitat Assessment for Sasol in Inhambane Province and has co-designed and implemented the Terrestrial Monitoring Program for Kenmare, MOMA, a heavy minerals mine in Mozambique. Tarryn has also managed a number of projects, her most recent ones including the Metals of Africa Graphite Mine ESIA, Triton Nicanda Hills ESHIA as well as smaller projects in South Africa.
4. IMPACT ASSESSMENT AND MITIGATION SUMMARY

This section provides an assessment of the pre-mitigation significance as well as the post-mitigation significance of the social and environmental impacts that may result from the major activities associated with the development.

4.1. Summary of Impacts Associated with the Development

The table below shows the significance of the impacts before and after mitigation is taken into account:

<table>
<thead>
<tr>
<th>IMPACT</th>
<th>WITHOUT MITIGATION</th>
<th>WITH MITIGATION</th>
<th>NO-GO OPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction Phase</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loss of Natural Vegetation</td>
<td>MODERATE-</td>
<td>LOW-</td>
<td>N/A</td>
</tr>
<tr>
<td>Loss of Species of Conservation Concern</td>
<td>MODERATE-</td>
<td>LOW-</td>
<td>N/A</td>
</tr>
<tr>
<td>Invasion of Alien Species</td>
<td>MODERATE-</td>
<td>LOW-</td>
<td>MODERATE-</td>
</tr>
<tr>
<td>Stormwater Management</td>
<td>MODERATE-</td>
<td>LOW-</td>
<td>MODERATE-</td>
</tr>
<tr>
<td>Soil Compaction and Erosion</td>
<td>MODERATE-</td>
<td>LOW-</td>
<td>LOW-</td>
</tr>
<tr>
<td>Solid Waste Generation</td>
<td>MODERATE-</td>
<td>LOW-</td>
<td>LOW-</td>
</tr>
<tr>
<td>Air Pollution</td>
<td>MODERATE-</td>
<td>LOW-</td>
<td>LOW-</td>
</tr>
<tr>
<td>Noise</td>
<td>MODERATE-</td>
<td>LOW-</td>
<td>LOW-</td>
</tr>
<tr>
<td>Visual Impacts</td>
<td>MODERATE-</td>
<td>LOW-</td>
<td>LOW-</td>
</tr>
<tr>
<td>Traffic Impacts</td>
<td>MODERATE-</td>
<td>LOW-</td>
<td>LOW-</td>
</tr>
<tr>
<td>Impacts on Paleontological and Heritage Resources</td>
<td>LOW-</td>
<td>NEGLIGIBLE</td>
<td>N/A</td>
</tr>
<tr>
<td>Health and Safety Risks</td>
<td>MODERATE-</td>
<td>LOW-</td>
<td>N/A</td>
</tr>
<tr>
<td>Employment Creation</td>
<td>MODERATE+</td>
<td>MODERATE+</td>
<td>LOW-</td>
</tr>
<tr>
<td>Purchasing of Materials from Local Businesses</td>
<td>MODERATE+</td>
<td>MODERATE+</td>
<td>LOW-</td>
</tr>
<tr>
<td><strong>Operational Phase</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Invasion of Alien Species</td>
<td>MODERATE-</td>
<td>LOW-</td>
<td>MODERATE-</td>
</tr>
<tr>
<td>Increased Stormwater Runoff and Erosion Potential</td>
<td>MODERATE-</td>
<td>LOW-</td>
<td>MODERATE-</td>
</tr>
<tr>
<td>Solid Waste Generation</td>
<td>MODERATE-</td>
<td>LOW-</td>
<td>LOW-</td>
</tr>
<tr>
<td>Sewerage and Wastewater Generation</td>
<td>MODERATE-</td>
<td>LOW-</td>
<td>LOW-</td>
</tr>
<tr>
<td>Noise</td>
<td>LOW-</td>
<td>NEGLIGIBLE</td>
<td>LOW-</td>
</tr>
<tr>
<td>Visual Impacts</td>
<td>MODERATE-</td>
<td>LOW-</td>
<td>N/A</td>
</tr>
<tr>
<td>Educational Benefits</td>
<td>HIGH +</td>
<td>HIGH +</td>
<td>N/A</td>
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</table>

4.2. Summary of Mitigation Measures

**Construction Phase**

<table>
<thead>
<tr>
<th>ISSUE</th>
<th>IMPACT</th>
<th>MITIGATION MEASURES</th>
</tr>
</thead>
</table>
| Loss of Natural Vegetation   | The building of the CFH will result in the direct loss of less than 0.1ha of indigenous vegetation. This vegetation is not highly sensitive in and of itself and forms only a small part of the whole Pretoria National Botanical Gardens. | - Keep the footprint of the construction as small as possible, the area of construction should be demarcated, and personnel not allowed to heavily use the surrounding natural vegetation; and  
- Any stockpiles or laydown areas should be restricted to the area of the site office where possible. |
## Appendix G: Environmental Management Programme

### Construction Phase

<table>
<thead>
<tr>
<th>ISSUE</th>
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<th>MITIGATION MEASURES</th>
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</table>
| Loss of Species of Conservation Concern | The building of the CFH will result in the direct loss of some individuals of the SCC. *Podranea ricasoliana*, and potentially other species that may not have been recorded at the time of the site visit. | • Keep the footprint of the construction as small as possible, the area of construction should be demarcated, and personnel not allowed to heavily use the surrounding natural vegetation;  
• Any populations of SCC should be avoided wherever possible, where they cannot be avoided, every effort should be made to replant these individuals elsewhere in the gardens, or plant an equivalent or greater number of new individuals elsewhere in the gardens;  
• A full site walk-through should be conducted in the summer prior to any construction activities to list all SCC and associated permits should be obtained for their removal or transplantation. |
| Invasion of Alien Species | The building of the CFH will result in the influx of seeds and disturbance of existing seedbanks of alien invasive species. Considering the number of alien species already recorded from the Botanical Gardens, this impact will occur and must be managed. | • Keep the footprint of the construction as small as possible, the area of construction should be demarcated, and personnel not allowed to heavily use the surrounding natural vegetation.  
• Any existing and new alien species must be removed as soon as possible after emergence.  
• An alien vegetation management plan must be applied to the site to maintain the site free of alien invasions throughout the construction and operational phase of the development. |
| Stormwater Management | During the construction phase the inappropriate routing of stormwater may lead to sedimentation within the existing stormwater infrastructure, and could adversely affect aquatic environments located at the stormwater discharge point. | • Flood attenuation and storm water control measures must be implemented.  
• Erosion and sediment control measures must be developed and implemented to minimize the ingress of sediment-laden stormwater into the existing stormwater infrastructure. |
| Soil Compaction and Erosion | There is a possibility that soil may be compacted by the movement and parking of construction vehicles. Compacted soil results in the reduced ability for plant growth and water absorption. The clearing of vegetation will result in the exposure of soils. Exposed soils are easily susceptible to erosion by wind and water (i.e. run-off) during high wind or rainfall conditions. | • Newly cleared and exposed areas must be promptly rehabilitated to avoid soil erosion;  
• Where necessary, temporary stabilization measures must be used;  
• Plan for the worst case, that is, for heavy rainfall and runoff events, or high winds;  
• Appropriate erosion control measures must be implemented and a monitoring programme established to ensure that no erosion is taking place. At the first sign of erosion the necessary remedial action must be taken;  
• Care must be taken to ensure that runoff is well dispersed so as to limit erosion. |
### Construction Phase

