ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr)

PREPARED FOR: Wits Rural Facility

WITS RURAL FACILITY REDEVELOPMENT AND EXPANSION, INCLUDING THE INSTALLATION OF A SEWERAGE PACKAGE PLANT

WITS RURAL, HOEDSPRUIT REGION, LIMPOPO PROVINCE

LEDET reference number: 12/1/9/1-M75
NEAS Reference Number: LIM/EIA/0000676/2013

Applicant:
University of the Witwatersrand

July 2013

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ENVIRONMENTAL MANAGEMENT PROGRAMME (EMP)<br>WITS RURAL FACILITY REDEVELOPMENT AND EXPANSION, INCLUDING THE INSTALLATION OF A SEWERAGE PACKAGE PLANT

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WITS RURAL FACILITY REDEVELOPMENT AND EXPANSION, INCLUDING THE INSTALLATION OF A SEWERAGE PACKAGE PLANT

1. INTRODUCTION

The Environmental Management Programme (EMP) Report provides guidelines and directions to ensure that the proposed redevelopment and expansion of the Wits Rural Facility (WRF) is able to pursue its academic and social goals without impairing the long-term sustainability of the biophysical and cultural environment. The EMP addresses the managerial and operational activities of the proposed redevelopment and expansion during and after construction. Once approved by the authorities – Limpopo Department of Economic Development, Environment and Tourism (LEDET), and the National Department of Environmental Affairs (DEA); compliance is obligatory for the contractors, service providers, WRF staff, WRF management and property owners (Wits University).

2. ACTIVITIES COVERED BY THE EMPR

The WRF is situated on the northern side of the Acorhoek-Orpen Road in Limpopo Province. The project entails the expansion and redevelopment of the existing University of Witwatersrand Rural Facility (Wits Rural) main camp. The WRF has been operational since the late 1980’s, and is used extensively as a satellite campus for Wits student field trips and research. Originally, the farm and associated infrastructure was bought by Wits from the previous owner, who ran the main camp (and other camps on the bigger farm property) as a bushveld WRF/resort in the 1970’s.
The following expansions and additions are proposed at the Wits Rural Facility Main Camp:

1. A new reception, lounge, bar, dining room and kitchen area (Phase 1)
2. A new laboratory for field studies (Phase 1)
3. Four (4) new seminar rooms for lectures (Phase 1)
4. One (1) new conference room (Phase 1)
5. A new club house at the existing swimming pool (existing club-house is to be demolished) (Phase 1)
6. A number of new storerooms, staff kitchen, laundry and workshop is also proposed (Phase 1)
7. New Sewerage Package Plant (Phase 1) – currently the Wits Rural Facility uses septic tanks, which have been in use since the camp was established in the 1970’s. The proposed sewerage package plant will replace all the existing septic tanks in use.
8. Fifty-four (54) new accommodation units to be developed in 2 phases. Twelve (12) accommodation units to be established in Phase 1 and the reminder in Phase 2.

3. OWNER OF WITS RURAL FACILITY

University of the Witwatersrand – Johannesburg

The property owner is ultimately responsible for:

- Commissioning the preparation, implementation and monitoring of the EMPr.
- Ensuring that the EMPr is submitted for approval with the Environmental Impact Assessment and that approval in the form of an Environmental Authorization is given before development begins.
- Appointing the Environmental Control Officer (ECO).
- Ensuring compliance by all parties and the imposition of penalties for non-compliance through the ECO.
- Appointment of an Internal Environmental Officer (IEO)
- Bearing the costs of development and implementation.
- Implementing corrective action where required
- After the development has been completed and individual buyers take ownership, the above responsibilities devolve to the property owners association or other appropriate organisation.

4. ENVIRONMENTAL CONSULTANT

SEATON THOMSON AND ASSOCIATES

The consultant is responsible for:

- Preparing the EMPr.
- Facilitating its submission to the Authority for an Environmental Authorization.
- The consultant is not responsible for the implementation or the monitoring of the EMPr unless expressly commissioned to do so.

