NKT CONSULTING SERVICES (PTY) LTD
WATER & ENVIRONMENTAL SERVICES

ENVIRONMENTAL MANAGEMENT PROGRAMME FOR THE UPGRADING OF EXISTING MAIN OUTFALL SEWER ON THE NORTHERN AREA (GRAVITY SEWER MAIN EVATON AND SEBOKENG NORTH TO WASTE WATER TREATMENT WORKS)

EMFULENI
LOCAL MUNICIPALITY

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ABBREVIATIONS

EMPr:	Environmental Management Programme
NEMA:	National Environmental Management Act
EIA:	Environmental Impact Assessment
I&APs:	Interested and Affected Parties
EMM:	Ekurhuleni Metropolitan Municipality
DEO:	Designated Environmental Officer
ECO:	Environmental Control Officer
SDC:	Safe Disposal Certificate
MSDS:	Material Safety Data Sheets
SAHRA:	South African Heritage Resource Agency
SANS:	South African National Standards
DWS:	Department of Water and Sanitation

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1 INTRODUCTION

The Bill of Rights – Chapter 2 of the Constitution Act No. 108 of 1996, includes an environmental right (Section 24) according to which, "*everyone has the right to an environment that is not*

harmful to their health or well-being and to have the environment protected for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation, promote conservation and the sustainable use of natural resources while promoting justifiable economic and social development". In addition, Section 28 of the National Environmental Management Act No 107 of 1998 (NEMA), requires, "*every person causing significant pollution or degradation of the environment, to take reasonable measures to prevent it from occurring, continuing or recurring*". Therefore, in order to promote effective environmental management throughout the life-cycle of a project, it is important that management actions arising from Environmental Impact Assessments (EIAs) are clearly defined and translated into an Environmental Management Programme (EMPr) for the design, construction, operation and/or decommissioning phases of a project.

According to the Western Cape Department of Environmental Affairs and Development Planning (2005), an Environmental Management Programme (EMPr) can be defined as, "*an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented; and that the positive benefits of the project are enhanced*".

1.1 Purpose of the EMPr

The purpose of an EMPr is therefore to:-

- Encourage good management practices through planning and commitment to environmental issues;
- Define how the management of the environment is reported and performance evaluated;
- Provide rational and practical environmental guidelines to:
    - Minimise the extent of environmental impacts and to manage environmental impacts and where possible, to improve the condition of the environment;
    - Prevent long-term or permanent environmental degradation.
    - Comply with all applicable laws, regulations, standards and guidelines for the protection of the environment;
    - Provide guidance regarding method statements which are required to be implemented to achieve environmental specifications;
    - Define the corrective actions which must be taken in the event of non-compliance with the specifications of the EMPr;
    - Describe all monitoring procedures required to identify impacts on the environment, and;
    - Train employees and contractors with regard to environmental obligations.

1.2 Project Location

The project falls within the jurisdiction of Emfuleni Local Municipality, at Sedibeng District Municipality which lies in south west of Gauteng province, South Africa. More-over, the study area is seen to fall approximately 18 km north east of the town of Vanderbijlpark and approximately 14.8 km North West of town of Vereeniging. The proposed main outfall line is a sewer bulk line which collect sewerage around the immediate and nearby area`s to the waste water treatment plant and is located at roughly the following coordinates

	Latitude (S)	**Longitude (E)**
Starting point of the activity	26°34'22.35"	27°48'56.43"
Middle point of the activity	26°33'32.78"	27°49'08.65"
End point of the activity	26°40’43.79”	27°53’19.43”

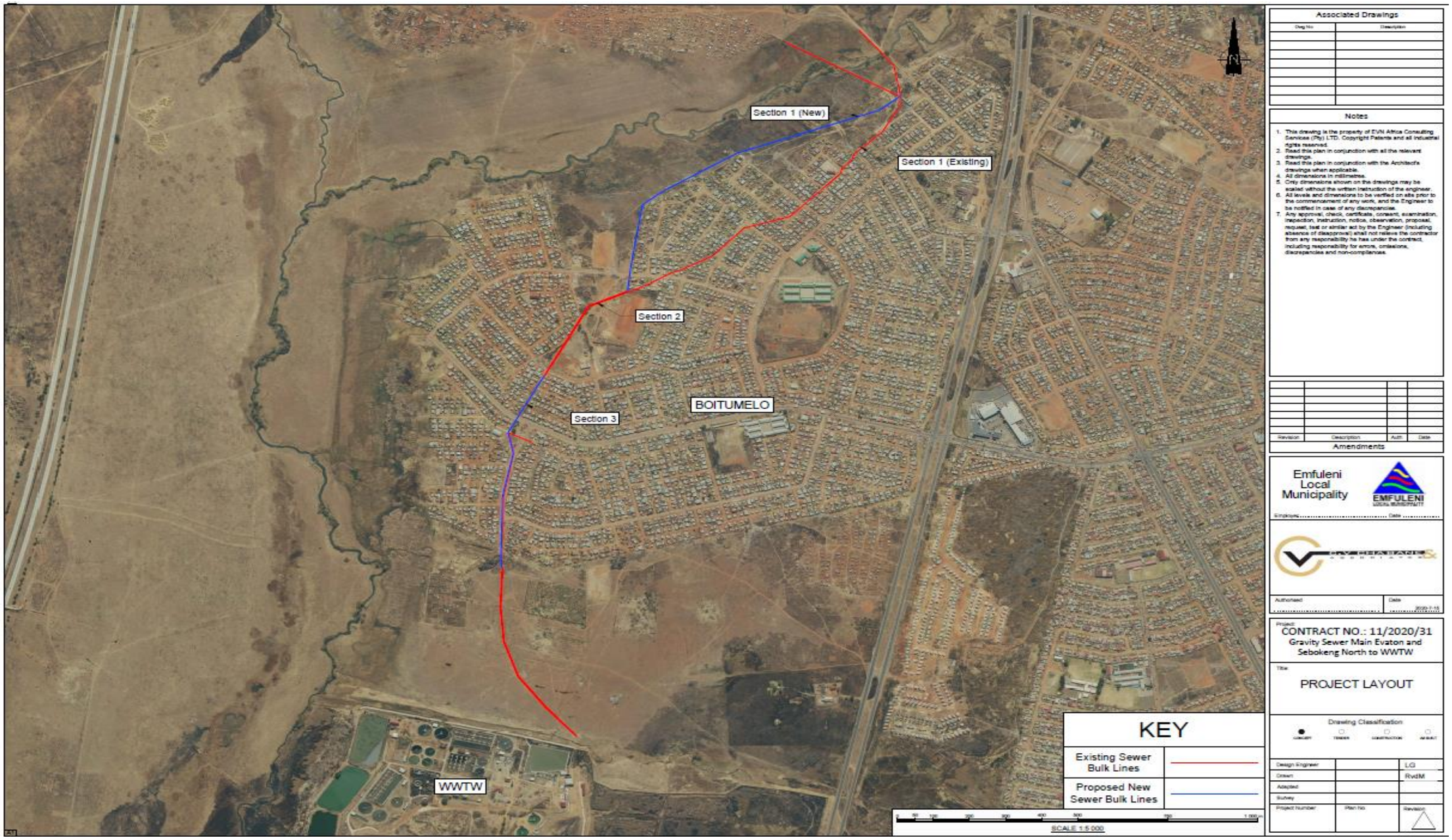

Figure 1: Site Location

2 PROJECT DESCRIPTION

Based on the design the proposed bulk line is approximately 2.94km. The details of the proposed project are as follows:

