



# LEFATSE

Environmental Planning Services (PTY) Ltd

## Environmental Management Programme

Proposed residential development on the farm Strathearn  
2154/1 (Remaining Extent), Magisterial District Bloemfontein,  
Free State Province

November 2019

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# **Environmental Management Programme**

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## TABLE OF CONTENTS

1.	Project description.....	1
2.	Scope .....	2
3.	Details of the EAP .....	3
4.	Assumptions, knowledge gaps and limitations .....	3
5.	Impact management outcomes .....	4
6.	Recommended environmental management / mitigation measures and monitoring .....	5
7.	Procedures for recording, reporting and corrective action .....	20
8.	Environmental awareness plan.....	21

### List of Figures

Figure 1: Locality map.....	1
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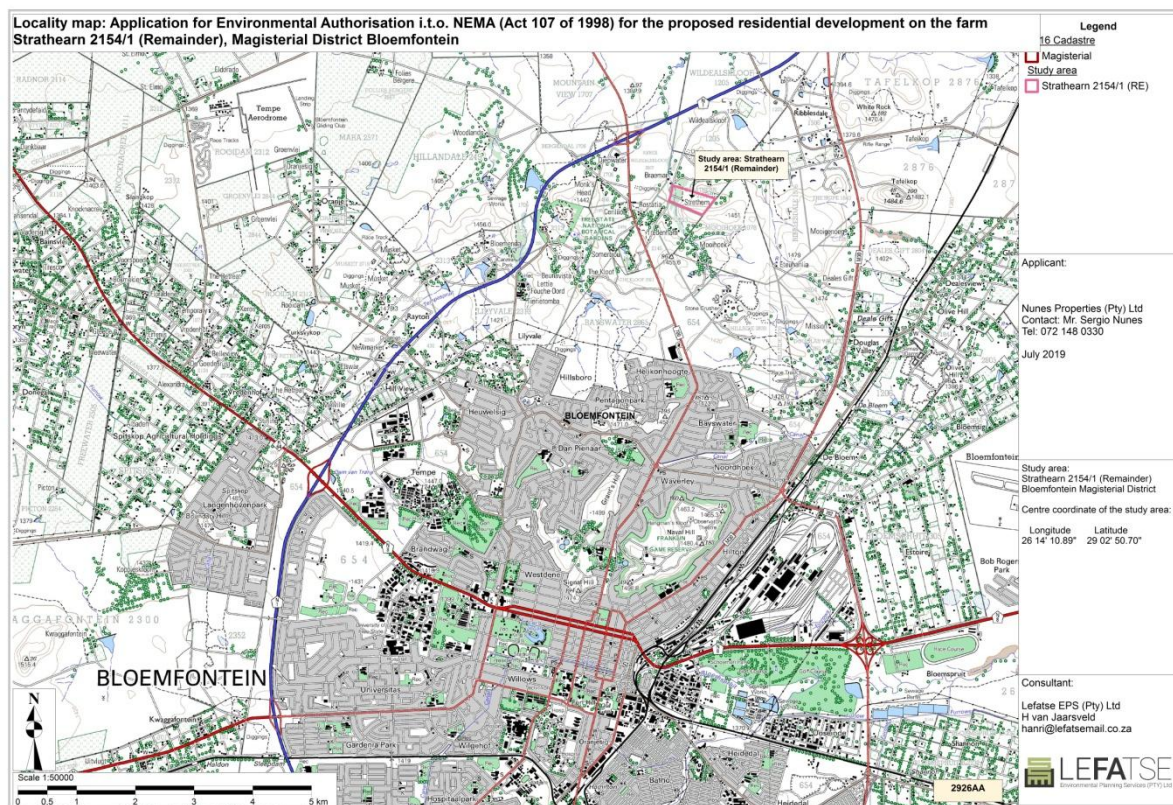
### List of Tables

Table 1: Recommended environmental management/mitigation measures .....	6
Table 2: Recommended environmental monitoring programme .....	16

## 1. PROJECT DESCRIPTION

Lefatse Environmental Planning Services (Pty) Ltd (Lefatse EPS) was appointed to manage an application for Environmental Authorisation (EA) in terms of the National Environmental Management Act (NEMA), 1998 (Act 107 of 1998) and related regulations for the following (previously approved under Regulations R385 and R366 of April 2006):

The proposed development of at least 28 residential units as part of a group housing scheme on the Remaining Extent of Portion 1 of the farm Strathearn 2154, situated in the Magisterial District of Bloemfontein, Free State Province (Figure 1).



