
APPENDIX 8: ENVIRONMENTAL MANAGEMENT PROGRAMME

Appendix 8.1: Construction EMPr

Appendix 8.2: Operations EMPr

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Appendix 8.1: Construction EMPr

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PROGRAMME FOR THE PROPOSED GLASS BOTTLE MANUFACTURING PLANT

Portion 1/238, Leeuwkuil 596 IQ, Gauteng

Prepared for: The South African Breweries (Pty) Ltd

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ACRONYMS AND ABBREVIATIONS

Acronym / Abbreviation	Definition
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIAR	Environmental Impact Assessment Report
EMPr	Environmental Management Programme
EO	Contractor's on-site Environmental Officer or Site Agent.
GDARD	Gauteng Department of Agriculture and Rural Development
GN	Government Notice
I&APs	Interested and Affected Parties
NEMA	National Environmental Management Act, 1998 (No. 107 of 1998)
NEMWA	National Environmental Management Waste Act, 2008 (No. 59 of 2008)
RE	Resident Engineer
S&EIA	Scoping and Environmental Impact Assessment
SAB	The South African Breweries (Pty) Ltd
SLR	SLR Consulting (South Africa) (Pty) Ltd

1 INTRODUCTION

1.1 PROJECT BACKGROUND

The South African Breweries (Pty) Ltd (SAB), together with future Black owned business partner(s), is proposing to enter the glass bottle manufacturing industry in order to transform its glass bottle procurement spend, whilst providing a unique opportunity for new Black economic entrant(s). Ownership of the plant is still being determined and SAB is likely to only be a minority shareholder in the future business. The intention is for the facility to be majority Black owned.

SAB has made application for an integrated Environmental Authorisation in terms of the National Environmental Management Act, 1998 (No. 107 of 1998) (NEMA) and the National Environmental Management: Waste Act, 2008 (No. 59 of 2008) (NEMWA). SLR Consulting (South Africa) (Pty) Ltd (hereafter referred to as "SLR") was appointed as the environmental assessment practitioner (EAP) to undertake the environmental assessment for the proposed project.

1.2 AIMS OF THIS DOCUMENT

This Construction Environmental Management Programme (EMPr) has been compiled as part of the Scoping and Environmental Impact Assessment (hereafter collectively referred to as "S&EIA") process in compliance with Appendix 4 of the EIA Regulations 2014 (as amended).

The purpose of this EMPr is to ensure that impacts associated with the planning and construction phase(s) are avoided and, where they cannot be avoided, are kept to a minimum and rehabilitated. The EMPr, which has as its basis the technical design controls and mitigation measures listed in the Environmental Impact Assessment Report (EIAR), sets environmental targets for the Contractor (or selected sub-contractors) and reasonable standards against which the project's environmental performance can be measured during the construction phase.

This document will be included in the contract documentation for the construction phase and will thus form a binding agreement between the Contractor and the owner. The EMPr will form the basis for the environmental specifications that the Contractor, in terms of the construction contract, will be obliged to adhere to during construction.

1.3 PROJECT DESCRIPTION

The project that is managed in terms of this EMPr is fully described in Section 5 of the EIAR produced by SLR (November 2018). A summary of the project description is included below and further context is provided in Figures 1-1 to 1-3.

1.3.1 Summary of Property/Site Information

Farm name:	Portion 238 (a portion of portion 149) of the farm Leeuwkuil 596 IQ. NB - there is a town planning application underway to subdivide and rename this as Portion 295 of the farm Leeuwkuil 596 IQ.
Physical address:	Corner of Boy Louw Street (R 28) and Lager Avenue, Vereeniging
Surveyor General 21 digit code:	TOIQ0000000059600238
Property size:	Currently 67.26 ha, but the subdivided portion will be 29.23 ha

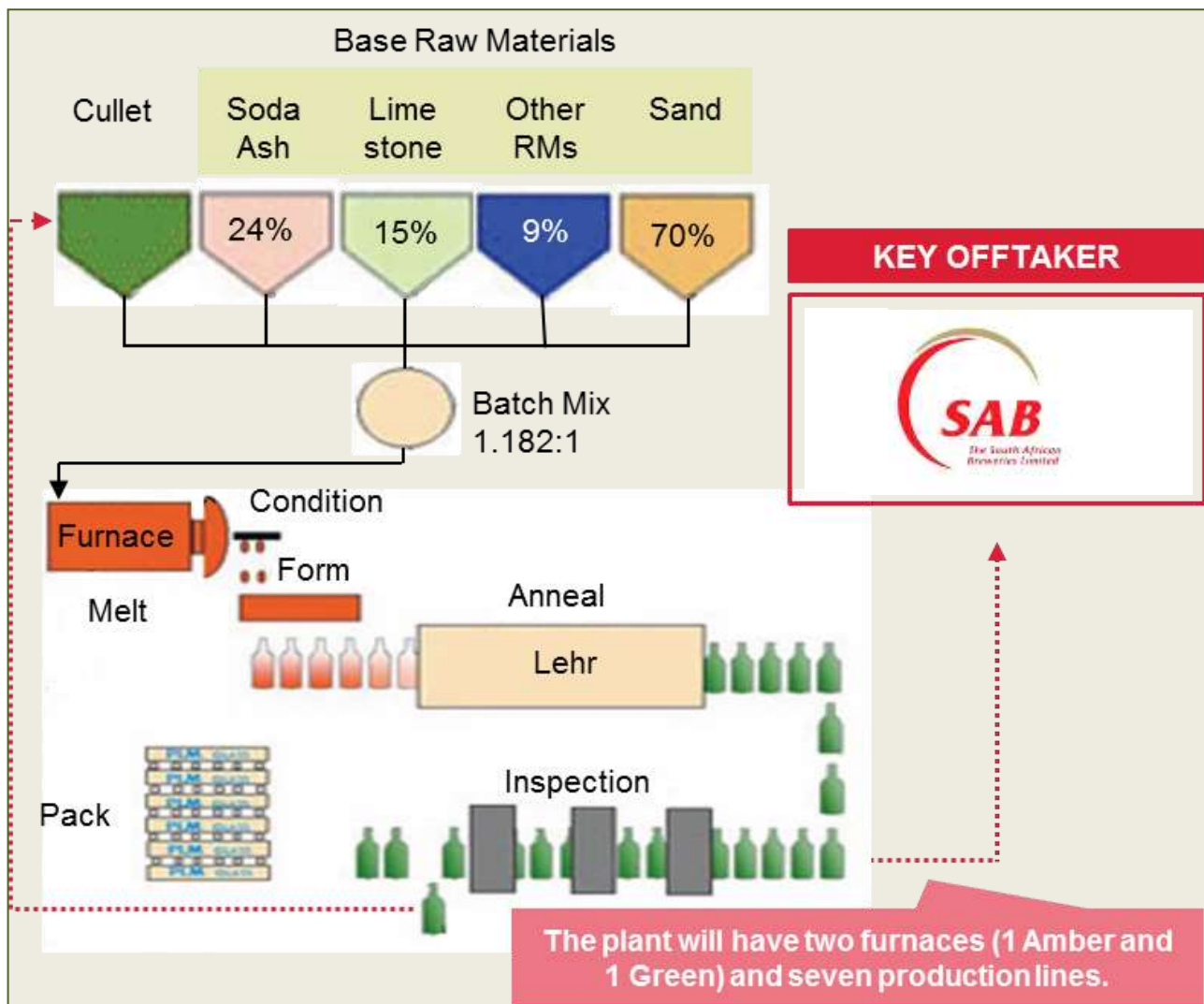
Development footprint size:	Approximately 15 000 m ² (15 ha)
Local municipality	Emfuleni Local Municipality in the Sedibeng District Municipality
Centre coordinates of site:	Latitude (S): 26°40'3.60"S
	Longitude (E): 27°54'9.10"E

1.3.2 Description of the Proposed Glass Bottle Manufacturing Project

SAB, with Black owned partner(s), is intending to enter the glass bottle manufacturing industry in order to transform its glass bottle procurement spend, while at the same time providing a unique opportunity for new Black economic entrant(s). Ownership of the plant is still being determined and SAB is only likely to be a minority shareholder in the future business.

The proposed plant would produce green and amber coloured bottles. The facility would comprise a batch plant, main manufacturing building with gas fired furnaces and a warehouse. The annual glass bottle production target would be approximately 290 000 tons. Glass is a non-crystalline amorphous solid made of the fusion of a diverse range of non-organic oxides found in sand, soda ash, limestone and other raw materials.

The conceptual process flow of the proposed project is illustrated in the diagram below and the main components are described in the text.



1.3.2.1 Batch Plant

The batch plant building would be used to receive, store and mix the raw materials required in glass manufacture. The key raw materials are sand, soda ash and limestone, with a number of other raw materials also required. Recycled glass, known as cullet, would also be utilised as a raw material. The raw materials are stored in a variety of silos, hoppers and bunds, before being mixed according to specific recipes for each glass product. Once mixed, the raw material batches would be conveyed across to the main manufacturing building.

1.3.2.2 Main Manufacturing Building

The main manufacturing building would comprise a single large covered hall, approximately 45 000 m² in extent. The building consists of three areas (named the Furnace, Hot End and Cold End areas) in which, the glass is melted, formed into bottles and inspected for quality and defects.

1.3.2.3 Furnaces

The two furnaces would utilise natural gas or Liquid Petroleum Gas (LPG) as a heat source. The green glass furnace would have capacity to melt 390 metric tons per day (mtpd). This furnace would feed to three bottle manufacturing lines. The amber glass furnace, with a capacity to melt 530 mtpd, would feed to four bottle manufacturing lines. In the furnace the raw materials would be melted into glass at temperatures of up to 1 530°C and degassed. Emissions from the furnaces would be cleaned in order to comply with the minimum emissions standards and released via a stack.

1.3.2.4 Hot End

In the Hot End the molten glass would be channelled to a series of glass forming machines that cool and meter the glass before using mechanical and pneumatic means to create the specific glass containers. The bottles would be hot end coated to enhance surface resistance and cooled in an annealing oven in a controlled manner, so as to avoid internal stresses.

1.3.2.5 Cold End

At the Cold End the bottles would be further coated and then subject to inspection for defects by high precision equipment that measure capacity, dimensions, impact, pressure resistance and other tests. Bottles that do not meet specifications would be crushed and conveyed back to the furnaces where the cullet is re-used in the raw material mix. Completed bottles would be packaged by automated palletizers and moved to the warehouse for storage and distribution.

1.3.2.6 Warehouse

The warehouse building would have an area of approximately 40 000 m². Storage of the bottles would be in plastic wrapped, bulk pallets up to three pallets high. Pallets would be mobilized using single or dual fork lifts and loaded onto trucks for distribution to customers.

1.3.2.7 Utilities

The glass production process requires several utility systems (gas and liquids) for operation. Support services associated with the proposed project would include an office building, canteen and gate house. The facility would also have a gas station to regulate gas supply, a diesel fuel oil storage facility as a back-up furnace fuel, diesel generators for emergency electricity supply and emergency water storage.