1. Re-route all or most of the incoming outfall sewer with a new 1,5m diameter pipe around the village (see layout) and connect to existing parallel pipelines.

a. Approximate length = 1150

b. Proposed Material: A combination of concrete and structured HDPe pipes.

c. Anticipated length above ground = 750

d. Anticipated length underground = 400

e. Anticipated height above ground = 2.6m

f. Anticipated max depth of excavation = 3.0m

g. New manholes = 11

2. Due to the space available a small section of the existing line must be re-routed to provide space for the new parallel 1.8m diameter line.

a. Length of deviation = 130 m with 3 new manholes

b. Proposed Material: A combination of concrete and structured HDPe pipes.

c. Length of new pipeline = 720

3. Due to possible capacity and elevation problems in future a new parallel line is also included alongside the 2 existing parallel lines.

a. Length of new pipeline = 335

b. Proposed Material: A combination of concrete and structured HDPe pipes

c. New manholes = 3

DESIGN CRITERIA Design Standards

The design criteria are in accordance with the Guidelines for the provision of Engineering Services in Residential Townships and can be summarized as follows:

Due to no clear design criteria being available for outfall sewers the following principals has been used for the preliminary design of the proposed outfall sewers. Actual design figures will be dealt with in the final detailed design report.

As from Stats SA the annual growth rate for Boitumelo of 0.92% per year has been used.

A 30-year design horizon has been used which is considered as the normal lifetime of a pipeline.

Minimum self-cleaning velocity of 0.7m/s

Design capacity of new pipelines = 50%

Maximum capacity of pipeline = 80%

Manholes must be placed as follows:

a) At intervals of not more than 110 m on network sewers. This distance must be decreased on steep grades so that the head on any part of the sewer does not exceed 6 m under blockage conditions. On collector sewers, and especially outfall sewers, the distance between manholes may be increased in consultation with the Divisional Head: Water and Sanitation. We propose not more than 150m apart.

b) At all changes in grades and/or directions.

c) Where two or more sewer lines connect.

d) At positions on steep grades (1:10 or steeper), to prevent backpressure in house gullies under blockage conditions.

e) At the higher end of all sections that serve more than three dwelling units and that are longer than 50 m.

f) Where a sewer line crosses a road, at least one manhole must be positioned in the road reserve.

Fall through manholes:

A fall, to compensate for energy losses, must be made in the channel of all manholes. For pipes of a diameter of 150 mm, 200 mm or 300 mm, the fall through manholes must be a minimum of 80 mm, up to gradients of 1:15.

For gradients steeper than 1:15, the actual fall through the manhole, plus 25 mm, must be provided. In the case of pipes of more than 300 mm in diameter, the actual fall must be calculated using the standard energy equation.

Servitudes

In all cases where municipal sewers across private properties are not protected by servitudes in terms of the conditions of establishment for the specific township, servitudes must be registered over such municipal sewers, in favour of the municipality, at the costs of the applicant.

Method Statement for construction

a) Exposed all existing services along the proposed bulk and proposed new route

b) Check levels of all existing services especially existing sewer and Stormwater, other services such as electricity, Telkom and water can be adjusted or relocated.

c) Install new pipes and manholes, test, inspect, CCTV and approved

d) Install temporary structure to by-pass existing sewer flow while connecting new connector manholes.

Finalise connector manholes, remove temporary by-passes and allow flow into combination of existing and new outfall sewers

3 LEGISLATIVE FRAMEWORK

3.1 Environmental Policy

The Contractor is required to compile an environmental management policy, which must consider the following:

- The Contractor's mission, vision and core values;
- Guiding principles;
- Requirements of, and communication with interested and affected parties (I&APs);
- The need to work towards continual improvement;
- The obligation to prevent pollution and ecological degradation;
- The importance of coordination with other organisational policies (e.g. quality, occupational health and safety, etc.);
- Reference to specific local and/or regional conditions; and

- A commitment to compliance with relevant environmental laws, regulations, by-laws and other criteria to which the Contractor subscribes.

3.2 Legislative Framework

Construction must be according to the best industry practices, as identified in the project documents. This EMPr, which forms an integral part of the contract documents, informs the contractor as to his duties in the fulfilment of the project objectives, with particular reference to the prevention and mitigation of environmental impacts caused by construction activities associated with the project. The Contractor should note that obligations imposed by the EMPr are legally binding in terms of environmental statutory legislation and in terms of the additional conditions to the general conditions of contract that pertain to this project. In the event that any rights and obligations contained in this document contradict those specified in the standard or project specifications then the latter shall prevail.

3.2.1 Statutory and Other Applicable Legislation and Standards

The Contractor shall identify and comply with all South African national and provincial environmental legislation, including associated regulations and all local by-laws relevant to the project. Key legislation currently applicable to the design, construction and implementation phases of the project must be complied with. The list of applicable legislation provided below is intended to serve as a guideline only and is not exhaustive:-

- The Constitution of the Republic of South Africa Act 108 of 1996
- National Environmental Management Act 107 of 1998
- National Environmental Management: Protected Areas Act 57 of 2003
- National Environmental Management: Biodiversity Act 10 of 2004
- National Water Act 36 of 1998
- Hazardous Substances Act 15 of 1973
- National Heritage Resources Act 25 of 1999
- Atmospheric Pollution Prevention Act 45 of 1965
- National Environmental Management: Air Quality Act 39 of 2004
- National Environmental Management: Waste Management Act 59 of 2008
- Occupational Health and Safety Act 85 of 1993
- South African National Roads Agency Limited Act 7 of 1998
- All relevant provincial legislation, Municipal by-laws and ordinances.

4 ADMINISTRATION AND REGULATION OF ENVIRONMENTAL OBLIGATIONS

4.1 Management Structure

The Contractor must compile an organogram illustrating the management structure for inclusion within the final EMPr. This organogram should depict the organisation structure of the Contractor, and must contain supporting documentation to demonstrate the environmental responsibilities, accountability and liability of the Contractor's employees. The Contractor should assign responsibilities for the following:

- Reporting structures.
- Actions to be taken to ensure compliance.
- Overall design, development and implementation of the EMPr.
- Documenting the environmental policy and strategy.
- Implementing the EMPr in all stages/phases of the project.
- All the aspects which require action under the other core elements and sub-elements of the EMPr.