**Figure 1: Locality map**

Associated activities will, amongst other, include the following:

- Construction of an access road of approximately 13m in width, but less than 1km long; and an entrance gate traversing the 1:100 year flood line (Erf 37005);
- Extension of the existing bulk services, e.g. sewage line and clean water line (Possibly traversing the 1:100 year flood line);

- Construction of a reservoir for storage of water (capacity 330 kilolitres and footprint approximately 144m<sup>2</sup>) (Erf 37005);
- Construction of a 500kVa (0.5 megawatt) mini-substation (approximately 5.4m x 3.8m totalling 20.52m<sup>2</sup>) (Erf 37005) extending 11kV to the existing Threatnam substation;
- Phased construction of houses and associated infrastructure during development of the 28 residential units on the property (Erf 37005);
- Establishment of below-ground electricity lines (Erf 37005);
- Establishment of street lighting along the access road (Erf 37005);
- Implementation of storm water control measures, e.g. culverts and flow attenuation measures. This includes a storm water drainage channel within a servitude of 10m in width extending on the northern boundary of the farm on Erf 37004.
- Bulk services that will be associated with the development will be incorporated within the existing services of Mangaung Metropolitan Municipality and done in accordance with the service agreement.

Also refer to the sensitivity map attached under Appendix A of the BAR for an indication of the proposed activity superimposed on the environmental sensitivities of the preferred site.

## **2. SCOPE**

A Basic Assessment process in terms of regulations 19 and 20 of the NEMA Environmental Impact Assessment (EIA) Regulations, 2014 as amended was commenced with as part of the EA application. This included baseline and specialist assessments, public consultation and the development of an Environmental Management Programme (EMPr).

This EMPr includes management measures recommended for implementation during construction and post-monitoring as a minimum (and where applicable) in order to prevent and/or limit the potential environmental impacts or risks that have been identified during the impact assessment (Annexure F1 of the BAR). Once construction has been finalised, the residential development and associated activities will be managed and legislated in terms of other legislative frameworks, e.g. SPLUMA, 2013 (Act 16 of 2013), Service Level Agreement, etc.

### **3. DETAILS OF THE EAP**

The details of the person responsible for the assessment and preparation of this report are as follow:

Environmental Assessment Practitioner:

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Qualifications of the practitioner:

B.Sc. Microbiology and Zoology

B.Sc. Honours in Zoology

Magister in Environmental Management

Summary of the practitioner's expertise:

H van Jaarsveld has been involved in environmental management since 2007. Personal experience includes amongst other: Coordination of environmental courses presented at the Centre for Environmental Management, UFS; Project management; Applications for Environmental Authorisation in terms of NEMA, 1998 (Act 107 of 1998) and related regulations, including waste licences and atmospheric emission licenses; Application of Integrated Water Use Licenses in terms of the NWA, 1998 (Act 36 of 1998); Environmental compliance auditing on especially road construction projects and mining related operations.

### **4. ASSUMPTIONS, KNOWLEDGE GAPS AND LIMITATIONS**

The following assumptions, uncertainties and knowledge gaps/limitations were identified:

- During the assessment it was assumed that the information provided by the applicant, input from I&APs and stakeholders and input from the specialists were true, correct to the best of their knowledge and unbiased.
- Potential seasonal limitations during the time of the assessments.

- Due to the type and nature of the proposed development, it is expected to be permanent. The operational activities related to the proposed development will be managed and legislated in terms of other legislative frameworks, e.g. SPLUMA, 2013 (Act 16 of 2013), Service Level Agreement.
- Management measures described in this EMPr therefore mainly focussed on the Planning- and Construction Phases, as well as rehabilitation after construction.

## 5. IMPACT MANAGEMENT OUTCOMES

The potential impacts/risks that were identified during the Environmental Impact Assessment expected to be associated with the proposed development include the following:

- Clearance and transformation of natural vegetation on the physical footprint to be disturbed during construction;
- Habitat loss and effect on the general biodiversity;
- Loss of protected species during construction;
- Affect on the riparian zone and vegetation of the non-perennial stream;
- Influence on the flow and flooding regime of the stream system;
- Change in storm water flow due to the construction activities and overall development and built-up areas;
- Establishment and spread of alien vegetation;
- Erosion and loss of topsoil;
- Loss of agriculture potential due to a change in land use;
- Potential pollution risk to surface water quality (e.g. spillage) from the bulk sewage pipeline;
- Potential pollution to the surrounding environment due to waste generation;
- Dust generation during construction;
- Elevated noise levels during construction;
- Damage or destruction of objects of potential heritage importance;
- Health and safety risk to employees on site during construction;
- Impact on the general aesthetics of the area and immediate visual impact;
- Risk of veld fires;
- Positive impact on employment opportunities; and
- Positive impact of addressing housing need in Mangaung.