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<tr>
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</table>
| Solid Waste Generation | It is anticipated that the proposed development will produce solid waste in the form of cleared vegetation, building rubble, excavated soil, excess concrete and general waste, such as litter, during the construction phase. | - Rubble and other construction waste produced should be re-used if possible and, where it is not possible, must be disposed of at the nearest registered waste disposal facility;  
- Rubble, which will not be reused, must be removed from site on a regular basis;  
- If rubble is stored on site, it should be stored on designated portions of land away from any sensitive areas;  
- Litter must be controlled during construction – adequate bins must be made available on site at all times. These must be made scavenger and weather proof and must be emptied on a regular basis;  
- Construction materials stored at the site camp must be secured – i.e. plastics must be covered to prevent being blown off site;  
- The construction area must remain litter free and regular inspections for litter must be conducted. The activity should not contribute to any surrounding windblown litter;  
- Waste skips must be covered and emptied regularly;  
- Waste manifests must be provided by the Contractor to prove legal disposal;  
- Empty cement bags must be kept in a sealed waste containers;  
- Waste must not to be buried or burned. |
| Air Pollution          | During construction, dust may be generated, especially where there is exposed ground. Specific activities that may contribute to the release of dust include offloading and stockpiling of building materials such as sand, storage of excavated materials and movement of heavy vehicles. The generation of dust may be exacerbated during windy, dry periods. In addition to dust, air pollution may result from the exhaust fumes emitted by construction vehicles, especially if the vehicles have not been serviced correctly | - Topsoil should be cleared in a phased manner to avoid large areas of bare ground;  
- Employ dust suppression measures such as wetting of the project area during dry, windy periods (Only water from a licensed source will be used);  
- Where practical, do not leave large cleared areas exposed for longer than necessary;  
- The area of disturbance must be kept to a minimum at all times;  
- Vehicle speed should be limited to the lowest possible, and should not exceed 30km/h on the construction site, service road or gravel roads used to access the site camp.  
- Construction vehicles must be regularly maintained in order to ensure that no unnecessary exhaust fumes are being emitted. |
### Construction Phase

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</table>
| Noise | Construction activities are associated with an increase in noise levels as a result of construction vehicles, plant generators and various other equipment being used on site. While these activities will produce noise, it is unlikely to have a significant impact on the surrounding area which is located within a busy urban area. | • No construction activities may take place between sunset and sunrise;  
• Machinery that generates noise must be regularly maintained in order to ensure that no unnecessary additional noise is produced;  
• Equipment with lower sound levels should be selected where feasible. |
| Visual Impacts | Construction vehicles and equipment will be evident in the existing landscape. Generation of dust will increase the visibility of the project and may become an eyesore if not managed correctly. | • Employ techniques to suppress dust and smoke generation during construction;  
• The contractor should maintain good housekeeping on site to avoid litter and minimise waste;  
• Night lighting of the construction sites should be minimised within requirements of safety and efficiency of the Environmental Regulations for Workplaces in terms of the Occupational Health and Safety Act (Act No. 85 of 1993);  
• Fires and fire hazards need to be managed appropriately. |
| Traffic Impacts | During the construction phase of the proposed development, construction vehicles will be utilizing the existing road network. This may result in the impeding of traffic and damage to existing roads. | • Large construction vehicles must not be permitted to utilize public roads during peak hours (AM: 06:30 – 08:30 and PM: 16:00 – 18:30);  
• Any damage to existing roads directly caused by large construction vehicles operating on this project must be repaired immediately. |
| Impacts on Paleontological and Heritage Resources | The likelihood that fossils will be found in the rocks of the adjacent Dassoort Formation is very slim due to the thermal metamorphosis this formation would have experienced during the intrusion of the diabase. In addition, no heritage features or indications of the presence of such features were observed within the proposed Pretoria National Botanical Gardens Infrastructure Project development site. However, should any features of paleontological or heritage importance be encountered at the site, there is a risk that they | • Please refer to the Heritage and Paleontological specialist reports included in Appendix D of BAR;  
• Should any archaeological, paleontological or cultural sites or objects be located during the construction of the proposed project, it must immediately be reported to the South African Heritage Resources Agency (SAHRA). Failure to report a site or object of archaeological and/or cultural significance is a contravention of the National Heritage Act (Act No. 25 of 1999). |
### Construction Phase

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<th>IMPACT</th>
<th>MITIGATION MEASURES</th>
</tr>
</thead>
</table>
|                                     | will be destroyed as a result of the proposed development.             | • All relevant Health and Safety legislation as required in South Africa should be strictly adhered to, including but not limited to the Occupational Health and Safety Act, 1993 (No. 85 of 1993);  
• Smoking should be prohibited in the vicinity of flammable substances;  
• Any welding or other sources of heating of materials should be done in a controlled environment and under appropriate supervision;  
• Ensure availability of fire extinguishers;  
• All employees must be aware of emergency/contingency plans to ensure an understanding of the hazards and procedures required during an emergency situation;  
• An emergency preparedness and response protocol must be development by the appointed contractor to be implemented for the duration of construction;  
• Records of environmental and/or health and safety related incidents should be maintained and communicated to the relevant persons;  
• The Contractor shall ensure that signage, which should be pictorial and in the vernacular, is erected to warn against entering the construction area;  
• Traffic calming and speed control measures for access to construction sites shall be instigated in consultation with the local authorities. |
| Health and Safety Risks             | The use of construction machinery during the construction phase poses a potential risk to the health and safety of people working at the construction site as well as to commuters passing the site. The movement of construction vehicles also increases the risk of road accidents. The risk of accidents, fires and explosions must be mitigated effectively. |                                                                                                                                                    |
| Employment Creation                 | The construction phase of the proposed development will create approximately 120 temporary jobs for locals within the area.  
                                              | • None required.                                                                                                                                 |
| Purchasing of Materials from Local Businesses | Where possible, materials will be sourced from local businesses and this will result in a boost of the local economy of the immediate vicinity and surrounding areas. | • None required.                                                                                                                                 |

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### Operational Phase

<table>
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<tr>
<th>ISSUE</th>
<th>IMPACT</th>
<th>MITIGATION MEASURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invasion of Alien Species</td>
<td>If poorly maintained, the cleared areas surrounding the proposed building will result in the influx of seeds and disturbance of existing seedbanks of alien invasive species. Considering the number of alien species already recorded from the Botanical Gardens, this impact will occur and must be managed.</td>
<td>- An alien vegetation management plan must be applied to the site to maintain the site free of alien invasions throughout the construction and operational phase of the development.</td>
</tr>
</tbody>
</table>
| Increased Stormwater Runoff and Erosion Potential | The proposed development will result in more impermeable surfaces than what currently exists on site and this will result in increased runoff and potentially increased erosion.                                       | - Flood attenuation and storm water control measures must be implemented;  
  - Storm-water structures need to be implemented as part of the development and must link up with the current storm-water infrastructure in order to navigate stormwater and minimise soil erosion;  
  - At the first signs of erosion, the correct procedures must be undertaken to manage, resolve and prevent it from occurring. |
| Solid Waste Generation                          | Solid waste during the operational phase will primarily consist of the generation of litter from the administrative staff, visitors and shops within the proposed CFH. Solid waste has the potential to pollute the surrounding land or enter stormwater and sewerage systems unless it is managed correctly. Solid waste can also be considered a cumulative impact as it will contribute to the overall waste produced within the City of Tshwane Metropolitan Municipality and the decrease in available landfill space. | - Adequate waste disposal (litter) bins must be available on site. Bin located on the outside of the building must be properly secured and covered to prevent scavengers from tipping them;  
  - A responsible person must be appointed to manage the solid waste generated at the proposed development in order to ensure that the waste is properly stored and regularly removed by municipal refuse services. |
| Sewerage and Wastewater Generation              | The operation of the new development will contribute to additional effluent and wastewater being generated and disposed into the municipal sewerage system. Sewage and wastewater has the potential to leak and contaminate the soils, stormwater and groundwater in the area.                                          | - Wastewater and effluent management must be implemented on site;  
  - Ablution facilities and associated piping must be adequately lined and checked for leaks on a regular basis. |
### Operational Phase