Seaton Thomson and Associates have ±30 years experience in town, regional and environmental planning. This includes environmental impact assessment and environmental management. The Company has undertaken numerous EIA and BA applications for authorisation under both the Environment Conservation Act (Act 73 of 1989) and the National Environmental Management Act (NEMA)(as amended) (Act 107 of 1998) in all Provinces in South Africa, including diverse land use development applications, various types of bulk and service infrastructure, filling stations and game WRFs in conservation areas.
5. AUTHORITIES

LIMPOPO DEPARTMENT OF ECONOMIC DEVELOPMENT, ENVIRONMENT AND TOURISM (LEDET) and NATIONAL DEPARTMENT OF ENVIRONMENTAL AFFAIRS (DEA)

The Authority is responsible for:

- Appraising the EMP in the light of the Basic Assessment Report findings and other relevant information.
- Calling for modifications, extensions or further information if required.
- Issuing an Environmental Authorization on the Basic Assessment Report, which includes approval (or otherwise) of the EMP.

6. ENVIRONMENTAL CONTROL OFFICER (ECO)

TO BE APPOINTED

The ECO is appointed by the developer and is responsible for:

- Implementing all aspects of the EMP.
- Monitoring and verifying compliance with the EMP by contractors, sub-contractors, agents, property owners and any other parties concerned with the development.
- Being fully familiar with relevant legislation and regulations.
- Providing guidance and assistance to all participants in implementing and complying with the EMP.
- Keeping a permanent, written and photographic record of activities, instances of non-compliance.
- Implementing corrective action with regard to the EMP and imposing appropriate penalties for non-compliance as authorised by the owner/developer.

7. CONTRACTORS AND SERVICE PROVIDERS

All contractors, sub-contractors and service providers are responsible for:

- Incorporating the EMP into their contracts and signing agreements to comply with its conditions.
- Submitting an obligatory Methods Statement for approval by the ECO before any work is undertaken.
- Adhering to any instructions issued by the ECO.

8. INTERNAL ENVIRONMENTAL OFFICER (IEO)

WRF must appoint an Internal Environmental Officer (IEO), a employee of WRF, who will be responsible for monitoring, reviewing and verifying compliance with the EMP on a day-to-day basis while construction is underway, and while the WRF is in operation. This role may be fulfilled by any suitably qualified and responsible representative involved with daily on-site operations.
9. LEGISLATION

Management of the development during both the construction and the operational stages is subject to a suite of environmental law. Compliance with this legislation is an integral aspect of the EMPr. Examples of some of the relevant legislation:

- National Environmental Management Act 107 of 1998 (as amended)
- National Heritage Resources Act (Act No. 25 Of 1999)
- National Parks Act (Act 57 of 1976)
- National Environmental Management: Biodiversity Act (Act 10 of 2004)
- National Environmental Management: Protected Areas Act (Act 57 of 2003)
- Conservation of Agricultural Resources Act (Act 43 of 1983)
- Atmospheric Pollution Prevention Act 45 of 1965
- Local Government Municipal Structures Act 117 of 1998
- Hazardous Substances Act 85 of 1993
- Fire Services Act 99 of 1956
- Occupational Health and Safety Act 85 of 1993
- Environmental Planning Act (Act No. 88 of 1967)
- Forest and Veld Conservation Act (Act No. 13 of 1941)
- Land Survey Act (Act No. 9 of 1921)
- Minerals and Petroleum Resources Development Act (Act No. 28 Of 2002)
- Soil Conservation Act (Act No. 76 of 1969)
- Water Services Act (Act 108 of 1997)
- Relevant building codes (e.g. SABS 089)
- Provincial and Local Government Ordinances and Bylaws
- Regional Development Frameworks
- Land Use Planning Policies.