1.3.2.8 Associated Services

Access and Transport: Access to the facility would be via Lager Avenue, off the R28. Transport of goods to, and products from, the facility would be by truck.

Water: Potable and process water would likely be sourced from the Emfuleni Local Municipality via a new bulk water connection from the Rand Water connection in Botha Street.

Power: Electrical power would likely be sourced from the Emfuleni Local Municipality. The electrical connection would be via underground cables from the substation located adjacent to the R 59.

Gas: The proposal is to source gas for the furnaces from the existing pipeline that runs on the facility-side of the R59. A connection metering station and underground pipe would be installed

Sewage: Sewage generated at the facilities would likely be treated in an on-site package plant. Treated effluent will be used for local irrigation or discharged to the environment.

Waste: Wastes generated by the plant and associated operations will be separated at source, as much as is feasible, and then directed to appropriate recycling, re-use or disposal facilities.

1.4 EAP DETAILS

The details and expertise of the EAP who prepared the EMPr are included below. CVs of the EAP are included in Appendix 2 of the EIAR (SLR, November 2018).

General				
Organisation	SLR Consulting (South Africa) (Pty) Ltd			
Postal address	PO Box 1596, Cramerview, 2060			
Tel No.	(011) 467 0945			
Fax No.	(011) 467 0978			
Name	Qualifications	Professional registrations	Experience (Years)	Tasks and roles
Jonathan Crowther (SLR)	M.Sc. (Env. Sci.). University of Cape Town	Pr.Sci.Nat., CEAPSA, Member IAIAsa	30	Report and process review
Matthew Hemming (SLR)	M.Sc. (Cons. Biol.), University of Cape Town	Pr.Sci.Nat., Member IAIAsa	13	Management of the S&EIA process, including public consultation, process review, specialist study review and report compilation.