All official communication and reporting lines including instructions, directives and information shall be channelled according to the organisation structure.

4.2 Roles and Responsibilities

4.2.1 Emfuleni Municipality (ELM)

ELM is the client and will therefore be the entity monitoring the implementation of the EMPr. However, if ELM appoints a Contractor to implement the project and hence implement the proposed mitigation measures documented in this EMPr on their behalf, then the successful contractor's responsibilities are outlined in Section 4.2.2 that follows.

4.2.2 Contractor

The successful Contractor shall:

- Be responsible for the overall implementation of the EMPr in accordance with the requirements of EMM;
- Ensure that all third parties who carry out all or part of the Contractor's obligations under the Contract comply with the requirements of this EMPr

4.2.3 Designated Environmental Officer

The Contractor shall appoint a nominated representative of the contractor as the Designated Environmental Officer (DEO) for the contract. The DEO will be site-based and shall be the responsible person for implementing the environmental provisions of the construction contract. There shall be an approved DEO on the site at all times.

The DEO's duties will include, *inter alia*, the following:

- Ensuring that all the permits required in terms of the applicable legislation have been obtained prior to construction commencing.
- Reviewing and approving construction method statements with input from the ECO and Engineer, where necessary, in order to ensure that the environmental specifications contained within the construction contract are adhered to.
- Assisting the Contractor in finding environmentally responsible solutions to problems.
- Keeping accurate and detailed records of all activities on site.
- Keeping a register of complaints on site and recording community comments and issues, and the actions taken in response to these complaints.
- Ensuring that the required actions are undertaken to mitigate the impacts resulting from non-compliance.
- Reporting all incidences of non-compliance to the ECO and Contractor.

The DEO shall submit regular written reports to the ECO, but not less frequently than once a month.

The DEO must have:

- The ability to manage public communication and complaints;
- The ability to think holistically about the structure, functioning and performance of environmental systems; and
- The DEO must be fully conversant with the Environmental Management Programme and all relevant environmental legislation.

The ECO shall have the authority to instruct the contractor to replace the DEO if, in the ECO's opinion, the appointed officer is not fulfilling his/her duties in terms of the requirements of the construction contract. Such instruction will be in writing and shall clearly set out the reasons why a replacement is required and within what timeframe.

4.2.4 Environmental Control Officer

For the purposes of implementing the conditions contained herein, ELM shall appoint an Environmental Control Officer (ECO) for the contract. The ECO shall be the responsible person for ensuring that the provisions of the EMPr are complied with. The ECO will be responsible for issuing instructions to the contractor and where environmental considerations call for action to be taken. The ECO shall submit regular written reports to ELM, but not less frequently than once a month. The ECO will be responsible for the monitoring, reviewing and verifying of compliance with the EMPr by the Contractor. The ECO's duties in this regard will include, *inter alia*, the following:

- Confirming that all the environmental permits required in terms of the applicable legislation have been obtained prior to construction commencing.
- Monitoring and verifying that the EMPr and Contract 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.
- Reviewing and approving construction method statements with input from the DEO and Engineer, where necessary, in order to ensure that the environmental specifications contained within this EMPr are adhered to.
- Inspecting the site and surrounding areas on a regular basis regarding compliance with the EMPr and Contract.
- Monitoring the undertaking by the Contractor of environmental awareness training for all new personnel on site.
- Ensuring that activities on site comply with all relevant environmental legislation.
- Ordering the removal of, or issuing spot fines for person/s and/or equipment not complying with the specifications of the EMPr.
- Undertaking a continual internal review of the EMPr and submitting any changes to ELM for review and approval.
- Checking the register of complaints kept on site and maintained by the DEO and ensuring that the correct actions are/were taken in response to these complaints.
- Checking that the required actions are/were undertaken to mitigate the impacts resulting from non-compliance.
- Reporting all incidences of non-compliance to the ELM.
- Conducting annual environmental performance audits in respect of the activities undertaken relating to the project.
- Keeping a photographic record of progress on site from and environmental perspective.
- Recommending additional environmental protection measures, should this be necessary.
- Providing report back on any environmental issues at site meetings

The ECO must have:

- A good working knowledge of all relevant environmental policies, legislation, guidelines and standards;
- The ability to conduct inspections and audits and to produce thorough, readable and informative reports;
- The ability to manage public communication and complaints;

- The ability to think holistically about the structure, functioning and performance of environmental systems; and
- Proven competence in the application of the following integrated environmental management tools:
  - Environmental Impact Assessment.
  - Environmental management plans/programmes.
  - Environmental auditing.
  - Mitigation and optimisation of impacts.
  - Monitoring and evaluation of impacts.
  - Environmental Management Systems.

The ECO must be fully conversant with the Environmental Management Programme and all relevant environmental legislation. ELM shall have the authority to replace the ECO if, in their opinion, the appointed officer is not fulfilling his/her duties in terms of the requirements of the EMPR or this specification. Such instruction will be in writing and shall clearly set out the reasons why a replacement is required and within what timeframe.

4.2.5 Traffic Safety Officer

The Contractor shall nominate knowledgeable members of staff on site who shall be the responsible persons for the arrangement and maintenance of all traffic accommodation measures required for the duration of the contract. The Traffic Safety Officer shall liaise with the DEO and/or ECO in order to ensure adequate and appropriate traffic arrangements.

4.3 Emergency Preparedness

The Contractor shall compile and maintain environmental emergency procedures to ensure that there will be an appropriate response to unexpected or accidental actions or incidents that will cause environmental impacts, throughout the life cycle of the project. Such activities may include, *inter alia*:

- Accidental discharges to water and land.
- Accidental exposure of employees to hazardous substances.
- Accidental veld or forest fires.
- Accidental spillage of hazardous substances.
- Accidental toxic emissions into the air (e.g. at asphalt plants if there will be any).
- Specific environmental and ecosystem effects from accidental releases or incidents.

These plans should include:

- Emergency organisation (manpower) and responsibilities, accountability and liability.

- A list of key personnel.
- Details of emergency services applicable to the various areas along the route (e.g. the fire department, spill clean-up services, etc.).
- Internal and external communication plans, including prescribed reporting procedures where required by legislation.
- Actions to be taken in the event of different types of emergencies.
- Incident recording, progress reporting and remediation measures required to be implemented.
- Information on hazardous materials, including the potential impact associated with each, and measures to be taken in the event of accidental release.
- Training plans, testing exercises and schedules for effectiveness.

The Contractor shall comply with the emergency preparedness and incident and accident-reporting requirements, as required by the Occupational Health and Safety Act, 1993 (Act No 85 of 1993), the National Environmental Management Act, 1998 (Act No 107 of 1998), the National Water Act, 1998 (Act No 36 of 1998) and the National Veld and Forest Fire Act, 1998 (Act No 101 of 1998) as amended and/or any other relevant legislation.