10. EMP UPDATE

This EMPr must be updated upon:

- receipt of an Environmental Authorization (EA), and/or
- issues of any relevant environmental permit, licence, or authorisation with respect to the project
## 11. PLANNING, DESIGN AND PRE-CONSTRUCTION PHASE

<table>
<thead>
<tr>
<th>Aspect/ activity</th>
<th>Impacts</th>
<th>Management and mitigation</th>
<th>Responsibility</th>
<th>Frequency</th>
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<tbody>
<tr>
<td>All planning and design aspects of the WRF expansion</td>
<td>None</td>
<td>Planning and design of all elements of the application to be in accordance with acceptable and approved standards as required by the relevant authorities. Planning and design to take cognisance of localised conditions and circumstances, particularly in terms of control of building operations, appropriate approved and registered contractors, access to the site, source of labour and transportation.</td>
<td>Project planning team</td>
<td>Throughput planning phases, before construction commences</td>
</tr>
<tr>
<td>Contractual Issues</td>
<td>None</td>
<td>The appointed contractors will be contractually bound to these conditions as well as the provisions of the proposed EMPr. The appointed contractors will undertake an induction process with all staff and workers on site and issue a written schedule of rules and work conditions specific to the site.</td>
<td>Project planning team and contractor</td>
<td>As required</td>
</tr>
<tr>
<td>Site Establishment and site infrastructure</td>
<td>Disturbance and possible degradation of bushveld areas and wildlife</td>
<td>The contractor and/or WRF must provide for the following: 1. An area to set up a temporary construction camp and laydown area at least 100m from any riparian habitat or river frontage. The site camp is to be fenced off to ensure that encroachment into the surrounding natural area is avoided. The contractor and sub-contractors will utilise this designated area which is to include ablution facilities, location of waste containers, fuel storage areas, laydown areas etc 2. Adequate ablution facilities for all construction personal at least 100m from any riparian habitat or river frontage. Abluting anywhere other than in the toilets provided is strictly forbidden. 3. Provide clean drinking water to all construction staff 4. Provide refuse bins in the construction camp as well as on the construction site 5. All roads and accesses to the various construction sites must be maintained. Vehicles may not leave the designated roads, tracks and/or turnaround points at any time.</td>
<td>Project planning team and developer</td>
<td>Before actual construction commences on the site</td>
</tr>
<tr>
<td>Demarcation of the various work sites</td>
<td>Disturbance and possible degradation</td>
<td>The Contractors shall demarcate the boundaries of entire work site with a temporary fence and shade cloth; in order to</td>
<td>Contractor and developer</td>
<td>Before commencement</td>
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## 11. PLANNING, DESIGN AND PRE-CONSTRUCTION PHASE

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<tr>
<td>within the larger WRF</td>
<td>of bushveld areas and wildlife</td>
<td>restrict their construction activities to within the site.</td>
<td></td>
<td>of construction</td>
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<tr>
<td>Main camp boundary</td>
<td></td>
<td>· The demarcation must be in the form of green, brown and/or camouflage hessian or shade cloth to limit visual disturbance to wildlife</td>
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<td></td>
<td></td>
<td>· Maintain site demarcations in position until the completion of all construction works.</td>
<td></td>
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</tr>
<tr>
<td>Sensitive Areas</td>
<td>Disturbance and possible degradation of bushveld areas and wildlife</td>
<td>All areas which are not part of the direct working sites are considered to be sensitive, as the area is a Reserve/game farm. All areas except those demarcated as work areas as above are strictly out of bounds.</td>
<td>All</td>
<td>Fore entire construction period</td>
</tr>
<tr>
<td>Topsoil conservation</td>
<td>Loss of topsoil</td>
<td>Any topsoil which is to be stripped must be stockpiled for use during rehabilitation and landscaping.</td>
<td>Contractor</td>
<td>Before construction</td>
</tr>
<tr>
<td>Erosion Control</td>
<td>Loss of soils into non-perennial watercourse</td>
<td>The Contractors shall take all reasonable measures to ensure that erosion does not occur as a result of any construction related activities.</td>
<td>Contractors</td>
<td>As required</td>
</tr>
<tr>
<td>Record of environmental incidents</td>
<td>Possible non-compliance</td>
<td>· All incidents should be thoroughly investigated and recorded</td>
<td>Contractors and ECO</td>
<td>As required</td>
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<td></td>
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<td>· document all environmental incidents in the required manner</td>
<td></td>
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<td></td>
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<td>· recorded environmental incidents are to be reported to the project site agent immediately, and within 24 hours to independent environmental control officer</td>
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</tr>
<tr>
<td>Legal compliance</td>
<td>Non-compliance</td>
<td>All relevant legislation must be adhered to before construction commences. The environmental authorisation as well as any licences or permits must be in place before construction commences, and any recommendations contained in these permits, licences and/or authorizations must be incorporated into the project design</td>
<td>Project Manager and contractor</td>
<td>As required</td>
</tr>
<tr>
<td>Identification &amp; marking of trees to</td>
<td>Potential impact on significant or protected trees within the development</td>
<td>· The landscape architect and ECO are to clearly mark the trees that are to be protected and retained.</td>
<td>Landscape Architect, ECO, contractor</td>
<td>Once off before any onsite works commence</td>
</tr>
<tr>
<td>protect</td>
<td></td>
<td>· These are to be pointed out to the ECO and the contractor</td>
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## 12. CONSTRUCTION PHASE