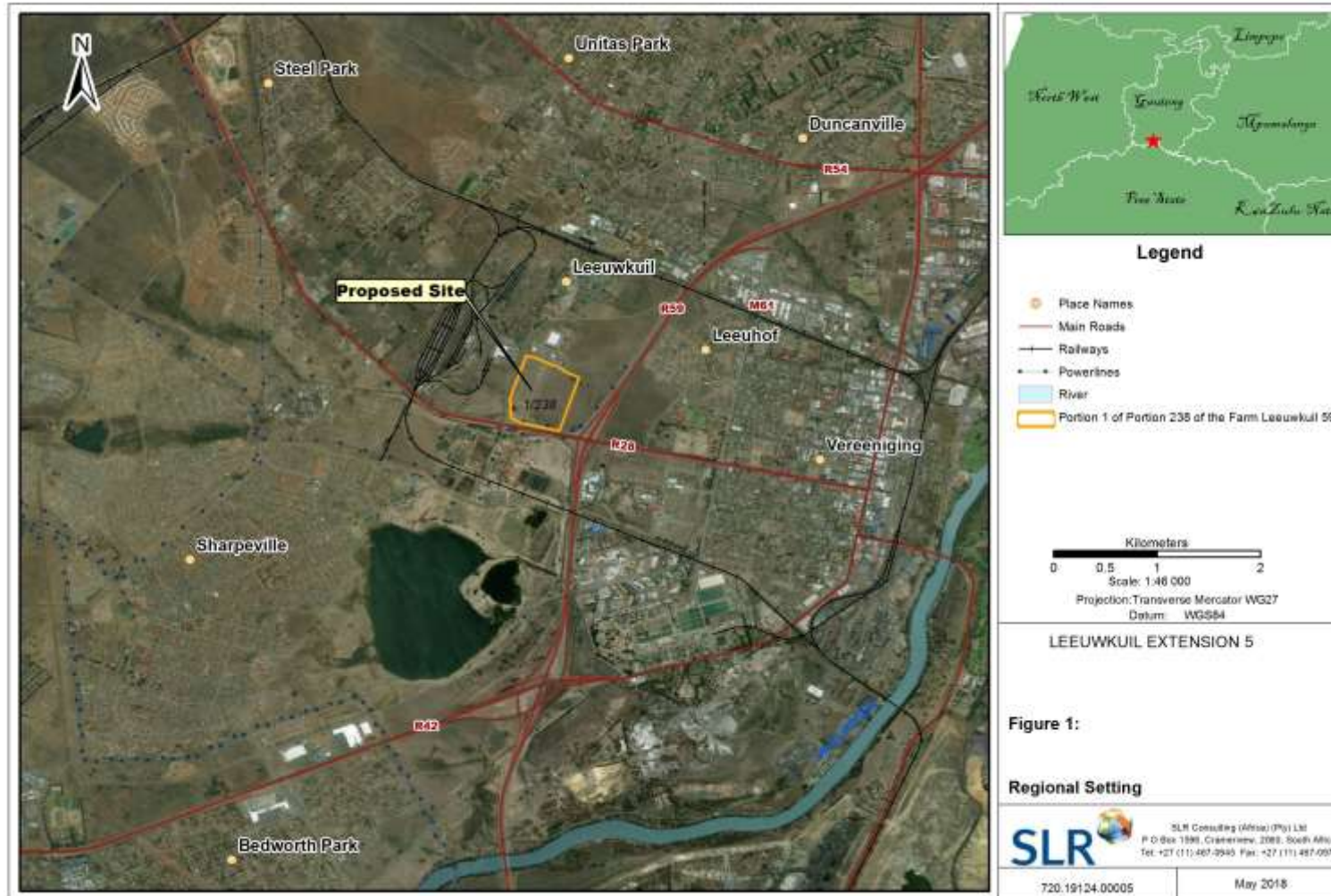


FIGURE 1-1: REGIONAL SETTING OF THE PROPOSED GLASS BOTTLE MANUFACTURING PLANT

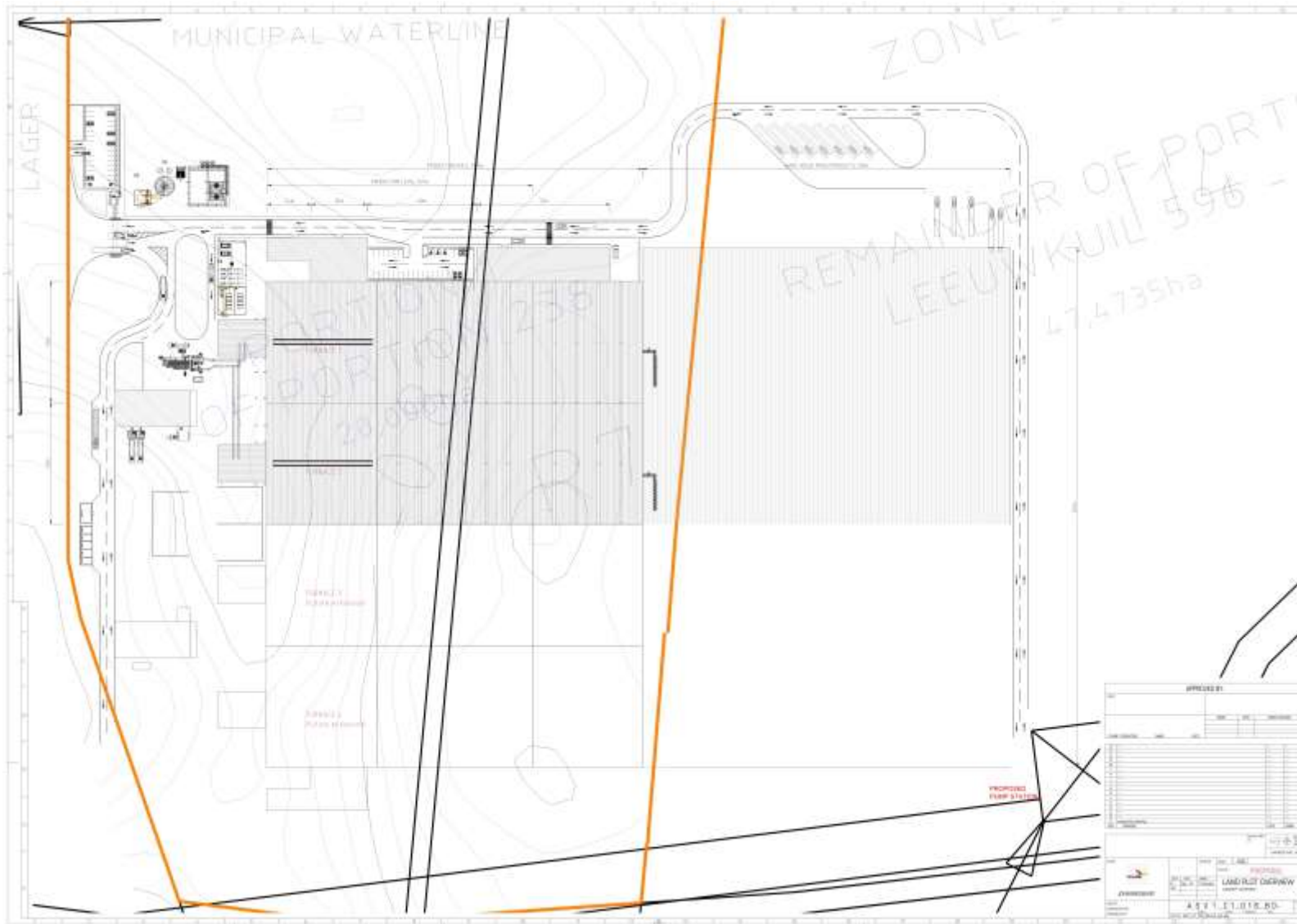


FIGURE 1-2: CONCEPTUAL SITE DEVELOPMENT PLAN

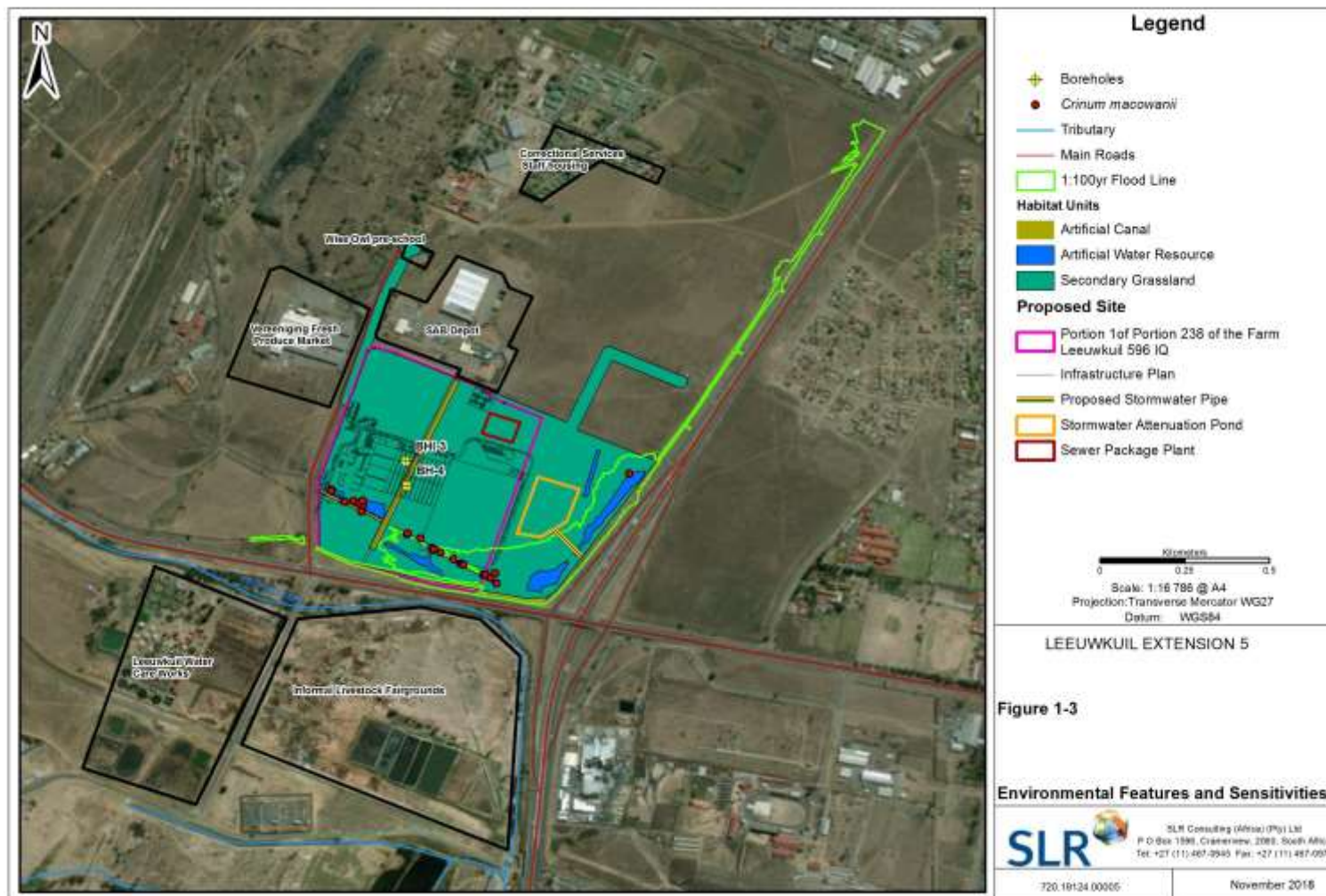


FIGURE 1-3: SITE SENSITIVITY PLAN

2 PLANNING AND DESIGN PHASE

This section of the EMPr caters for the planning and design phase, which would be undertaken pre-construction, and should be used to inform design decisions.

2.1 ENVIRONMENTAL MANAGEMENT OUTCOMES

The environmental objectives and goals outlined for the construction (see Section 3.7) and operations (Operations EMPr, Report 4) phases of the project must be taken into account during the planning and design phase. The planning and design phase must enable the achievement of the project's environmental objectives and goals.

2.2 IMPACT MANAGEMENT ACTION PLAN

The planning and design action plan is presented in tabular format (see Table 2-1). The action plan must be implemented during the planning and detailed design phase of the glass bottle manufacturing plant (i.e. pre-construction).

Also provided are the specific objectives and parameters that must be included in the detailed design of the plant in order to ensure that the future environmental objectives and goals can be achieved. See Table 2-2.

It is the responsibility of the holder (applicant) of the integrated Environmental Authorisation to ensure implementation of the actions set out in Tables 2-1 and 2-2.

TABLE 2-1: MANAGEMENT ACTION PLAN – PLANNING AND DESIGN

Aspect	Control measures
Relocation of the Wise Owl pre-school	<ul style="list-style-type: none"> • Prior to construction, assist the municipality to relocate the Wise Owl pre-school to a site with suitable zoning for an educational facility of this nature and where it would remain suitable for the school children that attend. • Assist the municipality to clearly communicate the relocation plans in a manner that ensures transparency.
Management system	<ul style="list-style-type: none"> • Develop an environmental management system for the site. The system should be based on the principles of ISO 14001 and provide for resources, planning, controls, evaluation and improvement. • The management system should be implemented from the start of construction. • Appoint a suitable Environmental Control Officer (ECO) for the duration of the construction works to monitor compliance with the EMPr and act as a liaison between local communities and the project. • Plan for environmental awareness and training of employees as per Section 3.8 Error! Reference source not found.
Approvals	<ul style="list-style-type: none"> • Apply for relevant authorization under the National Water Act and adhere to any conditions. • Apply for relevant approvals from the roads authorities and adhere to any conditions. • Apply for relevant plant relocation approvals from GDARD.
Scope and footprint	<ul style="list-style-type: none"> • Plan and design the plant in line with the project scope outlined in Section 5 of the EIAR as well as the measures detailed in Table 2-2 below. • Limit the project footprint to that proposed. Physical disturbance must be less than 20 ha. • Fence the property and plan construction activities for within this area. • Locate the plant infrastructure outside of the 1:100 year flood line.
Procedures	<ul style="list-style-type: none"> • Develop procedures for: <ul style="list-style-type: none"> - incident response and management; - the storage, handling and transportation of waste from site in line with the requirements of the NEM:WA Norms and Standards; - alien invasive plant management; - rehabilitation and landscaping; - equipment and vehicle maintenance, including a schedule.
Method statements	<ul style="list-style-type: none"> • Develop method statements for the following: <ul style="list-style-type: none"> - site clearance, preparation and earthworks; - dust control; - fire control; - cement and concrete batching; - storage and handling of dangerous goods; and - spill clean-up.
Monitoring	<ul style="list-style-type: none"> • Ensure that the monitoring programmes comprise the following: <ul style="list-style-type: none"> - a formal procedure; - appropriately calibrated equipment; - where samples require analysis they will be preserved according to laboratory specifications; - an accredited, independent, commercial laboratory will undertake sample analyses; - parameters to be monitored will be identified in consultation with a specialist in the field and/or the relevant authority; - if necessary, following the initial monitoring results, certain parameters may be removed from the monitoring programme in consultation with a specialist and/or the relevant

Aspect	Control measures
	authority; - monitoring data will be stored in a structured database; - data will be interpreted and reports on trends in the data will be compiled by an appropriately qualified person; - both the data and the reports will be kept on record for the life of plant.
Stakeholder engagement	<ul style="list-style-type: none"> Develop a stakeholder communication and engagement strategy and plan that includes communication mechanisms, a database that recognises all stakeholder groups, meaningful and transparent communication, information sharing (including safety risks associated with the project, addressing grievances and reporting back on monitoring results), on-going monitoring to ensure that the strategy is up to date, and follow up auditing. Develop a formal complaints (grievance) procedure that incorporates measures for receiving, responding, tracking and recording complaints and grievances from all stakeholders. All registered complaints will be documented, investigated in a timeously manner and efforts made to address the area of concern where possible. Where required specific monitoring must take place.
Economic and social development	<ul style="list-style-type: none"> Develop recruitment and procurement policies and procedures that: <ul style="list-style-type: none"> prioritise local employment, with a focus on semi-skilled and skilled positions being made available to local people as far as possible; sourcing contractors and service providers from within Emfuleni Local Municipality, and specifically Vereeniging, where possible; provide training and skills development to the youth, prospective employees and local businesses; include a procurement mentorship programme for local and black owned businesses. Develop local corporate social investment strategies in consultation with the relevant authorities. Give preference to the Emfuleni Livestock Group. Develop a policy and plan for influx management that allows for collaboration with government authorities and landowners. Develop a policy and plan for health management and awareness for employees inclusive of sex education, HIV/AIDS and related illnesses, drug and alcohol abuse, and personal development. Plan for capacity building with key stakeholders such as health and social welfare.

TABLE 2-2: MEASURES TO BE INCLUDED IN THE DETAILED DESIGN OF THE PLANT AND SITE LAYOUT

Aspect	Control measures
Earthworks and rehabilitation	<ul style="list-style-type: none"> Design and plan the plant to support the requirements outlined in Table 3-3.
Spill prevention	<ul style="list-style-type: none"> In the design of the plant make provision for: <ul style="list-style-type: none"> Hardstanding with engineered containment measures in all areas where potential contaminants will be stored or handled. Dedicated areas for fixing and washing of equipment and machinery. These areas should be surfaced and bunded to contain spills at source and with sufficient capacity to contain 110% of the total spill. Where required silt/oil traps should be installed. Where activities are required away from these areas plan that appropriate bases and containment must be used. Handling and storage of chemicals and hazardous substances to be undertaken in designated areas. These areas should be covered, surfaced and bunded to contain spills at source and with sufficient capacity to contain 110% of total spilled materials.
Waste	<ul style="list-style-type: none"> Design and plan the plant to support the requirements outlined in Table 3-4.