4.4 Checking and Corrective Action

4.4.1 Non-Compliance

Non-compliance with the specifications of the EMPr and/or conditions of any environmental permits, both of which will be present on-site at all times, constitutes a breach of Contract for which the Contractor may be liable to pay penalties. The Contractor is deemed not to have complied with the EMPr if:

- There is evidence of contravention of the EMPr specifications within the boundaries of the construction site, site extensions and haul/access roads;
- There is contravention of the EMPr specifications which relate to activities outside the boundaries of the construction site.
- Environmental damage ensues due to negligence;
- Construction activities take place outside the defined boundaries of the site; and/or
- The Contractor fails to comply with corrective or other instructions issued by the Engineer and/or ECO within a specific time period.

The contractor shall act immediately when a notice of non-compliance is received and correct whatever was the cause for the issuing of the notice.

Any non-compliance with the agreed procedures of the EMPr is a transgression of the various statutes and laws that define the manner by which the environment is managed therefore any avoidable non-compliance, dependant on severity, shall be considered sufficient grounds for contact to be made with relevant provincial or national authorities.

The engineer's decision with regard to what is considered a violation, its seriousness and the action to be taken against the contractor shall be final. Failure to redress the cause shall be reported to the relevant authority. The responsible provincial or national authorities shall ensure compliance and impose penalties relevant to the transgression as allowed for within its statutory powers.

4.4.2 Monitoring

A monitoring programme will be implemented for the duration of the construction phase of the project. This programme will include:

- **Performance Audits**: Monthly inspection reports which are performance based compiled by the ECO. This must also incorporate monitoring of compliance issues as well as permits, licenses, the EMPr and all contract documentation's conditions. These audits can be conducted randomly and do not require prior arrangement with the project manager.
- **Compliance Audits**: The auditor will initially undertake compliance audits every month. Compilation of an audit report with a rating of the compliance with the EMPr. This report will be submitted to the relevant authorities as and when required.

The following will also assist with monitoring:-

Complaints Register

The Contractor will ensure that a dedicated Complaints Register is kept on site at all times. The register will contain the details of the person who made the complaint, the nature of the complaint received, the date on which the complaint was made and the response noted with the date and action taken. The Complaints register will be kept in accordance with the requirements of the ECO. This record shall be submitted with the monthly reports and an oral report given at the monthly site meetings.

Inspections

On-going visual inspections will be conducted daily by the DEO. The DEO will spend the bulk of his/her time on site on the lookout for any unsafe acts and activities that transgress the requirements as specified in the EMP. The DEO compiles the site register and the ECO maintains

the complaints register and any other records required (the DEO would also have input into this as well, as he/she would be site-based).

Incident Reporting and Remedy

If a leakage or spillage of hazardous substances occurs on site, the local emergency services must be immediately notified of the incident (within 24 hours). The following information must be provided:

- The location;
- The nature of the load; and
- The status at the site of the accident itself (i.e. whether further leakage is still taking place, whether the vehicle or the load is on fire).

Written records must be kept on the corrective and remedial measures decided upon and the progress achieved therewith over time. Such progress reporting is important for monitoring and auditing purposes. The written reports may be used for training purposes in an effort to prevent similar future occurrences.

Public Communication and Liaison with Interested and Affected Parties

The Contractor shall comply with the requirements for public consultation as required by the Constitution Act, 1996 (Act No 108 of 1996) and the National Environmental Management Act, 1998 (Act No 107 of 1998). During the construction phase of the project, the Contractor shall be responsible for erecting information boards, in the position, quantity, design and dimensions approved by the Engineer.

The information boards shall contain relevant information regarding the construction activity and the relevant contact details to assist persons who wish to submit complaints regarding construction activities.

Information distribution

Copies of the EMPr will be made available to I&APs at appropriate locations. Copies will also be distributed to all senior contract personnel. All senior personnel on the construction site will be required to familiarize themselves with the contents of the document.

4.5 Management Review

A formal management review needs to be conducted on a regular basis in which the monthly internal audit reports written by the ECO and based on frequent inspections and interactions with the DEO based on the latter's daily reports, audit reports by the independent external auditor will be reviewed. The purpose of the review is to critically examine the effectiveness of the EMPr and its implementation and to decide on potential modifications to the EMPr as and when necessary. The process of management review is in keeping with the principle of

continual improvement. Management review will take place monthly for the duration of the project.

5 DETAILED ENVIRONMENTAL MANAGEMENT PROGRAMME

The EMPr forms part of the Contract Documentation and is thus a legally binding document. It is also necessary for the Contractor to make provisions as part of their budgets for the implementation of the EMPr. In terms of the NEMA an individual responsible for environmental damage must pay costs both to the environment and human health and the preventative measures to reduce or prevent additional pollution and/or environmental damage from occurring. This is referred to as the Polluter Pays Principle. Section 28 of the NEMA embodies the Polluter Pays Principle. The Contractor is deemed not to have complied with the Environmental Specifications/EMPr if:

- Environmental damage ensues due to negligence;
- The Contractor ignores or fails to comply with corrective or other instructions issued by ELM, the Engineer or ECO within a specified time; and
- The Contractor fails to respond adequately to complaints from the public.

5.1 Pre-Construction Phase

5.1.1 Permits and Licenses

All necessary permits and licences must be obtained by ELM prior to the commencement of construction

5.1.2 Appointment of Contractor

- ELM must ensure that this EMPr forms part of any Contractual agreements with the Contractor(s) and sub-Contractors for the execution of the proposed project. The Contractor must make adequate provision in their budgets for the implementation of the EMPr.
- The Principal Contractor (including sub-Contractors and suppliers) must comply with the relevant provisions of the EMPr, applicable environmental legislation, by-laws and associated regulations promulgated in terms of these laws.
- Tender documents should include statements to include the use of local communities or local community organisation where possible in supplying services and labour to the construction activities.
- Local labourers should be used for such methods

5.1.3 Preparation of Method Statements

- Method Statements must be submitted by the Contractor to the ECO and must be adhered to by the Contractor and Project Engineer for the duration of the Project. These relate to water and storm water management requirements, traffic requirements, solid waste management requirements, fuel storage and filling and dispensing of fuel (diesel and petrol), hydrocarbon spills, contaminated water treatment, the storage of hazardous materials, standard emergency procedures, and biohazard control, and any further activities which the ECO and Project Engineer deem necessary.
- The ECO will monitor the implementation of the Method Statements. All copies of the statements and plans must be submitted to the appointed ECO.