The main impact management outcomes of the Environmental Management Programme and implementation thereof are:

- To develop management measures for implementation during the Planning- and Construction Phases, as well as rehabilitation of the environment after construction.
- To avoid and/or minimise potential environmental impacts that were identified to be associated with the proposed development.
- Limit the physical footprint of disturbance and avoid the more sensitive areas on the prominent hill.
- To document design phase guidelines, specifying methods by which contractors must conduct themselves in order to minimise any negative impacts on the environment, and enhance opportunities through this development.
- Comply with prescribed environmental management standards or practices that may be applicable to the proposed development.

## **6. RECOMMENDED ENVIRONMENTAL MANAGEMENT / MITIGATION MEASURES AND MONITORING**

Information gathered from the baseline study, specialist studies, site assessment and involvement from I&APs were used to identify the potential impacts expected to be associated with the proposed development. The actual occurrence of some of these impacts may be unlikely due to the specific nature and site layout.

Refer to Table 1 for a description of the environmental management and mitigation measures to be implemented as minimum during the planning and construction phases of the development, as well as rehabilitation after construction to avoid and/or limit the potential environmental impacts.

It is also important that monitoring of the implementation of the environmental management action is undertaken to ensure compliance with the conditions within the Environmental Authorisation (if considered for approval) and the EMPr specifications, as well as to identify problems or issues of non-conformance in order for appropriate corrective action to be implemented to minimise the impact. Refer to Table 2 for a recommended monitoring programme to be followed during construction and rehabilitation after construction.



**Table 1: Recommended environmental management/mitigation measures**

Activity / Aspect	Recommended management/mitigation	Performance indicator	Phase	Responsible person
Change in land use	The necessary approval and removal of restrictive title conditions from COGTA must be obtained prior to commencement of construction. Implementation of the amended general plan and site layout of a maximum of 28 residential units.	<ul style="list-style-type: none"> <li>- Approved general plan.</li> <li>- Inclusion in the Town Planning Scheme of Bloemfontein.</li> <li>- Avoid impact on the more sensitive natural areas on the hill.</li> <li>- Limited concentration of housing development, thus limiting the physical footprint of disturbance.</li> </ul>	During Planning	Applicant; Developer
Site preparation, landscaping and construction of related infrastructure	A Designated Environmental Officer (DEO) should be appointed and must be responsible for the daily environmental aspects related with the construction activities on site. Keep a photograph record of the site before any clearance during construction.	<ul style="list-style-type: none"> <li>- Record of appointed DEO on file.</li> <li>- Photographic record on file.</li> </ul>	During commissioning	Site manager; DEO
	Limit removal of vegetation and topsoil to areas directly affected by the proposed development as per approved general plan and site layout, e.g. access road and gate, residential units, etc.	<ul style="list-style-type: none"> <li>- Avoid impact on the more sensitive natural areas on the hill.</li> <li>- Limited concentration of housing development, thus limiting the physical footprint of disturbance.</li> <li>- Limit occurrence of erosion and remedy through reinstatement of eroded areas.</li> <li>- Limit nuisance dust generation.</li> </ul>	During commissioning and construction	Site manager; DEO
	A Water Use Authorisation for activities within the flood line and/or 100 m of the non-perennial stream must be obtained from the competent authority.	<ul style="list-style-type: none"> <li>- Permitted Water Use License.</li> </ul>	During planning	Applicant; Developer
	A search and rescue plan is recommended for the removal and re-establishment of protected plant species found within the confines of the physical areas of disturbance. Offset of species not found to be re-	<ul style="list-style-type: none"> <li>- Avoid destruction of protected plant species.</li> </ul>	During commissioning and construction	Site manager; DEO; Specialist

Activity / Aspect	Recommended management/mitigation	Performance indicator	Phase	Responsible person
	established successfully should be considered on the hill.			
Site preparation, landscaping and construction of related infrastructure	No poaching and/or unpermitted collection of plants or animals will be allowed on site.	- No harm to animals as a result of construction activities or poaching.	During construction and rehabilitation after construction	Site manager; DEO
	Clear any proclaimed weed or invasive vegetation on disturbed areas before seeding. The use of chemical substances should be used in accordance with the user specifications. The chemical should also be certified to be safe for use near a water resource if considered for use within the flood line of the stream system.	- No alien vegetation establishment on site or on topsoil stockpiles.	During commissioning and construction	Site manager; DEO
	No open fires must be allowed by construction workers on site.	- No incidents of uncontrolled fires.	During construction and rehabilitation after construction	Site manager; DEO
	Storm water management measures through means of channels will be implemented to control storm water on site. This will include a storm water channel to the north of the site to divert storm water directly to the stream system situated to the west.  Stream flow attenuation measures will be implemented to reduce stream flow and risks of erosion.  No containment or damming within the stream will be allowed.	- Well functioning channels with capacity to provide for high rain events. - No damming of storm water on the development site. - No damming of water on the access road. - Drainage of storm water to the surrounding environment and existing stream system. - Limited impact on stream flow downstream. - No erosion and loss of topsoil.	During construction and rehabilitation after construction.	Site manager; DEO; Engineer