Aspect	Control measures																		
Effluent	<ul style="list-style-type: none"> Design the sewage treatment plant in line with an authorisation in terms of the National Water Act. Design the sewage treatment plant to meet the discharge limits below: <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">- Conductivity: <10 mS/m</td> <td style="width: 25%;">- pH: 6.5-8.5 pH units</td> <td style="width: 25%;">- Chemical Oxygen Demand (COD): <10 mg/l</td> <td style="width: 25%;">- Ammonia (NH4): <0.2 mg/l</td> </tr> <tr> <td>- Chloride (Cl): <25 mg/l</td> <td>- Fluoride (F): <0.05 mg/l</td> <td>- Alkalinity (CaCO3): <40 mg/l</td> <td>- Nitrate (NO3): <0.1 mg/l</td> </tr> <tr> <td>- Phosphate (PO4): 0.05 mg/l</td> <td>- Sulphate (SO4): <20 mg/l</td> <td>- Faecal coliforms: 0 counts/100ml</td> <td>-</td> </tr> </table> Include conservancy tanks in the design of the treatment plant to store effluent during periods of maintenance. Prevent untreated effluent from entering the clean storm water system. Provide for the re-use and recycling of treated effluent on-site, such that the minimum volume of effluent is discharged to the environment. Provide for flow meters within the plant and at the discharge point. 	- Conductivity: <10 mS/m	- pH: 6.5-8.5 pH units	- Chemical Oxygen Demand (COD): <10 mg/l	- Ammonia (NH4): <0.2 mg/l	- Chloride (Cl): <25 mg/l	- Fluoride (F): <0.05 mg/l	- Alkalinity (CaCO3): <40 mg/l	- Nitrate (NO3): <0.1 mg/l	- Phosphate (PO4): 0.05 mg/l	- Sulphate (SO4): <20 mg/l	- Faecal coliforms: 0 counts/100ml	-						
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- Phosphate (PO4): 0.05 mg/l	- Sulphate (SO4): <20 mg/l	- Faecal coliforms: 0 counts/100ml	-																
Storm water and flood	<ul style="list-style-type: none"> Ensure that the ground level of the warehouse is at or above an elevation of 1441.07 m amsl. Develop a storm water management plan that separates clean and dirty water run-off, diverts upstream run-off around the site and attenuates run-off to meet pre-development flows. Design energy dissipation measures for the attenuation pond, for a 1:100 year storm event, to reduce the flow and prevent erosion. Upgrade storm water channels, if required, in consultation with other developers. Ensure the discharge channels have suitable gradient and liner to provide effective operation and prevention of erosion. Develop a dynamic climatic water balance for the site to inform water uses on site, attenuation of storm water and discharge requirements. 																		
Air	<ul style="list-style-type: none"> Design the plant such that emissions from the main glass manufacturing building are extracted and passed through the emissions control system with furnace emissions. Total emissions must meet Section 21 emission standards for Subcategory 5.8 listed activity (Glass production). The emissions control system should include a Ceramic Candle Filter at the furnace stack. <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="background-color: #ADD8E6;">Substance or mixture of substances</th> <th rowspan="2" style="background-color: #ADD8E6;">Plant Status</th> <th rowspan="2" style="background-color: #ADD8E6;">mg/Nm³ under normal conditions of 10% O₂, 273 Kelvin and 101.3 kPa</th> </tr> <tr> <th style="background-color: #ADD8E6;">Common name</th> <th style="background-color: #ADD8E6;">Chemical symbol</th> </tr> </thead> <tbody> <tr> <td>Particulate Matter</td> <td>N/A</td> <td>New</td> <td>30</td> </tr> <tr> <td>Oxides of nitrogen</td> <td>NO_x expressed as NO₂</td> <td>New</td> <td>1500</td> </tr> <tr> <td>Sulphur Dioxide (<u>gas</u> fired furnace)</td> <td>SO₂</td> <td>New</td> <td>800</td> </tr> </tbody> </table> <ul style="list-style-type: none"> The Batch plant must be enclosed and fitted with a specialized particulate removal system (e.g. ESP or filter bags) to ensure 98% control efficiency. 	Substance or mixture of substances		Plant Status	mg/Nm ³ under normal conditions of 10% O ₂ , 273 Kelvin and 101.3 kPa	Common name	Chemical symbol	Particulate Matter	N/A	New	30	Oxides of nitrogen	NO _x expressed as NO ₂	New	1500	Sulphur Dioxide (<u>gas</u> fired furnace)	SO ₂	New	800
Substance or mixture of substances		Plant Status	mg/Nm ³ under normal conditions of 10% O ₂ , 273 Kelvin and 101.3 kPa																
Common name	Chemical symbol																		
Particulate Matter	N/A	New	30																
Oxides of nitrogen	NO _x expressed as NO ₂	New	1500																
Sulphur Dioxide (<u>gas</u> fired furnace)	SO ₂	New	800																
Noise	<ul style="list-style-type: none"> In the design of the plant make provision for: <ul style="list-style-type: none"> Equipment selected and method statements should result in the lowest sound power levels. Vendors/contractors should provide guarantees to this effect. Noisy plant and equipment should be sited as far away from NSRs as possible. 																		

Aspect	Control measures
	<ul style="list-style-type: none"> - As far as is practically possible, noise generating components will be enclosed. • A noise screen/barrier will be placed between the site and the correctional services staff accommodation (guidance is included in the specialist study). • Where possible, plan for non-routine noisy activities to take place during day-time hours. • Limit heavy vehicle traffic to hours between 06:00 and 18:00 as far as possible. • Alternatives to the traditional reverse 'beeper' alarm such as a 'self-adjusting' or 'smart' alarm should be considered where these do not hamper health and safety requirements.
Visual	<ul style="list-style-type: none"> • In the design of the plant make provision for: <ul style="list-style-type: none"> - Only removing vegetation where this is necessary. - Establish tree screens along the north, east and south of the site. - Utilize locally appropriate, indigenous plant species in the landscaping. - Paint structures with colours that reflect and compliment the surrounding landscape. - Cladding and external surfaces of structures should be articulated or textured to create interplay of light and shade. - Install light fixtures that provide precisely directed illumination. - Avoid high pole top security lighting along the periphery of the site. - Minimise the number of light fixtures, including security lighting, to the minimum required.
Traffic	<ul style="list-style-type: none"> • In the design of the plant make provision for: <ul style="list-style-type: none"> - Traffic upgrades as per specialist study. - Provide signage, road markings and traffic calming measures where relevant in consultation with the roads authority. - Take care when placing signage in close proximity of access points. • Co-ordinate the transport of any abnormal heavy loads with the relevant roads department. • Comply with Hazchem requirements for the transport of any hazardous substances.

3 ADMINISTRATION AND REGULATION OF THE EMPr

3.1 ORGANISATIONAL STRUCTURE

The implementation of this EMPr requires the involvement of several stakeholders, each fulfilling a different but vital role to ensure sound environmental management during the planning and construction phase. Details of the management structure for this EMPr are presented below. All official communication and reporting lines including instructions, directives and information shall be channelled according to the management structure presented below.

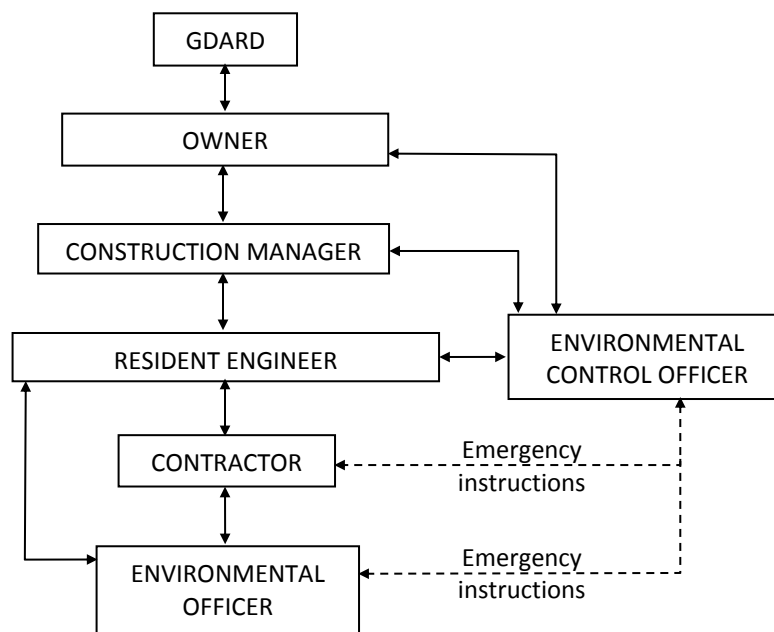


FIGURE 3-1: ORGANISATIONAL STRUCTURE FOR EMPr IMPLEMENTATION

3.2 ROLES AND RESPONSIBILITIES

3.2.1 Department of Agriculture and Rural Development (GDARD)

GDARD is the designated authority responsible for authorising this EMPr and has overall responsibility for ensuring that the holder complies with this EMPr and any conditions listed in the integrated Environmental Authorisation. GDARD will be responsible for approving any significant amendments that may be required to the EMPr.

3.2.2 Holder of Integrated Environmental Authorisation

The holder (applicant) of the integrated Environmental Authorisation is ultimately responsible for the implementation of the EMPr and the financial cost of all environmental control measures. The holder must ensure that any person acting on its behalf complies with the conditions / specifications contained in this EMPr. The holder is responsible for the appointment of a Construction Manager, Contractor and Environmental Control Officer (ECO).

The holder shall address any site problems pertaining to the environment at the request of the GDARD, Engineer and/or the ECO.

3.2.3 Construction Manager

The Construction Manager shall oversee the planning, design and construction phases of the project. The Construction Manager shall appoint a Resident Engineer (RE) to act as the holder's on-site implementing agent. The Construction Manager shall address any site problems pertaining to the environment at the request of the RE and / or the ECO.

3.2.4 Resident Engineer

The RE shall act as the holder's on-site implementing agent and has the responsibility to ensure that their obligations are executed in compliance with the EMPr. Any on-site decisions regarding environmental management are ultimately the responsibility of the RE. The RE shall assist the ECO where necessary and shall have the following responsibilities in terms of the implementation of this EMPr:

- Reviewing and approving the Contractor's Method Statements with input from the ECO where necessary;
- The day-to-day monitoring and verifying that the EMPr and Method Statements are adhered to at all times and taking action if specifications are not followed;
- Keeping a photographic record of construction activities on site;
- Assisting the Contractor in finding environmentally responsible solutions to problems with input from the ECO where necessary;
- Ordering the removal of person(s) and/or equipment not complying with the EMPr specifications;
- Issuing fines for transgressions of site rules and penalties for contravention of the EMPr;
- Delaying any construction activity if he/she believes the environment has been or is likely to be seriously harmed / impacted;
- Providing input into the ECO's ongoing review of the EMPr; and
- Communicating environmental issues to the Environmental Officer(s).

3.2.5 Environmental Control Officer

The ECO shall act as the holder's on-site environmental agent and has the responsibility to ensure that their obligations are executed in compliance with the EMPr. The ECO shall communicate directly with the RE. The ECO's duties shall include, *inter alia*, the following:

- Reviewing Method Statements;
- Advising the Contractor and / or the RE on environmental issues within defined construction areas;
- Undertaking regular site visits to ensure compliance with the EMPr and verifying that environmental impacts are kept to a minimum throughout the contract;
- Completing environmental checklists during site visits;
- Keeping a photographic record of progress on site from an environmental perspective;
- Assisting the Contractor, EO and / or the RE in finding environmentally acceptable solutions to construction problems;

- Recommending additional environmental protection measures should this be necessary;
- Assisting the RE in ensuring that the necessary environmental authorisations and permits have been obtained;
- Presenting the initial environmental awareness training course to the Contractor's site management staff;
- Ensuring that GDARD is informed of work progress on site;
- Reporting any incidents that may or have caused damage to the environment or breaches of the EMPPr to GDARD;
- Recommending the issuing of fines for transgressions of site rules and penalties for contraventions of the EMPPr (via the RE);
- Advising on the removal of person(s) and/or equipment not complying with the specifications (via the RE); and
- Compiling a final environmental audit report at the conclusion of the construction phase for submission to GDARD and Construction Manager.

The ECO shall visit the site monthly, or more frequently as required (i.e. during the initial stages of construction).

Should problems arise on site that cannot be resolved between the ECO and the RE, the ECO shall take the matter up with the Construction Manager and / or the holder. If the holder does not respond, the ECO shall take the matter up with GDARD.

3.2.6 Contractor(s)

The Contractor shall have the following responsibilities:

- To implement all provisions of the EMPPr. If the Contractor encounters difficulties with specifications, he / she must discuss alternative approaches with the RE and / or the ECO prior to proceeding;
- To ensure that all staff, including Sub-contractors, are familiar with the EMPPr;
- Monitoring and verifying that the environmental impacts are kept to a minimum;
- To make personnel aware of environmental issues and to ensure they show adequate consideration of the environmental aspects of the project;
- To prepare the required Method Statements (see Section 3.5);
- To report any incidents of non-compliance with the EMPPr to the RE and / or the ECO; and
- To rehabilitate any sensitive environments damaged due to his / her negligence. This shall be done in accordance with the RE's specifications.