5.1.4 Project Required Method Statements

a) Working within watercourses

As part of the finalisation of the EMPr, detailed Method Statements must be compiled for all construction activities confirmed to occur within the watercourses. The Method Statements must provide detail on the following, where applicable:

- Working area extent and demarcation;
- Vegetation and soil clearing / grubbing / stripping and stockpiling;
- Access and running track establishment and decommissioning;
- Method of excavation;
- Temporary flow diversion measures;
- Infrastructure placement measures; and
- Rehabilitation – reshaping, soil preparation, stabilisation / erosion control and revegetation

b) Pipeline Upgrades

- Competent site investigation, sampling and relevant testing to build up an informed picture of the task.
- Demarcate the construction servitude where construction works occur within or in close proximity to a watercourse.
- Ensure that the design of watercourse crossings complies with best-practice guidelines and recommendations.
- Ensure that site workers are well versed in the Method Statement and any other mitigation and management guidelines.
- Ensure that 'standard mitigation' measures to limit impacts on water resources are complied with (refer to all relevant sections of the Environmental Management Programme, EMPr and specialist reports).

- Ensure that appropriate mitigation measures for site establishment are implemented.
- Ensure that mitigation measures for access control are implemented.
- Ensure that appropriate mitigation measures for site clearing & vegetation stripping are implemented.
- Ensure that appropriate storm water management and erosion control measures are implemented.
- Backfill according to the specifications indicated on the construction drawings with material approved by the engineer to the height of the fill.
- Perform required compaction tests on all backfill material.

5.2 Planning and Pre-Construction Phase Activities

5.2.1 Site Establishment

Careful planning of the construction camp can ensure that the time and costs associated with environmental management and rehabilitation are reduced

MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
Layout a) The choice of the Contractor's camp requires the Project Manager's permission and must ensure that the camp is located in an area that will ensure a minimum impact on the environment and surrounding residents. b) The contractor should submit plans of exact location, extent and construction details of the temporary construction camp facilities to the Project Manager for approval, prior to establishment of the camp. c) The layout plans should reflect the proposed camp's location in relation to any existing infrastructure (water mains, electricity cables, sewage mains, etc.) on site. d) Access to the construction camp must be through an existing route or one that is clearly demarcated and agreed upon	Contractor & Project Manager	Prior to moving on site
Provision for waste disposal a) Bins and skips shall be provided at convenient intervals for disposal of waste within the construction camp / site. b) Recycling and provision of separate waste receptacles for different types of waste		Ongoing

MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
should be encouraged. c) Waste bins should be stored in a clearly demarcated area (i.e. not in close proximity to wet areas or drainage lines).		

5.2.2 Establishing Storage Areas

Storage areas can be hazardous and unsightly. These storage areas can also cause environmental pollution if not designed and managed properly

MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
General Substances and Materials a) When deciding on the location of temporary stockpiles, the following needs to be considered: ○ road access, ○ length of time the stockpile will exist. b) Additionally all stockpiles should be located away from sensitive ecosystems and protected from the prevailing winds. c) Storage areas must be designated, demarcated and fenced if necessary. d) Storage areas should be secured, to minimize the risk of crime and contamination. e) Develop, design and maintain an overall site Stormwater Management Plan for the construction, operational and decommissioning phases, which includes appropriate, effective and legal management of stormwater; inter alia the following:	ECO	During site set up

MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
○ Ensure that the ultimate flow from the development does not result in any negative impacts on downstream properties or wetlands/watercourses and must therefore ensure that stormwater is managed within the overall site as effectively as possible; and ○ These networks must be designed and constructed in such a manner that stormwater of a suitable quality will drain into the surrounding system. ○ Include the Stormwater Management Plan in the contractor tendering and agreement process / operational EMS.		
Hazardous Substances and Materials a) Should it happen that there is a need to store fuel on site; it must be stored in a bunded area with at least a volume of 110% of the largest tank. b) Hazardous chemical working/refuelling areas must be bunded with an impermeable liner. c) Ensure that there is always a supply of absorbent material readily available to absorb/break down any hydrocarbon spillage. d) In the case of a spill, contaminated material must be removed from the site immediately and disposed of at an appropriate hazardous waste facility. e) All Material Safety Data Sheets (MSDS) should be available on site for the stored hazardous materials. f) All site staff that work with hazardous substances should be trained on the handling and use of hazardous substances	Eco Approval	During site set up

5.2.3 Education of Site Staff on General Environmental Conduct

These points must be communicated to all staff before the project commence on site

MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
Environmental Education and Awareness Ensure that all site personnel have a basic level of environmental awareness training. Topics covered should include: a) What is meant by 'Environment'? b) Why do we have to protect the environment? c) How construction activities can impact on the environment. d) How can these impacts be mitigated. e) Awareness of emergency and spills response provisions. f) Awareness on waste management g) Social responsibility during construction e.g. being considerate to local residents. It is the contractor's responsibility to provide the site foreman with no less than 1 hour's environmental training and to ensure that the foreman has sufficient understanding to pass the information onto the construction staff. a) Translators are to be used where necessary. b) The use of pictures and real-life examples is encouraged as these are easier to remember. c) The need for a 'clean site' policy also needs to be explained to the construction workers	ECO	During induction
Worker Conduct on Site	PM/Contractor	During induction and

MITIGATION MEASURES	**RESPONSIBILITY**	**MONITORING FREQUENCY**
Under no circumstances may open areas or surrounding bush be used as toilet facilities. A general regard for the social and ecological well-being of the site and adjacent areas is expected of the site staff. Workers need to be made aware of the following general rules: a) No alcohol/drugs to be present on site. b) No fire arms allowed on site or in vehicles transporting staff to/from the site (unless by security personnel.) c) No trespassing on residential properties. d) Construction staff is to make use of facilities provided for them, as opposed to ad hoc alternatives		also on-going monitoring
Waste Management a) A dedicated area must be allocated for waste sorting (where applicable) and storage prior to construction. b) Individual waste skip or wheelie bins for different types of waste should be provided. c) Adhere to and practice good housekeeping to ensure that construction camps and sites are well organised, material is neatly stacked and waste is regularly removed. d) All litter throughout the site should be picked up and placed in the appropriate recycling bins provided	PM/ECO	During site set up

5.2.4 Security and Safety

Security and safety should be in line with Emfuleni's Safety Policy and By-Law Requirements

MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
Risks Associated with Materials on Site a) Material stockpiles or stacks such as cement, steel, bricks, corrugated iron sheeting, plastic piping, etc. must be stable and well packed to avoid collapse and possible injury to site workers, stockpiles must also be covered to avoid seepage and ground water pollution (where applicable). b) No materials are to be stored in unstable or high risk areas such as in close proximity of the entrance road, excavated areas, etc	PM/Contractor	On-going

5.3 Construction Phase Activities

5.3.1 Site Access

Access road

MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
Access to the site a) Ensure that access to the site is via the approved access road. b) Clearly communicate access policy for the properties to the staff and public, using notice boards on access gates and by directly communicating with the nearby residents.	PM/Contractor	Monthly