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<tr>
<td>Monitoring and reporting</td>
<td>Compliance with the EMPr and Environmental Authorisation.</td>
<td>• Monitor site activities and compliance with EMPr.</td>
<td>ECO or IEO</td>
<td>Monitor daily. Full report back monthly.</td>
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<td>• Identify, propose, monitor and sign off on the implementation of rectification measures</td>
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<tr>
<td>Environmental Incidents</td>
<td>Environmental incident during the construction phase</td>
<td>The IEO and ECO must immediately be informed should any serious incident occur which is likely to have detrimental effects on the environment. A record of these incidents must be kept.</td>
<td>Contractor, IEO and ECO</td>
<td>As required</td>
</tr>
</tbody>
</table>
| Demolition of existing buildings          | Waste generation Dumping of demolition materials                        | • Appropriate, clean building material can be used for fill material if agreed with the engineers. Typical fill items include inside of the gabions, the septic tanks, crushed for use under the building platforms.  
  • No contaminated materials are to be used as fill or dumped on site in any areas.  
  • ECO is to undertake inspections of all fill areas as and when filling occurs to ensure compliance.  
  • Pavers can be re-used for the new pathways and are therefore to be stockpiled in the appropriate manner and in a location agreed with the ECO. | Engineers, ECO & contractor | AS required and at all times during any demolition works |
| Traffic                                   | Degradation to roads within WRF Farm                                   | • Damping down of un-surfaced roads used regularly by construction vehicles near staff housing and other camps within WRF farm.  
  • Construction traffic vehicles and worker-related traffic shall be routed to minimise disturbances to WRF staff and wildlife | Contractor             | Daily                           |
| Maintenance of vehicles and equipment     | Oil, diesel, petrol leaks                                              | • Regularly check vehicles, machinery and equipment operating on site to ensure that none have leaks or cause spills of oil, diesel, grease or hydraulic fluid.  
  • No vehicles, machinery or equipment with leaks or causing spills may be allowed to operate on the construction site. These must be sent to the maintenance yard or workshop for repair, or must be removed from site | Contractor             | Daily                           |
| Fuel storage and dispensing               | Potential ground water contamination                                   | • The volume of fuel that is to be stored is to be as minimal as possible.  
  • All legal compliance in terms of fuel storage and handling are to be met. All fire safety regulations are to be adhered to. | Contractor, ECO        | Check daily                     |
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| **Fuel Storage** | • Fuel storage should be surrounded by adequate bund walls (110% capacity of fuel stored) and provided with an impervious surface to contain the full volume of fuel stored in the tank.  
• The area outside the containment should either be concrete or crusher so that spills can be easily and appropriately cleaned up.  
• Ensure that there is a spill plan and trained staff to deal with spillages if a substantial amount of fuel is spilled.  
• All vehicles should be in good working order and leaks such as oil and fuel should be repaired immediately. | | | |
| **Cultural, Historical and Archaeological Features** | • Any archaeological sites exposed during construction must not be disturbed during or after the construction period prior to authorisation from SAHRA. The removal, exhuming, destruction, altering or any other disturbance of heritage sites must be authorised by SAHRA in terms of the National Heritage Resources Act (No 25 of 1999)  
• Should any unusual features, artefacts, graves etc be discovered on the site during excavation and construction, this must be brought to the immediate attention of the Contractor / Project Manager / IEO and ECO | Contractor and project Manager | As required |
| **Noise** | • Keep any WRF guests informed of unusually noisy activities.  
• Noise suppression measures can be applied to all equipment. Equipment must be kept in good working order, and where appropriate fitted with silencers which are to be kept in good working order. | Contractor and WRF management | As required |