Failure to comply with the EMPPr may result in fines and reported non-compliance may result in the suspension of work or termination of the contract by the Engineer.

The Contractor shall appoint, at his / her own cost, a competent individual as the on-site Environmental Officer (EO). Each Contractor's EO must be appropriately trained in environmental management and must possess the skills necessary to impart environmental management to all personnel involved in the contract.

3.2.7 Environmental Officer

The EO shall be responsible for monitoring, reviewing and verifying the Contractor's compliance with the EMPr during the construction phase. The EO's duties in this regard shall include, *inter alia*, the following:

- Monitoring and verifying that the EMPr and Method Statements are adhered to at all times and taking action if specifications are not followed;
- Monitoring and verifying that environmental impacts are kept to a minimum;
- Inspecting the site on a daily basis with regard to compliance with the EMPr;
- Keeping accurate and detailed records of these inspections;
- Completing weekly checklists;
- Assisting the RE and ECO in finding environmentally responsible solutions to problems;
- Supervision of work where environmental management is a key aspect (e.g. in sensitive areas, with high environmental risk, etc.);
- Keeping a record of on-site incidents and accidents and how these were dealt with;
- Reporting any incidents of non-compliance with the EMPr to the RE and / or the ECO; and
- Keeping a register of complaints on site and recording community comments and issues, and the actions taken in response to these complaints.

3.3 EMPr ADMINISTRATION

Copies of this EMPr shall be kept at the site office(s) and shall be made available to the Construction Manager, RE, Contractor, EO and the ECO. All senior personnel within the related organisations shall be required to familiarise themselves with the contents of this document.

Suggestions for revisions or updates to the EMPr should be directed to the ECO. Any significant revisions to the EMPr document must be approved by GDARD before the EMPr is revised. The ECO shall be responsible for the distribution of any "approved" revisions to the EMPr.

3.4 NOTIFICATION OF COMMENCEMENT OF CONSTRUCTION

The ECO shall give GDARD at least one week's (or as specified in the Environmental Authorisation) written notice prior to the commencement of construction. A general notification letter shall also be sent to neighbouring residents and businesses listed on the I&AP database.

3.5 METHOD STATEMENTS

The Contractor shall submit written Method Statements to the RE and ECO for all environmentally sensitive aspects of the work. Method Statements shall cover applicable details with regard to:

- Construction procedures;
- Materials and equipment to be used;
- Getting 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, RE or ECO.

Method Statements shall be submitted to the RE and ECO at least five (5) days prior to the commencement of the related works. It should be noted that Method Statements must contain sufficient information and detail to enable the RE and ECO to apply their minds to the potential impacts of the works on the environment. The Contractor will also need to thoroughly understand what is required of him / her in order to undertake the works.

Based on the specifications in this EMPr, the following Method Statements are required as a minimum:

- site clearance, preparation and earthworks;
- dust control;
- fire control;
- cement and concrete batching;
- storage and handling of dangerous goods; and
- spill clean-up.

The RE and / or the ECO shall specify any additional Method Statements that may be required. Where relevant, the Method Statements indicated above can be combined on agreement with the RE or ECO. Work shall not commence until Method Statements have been approved by the RE. Failure to submit Method Statements may cause the RE to order the Contractor to suspend part or all of the works concerned until a Method Statement has been submitted and approved. Any damage caused to the surrounding environment by work done without prior approval shall be rehabilitated at the Contractor's cost.

3.7 CONSTRUCTION PHASE EMPR

This section caters for the construction phase and forms the basis for the environmental specifications that the Contractor, in terms of the construction contract, will be obliged to adhere to during construction. This section of the EMPr should be included in the contract documentation for the construction phase and will thus form a binding agreement between the Contractor and the Holder.

3.7.1 Environmental management outcomes

Environmental objectives and goals to control, remedy or stop identified environmental impacts emanating from the site which may impact on communities and I&APs are outlined below (Table 3-1).

TABLE 3-1: ENVIRONMENTAL OBJECTIVES AND GOALS - CONSTRUCTION

Aspect	Environmental objective	Goals
Security and access control	To prevent physical harm to third parties and animals.	To prevent and control unauthorised access to the site.
Soil	To prevent unnecessary loss of soil resources.	To ensure that topsoil is not contaminated. To ensure that all topsoil is recovered and managed. To ensure the beneficial use of soil stripped from the project footprint.
Vegetation	To prevent unacceptable disturbance of biodiversity and related ecosystem functionality	To avoid loss of natural resources. To ensure rehabilitation of disturbed areas.
Water and aquatics	To prevent and minimise contamination of resources and unacceptable loss of aquatic ecosystems and related functionality.	To avoid contamination of freshwater resources.
Air quality	To prevent unacceptable air quality related impacts.	To operate responsibly within the ambit of the existing ambient site conditions.
Noise	To limit excessive noise pollution from project activities and facilities.	To operate as a responsible neighbour.
Visual	To limit excessive visual impacts.	To develop a plant that is aesthetically pleasing and appropriate for its location.
Stakeholders	To support open and transparent communication between the project and stakeholders.	To support open and transparent communication between the project and stakeholders.
Socio-economic	To enhance positive and minimise negative economic impacts. To prevent unacceptable impacts on surrounding land uses and their economic activity.	To work together with existing structures and organisations. To establish and maintain a good working relationship with surrounding stakeholders.
Traffic	To reduce the potential for project-related impacts on third party road users.	To ensure the use of public roads is done in a responsible manner. To upgrade the roads to ensure that service levels remain acceptable.
Heritage	To prevent unacceptable loss of resources and related information.	To protect heritage resources where possible. If disturbance is unavoidable, then mitigate impact in line with regulatory requirements.

3.7.2 Impact management action plan

The construction management action plan is presented below in tabular format, together with timeframes for each action (see Table 3-2). The action plan includes the frequency for implementing the mitigation measures and identifies the responsible party. Site specific plans are included for soil and waste management (see Tables 2-5 and 2-6). The action plans must be implemented during the construction phase.

3.7.3 Monitoring programme

The purpose of the monitoring programme (see Table 2-7) is to review the site's impact on various aspects of the environment and to report on changes needed to the management programme as proposed in this report. The programme includes the monitoring of environmental aspects such as water resources, air and noise, as well as for EMPr performance assessment. Figure 3-2 provides the location of monitoring points.

TABLE 3-2: IMPACT MANAGEMENT ACTION PLAN - CONSTRUCTION

Aspect	Action plan and control measures	Action plan		
		Timeframe	Frequency	Responsible parties
Construction camp	<ul style="list-style-type: none"> The construction camp(s) shall be located within the project site, at an easily accessible point(s) and within an area of low environmental sensitivity that is visually unobtrusive. The Contractor shall take reasonable measures to ensure that construction camp does not have an unreasonable impact on the aesthetics of the area or cause a reasonably avoidable disturbance to the surrounding users. All construction areas shall be kept neat and tidy at all times. Provide appropriate sanitary facilities. 	Entire construction phase	Continuous	Construction Manager
Site Demarcation	<ul style="list-style-type: none"> If the site is not fully fenced, demarcate the construction area with a temporary fence. All areas outside of this shall be regarded as a 'no-go' area. The ECO may declare additional no-go areas at any time during the construction phase as deemed necessary. The Contractor shall ensure that his/her staff do not enter private properties adjacent to the construction site under any circumstances except on official business. 	Entire construction phase	Continuous	Construction Manager
Design controls	<ul style="list-style-type: none"> Construct site in a manner that ensures compliance with the design controls outlined in Section 5 of the EIAR as well as the measures detailed in Section 3.7 of the EMPr. 	Entire construction phase	Continuous	Construction Manager
Security and access control	<ul style="list-style-type: none"> Establish and maintain security control measures. Undertake regular patrols of plant perimeter. Implement community awareness programme. Handle any injury or death in accordance with the emergency response procedure (see Section 3.11). 	From start From start From start Emergency	Continuous Weekly At start and then quarterly As required	Construction Manager Security personnel ECO Construction Manager
Stakeholder engagement	<ul style="list-style-type: none"> Implement the stakeholder communication and engagement strategy. Implement and maintain the formal complaints (grievance) procedure. 	From start From start	Continuous, quarterly meetings Continuous	Construction Manager ECO

Aspect	Action plan and control measures	Action plan		
		Timeframe	Frequency	Responsible parties
Soil and vegetation management	<ul style="list-style-type: none"> Implement soil management and rehabilitation plan (Table 2-5). Implement waste management plan and maintain waste management systems (<ul style="list-style-type: none"> Table 3-4). Implement an alien invasive plant management plan. Maintain containment measures in proper working conditions and with sufficient capacity. Handle major spillage incidents in accordance with the emergency response procedure (see Section 3.11). Implement a search and rescue programme to collect and relocate all protected <i>Crinum macowanii</i> individuals within the site. 	From start From start From start	Continuous Continuous Continuous	Construction Manager Construction Manager Construction Manager
		Emergency	As required	Construction Manager
Hazardous materials handling and storage	<ul style="list-style-type: none"> All fuel, oil and other hazardous substances (i.e., paints, poisons, etc.) shall be confined to demarcated, adequately bunded areas within the construction camp and stored in suitable containers. The Contractor shall ensure that run-off from any hazardous substance storage area is contained. The relevant Material Safety Data Sheets for all hazardous chemical substances (as defined in the Regulations for Hazardous Chemical Substances) shall be available. The ground surface under any refuelling/servicing area shall be protected against pollution. Concrete batching activities shall be located in an area of low environmental sensitivity to be identified and approved by the ECO. 	From start	Continuous	Construction Manager
		From start	Continuous	Construction Manager
		From start	Continuous	Construction Manager
		From start	Continuous	Construction Manager
Effluent management	<ul style="list-style-type: none"> Undertake the primary earthwork activities for the discharge channel in the drier winter months. Implement soil management and rehabilitation plan. Monitor water quality in the Vaal tributary. 	Drier winter months	Once off	Construction Manager
		From start As per Section 3.7.3	Continuous As per Section 3.7.3	Construction Manager Construction Manager
Storm water management	<ul style="list-style-type: none"> Implement a storm water management system. Protect areas susceptible to erosion by installing the necessary temporary and permanent drainage works as soon as possible and by taking measures necessary to prevent surface water from being concentrated in streams and from scouring slopes, banks or other areas. 	From start From start	Continuous Continuous	Construction Manager Construction Manager
Air quality management	<ul style="list-style-type: none"> Implement a dust suppression management system. Reduce fugitive PM emissions through the sweeping of surfaced roads. Reduce vehicle entrainment emissions from the paved access roads using a mechanical sweeper, strict enforcement of speed limits (maximum 20 km/h on access roads), and regular clean-ups of road spillages. 	From start During dry periods From start	Continuous As required Continuous	Construction Manager Construction Manager Construction Manager
		As per Section 3.7.3	As per Section 3.7.3	Construction Manager