<table>
<thead>
<tr>
<th>ISSUE</th>
<th>IMPACT</th>
<th>MITIGATION MEASURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise</td>
<td>The operation of the proposed development may result in a slight noise increase due to a higher number of visitors passing through the area as well as additional administrative staff accessing the site. The overall noise level should not be any more than what is currently experienced on site.</td>
<td>• The City of Tshwane municipal by-laws relating to noise must be adhered to at all times.</td>
</tr>
<tr>
<td>Visual Impacts</td>
<td>The visibility of the proposed development will be noticeable and will be a significant visual transformation of the land that is currently undeveloped however, in relation to the nature of the surrounding urban areas, it will not be a significant visual transformation to the general landscape.</td>
<td>• Building finishes should be of appropriate design and quality;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Buildings should be designed in such a way that it fits into the surrounding environment;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Waste must be removed from site regularly and disposed of at a registered landfill site in order to avoid unnecessary litter being viewed on site;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• General good housekeeping must be maintained at all times.</td>
</tr>
<tr>
<td>Educational Benefits</td>
<td>The proposed development will contribute to educational infrastructure within the City of Tshwane and will contribute to biodiversity research in South Africa and abroad.</td>
<td>• None required</td>
</tr>
</tbody>
</table>

### 4.3. Basic Assessment Issues and Mitigation Measures

The identification and significance of identified project related impacts (before and after mitigation is presented in the Basic Assessment Report (BAR). The BAR identified potential impacts and risks associated with the proposed development and these, contained in this EMP, presents the preliminary actions, specifications and management commitments that need to be adhered to in order to mitigate or enhance the impacts of significance. These are detailed in the sections that follow.
5. ENVIRONMENTAL MANAGEMENT SYSTEM

5.1. Reporting

5.1.1. Administration

Before the contractor begins each construction activity, the Contractor shall give to the ECO and engineer a written method statement setting out the following:

• The type of construction activity;
• Locality where the activity will take place;
• Identification of impacts that might result from the activity;
• Identification of activities or aspects that may cause an impact;
• Methodology and/or specifications for impact prevention for each activity or aspect;
• Methodology and/or specific actions for impact containment for each activity or aspect;
• Emergency/disaster incident and reaction procedures;
• Treatment and continued maintenance of impacted environment.

The contractor may provide such information in advance of any or all construction activities provided that new submissions shall be given to the ECO and/or engineer whenever there is a change or variation to the original.

The ECO and/or engineer may provide comment on the methodology and procedures proposed by the Contractor but he shall not be responsible for the contractor’s chosen measures of impact mitigation and emergency/disaster management systems. However, the contractor shall demonstrate at inception and at least once during the contract that the approved measures and procedures function properly.

5.1.2. Good housekeeping

The contractor shall undertake “good housekeeping” practices during construction. This will help avoid disputes on responsibility and allow for the smooth running of the contract as a whole. Good housekeeping extends beyond the wise practice of construction methods that leaves production in a safe state from the ravages of weather to include the care for and preservation of the environment within which the site is situated.

5.1.3. Record keeping

The engineer and the ECO will continuously monitor the contractor’s adherence to the approved impact prevention procedures and the engineer shall issue to the contractor a notice of non-compliance whenever transgressions are observed. The ECO should document the nature and magnitude of the non-compliance in a designated register, the action taken to discontinue the non-compliance, the action taken to mitigate its effects and the results of the actions. The non-compliance shall be documented and reported to the engineer in the monthly report. These reports shall be made available to the authorities when requested.

The Contractor shall ensure that an electronic filing system identifying all documentation related to the EMPr is established.

A list of reports likely to be generated during all phases of the Project is provided below, and all applicable documentation must be included in the environmental filing system catalogue or document retrieval index.

• Environmental Management Programme;
• Final design documents and diagrams issued to and by the Contractor;
• All communications detailing changes of design/scope that may have environmental implications;
Appendix G: Environmental Management Programme

- Complaints register;
- Medical reports;
- Incident and accident reports;
- Emergency preparedness protocol;
- Copies of all relevant environmental legislation;
- All relevant permits;
- All method statements from the Contractor for all phases of the project.

5.1.4. Document control

The Contractor and resident engineer shall be responsible for establishing a procedure for electronic document control. The document control procedure should comply with the following requirements:

- Documents must be identifiable by organisation, division, function, activity and contact person;
- Every document should identify the personnel and their positions, who drafted and compiled the document, who reviewed and recommended approval, and who finally approved the document for distribution;
- All documents should be dated, provided with a revision number and reference number, filed systematically, and retained for a five year period.

The Contractor shall ensure that documents are periodically reviewed and revised, where necessary, and that current versions are available at all locations where operations essential to the functioning of the EMPr are performed. All documents shall be made available to the independent external auditor.

5.2. Construction phase

5.2.1. Clearing of the Site

In all areas where the contractor intends to, or is required to clear the natural vegetation and soil, either within the construction area, or at designated or instructed areas outside the construction area, a plan of action shall first be submitted to the engineer for his approval.

The EMPr shall contain a photographic record and change/land reference of the areas to be disturbed. This shall be submitted to the engineer for his records before any disturbance/stockpiling may occur. The record shall be comprehensive and clear, allowing for easy identification during subsequent inspections.

The contractor shall be responsible for the re-establishment of natural vegetation within the development boundaries for all areas disturbed during construction. This includes, for example, service roads, stockpile areas, stop/go facilities, windrows and wherever material generated for, or from, road construction has to be stored temporarily or otherwise within the construction area, or at designated or instructed areas outside the construction area. This responsibility shall extend until expiry of the defects notification period.

5.2.2. Site access and demarcation

The location, layout and method of establishment of the construction camp including the following must be clearly indicated and demarcated prior to construction activity commencing:

- All Contractor's buildings, and/or offices
- Lay down areas
- Vehicle wash areas (if any)
- Workshops and drip trays
- Fuel storage areas (including filling and dispensing from storage tanks)
Appendix G: Environmental Management Programme

- Cement/concrete mixing areas (including the methods employed for the mixing of concrete and particularly the containment of runoff water from such areas and the method of transportation of concrete)
- Other infrastructure required for the running of the project
- Road construction forewarning signs and detour signage if necessary

Details, including a drawing, showing where and how the access points and routes will be located and managed must be submitted to the ECO and developer that are supported by the following management requirements:

- On the site and within such distance of the site as may be stated, 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 as to minimise disruption to regular users of the routes not on the Site.
- On gravel or earth roads on site and within 500m of the site, the vehicles of the contractor and his suppliers shall not exceed a speed of 45 km/h or as directed by the ECO.
- The Contractor shall supply the ECO with a Method Statement detailing the location and management of all access points and roads.