| **Soils** | • No soil stripping shall take place on areas within the sites that the contractors do not require for services or structures  
• All good topsoil exposed will be stockpiled for use in rehabilitation and landscaping. Stockpiles must be on already disturbed areas (i.e. NOT in natural veld areas)  
• All cement or mortar mixing shall be done in already impacted areas, and on trays or sealed areas, to prevent soil contamination | Contractor | Check daily |
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| Ground water pollution           | Potential for decrease in groundwater quality and quantity             | • All cement or mortar mixing shall be done in already impacted areas, and on trays or sealed areas, to prevent any water pollution. All excess cement must be disposed of outside of the WRF Farm, at a registered land fill site that accepts discard cement.  
• Any hazardous substances (i.e. diesel or oil) that are spilled must be contained and removed immediately.  
• All hazardous storage vessels must be designed and managed in order to prevent pollution. All vessels to be bunded.  
• The main contractor will be responsible for ensuring that used oils/lubricants are not disposed of on/near the site or in the WRF Farm, and that contractors purchasing these materials understand the liability under which they must operate. |
|                                  |                                                                        |                                                                                                                                                                                                                         | ECO and Contractor       | Daily     |
| Surface water pollution          | Potential for decrease in surface water quality and/or quantity        | • No construction activities or construction personnel will be allowed in the dry river bed bordering the main camp.  
• A temporary fence (at least 2 meters high) must be constructed along the riparian edge to prevent any movement into the dry river bed or in to the riparian vegetation  
• The entire work site must be managed in order to prevent pollution of nearby drainage systems, due to suspended solids, silt or chemical pollutants.  
• All cement or mortar mixing shall be done in already impacted areas, and on trays or sealed areas, to prevent any water pollution. All excess cement must be disposed of outside of the WRF Farm, at a registered land fill site that accepts discard cement. |
|                                  |                                                                        |                                                                                                                                                                                                                         | Contractor and ECO       | Daily     |
| Air pollution due to dust and odours | Air pollution due to dust, odours or fire                              | • The Contractors will dampen exposed soil surfaces with a water bowser or sprinklers, as necessary to minimise dust problems.  
• The Contractors will commence rehabilitation of exposed soil surfaces as soon as practical after completion of construction  
• Cooking will only be permitted at a designated area and the establishment of open fires will strictly prohibited. |
|                                  |                                                                        |                                                                                                                                                                                                                         | Contractor               | Daily     |
| Security and protection to site visitors | Crime; as well as other security risks                              | • The entire work site must be demarcated by means of a temporary fence, covered in green, brown and/or camouflage. |
|                                  |                                                                        |                                                                                                                                                                                                                         | Contractor and developer | Daily     |
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| Injury to visitors to the site relating to wildlife. | hessian or shade cloth material to limit any security issues that may arise from wildlife encounters  
- No construction personnel will be allowed outside of the construction camp or work site under any circumstances  