Activity / Aspect	Recommended management/mitigation	Performance indicator	Phase	Responsible person
Site preparation, landscaping and construction of related infrastructure	The 1:100 year flood line will be incorporated in the design and final site layout. No residential infrastructure will be constructed within the flood line.	<ul style="list-style-type: none"> <li>- Avoid risks of damage to infrastructure during flooding.</li> <li>- Limit the impact on the flow and flood regime of the stream.</li> </ul>	During construction	Applicant; Developer; Architect
	Good housekeeping and implementation of Environmental Best Practices should be maintained on site.	<ul style="list-style-type: none"> <li>- Well managed site without environmental incidents and with limited risks.</li> <li>- Limit the visual impact from the passing road and surrounding area.</li> </ul>	During construction and rehabilitation after construction	Site manager; DEO
	Any excavation and landscaping as part of construction must be done to acceptable slopes and rehabilitated after construction.	<ul style="list-style-type: none"> <li>- Allow appropriate drainage of storm water.</li> <li>- Ensure a safe construction site.</li> <li>- Rehabilitated and stabilised slopes after construction.</li> </ul>	During construction and rehabilitation after construction	Site manager; DEO
	<p>Topsoil must be removed prior to commencement of construction.</p> <p>Topsoil must be stored in an area not prone to erosion and should be used for rehabilitation and landscaping purposes after construction has been finalised.</p> <p>Topsoil stockpiles should not exceed a height of 2m.</p> <p>Any contaminated soil and the contaminant will be removed and placed into suitable receptacles for disposal at a recognised facility.</p> <p>Movement of heavy vehicles will be limited to the access roads.</p>	<ul style="list-style-type: none"> <li>- Topsoil available for use during rehabilitation of disturbed areas after construction.</li> <li>- Establishment of natural occurring vegetation after rehabilitation.</li> <li>- No erosion and loss of topsoil.</li> <li>- No disposal of contaminated soil or contaminants on site.</li> <li>- Limit unnecessary disturbance and compaction of soils.</li> </ul>	During construction and rehabilitation after construction	Site manager; DEO
	Should any object or site of heritage importance be unearthed, construction activities in the immediate vicinity will be stopped and the South African Heritage	<ul style="list-style-type: none"> <li>- No damage to any object or site of heritage importance.</li> </ul>	During planning, commissioning and construction	Site manager; DEO

Activity / Aspect	Recommended management/mitigation	Performance indicator	Phase	Responsible person
	Resource Agency (SAHRA) will be contacted.			
Site preparation, landscaping and construction of related infrastructure	<p>Access to the property during construction should be controlled as far possible.</p> <p>No construction workers will be residing on site but will be commuted to and from site daily.</p> <p>Construction activities must be limited to day time working hours, e.g. 07:00 – 18:00, unless where otherwise arranged.</p>	<ul style="list-style-type: none"> <li>- Avoid safety risks.</li> <li>- No record of complaints of nuisance noise.</li> <li>- Compliance with relevant legislation.</li> </ul>	During construction and rehabilitation after construction	Security; Site manager
	<p>No permanent storage of potential hazardous substances, e.g. fuel and oil, on site. Contractors should transport any fuel or substances necessary during construction to site in acceptable and sealable containers.</p> <p>Potential hazardous substances temporary kept on site should be kept in a secured and bunded area with an impermeable lining to prevent pollution to the surrounding environment. This area will be located at least 100 m from the stream.</p> <p>Any spillage of petrochemical products must be cleaned immediately.</p> <p>Drip trays must be used at stationary construction vehicles to prevent any spillages to the surrounding environment.</p> <p>Any gas cylinders should be stored in a designated and well ventilated area.</p> <p>In the case of a major spill the responsible departments (i.e. DWS and DESTEA FS) should be notified within 24 hours.</p>	<ul style="list-style-type: none"> <li>- No safety risks and spillage incidents related with potential hazardous substances, e.g. fuel, oil, etc.</li> <li>- No incidents of gas leakages or explosions.</li> </ul>	During construction and rehabilitation after construction	Site manager; DEO; Contractor supervisor