The Contractor shall erect and maintain permanent and/or temporary fences of the type and in the locations directed by the ECO. Such fences shall, if so specified, be erected before undertaking designated activities. Certain areas within or next to the Site shall be "no go" areas. The Contractor shall ensure that, insofar as he has the authority, no person, machinery, equipment or materials enter the "no go" areas at any time.

5.2.3. Materials handling, use and storage

- The Contractor shall ensure that any delivery drivers are informed of all procedures and restrictions (including identified "no go" areas) required to comply with the EMPR.
- The Contractor shall ensure that these delivery drivers are supervised during off loading, by someone with an adequate understanding of the requirements of the EMPR.
- Materials shall be appropriately secured to ensure safe passage between destinations. Loads including, but 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 manufactured and/ or imported material shall be stored within the Contractor's camp, and, if so required by the EMPR, out of the rain.
- All lay down areas outside of the construction camp shall be subject to the ECO's approval.
- Imported gravel, fill, soil and sand materials shall be free of weeds, alien invasive seed matter, plant material, litter and contaminants and shall be obtained from sources approved by the ECO.

5.2.4. Stockpiling

- Any stockpiling of gravel, cut, fill or any other material including spoil shall be in areas approved by the ECO within the defined working area.
- The Contractor shall ensure that the material does not blow or wash away. If the stockpiled material is in danger of being washed or blown away, the Contractor shall spray it with Dustex or cover it with a suitable material, such as hessian or plastic. Stockpiles of topsoil shall not be covered with plastic.
- No stockpiling of any material shall be allowed within 20 m of any "no go" area.

5.2.5. Solid waste management

- No on-site burning, burying or dumping of any waste materials, litter or refuse shall occur.
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- The Contractor shall provide vermin and weatherproof bins with lids of sufficient number and capacity to store the solid waste produced on a daily basis. The lids shall be kept firmly on the bins at all times.
- Bins shall not be allowed to become overfull and shall be emptied at least once a day.
- The waste from bins may be temporarily stored on Site in a central waste area that is weatherproof and scavenger-proof, and which the ECO has approved.
- Recyclable waste shall be disposed of into separate skips/bins and removed off-site for recycling.
- All solid waste shall be disposed of off-site at an approved registered landfill site. The Contractor shall supply the ECO with the appropriate disposal certificates.

5.2.6. Water use

- All sources of water for construction purposes must be approved by the ECO in writing before any such sources can be used to obtain water;
- Water may not be sourced from a river, natural watercourse or from a borehole without the appropriate authorisation from the Department of Water and Sanitation (DWS);
- Where possible all wash water will be recycled for use, as wash water again or for dust suppression where applicable.

5.2.7. Contaminated water

- Potential pollutants of any kind and in any form shall be kept, stored, and used in such a manner that any escape can be contained and that the water table and surface water is not endangered. Water containing such pollutants as chemicals, washing detergents, sewerage, fuels, paints and solvents and hydrocarbons shall be contained and discharged into an impermeable storage facility for removal from the site or for recycling. This particularly applies to runoff from fuel depots/workshops/truck washing areas.
- Wash down areas shall be placed and constructed in such a manner so as to ensure that the surrounding areas are not polluted. The Contractor shall notify the ECO immediately of any pollution incidents on Site.

5.2.8. Hazardous substances

- The transportation and handling of hazardous substances must comply with the provisions of the Hazardous Substances Act (Act No.187 of 1993) and associated regulations as well as SABS 0228 and SABS 0229.
- The Contractor shall also comply with all other applicable regional and local legislation and regulations with regard to the transport, use and disposal of hazardous substances. Hazardous chemical substances (as defined in the Regulations for Hazardous Chemical Substances) used during construction shall be stored in secondary containers. The relevant Material Safety Data Sheets (MSDS) shall be available on site. Procedures detailed in the MSDSs shall be followed in the event of an emergency situation.
- The Contractor shall be responsible for the training and education of all personnel on site who will be handling hazardous materials about their proper use, handling and disposal.
- If potentially hazardous substances are to be stored or used on site, the Contractor shall submit a Method Statement to the ECO detailing the substances / materials to be used, together with the transport, storage, handling and disposal procedures for the substances.

5.2.9. Cement and mixing of concrete

- The proposed location of cement mixing areas (including the location of cement stores and sand and aggregate stockpiles) shall be indicated on the site layout plan and approved by the ECO.
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- All wastewater generated from the operation and cleaning of concrete mixing equipment and other sources of concrete shall be passed through a concrete wastewater settlement system. The water from this system shall not be allowed to flow into any “no go” area or water course but must permeate through the ground before it reaches any such water course. The accumulated sludge in the settlement system must be regularly cleaned out and appropriately disposed of as solid waste.
- The Contractor shall ensure that minimal water is used for washing of concrete and cement mixing equipment.
- Used cement bags shall be temporarily stored in separate weatherproof bins on site to prevent the generation of wind-blown cement dust and the bags from blowing away. These used cement bags must then be correctly disposed of as hazardous waste.
- During construction, the contractor must ensure that concrete is mixed on mortar boards, all visible remains of concrete are removed and disposed of as waste and that all surplus aggregate is removed.

5.2.10. Fuel (petrol and diesel) and oil

Fuel Storage

- All construction materials including fuels and oil should be stored in demarcated areas that are contained within berms / bunds to avoid spread of any contamination into nearby rivers or drainage lines. Washing and cleaning of equipment should also be done in berms or bunds, in order to trap any cement and prevent excessive soil erosion. These sites must be re-vegetated after construction has been completed. Mechanical plant and bowsers must not be refuelled or serviced within or directly adjacent to any drainage line or waterbody.
- The location of the fuel storage area will be approved by the ECO and will be situated at least 20 m away from any “no go” areas. All necessary approvals with respect to fuel storage and dispensing shall be obtained from the appropriate authorities. Symbolic safety signs depicting “No Smoking”, “No Naked Lights” and “Danger” conforming to the requirement of SABS 1186 shall be prominently displayed in and around the fuel storage area. There shall be adequate fire-fighting equipment at the fuel storage area.
- The Contractor shall ensure that all liquid fuels and oils are stored in tanks with lids, which are kept firmly shut and under lock and key at all times. The capacity of the tank shall be clearly displayed and the product contained within the tank clearly identified using the emergency information system detailed in SABS 0232 part 1. Fuel storage tanks shall have a capacity not exceeding 9,000 litres and shall be kept on site only for as long as fuel is needed for construction activities, on completion of which they shall be removed.
- Tanks on site shall not be linked or joined via any pipe work, but shall remain as separate entities. The tanks shall be situated on a smooth impermeable base with a bund. The volume inside the bund shall be 110% of the total capacity of the largest storage tank. The base may be constructed of concrete, or of plastic sheeting with impermeable joints with a layer of sand over to prevent perishing. The impermeable lining shall extend to the crest of the bund. The floor of the bund shall be sloped to enable any spilled fuel and/or fuel-contaminated water to be removed. Appropriate material, approved by the ECO that absorbs / breaks-down or encapsulates minor hydrocarbon spillage and which is effective in water shall be installed in the sump.
- The tanks and bunded areas shall be covered by a roofed structure, taken off site to a disposal site approved by the ECO, and the material that absorbs / breaks-down or encapsulates minor hydrocarbon spillage shall be replenished.
- Only empty and externally clean tanks may be stored on the bare ground. Empty and externally dirty tanks shall be sealed and stored on an area where the ground has been protected.
- Adequate precautions shall be provided to prevent spillage during the filling of any tank and during the dispensing of the contents. The dispensing mechanism for the fuel storage tanks shall be stored in a waterproof container when not in use.
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- As part of the required site layout for the construction camp, a plan shall be submitted to the ECO detailing the design, location and construction of the fuel storage area as well as for the filling and dispensing from storage tanks and for the type of absorbing / breaking-down or encapsulating material to be used.