Aspect	Action plan and control measures	Action plan		
		Timeframe	Frequency	Responsible parties
	<ul style="list-style-type: none"> Vegetate any areas where further disturbance is unlikely. Monitor ambient dustfall. 			
Noise management	<ul style="list-style-type: none"> Maintain all equipment and vehicles in proper working order. Implement an equipment and vehicle maintenance plan. Any change in the noise emission characteristics of equipment will serve as trigger for withdrawing it for maintenance. Records will be kept for auditing purposes. Maintain road surfaces regularly to repair potholes and any damages. Avoid unnecessary idling times at all times. Minimise the need for trucks/equipment to reverse. When reversing, vehicles should travel in a direction away from receptors if possible. Conduct noise monitoring. 	From start From start From start From start From start From start From start As per Section 3.7.3	Continuous As per schedule in plan As required As required Continuous Continuous Continuous As per Section 3.7.3	Construction Manager Construction Manager Construction Manager Construction Manager Construction Manager Construction Manager Construction Manager Construction Manager
Traffic management	<ul style="list-style-type: none"> Maintain road and traffic upgrades. Maintain all equipment and vehicles in proper working order. Report any issues pertaining to damages and poor road conditions in close proximity of the project to the applicable authority and custodian of the respective roads. Handle any road accident involving or caused by project related traffic in accordance with the emergency response procedure (see Section 3.11). 	From start From start From start Emergency	Continuous Continuous As required As required	Construction Manager Construction Manager Construction Manager Construction Manager
Socio-economic development	<ul style="list-style-type: none"> Implement recruitment and procurement policies and procedures. Implement local corporate social investment strategies. Implement influx management plan. Implement health management plan for employees. 	From start From start From start From start	As required As required As required As required	Construction Manager Construction Manager Construction Manager Construction Manager
Monitoring	<ul style="list-style-type: none"> Monitor implementation of the EMP during construction Monitor environmental parameters as per Table 3-5. 	From start From start	Daily Monthly As required	Environmental Officer ECO ECO

TABLE 3-3: SITE-SPECIFIC SOIL MANAGEMENT AND REHABILITATION PLAN

Aspect	Action plan and control measures
Delineation of areas to be stripped	<ul style="list-style-type: none"> • Delineate project infrastructure footprints at the start of construction. • Topsoil stripping must only occur within delineated project infrastructure footprints.
Delineation of stockpiling areas	<ul style="list-style-type: none"> • Soil stockpile areas must be clearly marked on the ground and on the site layout map. • Stockpiling areas must be located within the site boundary near to the end use of the soil to limit handling and to promote reuse of soils in the correct areas. • Soil stockpiles must be located away from waste handling areas.
Search and rescue	<ul style="list-style-type: none"> • Implement a search and rescue programme to collect and relocate all protected <i>Crinum macowanii</i> individuals with the site. • This must be undertaken per the requirements of the permit.
Stripping and handling of soils and vegetation	<ul style="list-style-type: none"> • Undertake primary earthworks activities in the drier winter months. • The top 60 cm (greater if available) of soil removed during earthworks must be considered as topsoil. • Topsoil must be stockpiled separately from other soils, fill and spoil materials. • No foreign materials should be mixed with topsoil. • Soils should be handled in dry weather conditions as far as practically possible so as to minimise erosion and cause as little compaction as possible. • Movement of soils should be done in single actions wherever possible to reduce compaction, increase the viability of the seed bank and protect the soil structure. • Vegetation should be removed in a staged manner, where possible, to limit erosion. • Indigenous vegetation that is stripped should be stored as part of the utilizable soil. • As far as possible stripped soil must be used on site in landscaping of the site. • Topsoil may only be used for final shaping and landscaping and not as fill or spill. • Identify beneficial uses for excess topsoil that cannot be used on site. This could include sale to third parties.
Stockpile management	<ul style="list-style-type: none"> • Soil stockpile height should be restricted to between 4 and 5 metres to avoid compaction and damage to the underlying soils. For extra stability and erosion protection, stockpiles may be benched. • Soil stockpiles to include run-off and erosion (by water and wind) control measures especially where stockpiles will remain for more than 1 year and/or one rainy season. • Movement on top of soil stockpiles should be limited to avoid topsoil compaction and subsequent damage to the soils and seedbank. • Routine monitoring of stockpiles should take place.
Protection of soils, where possible	<ul style="list-style-type: none"> • Construction roads, equipment and material staging and storage areas should be delineated at the start of construction. • Operation of heavy vehicles and machinery, including delivery of materials should be confined to delineated sites to minimise compaction of soils. • No unnecessary off road or off-site driving should be allowed. • Non-infrastructure areas should be re-vegetated as quickly as possible to limit erosion and dust formation. • Where storm water flow is concentrated or discharged to the environment, controls which reduce the velocity and erosive energy of these waters must be implemented. • Water should be sprayed on roads to suppress dust.
Prevent and manage spills	<ul style="list-style-type: none"> • Provide sufficient quantities of appropriate spill kits for use on site. These should be available at all times. • Handle major spillage incidents in accordance with the emergency response procedure (see Section 2.1.2). • Any contaminated soil should be remediated appropriately. Options could include <i>in-situ</i> bio-remediation (where feasible), bio-remediation at a dedicated area within the site (<500 kg treatment capacity) or removal and disposal in accordance with SANS 10234 (classification and offsite disposal at a permitted hazardous waste facility).
Rehabilitation and landscaping	<ul style="list-style-type: none"> • Soils across non-infrastructure areas, disturbed during construction, should be loosened to alleviate compaction and vegetated as quickly as possible. • All wastes, except inert materials, should be removed prior to the placement of soils. • Utilisable soil should be redistributed in a manner that achieves a stable soil of approximately uniform thickness, consistent with the landscaped/rehabilitated area.

Aspect	Action plan and control measures
	<ul style="list-style-type: none">• Placement of topsoil should be done in consultation with a specialist and in a manner that supports the sustainability of the landscaped/rehabilitated area.• Only indigenous plant species* should be used across landscaped/rehabilitated area.• Erosion control measures must be implemented to ensure that the topsoil is not washed or blown away and that erosion gulleys do not develop.• Alien invasive plant species must be removed from the site*.• Routine monitoring of the landscaped/rehabilitated area should take place. <p>*Non- invasive, exotic tree species may be utilized for screening (noise and visual) where indigenous species are not fit-for-purpose.</p>

TABLE 3-4: WASTE MANAGEMENT PRACTICES FOR DOMESTIC AND INDUSTRIAL SOLID WASTE

Aspect	Action plan and control measures
Classification and record keeping	<ul style="list-style-type: none"> • Waste management procedures for the site should cover the storage, handling and transportation of waste from the site. • Contractors responsible for waste management must be made aware of the procedures prior to their appointment. • Management actions for each waste stream must be reviewed annually to assess whether there are alternative uses for the material. Alternative uses should be prioritized over the disposal option. • Wastes (except those listed in Annexure 1 of the Waste Regulations) should be classified in accordance with SANS 10234 within 180 days of generation. • Waste should be re-classified every five (5) years, or within 30 days of a modification to the process or activity that generated the waste, changes in raw materials or other inputs, or any other variation of relevant factors. • Ensure safety data sheets for hazardous waste (prepared in accordance with SANS 10234) are available where required in terms of the Regulations. • Maintain an accurate and up to date record of the management of the wastes generated, which records must reflect: <ul style="list-style-type: none"> - the classification of the wastes; - the quantity of each waste generated, expressed in tons or m³ per month; - the quantities of each waste that has either been re-used, recycled, recovered, treated or disposed of; and - by whom the waste was managed. • If activities generate more than 20 kg of hazardous waste per day, then the facility must register with the Gauteng Waste Information System and submit records as required by the National Waste Information Regulations. • Written evidence of safe disposal of waste to licensed disposal facilities must be kept. • Waste related records must be retained for a period of at least 5 years and should be made available to the Department on request. • Any container or storage impoundment holding waste must be labelled, or where labelling is not possible, records must be kept, reflecting: <ul style="list-style-type: none"> - the date on which waste was first placed in the container; - the date on which waste was placed in the container for the last time when the container was filled, closed, sealed or covered; - the dates when, and quantities of, waste added and waste removed from containers or storage impoundments, if relevant; - the specific category or categories of waste in the container or storage impoundment as identified in terms of the National Waste Information Regulations, 2012; and - the classification of the waste in terms of Regulation 4 once it has been completed (if required).
On-site waste management	<ul style="list-style-type: none"> • Littering must not be permitted. • No waste may be buried or burned on site. • Waste generated on-site must be: <ul style="list-style-type: none"> - separated into general and hazardous waste. - further separated into recyclable and non-recyclable wastes where appropriate. - placed in appropriate containers. • Designated waste collection points or storage areas must be established on site at locations that do not pose risk to the quality of storm water runoff. • Ensure that there are sufficient collection points with adequate capacity and that these are serviced frequently. • Provide sanitary facilities with adequate capacity and that are serviced frequently during construction. • No waste may be stored outside of the demarcated construction site. • Inert building and demolition waste may be stored in stockpiles, which must not exceed demarcated areas and should be located away from storm water flow paths. • General waste should be placed in designated bins or skips for temporary storage. • Hazardous wastes should be placed in designated, labelled containers with a lid or under cover for temporary storage. Such containers must be placed in a designated area marked as "Hazardous Waste Area".

Aspect	Action plan and control measures
	<ul style="list-style-type: none"> • Waste may not be mixed or treated where this would reduce the potential for re-use, recycling or recovery; or result in treatment that is not controlled and not permanent. • Waste may be blended or pre-treated to enable potential for re-use, recycling, recovery or treatment; or reduce the risk associated with management of the waste.
Off-site waste management	<ul style="list-style-type: none"> • Unless collected by the municipality, it must be ensured that wastes are directed to a qualified waste management contractor for management at an appropriately licensed facility, except where not required. • Only qualified waste management subcontractors should undertake the waste transport. • Wastes that consist of re-useable containers or packaging should be returned to suppliers. • Recyclable materials must be passed onto legitimate waste recyclers. • Where waste is destined for disposal, it must be ensured that it is assessed in accordance with the Norms and Standards for Assessment of Waste for Landfill Disposal set in terms of section 7(1) of the NEMWA prior to the disposal of the waste to landfill. • It must be ensured that the disposal of waste to landfill is done in accordance with the Norms and Standards for Disposal of Waste to Landfill set in terms of section 7(1) of the NEMWA. • General wastes should only go to appropriately licensed facility. • Hazardous wastes should only go to appropriately licensed facility. • Contractors must provide an inventory of each load of waste collected and of proof of delivery to the waste management facility or disposal at a licensed facility. • Waste management related records must be retained for a period of at least 5 years.