Activity / Aspect	Recommended management/mitigation	Performance indicator	Phase	Responsible person
Site preparation, landscaping and construction of related infrastructure	<p>All construction vehicles operational on site should be in good working condition.</p> <p>No major repairs will be done on equipment on site but at a workshop as far possible.</p> <p>Drip trays shall be implemented during emergency repairs and refuelling of construction vehicles to prevent any spillage.</p>	<ul style="list-style-type: none"> <li>- No spillages of oil, diesel, etc. on site.</li> <li>- No excessive air emissions.</li> <li>- Noise levels within allowable perimeters.</li> </ul>	During construction and rehabilitation after construction	Site manager; DEO; Contractor supervisor
	<p>Nuisance dust is expected to be low due to the type of activity to be undertaken. However, dust suppression may be required if nuisance dust during construction is above acceptable limits.</p> <p>Speed limits of 40km/h should be enforced on construction vehicles on the access road.</p> <p>Re-vegetate areas disturbed by construction activities as soon as possible to limit any exposed areas.</p>	<ul style="list-style-type: none"> <li>- No record of complaints of nuisance dust.</li> <li>- Compliance with relevant legislation.</li> </ul>	During construction and rehabilitation after construction	Site manager; DEO
	<p>Construction workers on site must be given an induction on environmental awareness.</p> <p>PPE will be provided to construction workers on site. No person or contractor will be allowed within construction areas on the property without the necessary PPE.</p> <p>All employees working with construction equipment and machinery should be properly trained in their specific tasks to limit injuries.</p> <p>The relevant Occupation and Safety regulation must be adhered to at all times during construction.</p>	<ul style="list-style-type: none"> <li>- Signed record of induction of each contractor's team on site.</li> <li>- Informed employees</li> <li>- No fatal incidents or major injuries.</li> </ul>	During construction and rehabilitation after construction	Site manager; DEO; Contractor supervisor

Activity / Aspect	Recommended management/mitigation	Performance indicator	Phase	Responsible person
Waste management	<p>An adequate number of temporary toilet facilities must be situated on site for use by construction workers and should be cleaned regularly.</p> <p>No toilet facility must be situated within 100m of the edge of the stream.</p>	<ul style="list-style-type: none"> <li>- No use of the surrounding environment by workers for toilet activities.</li> <li>- No pollution to any watercourse.</li> </ul>	During construction and rehabilitation after construction	Site manager; DEO
	<p>Appropriate waste management and waste minimisation shall be implemented on site.</p> <p>All sections of the NEM: Waste Act, 2008 (Act 59 of 2008) pertaining to the disposal of waste must be adhered to.</p> <p>It is anticipated that construction rubble will be used as filling during infill and levelling during construction. Unused rubble and inert waste will be loaded on tipper trucks and disposed of at the Northern landfill site.</p> <p>General waste will be collected in appropriate bins on site and disposed of at the Northern landfill site on a regular basis.</p> <p>Hazardous waste (including used oil/grease) should be contained in closed containers for resale or appropriate disposal at a recognised hazardous waste facility.</p> <p>Waste spills will be cleaned immediately and contaminated soil will be disposed of at a recognised facility.</p>	<ul style="list-style-type: none"> <li>- No littering and/or disposal of any waste on site.</li> <li>- Limited construction rubble and inert waste on site.</li> <li>- Minimise waste generation.</li> <li>- Limit disposal of construction rubble at the landfill site influencing the capacity of the landfill site.</li> <li>- Compliance with relevant legislation and municipal by-laws (if applicable).</li> </ul>	During construction and rehabilitation after construction	Site manager; DEO; Contractor
	<p>Solid waste during occupation of the residential units is expected to be limited to domestic solid waste and garden waste. Each home owner will be responsible to take their refuse bags to a central collection point likely to be at the access gate on a weekly basis. From this point, the solid waste will be</p>	<ul style="list-style-type: none"> <li>- Avoid disposal of solid waste on the property.</li> <li>- Limit the time duration of waste accumulating on site before removal.</li> </ul>	During operation	Body corporate; Municipality

Activity / Aspect	Recommended management/mitigation	Performance indicator	Phase	Responsible person
	collected by municipal refuse removal and/or private waste removal service providers contracted by the body corporate.			
Construction of the reservoir	<p>It is recommended that the reservoir form part of the internal clean water reticulation system on Erf 37005, rather than construction on the hill on Erf 37007.</p> <p>All the general environmental management and mitigation measures proposed for implementation during construction and rehabilitation after construction must be implemented.</p>	<ul style="list-style-type: none"> <li>- Limit cumulative visual impact and aesthetics of the area.</li> <li>- Avoid impacts on the natural vegetation and protected species present on the hill.</li> <li>- Limit disturbance to the physical footprint.</li> <li>- Limit distance and impact associated with the underground pipeline.</li> </ul>	During construction, rehabilitation after construction and operation	Developer; Site manager; DEO; Contractor supervisor
Construction of the access road	<p>The potential impacts expected to be associated with the access road will be similar on either alternative sites. However, the preferred site layout will allow a central access road from where all residential units can be accessed.</p> <p>The access road will also act as lay down area and route for other services, e.g. electricity lines and pipelines, making it a more practical option while in effect reducing the disturbance footprint.</p> <p>All the general environmental management and mitigation measures proposed for implementation during construction and rehabilitation after construction must be implemented</p>	<ul style="list-style-type: none"> <li>- Limit disturbance to the physical footprint.</li> <li>- Assist in future maintenance.</li> </ul>	During construction, rehabilitation after construction and operation	Developer; Site manager; DEO; Contractor supervisor
	<p>A low water crossing/bridge will be constructed over the non-perennial stream. Removal of vegetation will be limited to the physical footprint.</p> <p>Appropriate storm water management</p>	<ul style="list-style-type: none"> <li>- Limit disturbance to the physical footprint.</li> <li>- Limit impacts on the riparian zone.</li> <li>- No erosion and suspended solids in the stream system.</li> <li>- No damming of water without approval.</li> </ul>	During construction, rehabilitation after construction and	Developer; Engineer