**Refuelling**

- Where reasonably practical, the plant shall be refuelled at a designated re-fuelling area/depot or at a workshop as applicable. If this is not reasonably practical then the surface under the refuelling area shall be protected and appropriately bunded against pollution to the reasonable satisfaction of the ECO prior to any refuelling activities.
- If fuel is dispensed from 200 litre drums, the proper dispensing equipment shall be used, and the drum shall not be tipped in order to dispense fuel. The Contractor shall ensure that the appropriate fire-fighting equipment is present during refuelling operations.
- The Contractor shall ensure that there is always a supply of absorbent material readily available to absorb/breakdown or where possible, be designed to encapsulate minor hydrocarbon spillages. The quantities of such materials shall be able to handle a minimum of 200 ℓ of hydrocarbon liquid spill. Prior to any refuelling or maintenance activities, the ECO must approve this material.

**Used oil and hydrocarbon contaminated materials**

- Used oil shall be stored at a central location on site prior to removal off site for disposal at an approved disposal or recycling site.
- Old oil filters and oil, petrol and diesel-soaked material shall be treated as hazardous waste. The Contractor shall remove all oil, petrol, and diesel-soaked sand immediately and shall dispose of it as hazardous waste or treat it on site with material that breaks-down or encapsulates such spillages as approved by the ECO.

5.2.11. Workshop, equipment maintenance and storage

- Where practical, all maintenance of equipment and vehicles on site shall be performed in a workshop. If it is necessary to do maintenance outside of the workshop area, the Contractor shall obtain the approval of the ECO prior to commencing such activities. No maintenance, including emergency maintenance, of plant can take place within 20 m of any “no go”.
- The Contractor shall ensure that in his workshop and other plant maintenance facilities, including those areas where, after obtaining the ECO’s approval, the Contractor carries out emergency plant maintenance, there is no contamination of the soil or vegetation. The workshop shall have a smooth impermeable (concrete or thick plastic covered with sand) floor.
- The floor shall be bunded and sloped towards an oil trap or sump to contain any spillages. When 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, 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 the workshop or maintenance areas, and these areas 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 and low sudsing-type detergents.
- As part of the site layouts, a plan must be submitted to the ECO detailing the design of the bunding of the workshop and how run-off from the workshop will be managed as well as how drip trays used under plant will be managed.

5.2.12. Ablution facilities
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- Washing, whether of the person or of personal effects, and acts of excretion and urination are strictly prohibited other than at the facilities provided. The Contractor shall provide the necessary ablution facilities for all his personnel prior to the commencement of work and shall ensure that his personnel make use of the facilities.
- Toilet facilities shall be supplied by the Contractor for the workers at a ratio of at least 1 toilet per 20 workers in areas approved by the ECO. Every 1-man urinal will be taken as supplying the equivalent of 5 men in addition to the 20 men per toilet on site. No toilets will be erected within 20 m of any “no go” areas. Toilets shall be situated within 200m of any area where work is taking place in numbers sufficient to meet the ratio depicted above for the workers in the area. Mobile toilets (e.g. trailer mounted) should be considered for sites, where workers may be expected to cover large distances every day.
- The facilities shall be maintained in a hygienic state and serviced regularly. Toilet paper shall be provided. Temporary / portable toilets shall be secured to the ground to prevent them toppling due to wind or any other cause, to the satisfaction of the ECO.
- Discharge into the environment and burial of waste is strictly prohibited. The Contractor shall ensure that no spillage occurs when the toilets are cleaned or emptied and that the contents are removed from the site. Toilets shall be emptied before the Contractors’ holidays or any other temporary site closure.

5.2.13. Eating areas

- The Contractor shall designate eating area(s), subject to the approval of the ECO. No cooking is allowed outside of the Contractor’s camp area on site.
- At meal times all workers must eat in designated eating areas. These areas shall have shade for the workers. The eating areas may be in existing structures or in temporary / transportable structures that shall be well constructed using wood or metal for the frame and screened on the top and sides with shade cloth/canvas or other material to the satisfaction of the ECO. These areas shall be well demarcated and in locations approved by the ECO and shall not be within 20 m of any “no go” areas, on or adjacent to the site.
- Sufficient bins shall be present in these areas. All disposable food packaging must be disposed of in the bins after every meal.
- The area must be cleaned after every meal.
- The feeding or leaving of food for animals is strictly prohibited.

5.2.14. Site structures

- All site establishment components (as well as equipment) shall be positioned to limit visual intrusion on neighbours and the size of the land area disturbed. The type and colour of roofing and cladding materials to the Contractor’s temporary structures shall be selected to reduce reflection.
- The Contractor shall supply and maintain adequate and suitable sheds for the storage of materials. Sheds for the storage of materials that may deteriorate or corrode if exposed to the weather shall be weatherproof, adequately ventilated and provided with raised floors.

5.2.15. Lights

- The Contractor shall ensure that any lighting installed on the site for his activities does not cause a reasonably avoidable disturbance to the naturally-occurring fauna.

5.2.16. Noise

- The Contractor shall take precautions to minimise noise generated on site (e.g. install and maintain silencers on machinery).
- The Contractor shall comply with the Noise Induced Hearing Loss Regulations published under the Occupational Health and Safety Act.
- Appropriate directional and intensity settings are to be maintained on all hooters and sirens.
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- Work will be limited to daylight hours – between 6am and 6pm
- No amplified music shall be allowed on site. The Contractor shall not use sound amplification equipment on Site unless in emergency situations.

5.2.17. Dust Control

- The Contractor shall be responsible for the continued control of dust arising from his operations. The Contractor shall take all reasonable measures to minimize the generation of dust as a result of construction activities to the satisfaction of the ECO. Appropriate dust suppression measures include: spraying or dampening with water, using a commercial dust binder (such as Hydropam or Dustex), rotoverting straw bales, planting of open cleared space and the scheduling of dust-generating activities. If the conditions are such that the Contractor cannot satisfactorily dampen the dust, then the ECO may halt operations until such time as the conditions are more suitable for lower dust generating construction.
- Damping of all gravel haul and access roads (if constructed) with water must be ongoing and special attention must be given to roads close to residential areas. Should dust still be a problem on any specific road, the allowable speed will be reduced to 20km/h. If dust is still a problem the road should be treated with a commercial dust binder, as required, to form a cohesive layer that will control the dust on the road.
- Areas that are to have the topsoil stripped for construction purposes must be limited and only stripped when work is about to take place.
- Other activities and situations that may result in a dust nuisance include: site clearance and other earth moving operations, open cleared space, stockpiles of topsoil or sand and activities associated with concrete mixing.
- The appropriate health and safety equipment (e.g. dust masks) must be worn by workers during the phases of dust-producing construction activity.
- During periods of strong winds, construction work which tends to produce large amounts of dust should be paused until such a time that the wind subsides.