- All contractor’ staff as well of that of the sub-contractors are to be clearly identifiable by means of hard hats and reflective jackets  
- All visitors are to report to the site office on arrival and undertake a short induction. | Contractor – ECO to inspect | Daily |
| Waste management | Littering, contaminated water runoff, hazardous spills |  
- All waste streams (general, solid, liquid, hazardous etc…) must be disposed of adequately by the contractor. This disposal must be at a registered landfill site not inside the WRF Farm.  
- Provide general waste bins at all work sites and enforce the use of these by all construction personnel. Litter bins must be equipped with a closing mechanism to prevent their contents from blowing out or being overturned by wildlife  
- Immediately clean any accidental oil or fuel spills or leakages, and clean up and dispose of all general or non-hazardous construction related waste immediately.  
- All waste is to be transported in trucks covered by tarpaulins to ensure no loss of rubbish during transportation. | Contractor | Daily |
| Visual | Negative visual impact of construction activities to guests and wildlife |  
- All work sites must be demarcated in the form of a temporary fence, covered in green, brown and/or camouflage hessian or shade cloth material to limit any visual disturbance to WRF guests or wildlife  
- Any litter or other waste must be cleared on an on-going basis and placed in bins provided at each work site | Contractor | Daily |
| Fire | Destruction of bushveld and existing WRF structures |  
- The Contractors shall take all the necessary precautions to ensure that fires are not started as a result of activities on site  
- No open fires for heating or cooking shall be permitted on any of the work sites. Closed fires or stoves shall only be permitted at agreed designated safe sites in the construction camp.  
- The necessary fire fighting equipment shall be maintained on site to deal with any fire incidents | Contractor | Daily |
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<td>• Ensure that workers on site know the proper procedure in the incidence of fire on site.</td>
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<td></td>
<td></td>
<td>• Smoking on site is not permissible outside of the construction camp</td>
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<tr>
<td>Septic tanks</td>
<td>Spillage while emptying</td>
<td>• All septic tanks are to be emptied (liquid and solid waste) by a suitably qualified and experienced operator (Honey sucker or similar)</td>
<td>Contractor/ ECO</td>
<td>Once off, when scheduled</td>
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<td>• Full all septic tanks in with appropriate demolition material.</td>
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<td>• Emptying and filling of septic tanks is to be photographed and recorded by ECO</td>
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</tbody>
</table>
| Vegetation (flora)  | Reduction of biodiversity/ loss of flora as a result of the WRF expansion | • All identified and marked trees are to remain in place and not be cut down  
• Only those few trees and bushes identified to be cut down can be cut down  
• No protected trees are to be removed, defaced or impacted upon what-so-ever.  
• No clearing or removal of vegetation shall occur beyond the existing development footprint  
• Any indigenous vegetation damaged or removed *unnecessarily* during the construction phase must be replaced with the same species in the same position  
• No plant material may be collected for any reason including firewood, fruit or crops.  
• No plant collection for medicinal or other purposes to occur on the site | Contractor and ECO    | Monitor continuously    |
| Wildlife (fauna)     | Disturbance to natural wildlife and/or loss of natural wildlife         | • Construction workers may under no circumstances interfere with the fauna for the purposes of obtaining food or otherwise  
• Ensure that the Work Site is kept clean, tidy and free of rubbish that would attract animals  
• No birds or animals may be hunted by any means including snares or traps.  
• Trenches or any other open excavations must be inspected each morning to ensure that no fauna is trapped. | Contractor and ECO    | Monitor continuously    |
| Alien invasive plants| Emergence of                                                            | • All invasive weeds and exotic plants on the various work sites                                                                                                                                                    | Contractor, ECO        | Daily                   |
### 12. CONSTRUCTION PHASE