Activity / Aspect	Recommended management/mitigation	Performance indicator	Phase	Responsible person
	<p>measures must be implemented.</p> <p>No containment or damming of water behind the crossing/bridge will be allowed without required approvals.</p> <p>The crossing/bridge should be designed to allow for proper drainage and accommodate floods.</p> <p>Management measures must be implemented to temporary divert the stream during construction of the crossing/bridge if necessary.</p>		operation	
Construction of the mini-substation	All the general environmental management and mitigation measures proposed for implementation during construction and rehabilitation after construction must be implemented.	<ul style="list-style-type: none"> <li>- Limit disturbance to the physical footprint.</li> <li>- Limit impacts on the flood line.</li> <li>- No erosion and suspended solids in the stream system.</li> <li>- Avoid safety risks.</li> </ul>	During construction and rehabilitation after construction	Developer; Site manager; DEO; Contractor supervisor
Extension of the existing municipal bulk clean water and sewage pipeline	Effluent generated during the occupation of the residential units will be limited to normal sewage. This will be incorporated into the existing municipal bulk services. The internal sewage reticulation system will join into the existing municipal system for treatment at the existing and upgraded Northern Sewage Treatment Works.	<ul style="list-style-type: none"> <li>- No disposal and/or treatment of sewage on the property.</li> <li>- Limit risks for leakage of untreated sewage and pollution to the surrounding environment or stream system.</li> </ul>	During operation	Municipality
	All the general environmental management and mitigation measures proposed for implementation during construction and rehabilitation after construction must be implemented.	<ul style="list-style-type: none"> <li>- Limit disturbance to the physical footprint.</li> <li>- Limit impacts on the non-perennial stream and associated flood line.</li> <li>- No erosion and suspended solids in the stream system.</li> </ul>	During construction and rehabilitation after construction	Developer; Site manager; DEO; Contractor supervisor



Activity / Aspect	Recommended management/mitigation	Performance indicator	Phase	Responsible person
Rehabilitation after construction	<p>Disturbed areas should be reinstated as such areas become available for rehabilitation.</p> <p>Final rehabilitation of the disturbed surface areas will include cover with topsoil, landscaping and sloping, establishment of vegetation and weed clearing.</p> <p>Compacted surface areas related with construction activities will be ripped before being top soiled.</p> <p>All equipment and other items used during construction will be removed from site after construction has finished and rehabilitation has been finalised.</p> <p>Any remaining waste material of any description shall be removed from the site and disposed of at the Northern landfill site. Any potential hazardous waste should be removed and disposed of appropriately and not at the general landfill site. No disposal of any waste will be allowed on the property.</p>	<ul style="list-style-type: none"> <li>- Limited disturbed footprints at any given time.</li> <li>- Final rehabilitated area after construction.</li> <li>- Limit the impact on the aesthetic value of the area after construction.</li> <li>- Safe area after construction.</li> <li>- No residual infrastructure and/or equipment on site after construction.</li> </ul>	During construction and rehabilitation after construction	Site manager; DEO; Contractor supervisor
Environmental monitoring and reporting	<p>Any complaints received during construction must be recorded and measures must be implemented to address it where possible.</p> <p>The dust and noise levels must be managed and remedial measures must be implemented in the event of any excessive dust or noise above acceptable levels.</p> <p>Continuous visual checks will be undertaken to identify areas of establishment of invasive vegetation within the development footprint and controlled accordingly.</p> <p>The effectiveness of the storm water management measures must be verified</p>	<ul style="list-style-type: none"> <li>- Record of any complaints received and measures implemented to address these complaints.</li> <li>- Dust and noise levels complying with the relevant legislation.</li> <li>- Minimal invasive vegetation on site.</li> <li>- No erosion and loss of soil.</li> <li>- No hydrocarbon spillages on site.</li> <li>- Well maintained access road.</li> <li>- No vehicle accidents on the access road as a result of poor driving conditions.</li> </ul>	During construction and rehabilitation after construction	Site manager; DEO; Contractor supervisor