5.2.18. Environmental awareness training

- Environmental awareness training courses shall be run for all personnel on site (See Annexure 2 for a proposed Basic Environmental Education Course). Two types of courses shall be run, one for the Contractor's and Subcontractor's management and one for all site staff and labourers. Courses shall be run in the morning during normal working hours at a suitable venue provided by the Contractor. All attendees shall remain for the duration of the course and sign an attendance register on completion that clearly indicates participant's names, a copy of which shall be handed to the ECO.
- The size of each session shall be limited to 30 people. The Contractor shall allow for sufficient sessions to train all personnel. Subsequent sessions shall be run for any new personnel coming onto site. A Method Statement with respect to the organisation of these courses shall be submitted.
- Notwithstanding the specific provisions of this clause it is incumbent upon the Contractor to convey the sentiments of the EMPs to all personnel and Subcontractors involved with the Works.

Training course for management and foremen

- The environmental awareness training course for management shall include all management staff and foremen. The course, which will be presented by the ECO, will be of approximately one-hour duration.
- The initial course shall be undertaken not less than 7 days prior to commencement of work on site. Subsequent courses shall be held as and when required.

Training course for site staff and labour
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- The environmental awareness training course for site staff and labour shall be presented by the Contractor’s SHE Officer from material provided by the ECO unless otherwise required by the Project Specification. The course will be approximately one-hour long.
- The course shall be run not more than 7 days after commencement of work on site with sufficient sessions to accommodate all available personnel. Subsequent courses shall be held as and when required.

Construction personnel information posters

- The Contractor shall erect and maintain information posters for the information of his employees depicting actions to be taken to ensure compliance with the Environmental EMP. Construction personnel information posters shall be laminated and erected in all eating areas, workshops and site offices. The Contractor shall ensure that the construction personnel information posters are not damaged in any way, and shall replace them if any part becomes illegible.
- Examples of these posters will be supplied to the Contractor by the ECO in electronic format.

5.2.19. Fire control

- The Contractor shall take all the necessary precautions to ensure that fires are not started as a result of his activities on site.
- No open fires shall be permitted on the site.
- Smoking shall not be permitted in those areas where there 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 support the rapid spreading of an initial flame.
- 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 procedures to be followed. The Contractor shall forward the name of the Fire Officer to the ECO for his approval within 7 days of being on site.
- The Contractor shall ensure that there is basic fire-fighting equipment available on site at all times. This shall include at least rubber beaters when working in urban open spaces and natural areas, and at least one fire extinguisher of the appropriate type when welding or other “hot” activities are undertaken.
- The Contractor shall be liable for any expenses incurred by any organisations called to assist with fighting fires that were started as a result of his activities or personnel, and for any cost relating to the rehabilitation of burnt areas, or consequential damages.

5.2.20. Emergency procedures

- Emergency procedures, including the names and contact details of responsible personnel and emergency services shall be made available to all staff and shall be clearly displayed at relevant locations at the site. The Contractor shall advise the ECO of any emergencies on Site, together with a record of action taken, within 24 hours of the emergency occurring.
- Telephone numbers of emergency services shall also be posted conspicuously in the Contractor’s office near the telephone.
- The Contractor shall submit a Method Statement covering the procedures for the following emergencies:

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 procedures to be followed in the event of a fire.
Accidental leaks and spillages

- The Contractor shall ensure that his employees are aware of the procedures to be followed for dealing with spills and leaks, which shall include notifying the ECO and the relevant authorities. The Contractor shall ensure that all the necessary materials and equipment for dealing with spills and leaks are available on site at all times. Treatment and remediation of the spill areas shall be undertaken to the reasonable satisfaction of the 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/breakdown or where possible, be designed to encapsulate minor hydrocarbon spillages. The quantities of such materials shall be able to handle a minimum of 200 ℓ of hydrocarbon liquid spill.
- Any spills must be cleared and the contaminated soil/sludge disposed of in an appropriate manner, approved by the ECO, or at a licensed hazardous waste disposal site.

5.2.21. Protection of natural features

- The Contractor shall not deface, paint, damage or mark any natural features (e.g. rock formations or trees) situated in or around the site for survey or other purposes unless agreed beforehand with the ECO. Any features affected by the Contractor in contravention of this clause shall be restored/rehabilitated to the satisfaction of the ECO.
- The Contractor shall not permit his employees to make use of any natural water sources for the purposes of swimming, personal washing and the washing of machinery or clothes.

5.2.22. Topsoil

- Topsoil can only be stripped from the areas as indicated below:
  - Any area which is to be used for temporary storage of materials
  - Areas which could be polluted by any aspect of the construction activity and;
  - Areas designated for the dumping of soil.
- Stripping of topsoil will be undertaken in such a manner as to minimise erosion by wind or runoff.
- Outside of the development footprint, topsoil will be stripped to a depth not exceeding 150mm from the original ground level.
- Areas from which the topsoil is to be removed will be cleared of any foreign material which may come to form part of the topsoil during removal including bricks, rubble, any waste material, litter, excess vegetation and any other material which could reduce the quality of the topsoil.
- The Contractor shall ensure that subsoil and topsoil are not mixed during stripping, excavation, reinstatement and rehabilitation. If mixed with clay sub-soil the usefulness of the topsoil for rehabilitation of the site will be lost.
- Soils should be exposed for the minimum time possible once cleared.
- Topsoil will be temporarily stockpiled, separately from (clay) subsoil and rocky materials.
- Topsoil will be stockpiled in areas designated by the ECO.
- Stockpiles will either be vegetated with indigenous grasses or covered by a suitable fabric to prevent erosion and invasion of weeds.
- Stockpiled topsoil will not be compacted.

5.2.23. Stormwater management

- Stormwater should be managed using suitable structures such as swales, gabions and rock rip-wrap so that any run-off from the development site is attenuated prior to discharge. Silt and sedimentation should be kept to a minimum, through the use of the above mentioned structures by also ensuring that all structures don’t create any form of erosion.
- Natural run-off must be diverted to the nearest stormwater drains.
5.2.24. Erosion and sedimentation control

- The Contractor shall take all reasonable measures to limit erosion and sedimentation due to construction activities and shall, in addition, comply with such detailed measures as may be required by the EMP.
- Revegetate areas that have been disturbed as soon as possible.
- Cut and fill slopes must be made stable and be revegetated as soon as possible during the construction phase.
- Newly formed terraces within the facility must be vegetated in order to stabilise the soil.
- Where erosion and/or sedimentation, whether on or off the site, occurs despite the Contractor complying with the foregoing, rectification shall be carried out in accordance with details specified by the ECO. Where erosion and/or sedimentation occur due to the fault of the Contractor, rectification shall be carried out to the reasonable requirements of the ECO and at the expense of the Contractor.

5.2.25. Aesthetics

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

5.2.26. Community relations

- If so required by the Project Specification, the Contractor shall erect and maintain information boards in the positions, quantities, designs and dimensions specified. Such boards shall include contact details for complaints by members of the public in accordance with details provided by the ECO.
- The Contractor shall keep a "Complaints Register" on site. The Register shall contain all contact details of the person who made the complaint, and information regarding the complaint itself and note the date and time that the complaint was resolved.
- The ECO shall be responsible for responding to queries and/or complaints and may request assistance from the Contractor’s Management Staff.
- Construction materials and other purchases relating to the project should be done, where possible, within the nearby community and at local shops.

5.2.27. Temporary site closure

If the Site is closed for a period exceeding 5 days, the Contractor’s SHE Officer in consultation with the ECO shall carry out the following checklist procedure and ensure that the following conditions pertain and report on compliance with this clause:

*Fuels / flammables / hazardous materials stores*

- Fuel stores are as low in volume as practicable.
- There are no leaks.
- The outlet is secure and locked.
- The bund is empty.
- Fire extinguishers are serviced and accessible.
- The area is secure from accidental damage through vehicle collision and the like.
- Emergency and contact numbers are available and displayed.
- There is adequate ventilation in enclosed spaces.