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<tbody>
<tr>
<td>and weeds</td>
<td>Invasive Weeds to the Detriment of Indigenous Plants</td>
<td>are to identified and removed during the construction phase of the project</td>
<td>and flora specialist</td>
<td></td>
</tr>
</tbody>
</table>
| Socio-economic (positive) | Positive economic upliftment of local communities surrounding WRF Farm | • The labour force should largely be recruited from the local communities, where ever possible, including skilled and semi-skilled positions  
• In order to facilitate training and education, it is recommended that the contractors, where possible, recruits its Employees from previously disadvantaged groups and from adjoining low income areas, and not only will they fill certain posts, but for those posts that they are inexperienced in, a mentorship process should be initiated. | Contractor and developer | Continuous |

### 13. POST-CONSTRUCTION REHABILITATION PHASE

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<th>Frequency</th>
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</thead>
<tbody>
<tr>
<td>Site clean-up</td>
<td>Clear and completely remove from site all construction plant, equipment, storage containers, temporary fencing, temporary services, fixtures, waste and any other temporary construction works</td>
<td></td>
<td>Contractor and developer</td>
<td>Once off after construction</td>
</tr>
</tbody>
</table>
| Rehabilitation   | • The principle of progressive reinstatement must be followed wherever possible. This includes the reinstatement of disturbed areas on an ongoing basis, immediately after the specified construction activities for that area are concluded  
• All topsoil removed for any reason during construction must be used for landscaping or to rehabilitate any areas scarred by construction works  
• Grass and shrubs should be planted in areas which are devoid of vegetation  
• Focussed watering may be required to encourage regrowth of grasses and shrubs in disturbed areas | Contractor, developer and ECO | | Directly after construction, until such time as the ECO is satisfied with the rehabilitation |
## 14. OPERATIONAL PHASE

<table>
<thead>
<tr>
<th>Aspect/ activity</th>
<th>Impacts</th>
<th>Management and mitigation</th>
<th>Responsibility</th>
<th>Frequency</th>
</tr>
</thead>
</table>
| Legal requirements               | Non-compliance                                   | • The EMPr must be updated on a periodic basis to ensure that environmental legal requirements for the operational phase are adhered to.  
• An on-site safety plan must be available and all staff must be trained in the appropriate emergency procedures. | Contractor and WRF management | Continuous |
| Artificial lighting              | Impacts to nocturnal animals                     | • Artificial lighting must be restricted to areas strictly requiring lighting.  
• Only vertical lighting should be allowed, and not horizontal lighting.  
• Where lighting is required for safety or security reasons, this should be targeted at the areas requiring attention.  
• Low energy bulbs/ energy saving LED lamps should be used as they do not attract as many invertebrates (insects) at night and will not disturb the existing wildlife. | Developer and WRF management | Continuous |
| Vegetation management            | Loss of vegetation                               | Continued establishment and management of indigenous vegetation and removal and control of alien vegetation should continue for the entire operational phase. | WRF management                 | Continuous |
| Sewerage and waste               | Spills or broken pipes                           | • All spillages or broken pipes are to be attended to immediately to avoid environmental contamination  
• All pipes and sewerage package plant must be maintained in good working order  
• The Sewerage package plant is to be checked on a daily basis | WRF management                 | Continuous |
| Socio-economic (positive)        | Positive economic upliftment of local communities surrounding WRF Farm | • The staff sourced to work as both skilled and semi-skilled workers should largely be recruited from the local communities, where ever possible  
• In order to facilitate training and education, it is recommended that the WRF, were possible, recruits its Employees from previously disadvantaged groups and from adjoining low income areas to the WRF Farm, and not only will they fill certain posts, but for those posts that they are inexperienced in, a mentorship process should be initiated. | Developer and WRF management | Continuous |
| Environmental incidents          | Negative impact on all fauna, flora and other wildlife | • The WRF manager (or similar) must be informed of serious incidents immediately upon occurrence of the incident.  
• WRF will be responsible for rehabilitating any damaged caused to the environment due to any event occurring on site | Maintenance staff and WRF management | As required |
## 15. DECOMMISSIONING PHASE

<table>
<thead>
<tr>
<th>Aspect/ activity</th>
<th>Impacts</th>
<th>Management and mitigation</th>
<th>Responsibility</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permanent closure and decommissioning</td>
<td>N/A</td>
<td>This activity will not be decommissioned. This project has an extended lifespan period, and it is determined that decommissioning of the project will never happen. Due to this, no possible mitigation can at this stage be tabled, due to many environmental changes that will take place over time, which will subsequently render any mitigation discussed, void.</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

## 16. REFERENCES