Activity / Aspect	Recommended management/mitigation	Performance indicator	Phase	Responsible person
	<p>during and after rain events.</p> <p>Ongoing visual checks for hydrocarbon spills will be undertaken and cleaned if necessary.</p> <p>The condition of the access road must be checked continuously and maintained accordingly.</p>			

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**Table 2: Recommended environmental monitoring programme**

Activity / Aspect	Impacts requiring monitoring	Functional requirements for monitoring	Roles and responsibilities	Monitoring and reporting frequency
Change in land use	Loss of agriculture land. Non-compliance with restrictive title deeds.	Verify compliance with conditions of approvals and permits	Applicant Developer	Final review of the approved general plan and site layout during planning. Visual checks and confirmation from contractors that construction activities are undertaken within the footprints and confines of approved site layout and construction plans during construction.
Site preparation, landscaping and construction of related infrastructure	Clearance of vegetation. Establishment of alien vegetation. Destruction or removal of protected plant species. Impact on terrestrial fauna. Erosion and loss of topsoil. Damage or destruction of objects/artefacts of heritage importance.	Visual checks; Verify compliance with conditions of approved construction plans, the EA and EMP; Verify compliance with restrictive title deed descriptions and Service Level Agreement; Identify non-compliances; Monitor key parameters, e.g. noise levels.	Applicant Developer Site manager DEO Contractor supervisor	Weekly visual checks for erosion and extent of vegetation clearance. Reinstate eroded areas and implement preventative measures. Weekly visual checks for establishment of declared weeds or invasive plants. Clear and reinstate affected areas. Daily visual checks for spillage and/or leakage of substances with pollution potential, e.g. fuel, oil and sewage. Clean any spillage immediately and repair leakages. Weekly visual checks for disposal of waste on site. Remove any waste regularly for disposal at the Northern landfill site. Report environmental incidents as soon as possible. Report findings of objects of potential heritage importance to the site manager. Record incidents and non-compliances in accordance with EA conditions and relevant legislation.
Waste management	Spillage and/or disposal of construction waste.	Visual checks; Verify compliance with conditions of the EA and EMP; and the Service Level Agreement; Identify non-compliances	Site manager DEO Contractor supervisor	Weekly checks for signs of disposal of waste of any type on site. Clear any areas where disposal has occurred and reinstate the footprint.

Activity / Aspect	Impacts requiring monitoring	Functional requirements for monitoring	Roles and responsibilities	Monitoring and reporting frequency
Construction of the reservoir	Clearance of vegetation. Establishment of alien vegetation. Erosion and loss of topsoil. Functioning of reticulation system.	Visual checks; Verify compliance with conditions of the EA and EMPr; Verify compliance with the Service Level Agreement; Identify non-compliances	Site manager DEO Contractor supervisor Body corporate	Weekly visual checks for erosion and extent of vegetation clearance during construction. Reinstate eroded areas and implement preventative measures. Weekly visual checks for establishment of declared weeds or invasive plants during construction. Clear and reinstate affected areas. Daily visual checks for spillage and/or leakage of substances with pollution potential during construction. Clean any spillage immediately and repair leakages. Monitoring of flow, levels and functionality of the reservoir and internal clean water reticulation system in accordance with the Service Level Agreement and specifications of the body corporate. Report environmental incidents as soon as possible. Record incidents and non-compliances in accordance with EA conditions and relevant legislation.
Construction of the access road	Clearance of vegetation. Establishment of alien vegetation. Erosion and loss of topsoil. Ride ability of the access road and crossing/bridge. Flow of storm water in the non-perennial stream.	Visual checks; Verify compliance with conditions of the EA and EMPr; Verify compliance with the Service Level Agreement; Identify non-compliances	Site manager DEO Contractor supervisor Body corporate	Weekly visual checks for erosion and extent of vegetation clearance during construction. Reinstate eroded areas and implement preventative measures. Weekly visual checks for establishment of declared weeds or invasive plants during construction. Clear and reinstate affected areas. Daily visual checks for spillage and/or leakage of substances with pollution potential during construction. Clean any spillage immediately and repair leakages. Monitor the flow of water over or through the crossing/bridge over the stream via visual checks during flow of the stream to ensure water is not contained during operation. Regular visual checks for damage to the access road and bridge. Maintain the access road and repair when necessary during operation.