*Safety*

- Site safety checks have been carried out in accordance with the Occupational Health and Safety Act (No. 85 of 1993) prior to site closure.
- An inspection schedule and log for use by security or contracts staff is developed.
• All trenches and manholes are secured.
• Applicable notice boards are in place and secured.
• Emergency and Management contact details are prominently displayed.
• Security personnel have been briefed and have the facilities to contact or be contacted by relevant management and emergency personnel.
• Night hazards such as reflectors, lighting, traffic signage etc. have been checked.
• Fire hazards identified and the local authority notified of any potential threats e.g. large brush stockpiles, fuels etc.
• Pipe stockpiles are wedged / secured.
• Scaffolds are secure.
• Structures vulnerable to high winds are secure.

**Erosion**

• Wind and dust mitigation measures such as straw, brush packs, irrigation etc. is in place.
• Excavated and filled slopes and stockpiles are at a stable angle and capable of accommodating normal expected water flows.
• Re-vegetated areas have a watering schedule and the supply to such areas is secured.
• There are sufficient detention ponds or channels in place.

**Water contamination and pollution**

• Hazardous fuel stores are secure.
• Cement and materials stores are secure.
• Toilets are empty and secured.
• Refuse bins are empty and secured.
• Bunding is clean and treated with appropriate material that will absorb/ breakdown and where possible be designed to encapsulate minor hydrocarbon spillage.
• Drip trays are empty & secure.

5.2.28. **Excavation, hauling and placement**

The contractor shall provide the engineer with detailed plans of his intended construction processes prior to starting any cut or fill or layer. The plans shall detail the number of personnel and plant to be used and the measures by which the impacts of pollution (noise, dust, litter, fuel, oil, sewage), erosion, vegetation destruction and deformation of landscape will be prevented, contained and rehabilitated. Particular attention shall also be given to the impact that such activities will have on the adjacent built environment. The contractor shall demonstrate his “good housekeeping”, particularly with respect to closure at the end of every day so that the site is left in a safe condition from rainfall overnight or over periods when there is no construction activity.

5.2.29. **Construction Activities and Equipment**

• Construction will be restricted to normal daytime working hours (07:00 – 18:00);
• No construction activities will take place during weekday evenings and night-time (after 18:00), on Saturdays after midday (12:00) and the entire day on Sundays;
• All noise-making equipment shall be turned off when not in use;
• All equipment shall be kept in good working order;
• All equipment shall be operated within specifications and capacity (i.e. do not overload machines);
• Compliance with the appropriate legislation with respect to noise is mandatory;
• The Contractor will familiarise himself with, and adhere to, any local bylaws and regulations regarding the generation of noise;
• Construction staff should be given “noise sensitivity” training;
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The Contractor will endeavour to keep noise generating activities associated with construction activities to a minimum;
Modern low noise emission vehicles and equipment shall be favoured on site. The details of all construction machinery and vehicles must be determined prior to construction in order to identify potentially noisy machinery and to seek possible alternatives. These details will include the manufacturer, type and noise emission data of each machinery/vehicle and how many will be used at any time. Note that manufacturers of modern vehicles and machinery provided for the international market are obliged to provide noise emission data. Where this information is not available, noise measurements must be conducted prior to use of such machinery or vehicles;
A well planned and co-ordinated “fast track” procedure is implemented to complete the total construction process in the area in the shortest possible time.

5.3. Operation Phase

5.3.1. Health and safety

All relevant Health and Safety legislation as required in South Africa should be strictly adhered to, including but not limited to the Occupational Health and Safety Act, 1993 (No. 85 of 1993);
All necessary occupational certificates and inspections must be complied with to the approval of an appointed Health and Safety Officer;
The applicant or persons in control of the facility must train safety representatives, managers and workers in workplace safety.

5.3.2. Emergency Protocol

An emergency response protocol (for construction and operation) should be drawn up, to the approval of the ECO, prior to construction and operation taking place;
All pollution incidents must be reported immediately to the Authorities;
Record(s) of environmental related incidents should be maintained and communicated to the ECO.

Fire control

The applicant shall take all the necessary precautions to ensure that fires are not started as a result of his activities on site.
No open fires shall be permitted on the site.
Smoking shall not be permitted in those areas where there is a fire hazard.
The applicant 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 procedures to be followed.
The applicant shall ensure that there is basic fire-fighting equipment available on site at all times.
The applicant shall be liable for any expenses incurred by any organisations called to assist with fighting fires that were started as a result of his activities or personnel, and for any cost relating to the rehabilitation of burnt areas, or consequential damages.

5.3.3. Safeguarding of the environment, local community and employees against fire risk

Smoking should be prohibited in the vicinity of flammable substances;
Ensure the availability of sufficient firewater tie-in points;
Training must be provided in the use of the appropriate fire-fighting equipment;
Ensure availability of fire extinguishers and fire-fighting equipment (SABS 089-1-1987);
A close cooperation must be established with the local fire authority to ensure that they know the layout of the site, what equipment and facilities are available, where they are located, and how they are used; and
Appendix G: Environmental Management Programme

- All employees must be aware of emergency/contingency protocol to ensure an understanding of the hazards and procedures required during an emergency situation.

5.3.4. Effluent handling/ storm water management

- The clean (e.g. surface runoff from the driveway) and dirty (e.g. contaminated water from the forecourt and filling points) water systems must be separated to prevent contaminated runoff from entering the surface water, groundwater and soil;
- All surface spillages must be contained on-site through channels and trenches and diverted to an appropriate oil or water separator system of sufficient capacity;
- No fuels or oils must be allowed to be discharged directly into stormwater pipes or drains and sewage manholes or pipes;
- All waste oils, greases, fuels, chemicals etc. should be collected and disposed of in an appropriate manner off-site. The contents of grease traps or other waste oil, grease and/or fuel disposal or storage containers should under no circumstances be emptied and dumped to the surrounding area. Outflow must be directed to the municipal sewer system.

5.3.5. Ablution facilities

- Washing, whether of the person or of personal effects, and acts of excretion and urination are strictly prohibited other than at the facilities provided.
- The facilities shall be maintained in a hygienic state and serviced regularly. Toilet paper shall be provided.
- Discharge into the environment and burial of waste is strictly prohibited.

5.3.6. Eating areas

- Designated eating areas must be provided for the workers involved in the operation as well as for patrons visiting the site.
- Sufficient bins shall be present in these areas. All disposable food packaging must be disposed of in the bins after every meal.
- The area must be cleaned after every meal.
- The feeding or leaving of food for animals is strictly prohibited.

5.3.7. Site structures

- All site components (as well as equipment) shall be positioned to limit visual intrusion on neighbours and the size of the land area disturbed. The type and colour of roofing and cladding materials to the structure shall be selected to reduce reflection.
- The applicant shall supply and maintain adequate and suitable areas for the storage of materials. The areas that may deteriorate or corrode if exposed to the weather shall be weatherproof, adequately ventilated and provided with raised floors.

5.3.8. Lights

- The applicant shall ensure that any lighting installed on the site for his activities does not cause a reasonably avoidable disturbance to the naturally-occurring fauna.