TABLE 3-5: MONITORING PLAN - CONSTRUCTION

Impact	Parameter	Location of monitoring	Key performance indicator	Method of monitoring	Responsible person	Frequency	Reporting mechanism	Thresholds standards /	Recommended action
EMPr MONITORING AND PERFORMANCE ASSESSMENT									
Overall impact of the project	EMPr, EA conditions, project scope as provided for in this report	Site activities	Compliance	Site inspection and verification of monitoring data	Construction Manager, EO and ECO	Monthly (ECO) Annually and at completion	Internal reports External audit report for submission to GDARD	EMPr and EA conditions	Implement additional measures where required
Overall impact of the project	As above and including method statements and procedures	Site activities	Compliance	As above including photographic record, incident register, complaints register	Construction Manager, EO and ECO	Daily (EO), Weekly (Construction Manager) Monthly (ECO)	Internal reports	EMPr and EA conditions	Implement additional measures where required
WATER									
Surface water baseline quality	See Table 2-8, initial analysis to include full list. Once trends are established this list will be revised to monitor parameters of concern more regularly and other parameters less frequently	Receiving watercourse – upstream and downstream of discharge point (See Figure 3-2 Error! Reference source not found.)	As a minimum maintain baseline quality	Grab sampling	ECO and appropriately qualified specialist	Monthly	Internal and external reports	Compare against baseline quality and authorisation limits	Implement additional measures in consultation with authorities and specialist
Groundwater baseline quality		Boreholes as shown in Figure 3-2, can be amended with input from specialist	Maintain baseline quality; however, if contamination does migrate off site corrective action must be taken.	Grab sampling		Monthly	Internal and external reports	Compare against baseline quality and authorisation limits	
Water use	Supply volumes and use	At supply point	-	Flow meters		Continuous	Internal and external reports	Compare against service agreement	
BIOMONITORING									

Impact	Parameter	Location of monitoring	Key performance indicator	Method of monitoring	Responsible person	Frequency	Reporting mechanism	Thresholds / standards	Recommended action
Aquatic habitats and ecosystems baseline	Aquatic ecosystem health	Receiving watercourse – upstream and downstream of discharge point (See Figure 3-2)	As a minimum maintain baseline conditions	SASS5, Rapid Assessment	ECO and appropriately qualified specialist	Every six months	Internal report	As a minimum maintain baseline conditions	Implement additional measures in consultation with authorities and specialist.
AIR									
Dust generation	Dustfall	See Figure 3-2 Error! Reference source not found..	Compliance with non-residential limits at source and residential limits at receptors off-site	Visual, photos, dust buckets using American Society of Testing and Materials (ASTM) method	ECO and appropriately qualified specialist	Continuous with quarterly reporting	Internal and external reports	No visible dust plume in immediate vicinity of sources. Evaluation criteria adopted for this project can be revised with input from air specialist.	Implement additional measures in consultation with authorities and specialist.
NOISE									
Increase in ambient noise levels	dBA	Correctional services accommodation	55 dBA during the day and 45 dBA during the night	Day and night measurements with suitable instruments.	ECO and appropriately qualified specialist	Annually	Internal and external reports	55 dBA during the day and 45 dBA during the night	Implement additional measures in consultation with GDARD and noise specialist.
	dB	Livestock grounds	Below 85 to 90 dB			Annually		Below 85 to 90 dB	
SOCIAL									
Negative social impacts	Development's impact on local communities	Surrounding areas	Progress on implementation of policies and plans No. of complaints	Document review, complaints register	ECO	Monthly	Internal report	>5 complaints or observations Corporate sponsorship or support	Implement additional measures in consultation with authorities and specialist.

TABLE 3-6: WATER MONITORING PARAMETERS

In field measurements						
pH	Turbidity		Electrical conductivity		Total dissolved solids	
Laboratory analysis						
pH	Total dissolved solids	Carbonate as CO ₃	Alkalinity as CaCO ₃	Bicarbonate as HCO ₃	Sodium	Chloride
Electrical conductivity	Free and Saline Ammonia as N (NH ₃)	Nitrate as N (NO ₃)	Hydrocarbons	ICP- scan for trace metals (dissolved concentrations)	Calcium	Sulphate
Suspended solids	Orthophosphate (as P)	Manganese	Potassium	Faecal coliform units (FCU)	Fluoride	

TABLE 3-7: AIR QUALITY EVALUATION CRITERIA

Pollutant	Limit values	Frequency of exceedance
	Dustfall rate (mg/m ² /day)	Occurrences per year
Dustfall – residential areas	D < 600	Two within a year, not sequential months
Dustfall – non-residential areas	600 < D < 1200	

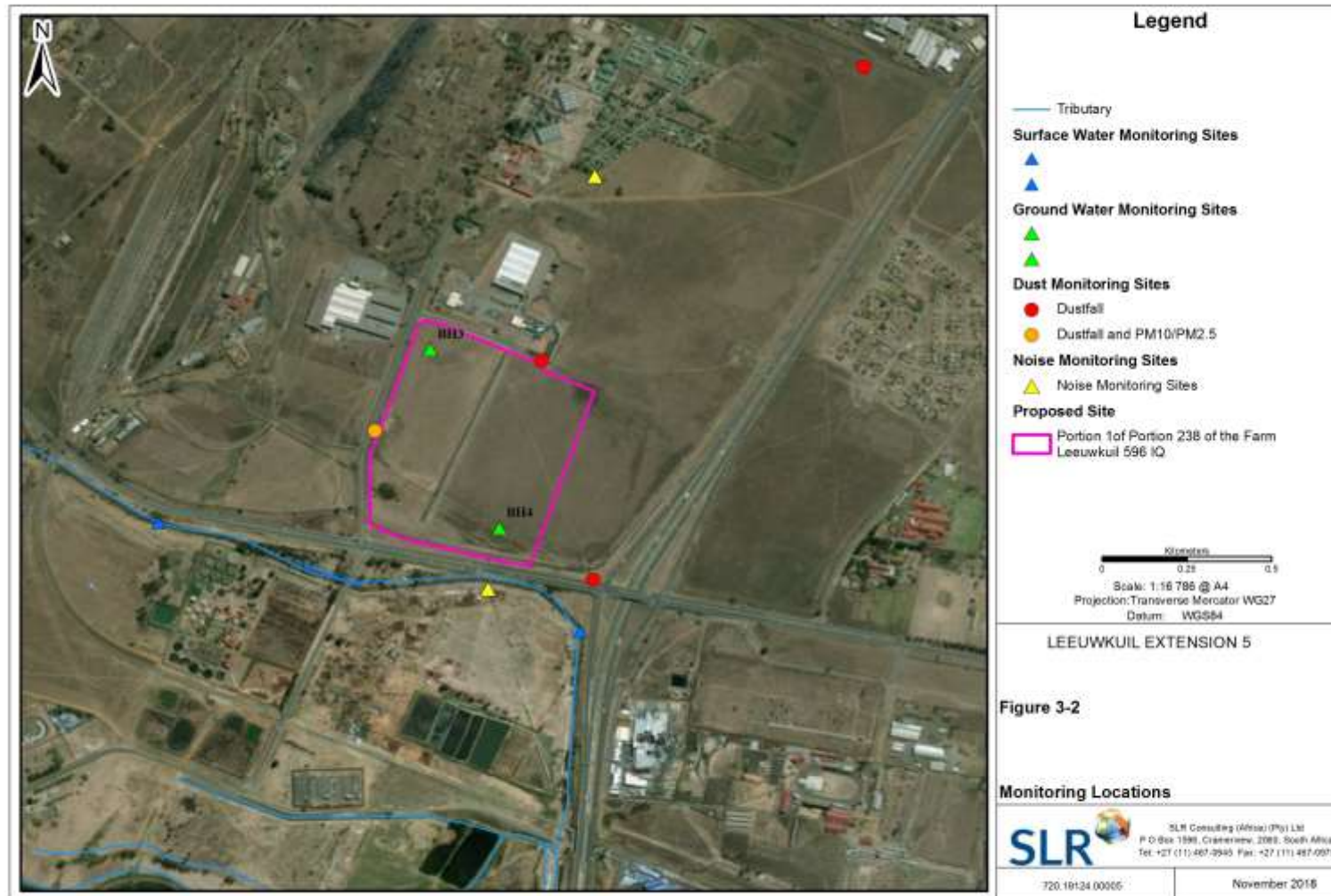


FIGURE 3-2: MONITORING LOCATIONS

3.8 ENVIRONMENTAL AWARENESS PLAN AND TRAINING

This section includes an environmental awareness plan for the site. The plan describes how contractors or employees would be informed of environmental risks which may result from their work, the manner in which the risk must be dealt with in order to avoid contamination or degradation of the environment and the training required for general environmental awareness and the dealing of emergency situations and remediation measures for such emergencies. This plan will be applied from the start of construction through operations.

The purpose of the environmental awareness plan is to ensure that all personnel and management understand the general environmental requirements of the site. In addition, greater environmental awareness must be communicated to personnel involved in specific activities which can have a significant impact on the environment and ensure that they are competent to carry out their tasks on the basis of appropriate education, training and/or experience. The environmental awareness plan should enable the site to achieve the objectives of an environmental policy.

3.8.1 Environmental policy

The environmental policy would be displayed prominently at the site entrance and on key notice boards. The core objectives of the environmental policy are described below.

- To minimise impact on the environment (including social) wherever possible.
- To comply with all applicable environmental legislation and the commitments contained in the Environmental Management Programme (EMPr).
- To ensure that all employees, contractors and sub-contractors:
 - Are aware of the impact of their activities on the environment
 - Are informed about the measures required to prevent, mitigate and manage environmental impacts
 - Apply these principles whilst carrying out their work.
- To establish and maintain a good relationship with stakeholders and other I&APs with regard to the activities on site.
- To develop a localised environmental strategy with the local authority and relevant stakeholder groups.
- To provide relevant and constructive consultation/public participation on the management of the potential environmental impacts posed by the site.

3.8.2 Steps to achieve the environmental policy objectives

The environmental policy would be realised by setting specific and measurable objectives. It is proposed that new objectives are set through the construction phase of the project. Initial objectives are outlined below.