Activity / Aspect	Impacts requiring monitoring	Functional requirements for monitoring	Roles and responsibilities	Monitoring and reporting frequency
				Record incidents and non-compliances in accordance with EA conditions and relevant legislation.
Construction of the mini-substation.	Clearance of vegetation. Establishment of alien vegetation. Erosion and loss of topsoil. Power failures and electrical demand.	Visual checks; Verify compliance with conditions of the EA and EMPr; Verify compliance with the Service Level Agreement; Identify non-compliances	Site manager DEO Contractor supervisor Centlec	Weekly visual checks for erosion and extent of vegetation clearance during construction. Reinstate eroded areas and implement preventative measures. Weekly visual checks for establishment of declared weeds or invasive plants during construction. Clear and reinstate affected areas. Daily visual checks for spillage and/or leakage of substances with pollution potential during construction. Clean any spillage immediately and repair leakages. Record incidents and non-compliances in accordance with EA conditions and relevant legislation during construction. Visual checks and monitoring with electrical equipment to ensure electrical capacity when necessary or regular power failure are identified. Repair when necessary.
Extension of the existing municipal bulk clean water and sewage pipeline	Spillage of untreated sewage. Bulk service demand	Visual checks; Verify compliance with conditions of the EA and EMPr; Verify compliance with the Service Level Agreement; Identify non-compliances	Site manager DEO Contractor supervisor Body corporate Mangaung Municipality	Scheduled visual checks for any signs of leakage from the bulk service pipelines. Any leakages should be repaired and the affected footprint reinstated if necessary. Record incidents and non-compliances in accordance with EA conditions and relevant legislation during construction.
Rehabilitation after construction	Establishment of natural vegetation. Establishment of alien vegetation. Erosion and loss of topsoil.	Visual checks; Verify compliance with conditions of the EA and EMPr; Verify compliance with the Service Level Agreement; Identify non-compliances; Monitor key	Applicant Developer Site manager DEO Contractor supervisor	Weekly visual checks for erosion and extent of establishment of natural vegetation. Reinstate eroded areas. Weekly visual checks for establishment of declared weeds or invasive plants. Clear and reinstate affected areas. Daily visual checks for spillage and/or leakage of

Activity / Aspect	Impacts requiring monitoring	Functional requirements for monitoring	Roles and responsibilities	Monitoring and reporting frequency
	Spillage of petrochemicals. Disposal of waste. Redundant construction equipment on site.	parameters.		substances with pollution potential during rehabilitation. Clean any spillage immediately and repair leakages. Visual checks for disposal of waste on site during rehabilitation. Remove any waste after final rehabilitation for disposal at the Northern landfill site. Report environmental incidents as soon as possible. Record incidents and non-compliances in accordance with EA conditions and relevant legislation.

## **7. PROCEDURES FOR RECORDING, REPORTING AND CORRECTIVE ACTION**

The following records are recommended to be maintained during construction to enable compliance with the EMPr specifications to be demonstrated:

- Daily log of site activities by the supervisor of each contractor, including aspects such as waste disposed off; fuels and chemicals list deliveries; Major spillage; adverse weather that may have an influence on construction activities.
- Records of results from ongoing monitoring of listed aspects during construction.
- Issues arising on the site during construction.
- Minutes of meetings held regarding environmental management.
- Method statements received and approved.
- Observations made during the site visits will be recorded and photographs taken to demonstrate both compliance and non-compliance with the specifications in the EMP.
- Cases of non-conformance with the EMPr and EA.
- Corrective action taken.

Reporting must further be done in accordance with the conditions stipulated in the Environmental Authorisation and any other legislative framework that may be applicable to the proposed development.

Issues of non-conformance noted by the responsible persons must be communicated to the site manager, who will be responsible for ensuring that the relevant parties are informed of the non-conformance and that appropriate corrective action is taken.

Environmental issues must be addressed at regular site meetings between the contractors, site manager and developer. The DEO will present a verbal report from his logbook of any environmental concerns or issues that have arisen, and of corrective actions that have been taken. Outstanding corrective actions will be discussed and agreed to at these meetings. Issues relating to complaints or comments received from the public will also be discussed at these meetings. Minutes of the meetings will be prepared by the DEO and copied to all attendees before the next meeting.

The frequency of the site meetings will be agreed by the Site manager, DEO, the contractors and other relevant parties prior to the commencement of the project.

## **8. ENVIRONMENTAL AWARENESS PLAN**

The National Environmental Management Act, 1998 (Act 107 of 1998) states that any costs incurred to remedy environmental damage must be borne by the person responsible for that damage (polluter pays). It is therefore imperative that the Applicant, Developer and any appointed contractors to the proposed project during construction read through and understand the requirements of this document and any proceeding documents pertaining to environmental requirements before construction commences.

NEMA, 1998 (Act 107 of 1998) states that everyone is required to take reasonable measures to ensure that they do not pollute the environment. Reasonable measures include informing and educating employees about the environmental risks of their work and training them to operate in an environmentally acceptable manner.

In terms of this:

- The Contractors must meet with members of the environmental team to discuss the environmental requirements;
- The Contractors, in conjunction with members of the environmental team, must meet with the construction workers to explain the environmental requirements of the Environmental Management Programme;
- A register must be kept of all employees attending the environmental awareness meeting(s).