5.3.9. Noise

- The applicant shall take precautions to minimise noise generated on site (e.g. install and maintain silencers on machinery).
- The applicant shall comply with the Noise Induced Hearing Loss Regulations published under the Occupational Health and Safety Act.
- No amplified music shall be allowed on site. The applicant shall not use sound amplification equipment on Site unless in emergency situations.
5.4. Monitoring and Auditing

An independent ECO should be appointed to serve as an external auditor during the construction phase and, if necessary, for the first year of operation. This is to ensure that the EMPr and other relevant requirements are complied with.

5.4.1. EMPr monitoring

The key to a successful EMPr is appropriate monitoring and review to ensure effective functioning of the EMPr and to identify and implement corrective measures in a timely manner. The overall monitoring and auditing of the site will be the responsibility of the ECO, however the operator must provide the necessary environmental control and audit measures and integrate these through their Environmental Management Systems. The ECO shall keep records of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken by the ECO. The ECO shall remain employed indefinitely until closure of the site (should this occur). The ECO shall remain employed until the close out audit and one year post construction. Records relating to monitoring and auditing must be kept on site and made available for inspection to any relevant and competent authority. Non-compliance with the EMPr must be rectified within one week of the relevant offending party receiving an audit report and notice.
6. ENVIRONMENTAL AWARENESS

Contractors shall ensure that its employees and any third party who carries out all or part of the Contractor’s obligations are adequately trained with regard to the implementation of the EMP, as well as regarding environmental legal requirements and obligations. Training shall be conducted by an independent person where necessary. Environment and health awareness training programmes should be targeted at two distinct levels of employment, i.e. management and labour. Environmental awareness training programmes shall contain the following information:

- The names, positions and responsibilities of personnel to be trained;
- The framework for appropriate training plans;
- The summarised content of each training course;
- A schedule for the presentation of the training courses.

The person conducting training shall ensure that records of all training interventions are kept in accordance with the record keeping and documentation control requirements as set out in this EMP. The training records shall verify each of the targeted personnel’s training experience.

The Developer shall ensure that adequate environmental training takes place. All employees shall have been given an induction presentation on environmental awareness and the content of the EMP. The presentation needs to be conducted in the language of the employees to ensure it is understood. The environmental training shall, as a minimum, include the following:

- The importance of conformance with all environmental policies.
- The environmental impacts, actual or potential, of their work activities.
- The environmental benefits of improved personal performance.
- Their roles and responsibilities in achieving conformance with the environmental policy and procedures, including emergency preparedness and response requirements.
- The potential consequences of departure from specified operating procedures;
- The mitigation measures required to be implemented when carrying out their work activities.
- Environmental legal requirements and obligations.
- Details regarding floral/faunal species of special concern and protected species, and the procedures to be followed should these be encountered during the construction of the development, main access roads, approach roads or construction camps.
- The importance of not littering.
- The importance of using supplied toilet facilities.
- The need to use water sparingly.
- Details of and encouragement to minimise the production of waste and re-use, recover and recycle waste where possible.
- Details regarding archaeological and/or historical sites which may be unearthed during construction and the procedures to be followed should these be encountered.

The Contractor must monitor the performance of construction workers to ensure that the points relayed during their introduction have been properly understood and are being followed. If necessary, a translator should be called to the site to further explain aspects of environmental or social behaviour that are unclear. An environmental training and awareness course has been provided in Annexure 2.
7. CONCLUSION

Although all foreseeable actions and potential mitigations or management actions are contained in this document, the EMPr should be seen as a day-to-day management document. The EMPr thus sets out the environmental standards that are required to minimise the negative impacts and maximise the positive benefits of the proposed development as detailed in the BAR. The EMPr is a "live document", and if continuously reviewed and managed correctly can result in successful construction and operation of the proposed development.

All attempts should be made to have this EMPr available, as part of any tender documentation, so that the contractors are made aware of the potential cost and timing implications needed to fulfil the implementation of the EMPr, thus adequately costing for these. Further guidance should also be taken on any conditions contained in the Environmental Authorisation, if the project is granted approval, and that these conditions must be incorporated into the final EMPr.
ANNEXURE 1: METHOD STATEMENTS

Method statements need to be compiled by the Contractor for approval by the ECO. For the purposes of the environmental specification, a method statement is defined as a written submission by the Contractor to the ECO setting out the plant, materials, labour and method the Contractor proposes using to carry out an activity, in such detail that the ECO is enabled to assess whether the Contractor’s proposal is in accordance with the EMPr and / or will produce results in accordance with EMPr.

The method statement shall cover applicable details with regard to:

- Construction procedures,
- Materials and equipment to be used,
- Getting the equipment to and from site,
- How the equipment/ material will be moved while on site,
- How and where material will be stored,
- The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur,
- Timing and location of activities,
- Compliance/ non-compliance with the Specifications, and
- Any other information deemed necessary by the Engineer.

The Contractor shall abide by these approved method statements, and any activity covered by a method statement shall not commence until the ECO has approved the method statement. The method statement shall be submitted to the ECO not less than 20 days prior to the intended date of commencement of the activity, or as directed by the ECO.
METHOD STATEMENT

CONTRACT:................................................................. DATE:..............................

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

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

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

Start Date: .................................. End Date: ..................................

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

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

* Note: please attach extra pages if more space is required
DECLARATIONS

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

(Signed) ____________________________ (Print name) ____________________________

Dated: ______________________________

2) PERSON UNDERTAKING THE WORKS
I understand the contents of this Method Statement and the scope of the works required of me. I further understand that this Method Statement may be amended on application to other signatories and that the ECO will audit my compliance with the contents of this Method Statement.

(Signed) ____________________________ (Print name) ____________________________

Dated: ______________________________
ANNEXURE 2: BASIC ENVIRONMENTAL EDUCATION COURSE

http://www.webweaver.nu/clipart/environmental.shtml
Appendix G: Environmental Management Programme

Reasons why should we look after the environment

- We have a right to a clean environment
- A clean environment is essential to healthy living
- All our basic needs come from the environment
- A contract has been signed – development vs the environment
- Penalties / fines could be issued

How to look after the environment

- Report issues
- Teamwork
- Follow the set rules and guidelines (EA, EMPr, Method statements etc.)
- Conserve, reuse and recycle
Appendix G: Environmental Management Programme

Tips and Guidelines

- Workers and equipment should not be allowed outside demarcated areas
- No swimming or polluting of water bodies allowed
- No damage / disturbance to vegetation or water bodies without consent / permits
- No disturbance allowed in no-go areas
- No hunting of animals
- Report all fires
- No burning or burying of waste
- No smoking near hazardous materials
- Training on fire fighting equipment
- Hazardous materials to be stored in designated and bunded areas
- Spill kits and drip trays a must
- Report all spills
- Control dust and Noise
- Maintain construction vehicles
- Availability and maintenance of sanitation facilities
Appendix G: Environmental Management Programme

Tips and Guidelines

- Only eat in designated areas
- Do not litter
- Vehicles to remain on approved tracks and adhere to speed limit
- Ensure emergency phone numbers are available
- Ensure PPE is worn
- Report fires, leaks and injuries
- Ask if unsure
ANNEXURE 3: CVS OF PROJECT TEAM

Please refer to the CVs in the Basic Assessment Report.
ANNEXURE 4: SENSITIVITY MAP

Legend
- Pretoria NBG
- Proposed Construction

G-Plan Categories
- Irreplaceable Area
- Ecological Support Area

Datum: WGS 1984
Produced for: SANBI

Drawn by: Michael Johnson
Date: June 2018
EOH Project code: P247