- Management of environmental responsibilities:
 - Appoint an Environmental Manager at senior management level, who will be provided with the necessary resources to carry out the management of all environmental aspects of the site as a primary function, for example:
 - compliance with environmental legislation and EMPr commitments;
 - implementing and maintaining an environmental management system;
 - developing environmental emergency response procedures and coordinating personnel during incidents;

- managing routine environmental monitoring and data interpretation;
- environmental trouble shooting and implementation of remediation strategies;
- closure planning (when required).
- Communication of environmental issues and information:
 - Carry out meetings, consultations and progress reviews and include:
 - set the discussion of environmental issues and feedback on environmental projects as an agenda item at all company board meetings;
 - provide progress reports on the achievement of policy objectives and level of compliance with the approved EMPr to the GDARD;
 - ensure environmental issues are raised at monthly management meetings and relevant meetings at all levels;
 - ensure environmental issues are discussed at all general liaison meetings with local communities and other interested and affected parties.
- Environmental awareness training:
 - Environmental awareness training would be provided to all individuals at a level of detail specific to the requirements of their job, but would generally comprise:
 - Basic awareness training for all prior to granting access to site (e.g. short video presentation requiring registration once completed). Employees and contractors who have not attended the training will not be allowed on site;
 - General environmental awareness training will be given to all employees and contractors as part of the Safety, Health and Environment (SHE) induction programme. All non-plant personnel who will be on site for more than five days must undergo the SHE induction training;
 - Specific environmental awareness training will be provided to personnel whose work activities can have a significant impact on the environment (e.g. workshops, waste handling, sanitation, effluent treatment, etc.).
- Review and update the environmental topics identified in the EMPr.
- Design all projects to minimise impact on the environment.
- Maintain records of all environmental training, monitoring, incidents, corrective actions and reports.

3.8.3 Training objectives and general contents of the environmental awareness plan

An environmental awareness plan ensures that training needs are identified and that appropriate training is provided. The environmental awareness plan should communicate:

- the importance of conformance with the environmental policy, procedures and other requirements of good environmental management;
- the significant environmental impacts and risks of individuals' work activities and explain the environmental benefits of improved performance;
- individuals' roles and responsibilities in achieving the aims and objectives of the environmental policy; and
- the potential consequences of not complying with environmental procedures.

To achieve the objectives of the environmental awareness plan the general contents of the training plans should be as follows:

- Module 1 – Basic training plan applicable to all personnel entering the site:
 - Short (15min) presentation to indicate the site layout and activities at specific business units together with their environmental aspects and potential impacts.
 - Individuals to sign off with site security on completion in order to gain access to the site.
- Module 2 – General training plan applicable to all personnel at the site for longer than 5 days:

- General understanding of the environmental setting of the plant (e.g. local communities and proximity to natural resources).
- Understanding the environmental impact of individuals' activities on site (e.g. excessive production of waste, poor housekeeping, energy consumption, water use, noise, etc.).
- Indicate potential site specific environmental aspects and their impacts.
- The site's environmental management strategy.
- Identifying poor environmental management and stopping work which presents significant risks.
- Reporting incidents.
- Examples of poor environmental management and environmental incidents.
- Procedures for emergency response and cleaning up minor leaks and spills.
- Module 3 – Specific training plan dependent on the employees work specification:
 - Environmental setting of the workplace (e.g. proximity of residential areas and natural resources, etc.);
 - Specific environmental aspects and the impact of these aspects.
 - Site's duty of care.
 - Purpose and function of the environmental management system.

Individuals required to complete Module 3 (Specific training module) would need to complete Modules 1 and 2 first. On completion of Module 3, individuals would be subject to a short test (written or verbal) to ensure the level of competence has been achieved. Individuals who fail the test would be allowed to re-sit the test after further training.

The actual contents of the training modules would be developed based on a training needs analysis. Key personnel would be required to undergo formal, external environmental management training (e.g. how to operate the environmental management system, waste management and legal compliance). In addition to the above the site would:

- Conduct refresher training/presentations on environmental issues for employees (permanent and contractors) at regular intervals.
- Promote environmental awareness using relevant environmental topic posters displayed at strategic locations on the site. These topics would be changed monthly, and would be reviewed annually by the SHE Manager to ensure relevance.
- Participate and organise events which promote environmental awareness, some of which would be tied to national initiatives e.g. National Arbour Week, World Environment Day and National Water Week.

3.9 INTERNAL REVIEW AND AUDITING

The Contractor and EO shall establish an internal review procedure to monitor the progress and implementation of the EMPr. Each contractor shall report on their compliance with the EMPr to the ECO monthly. The ECO shall report monthly to the Construction Manager on overall compliance with the EMPr.

Where necessary, and upon the recommendation of the RE and / or the ECO, procedures that require modification shall be changed to improve the efficiency of the EMPr. Any significant revisions to the EMPr document must be approved by GDARD and recorded in the revised EMPr. Any non-significant changes or adjustments to the EMPr shall be registered in the daily records of the RE. Adjustment and update of the original EMPr document is not required when these *ad hoc* changes are made.

At the conclusion of the construction phase, an environmental audit report shall be compiled and submitted to GDARD (or as specified in the Environmental Authorisation). This report shall be compiled by the ECO, in collaboration with the RE, EO and the Contractor. It shall, as a minimum, outline the implementation of the EMPr, and highlight any problems and issues that arose during the construction period to report, on a formal basis, the lessons learned from this project.

3.10 PERMITS AND LICENCES

3.10.1 Vegetation Clearing and Plant / Seed Collection

The ECO shall apply to GDARD for a permit to clear vegetation and collect indigenous plant species (Search and Rescue operation) prior to construction commencement.

3.10.2 Archaeological Permit

The ECO shall ensure that an archaeologist shall inspect the site for surface archaeological resources once vegetation clearing operations have been completed, but prior to the commencement of bulk earthworks. If surface archaeological resources are visible, these might need to be further investigated by the archaeologist, under permit from SAHRA, to determine the potential significance of the deposits.

3.11 PROCEDURES IN CASE OF ENVIRONMENTAL INCIDENTS

Emergency procedures apply to incidents that are unexpected and that may be sudden, and which lead to serious danger to the public and/or potentially serious contamination of, or detriment to the environment (immediate and delayed). Procedures to be followed in case of environmental incidents are described in Section 3.11.2 below. The procedures will be applied from the start of construction.

3.11.1 General Emergency Procedure

The general procedure that should be followed in the event of all emergency situations is outlined below.

- The Construction Manager and ECO must be notified of an incident upon discovery;
- Area to be cordoned off to prevent unauthorised access and tampering of evidence;
- If controls are partially or totally failing and this cannot be prevented, the emergency siren is to be sounded (nearest one available);
- Take photographs and samples as necessary to assist in investigation;
- The ECO must comply with Section 30 of the National Environmental Management Act (107 of 1998) such that:
 - The Environment department must immediately notify the Director-General (DEA, DWS, as appropriate), the South African Police Services and relevant fire prevention service, the provincial head of GDARD or municipality, the head of the regional DWS office and any persons whose health may be affected, of:
 - the nature of the incident;
 - any risks posed to public health, safety and property;
 - the toxicity of the substances or by-products released by the incident; and
 - any steps taken to avoid or minimise the effects of the incident on public health and the environment.
 - The Construction Manager must as soon as is practical after the incident:

- take all reasonable measures to contain and minimise the effects of the incident including its effects on the environment and any risks posed by the incident to the health, safety and property of persons;
 - undertake clean up procedures;
 - remedy the effects of the incident; and
 - assess the immediate and long term effects of the incident (environment and public health).
- Within 14 days the ECO must report to the Director-General (DEA, DWS, as appropriate), the provincial head of GDARD and the local municipality, the head of the regional DWS office such information as is available to enable an initial evaluation of the incident, including:
- the nature of the incident;
 - the substances involved and an estimation of the quantity released;
 - the possible acute effects of the substances on the persons and the environment (including the data needed to assess these effects);
 - initial measures taken to minimise the impacts;
 - causes of the incident, whether direct or indirect, including equipment, technology, system or management failure; and
 - measures taken to avoid a recurrence of the incident.

3.11.2 Identification of Emergency Situations

Project-specific emergency situations that have been identified together with specific emergency response procedures are outlined in Table 3-8.

TABLE 3-8: EMERGENCY RESPONSE PROCEDURES

Item	Emergency Situation	Response in addition to general procedures
1	Spillage of chemicals, engineering substances, waste	Where there is a risk that material will contaminate the land (leading to a loss of resource), surface water and/or groundwater, the site will: <ul style="list-style-type: none"> • Notify users downstream of the contamination incident. • Identify and provide alternative resources should contamination impact adversely on the existing environment. • Cut off the source of the spill) and make the infrastructure 'safe'. • Contain the spill (e.g. construct temporary earth bund around source) or redirect the spill to a contained area. • Pump excess hazardous liquids on the surface to temporary containers for appropriate disposal. • Remove hazardous substances from damaged infrastructure to an appropriate storage area before it is removed / repaired.
2	Discharge of dirty water or effluent to the environment	Apply the principals listed for Item 1 above. To stop spillage from the dirty water system the site will: <ul style="list-style-type: none"> • Pump dirty water to available containment. • Apply for emergency discharge as a last resort.
3	Groundwater contamination	<ul style="list-style-type: none"> • Use the downstream monitoring borehole as a scavenger well to pump out the polluted groundwater (hence containing the contamination and preventing further migration). • Investigate the source of contamination and implement control/mitigation measures.
4	Burst water pipes (loss of resource and erosion)	<ul style="list-style-type: none"> • Shut off the water flowing through the damaged area and repair the damage. • Apply the principals listed for Item 1 above if spill is from the dirty/process water circuit.
5	Failure of surface water control infrastructure	<ul style="list-style-type: none"> • Evacuate the area downstream of the failure. • Using the emergency response team, rescue/recover and medically treat any injured personnel and/or animal (where applicable). • Temporarily reinstate/repair storm water diversions during the storm event (e.g. emergency supply of sandbags). • Close the roads affected by localised flooding or where a storm water surge has destroyed crossings/bridges.
6	Risk of drowning from falling into water	<ul style="list-style-type: none"> • Attempt rescue of individuals from land by throwing lifeline/lifesaving ring. • Get assistance of emergency response team whilst attempting rescue. • Ensure medical assistance is available to recovered individual (where applicable).
7	Fire	<ul style="list-style-type: none"> • Evacuate employees from areas at risk. • Notify downwind residents and industries of the danger. • Assist those in imminent danger/less able individuals to evacuate until danger has passed. • Provide emergency fire-fighting assistance with available trained personnel and equipment.
8	Road traffic accidents	<ul style="list-style-type: none"> • The individual discovering the accident (be it bystander or able casualty) must raise the alarm giving the location of the incident. Able personnel at the scene should shut down vehicles where it is safe to do so. • Access to the area should be restricted and access roads cleared for the emergency response team. • Vehicles must be made safe first by trained professionals (e.g. crushed or overturned vehicles). • Casualties will be moved to safety by trained professionals and provided with medical assistance. • Medical centres in the vicinity with appropriate medical capabilities will be notified if multiple seriously injured casualties are expected.
9	Uncovering of graves and sites	<ul style="list-style-type: none"> • Personnel discovering the grave or site must inform the Environment Manager immediately. • An accredited heritage specialist must be notified of the find immediately. Measures to be implemented in line with the specialist recommendations.

Item	Emergency Situation	Response in addition to general procedures
		<ul style="list-style-type: none">• Prior to damaging or destroying any grave, permission for the exhumation and relocation of graves must be obtained from the relevant descendants (if known), the National Department of Health, the Provincial Department of Health, the Premier of the Province and the local Police.• The exhumation process must comply with the requirements of the relevant Ordinance on Exhumations, and the Human Tissues Act, 65 of 1983.

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