5.3.2 Maintenance of Construction Camp

MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
Ablution a) Provide adequate temporary chemical toilets on site: ○ Provide for a suitable ratio of toilets per number of employees (usually at least 1 toilet per 12 employees) ○ Provide for toilets to have hand wash facility either within the toilet cubicle or adjacent thereto ○ Locate toilets (porta loos) outside the 1:100 year floodline and preferably away and/or hidden from public roads, residential areas and other public places ○ Secure toilets (porta loos) firmly to prevent them from toppling over due to wind or any other cause ○ Appoint a service provider to remove sewage from the chemical toilets and/or sewage sludge from package plants on a regular basis; and provide and ensure for this sewage / sewage sludge to be disposed of at a municipal sewage treatment plant or alternatively on an appropriately designed on-site sewerage treatment plant ○ Clean the sewage system out regularly and immediately before long weekends, builders holidays and work breaks; and disposed the sewage to the municipal sewage system ○ Ensure that no spillage occurs when the toilets are cleaned or emptied and that the contents is properly stored and removed from site	ECO/Contractor	Weekly

MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
○ Keep toilets locked after working hours. b) Prohibit staff from abluting anywhere other than in toilets		
Eating Areas a) Eating areas (if applicable) should be serviced and cleaned regularly to ensure the highest possible standards of hygiene and cleanliness. b) All litter throughout the site should be picked up and placed in the appropriate recycling bins provided	Contractor	Weekly Inspection
Housekeeping Adhere to and practice good housekeeping to ensure that construction camps and sites are well organised, material is neatly stacked and waste is regularly removed	Contractor	Weekly Inspection

5.3.3 Fire Prevention and Response

MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
Fire Prevention and Response a) Responsible parties will be liable for any damage caused by fires resulting from their operation, negligence or lack of protection of the site from fires. b) Include a fire emergency preparedness plan for fighting accidental fires in the Emergency Response Plan. c) Fire-fighting equipment for each construction / operational / demolition team and/or area must be readily available on site; bearing in mind that these should be approved by the local Fire Prevention Officer, ECO, Safety and/or Health Officer. d) Avail and maintain appropriate fire-extinguishers on all vehicles carrying flammable materials. e) Keep a register and inspection log of all fire- fighting equipment; and inspect and check fire- fighting equipment regularly and record such inspection on the inspection log that is retained on-site. f) Prevent accidental fires through proper sensitisation of staff towards the associated risks, dangers and damage of property. g) Prohibit the use of open fires and random “braais” on-site, strictly, unless they are effectively contained and designated areas far away from vegetation. h) Inform and/or involve neighbouring land owners/ users/ managers should there be a risk of a fire spreading to their property	Contractor/ECO	Weekly

5.3.4 Waste and Stormwater Management

Activities in the construction site such as office work, usage of construction materials, etc., generate different types of waste that requires to be managed properly. These wastes could result in environmental pollution such as soil contamination/ pollution or health hazards to employees working on-site, if not managed properly

MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
On-Site Waste Management a) Waste is grouped into "general" or "hazardous", depending on its characteristics. The classification determines the handling methods and the ultimate disposal of the material. The Contractor/ECO must classify waste into general or hazardous based on the toxicity or hazard nature of waste. b) Develop and implement a detailed on-site Waste Management Plan, prior to the relevant waste generating activities commencing, covering inter alia: ○ Identification, classification and keeping of a register of type of waste generated; ○ Planning for the construction / establishment / operation / decommissioning of a centralised waste management facility and/or designated waste management areas; ○ Procedures to be followed for waste separation at source as well as reduce, re-use, recycle, recover and treatment of waste prior to the disposal option; and ○ Waste management procedures for waste disposal, e.g. storage, disposal, keeping of waste consignment certificates, etc. c) Waste must be placed in the designated or marked skips/bins which must be emptied	Contractor/PM/ECO	Weekly

MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
on a regular basis by a contracted waste collector. These should remain within the demarcated areas and should be designed to prevent refuse from being blown out by wind. d) Ensure that all conventional waste is properly disposed of and removed from the site to a permitted landfill site, or where applicable to an appropriately licensed waste recycling facility. e) Separation of waste and recycling of paper, glass, cans, scrap, metals, plastic bottles, etc., must be considered prior to disposal. The disposal at the landfill site should be considered as the last option, after having taken into consideration the prevention of waste generation, reduction waste generation, reuse and recycling. f) Hazardous waste that require disposal (oily rags, used fuel/oil, etc.) must be placed in a suitable leak proof skip or wheelie bin for disposal at an approved hazardous		
Stormwater Management a) A suitable stormwater drainage system and containment must be implemented by the PM to prevent soil and silt erosion, protect storage areas, to prevent uncontrolled stagnant ponds forming and avoid siltation of water resources b) Excavated and filled slopes and stockpiles are at a stable angle and capable of accommodating normal expected water flows. c) The PM shall take reasonable measures to control stormwater and the erosive effects thereof and shall provide a Method Statement for this. d) During the construction activities, the PM shall protect areas susceptible to erosion	ECO/Contractor/PM	Weekly

MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
by installing necessary temporary and permanent drainage works as soon as possible and by taking measures to prevent the surface water from being concentrated in streams and from scouring slopes, banks or other areas. e) Measures shall be implemented to effectively contain and treat any stormwater contaminated with silt, soil or any other substance in order to protect the wetland environment. f) Areas susceptible to erosion must be monitored regularly for evidence of erosion – this includes: ○ Areas stripped of topsoil ○ Soil stockpiles ○ Steep slopes and embankments. g) On any areas where the risk of erosion is evident, special measures may be necessary to stabilise the areas and prevent erosion. These may include, but not be restricted to: ○ Using mechanical cover or packing structures such as geofabric to stabilise steep slopes or hessian, gabions and mattress and retaining walls ○ Straw stabilising ○ Brushcut packing ○ Mulch or chip cover ○ Hydroseeding ○ Constructing anti-erosion berms. h) Where erosion does occur on any completed work/working areas, the PM shall		

MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
reinstate such areas and areas damaged by the erosion at his own cost and to the satisfaction of the ECO. i) Traffic and movement over stabilised areas shall be restricted and controlled. Any damage to the stabilised areas shall be repaired and maintained.		

5.3.5 Construction Vehicles/Equipment

Engine machines such as compressors, pumps, etc. can have small leaks (usually oil) that can accumulate to become spills, which require clean-up. These leaks become more evident if the equipment remains in the same place for an extended period of time. Damaged fuel tanks, fuel hoses, and fuel pumps can be sources of significant fuel leaks. Hydraulic systems can blow gaskets or hoses resulting in large quantities of hydraulic fluid spilled to the ground

MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
Construction Equipment a) Vehicles and machinery are to be kept in good working order and to meet manufactures specification for safety, fuel consumption and emission. b) Should excessive emissions be observed, the site manager needs to implement an effective vehicle and equipment service and maintenance plan. c) Vehicle parking and equipment storage must be done on a hardened and sealed surface area such that oil, fuel and other fluid leaks do not pollute soil or ground water sources.	Contractor/ECO	Ongoing

5.3.6 Emergency Response to Spillages

This section aims to provide measures to manage spillages from equipment used on site and measures for other construction materials handled on site.

MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
Emergency Response to Spillages The contractor shall take into account the following prevention measures to be applied during spillages. a) Immediately repair all leaks of hydrocarbons, oil, etc. b) Take reasonable measure to prevent the spills or leaks. c) Dispose contaminated materials to a location designated thereto. d) The contractor shall have its own spill response plan in the event of any spills (oil, fuel, hazardous materials) from machinery or equipment used on site.	Contractor/ECO	During Spillages

5.3.7 Construction Specific Activities

MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
Site Clearance a) Restrict the area to be cleared to a minimum, and clear areas sequentially as needed; to benefit from the stormwater absorption, erosion protection and dust control properties of the vegetation cover. b) Demarcate all areas to be cleared and those not to be cleared (e.g. "No-go" areas) clearly and effectively, prior to clearing	PM/ECO	On-going throughout the Construction phase

MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
Working Areas and No-go Areas a) The Site shall be divided into working areas and 'no-go' areas and shall be marked on appropriate plans for reference. b) Working areas are those areas required by the construction staff for their site maintenance works. c) No-go' areas are generally those large areas outside the designated working areas, and may include, but not be limited to: ○ Existing services and infrastructure ○ Privately owned land and residences (unless a formal agreement has been signed for access, use or impact) ○ Watercourses ○ Natural or special features as defined in the Environmental Specification d) The PM shall ensure that all "no go" areas are demarcated and that no unauthorised entry, litter, stockpiling, dumping or storage of equipment or materials shall be allowed within the demarcated "no go" areas. e) Once construction within an area or along the pipeline route has been completed and the area has been rehabilitated and re-vegetated, it shall be considered a "no go" area. In the event that any damage is caused to the 'no-go' areas, the PM will be required to repair, restore, reinstate and/or rehabilitate these areas at their own cost.	PM/ECO	On-going throughout the Construction phase

MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
Soil Stockpiling a) Store the topsoil separately (from general fill, rubble, etc.), effectively and securely for later use in rehabilitation in stockpiles in a manner that would limit erosion and dust. b) Locate all soil stockpiles (topsoil and fill) as follows: ○ Sufficiently away from seepage zones, flood lines, water courses and other ecological sensitive area ○ Preferably in areas that were already disturbed before the project activities commenced on site	PM/ECO	On-going throughout the Construction
Trenching for Pipeline Laying a) Ensure that all servitudes in the area to be trenched are known and that any neighbouring servitudes are not affected or impacted without the necessary approvals from the owners/operators of the servitudes. b) Mark open trenches with orange net c) Provide sloped access points for people and animals to escape from being trapped in the trenches. d) Give notification to landowners and residential properties prior to should the pipeline need to be laid under paving and residential driveways	PM/ECO	On-going throughout the Construction phase

5.3.8 Impact on Biophysical Environment

Incorrect disposal of substances and materials and polluted run-off can cause serious negative impacts on the surrounding water resources (wetland area). Due to the presence of wetlands the proposed project is likely to impact on these areas Soil erosion is also likely to be of concern. Specific focus should be given to erosion control in the vicinity of the wetlands.

MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
Control of Erosion, Sedimentation and Surface Water Quality a) Demarcate and prohibit entry into no-go areas. Provide a buffer of 32m around sensitive areas. b) Prohibit the use of natural surface water sources (i.e. streams, rivers, wetlands) for potable and other water use, as only municipal water (or from another legal source) may be used on site. c) Minimise impacts on natural watercourse areas, by taking all necessary precautions to ensure that construction activities do not alter natural ground and surface water quality or flows in areas identified as sensitive. d) Engineer proper management solutions (e.g. slopes shaped at a natural angle of the repose, discharge rates, discharge quality, scouring minimisation) to the flow of surface runoff to minimise erosion of topsoil and contamination of streams and wetlands, most notably from hardened surfaces such as roads and buildings. e) Develop, implement and maintain a Stormwater Management Plan and associated stormwater management system f) Stabilise and manage cleared areas to prevent and control erosion by applying	PM/ECO	Biweekly monitoring

MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
a suitable method of stabilisation. g) Remediate any erosion channels which develop on open ground by suitably backfilling, compacting and restoring to a proper condition (i.e. landscaped, vegetated etc.). h) Equipment and machinery must be in good operation condition, clean (power washed), free of leaks, excess oil and grease. i) Ensure that machinery is operated by a skilled driver who has been trained to use it correctly and who will be able to identify if something is wrong with the engine and conduct regular inspections identifying engine related leaks.		
Impacts on Fauna a) Minimise disturbance of animals on and within close vicinity of the site. b) All construction workers must be informed that the intentional killing of any animal is not permitted as faunal species are a benefit to society. c) Poaching is illegal and it must be a condition of employment that any employee caught poaching will be dismissed. No wild animal may under any circumstance be hunted, snared, captured, injured, killed, harmed in any way or removed from the site. This includes animals perceived to be vermin. d) Employees must be trained on how to deal with fauna species as intentional killing will not be tolerated. In the case of a problem animal e.g. a large snake, a specialist must be called in to safely relocate the animal if the ECO is not able to.	PM/ECO	Biweekly monitoring

MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
e) Environmental induction training and awareness must include aspects dealing in safety with wild animals on site. f) Minimise interruption of breeding patterns of birds g) Minimise destruction of habitats. h) Ensure that waste bins are kept tidy and that waste is removed weekly to reduce any rodent infestation. i) Facilitate search-and-rescue operations before and during site clearance, by rescuing at least but not limited to individuals of threatened species and re-locating these in neighbouring protected / conservation areas. j) Any animal found within the construction corridor should be moved to the closest point of natural or semi-natural vegetation outside the construction zone.		
Impacts on Flora a) Where possible, cut vegetation to ground-level rather than removing it completely, leaving root systems intact to ensure rapid re-colonization. b) Any exotic vegetation (trees and plants) encountered should be removed from the site and properly disposed of. c) Inform site staff that under no circumstance may firewood or medicinal plants be harvested. d) The success of natural regeneration should be monitored. In areas requiring further intervention, a suitable replanting /re-vegetation programme should be implemented. This should comprise a mix of rapidly germinating	PM/ECO	Biweekly monitoring

MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
indigenous grasses, shrubs and trees naturally occurring in the affected habitat and adapted to stabilizing areas. Locally occurring, indigenous runner grasses are typically most useful for rehabilitation purposes. e) No open fires shall be allowed on site under any circumstances, fires will only be permitted in adequate facility within the crew camp. f) Minimise scarring of the soil surface and land features. g) Minimise disturbance and loss of topsoil. h) Re-vegetation of the area should be allowed to proceed naturally or be re-instated through a suitable replanting / re-vegetation programme where necessary		
Water Contamination and Pollution a) All maintenance vehicles and equipment shall be kept in good working order, are serviced regularly. b) Portable toilets must be regularly emptied and secured. c) Refuse bins must be regularly emptied by an appropriate licensed waste contractor and secured d) Drip trays (where appropriate) must be emptied regularly and secured	ECO	Biweekly

5.3.9 Impacts on Socio-Economic Environment

MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
Public Health and Safety a) Take appropriate and effective precautions and all reasonable measures to ensure the safety of people in the surrounding area. b) Control access to the site and prohibit unsupervised public access to the site. c) Use all public roads responsibly. d) Deal with transgressions by staff with regard to public health and safety severely (fines and dismissals).	PM/ECO	Ongoing
Public and Service Infrastructure Use and Impact a) Liaise closely with the relevant authorities on all matters related to potential use of or impact on public services or service infrastructure, e.g. roads, pipelines, telecommunication, waste facilities, health services, emergency services, law enforcement services, etc.; including development and mitigation plans. b) Liaise closely with the relevant servitude/land owners / operators on access to, use of or impact on servitudes owned / used by other parties. c) Keep the disruption of essential services as short as possible to minimise public inconvenience for both planned and unforeseen events. d) Ensure that all affected communities and stakeholders are kept well informed of the process and of all significant dates attached to the development process. e) Protect all public and private service infrastructures (e.g. pipelines, cables) by clearly marking these or incorporating the relevant servitudes into "No-go"	PM/ECO	Ongoing

MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
areas. f) Ensure that the implementation process is carefully monitored and that any disruptions are immediately identified and appropriately managed.		
Traffic and Use of or Impact on Public Roads a) Liaise with the relevant traffic and transportation authorities (Emfuleni Municipality and/or Department of Transport) on envisaged traffic impacts, e.g. on transportation of bulky equipment. b) Provide adequate signage to notify drivers of the increase in heavy vehicles entering and exiting the site access as a result of construction, major maintenance and/or demolition. c) Keep all traffic rules and road safety regulations on public roads, including e.g. speed limits, vehicle registration, transport emergency card listing the hazards and emergency information for a material being transported and follow all orders from traffic police and the Department of Transport. d) Train staff to show respect to other road users and give public vehicles the right of way. e) Minimise construction, maintenance and demolition activities in roads during peak hours. f) Maintain all construction / operational vehicles using public roads in a roadworthy condition and refrain from using non-roadworthy vehicles on public roads.	PM/ECO	Ongoing

MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
g) Secure all loads for transport effectively and cover vehicles transporting materials such as sand, scrap metal and pipes effectively, to prevent their contents falling or blowing off, causing traffic hazards.		
Community Relationship and Influx of Job Seekers a) Make use of local labour and local suppliers of material for the construction as far as reasonably possible. b) Train staff to respect the property and needs of the adjacent landowners and public areas to minimise any unnecessary disturbance. c) Ensure that adequate lines of communication are established between Emfuleni Municipality, the contractors, landowners, neighbouring landowners and the public at large to deal with any public grievances. d) Formulate a rapid response plan to deal with security matters.	PM/ECO	Ongoing
Creation and Securing of Employment Opportunities Meet the requirements of the Emfuleni Municipality policies for procurement and employment, to take care of and avoid potential conflict between people in the immediate surroundings seeking employment and those from elsewhere	PM/ECO	Ongoing

5.3.10 Noise

Construction noise will mainly result from the use of vehicles during construction activities. However noise from site activities is considered of low significance

MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
Noise a) Restrict very noisy construction activities to daytime, if feasible; and if not, obtain authorisation from the local authority for alternative arrangements. b) Refrain from operations during the night as sound may travel to residential areas, businesses and communities. c) Provide affected parties with prior knowledge of scheduling for ultra-heavy-duty vehicles and advise on the frequency and day periods of exposure to such noise d) Ensure that all vehicles and where possible noisy equipment are fitted with silencers that are regularly and properly maintained e) Meet regulatory requirements in terms of site boundary noises (in terms of municipal requirements). f) Construction activities should be restricted to between 07H00 and 17H00, Monday to Friday, and 08H00 – 13H00 on Saturdays. No work must be undertaken on Sundays and Public Holidays	PM/ECO	Biweekly

5.3.11 Air Quality

Minimal dust and vehicle emissions will be generated during the construction phase

MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
Air Emissions and Adour Control a) Minimise the surface area of exposed soil and fine construction materials to wind erosion (construction phase) b) Sprinkle water from the municipal supply on exposed areas or soil mounds (e.g. from trenching) as and when dust problems arise (construction phase) c) Maintain vehicles and other driven machinery regularly to ensure that no smoke is emitted from exhausts (construction and operational phase) d) Prevent any uncontrolled fires (construction and operational phase) e) Prohibit burning of wastes/refuse (construction and operational phase) f) Regular monitoring of the road, undertake regular audits to monitor any significant dust emissions	PM/ECO	Biweekly

5.3.12 Heritage

MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
Heritage Control a) Cease all construction within a radius of at least 20m of any heritage features or artefacts, or skeletons or bones that are found during construction. This distance should be increased at the discretion of supervisory staff if heavy machinery could cause further disturbance to the suspected heritage resource. b) Mark this area using clearly visible means, such as barrier tape, and all personnel should be informed that it is a no-go area. c) Appoint a guard to enforce this no-go area if there is any possibility that it could be violated, whether intentionally or inadvertently, by construction staff or members of the public. d) No measures should be taken to cover up the suspected heritage resource with soil, or to collect any remains such as bone or stone. e) If a heritage practitioner has been appointed to monitor the project, s/he should be contacted and a site inspection arranged as soon as possible. f) Respect the potentially sensitive and confidential nature of the heritage resources, particularly human remains, and refrain from making public statements until a mutually agreed time. g) Any extension of the project beyond its current footprint involving vegetation and/or earth clearance should be subject to prior assessment by a qualified heritage practitioner, taking into account all information gathered during this initial heritage impact assessment	PM/ECO	Biweekly

5.4 Operational Activities

5.4.1 Wetland and Aquatic Environment

MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
Mitigation measures against impacts on the Wetland Environment Regular maintenance should be undertaken to ensure no leakages from the filling station and associated infrastructure	PM/ECO	During breakdowns or maintenance

5.4.2 Soil Erosion

This is as a result of poor slope stabilisation and poor rehabilitation/re-vegetation

MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
Soil Erosion a) Vegetation should be retained where possible to avoid soil erosion b) Re-vegetation of disturbed surfaces should occur immediately after the construction activities are completed to encourage water seepage	PM/ECO	During breakdowns or maintenance