

**MOKOLO AND CROCODILE
WATER AUGMENTATION PROJECT
PHASE 2 (MCWAP-2)**

TENDER NO 054/2024/PMID/MCWAP2/RFB

**PART C3.1
SPECIFICATION**

SECTION 4

ENVIRONMENTAL MANAGEMENT

PART C3.1 SPECIFICATION

SECTION 4 ENVIRONMENTAL MANAGEMENT

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SECTION 4

ENVIRONMENTAL MANAGEMENT

4.1 SCOPE

This Section covers the requirements for controlling the impact of construction activities on the environment, specifically relating to the biophysical environment. Environmental management is concerned not only with the final results of the Contractor's operations to carry out the Works, but also with the control of how the operations are carried out. It is thus a requirement that the Contractor shall comply with the environmental requirements on an ongoing basis throughout the construction period.

The Contractor shall take full responsibility for protecting the environment and eliminating or minimising the negative impacts of construction on the environment. All contractors staff are responsible to exercise due diligence in protecting the environment. The Contractor shall prevent or limit the occurrence of incidents which may cause damage to the environment and mitigate the consequences of such incidents. Nothing specified herein shall relieve the Contractor of any obligations or responsibilities in this regard.

The Contractor shall be aware of the importance of maintaining appropriate relationships with the landowners on whose properties he will be operating, as well as any tenants or occupiers of such properties. The Contractor and his workforce must ensure that their actions in no way damage the relationship between the landowners, tenants and occupiers, and the Employer.

4.2 DEFINITIONS AND REFERENCES

4.2.1 Definitions

- a) **"Contaminated water"** means water contaminated by the Contractor's activities, e.g. concrete water and all runoff from Equipment/personnel wash areas. This includes any solid material or material that is suspended, dissolved or transported in water (including sediment) and which is spilled or deposited on land or into a water resource in such volume, composition or manner as to cause, or to be reasonably likely to cause, the water resource to be polluted.
- b) **"Environment"** means the surroundings within which humans exist and that are made up of:
 - i) The land, water and atmosphere of the earth;
 - ii) Micro-organisms, plant and animal life;
 - iii) Any part or combination of i) and ii) and the interrelationships among and between them; and
 - iv) The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.
- c) **"Environmental incident"** means events (accidental or due to non-compliance with the Specification) that are either natural (e.g. fires, floods etc.) or human induced (e.g. oil, diesel or hazardous liquid spill) or related to labour issues (strike action etc.) and that may have a significant negative or social impact, or that may result in public concern.
- d) **"Existing vegetation"** means all existing species, indigenous or otherwise, of trees, shrubs, groundcover, grasses and all other plants found growing on the site.

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- e) **“Fertile Soil”** means the 500 mm (in cultivated land) and 450 mm (in all other areas) of the profile of soil still present after the “Topsoil” (i.e. Original Ground Level (OGL) minus 250 mm and 150 mm respectively) had been removed or the actual depth of fertile soil as determined by an Agronomist, available if it is less than these specified values, which will also be regarded as maximum values. These profiles are also indicated in Volume 5 - Geotechnical Information, and should be consulted in all instances, but specifically in rocky areas.
- f) **“Flood plain”** means the area located on either side of a watercourse that is below the 1:100 year flood line.
- g) **“Hazardous substances”** means any substance defined or listed in the Regulations for Hazardous Substances (Hazardous Substances Act No 15 of 1973). For the purpose of this Contract, hazardous substances shall include all compounds that pose a risk of contaminating water and soil, or exerting a deleterious effect on any living organism, and including but not limited to only petrol, diesel, engine oil, hydraulic oil, shutter oil, curing compound, paint and epoxy products.
- h) **“Litter”** means anything that is thrown down, dropped or deposited and left that causes defacement by any person. Litter is waste in the wrong place.
- i) **“Oil separator”** means a trap that separates oil from water and prevents oil from being carried from the Works area.
- j) **“Pollution incident”** means any incident that results in the release of a substance or substances that cause pollution and associated damage to the natural environment.
- k) **“Potentially hazardous substance”** is a substance that, in the reasonable opinion of the Engineer, can have an effect on the environment.
- l) **“Reasonable”**, unless the context indicates otherwise, means reasonable in the opinion of the Engineer after he has consulted with a person suitably experienced in environmental management practices.
- m) **“Sensitive area”** means any area that is denoted as sensitive by the Specification or Engineer in accordance with Clause 4.4, due to its particular attributes. These attributes could, include, for example, the presence of rare or endangered, and protected vegetation, rocky outcrops, and any area denoted a biodiversity hotspot, the presence of heritage resources (e.g. archaeological artefacts or graves), the presence of unique natural features, and the presence of a watercourse or waterbody, etc.
- n) **“Solid waste”** means all solid waste (general and hazardous), including construction debris, excess cement/concrete, spoil (inert waste), wrapping materials, timber, tins and cans, drums, wire, nails, food and domestic waste (e.g. plastic packets and wrappers).
- o) **“Topsoil”** The A horizon and B Horizon suitable for root development of arable crops. The depth where microbial activity is most active. In undisturbed soils that depth can be 400-600 mm.
Means the top 250 mm (in cultivated lands) and 150 mm (in all other areas) of the soil profile below the OGL irrespective of the fertility appearance, structure, agricultural potential, fertility and composition of the soil or the actual available depth if it is less than these specified values, which will also be regarded as maximum values.
- p) **“Waste”** As per the National Environmental Management Waste Act, 2008 (Act 59 of 2008);
- i) Any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes as defined in Schedule 3 to this Act; or
 - ii) any other substance, material or object that is not included in Schedule 3 that may be defined as a waste by the Minister by notice in the Gazette.
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- q) **“Watercourse”** means:
- i) A river or spring;
 - ii) A natural channel in which water flows regularly or intermittently;
 - iii) A wetland, lake or dam into which, or from which, water flows;
 - iv) Any collection of water which the Minister of the Department of Water and Sanitation may, by notice in the Gazette, declare to be a watercourse and a reference to a watercourse includes, where relevant, its bed and banks; and
 - v) Any river, stream and natural drainage channel whether carrying water or not.
- r) **“Waterbody”** means a local topographic depression that contains any form of water and includes dams and wetlands, whether these are ephemeral or permanent.
- s) **“Wetland”** means all areas with waterlogged soils, or soils covered with a shallow layer of water (permanently or seasonally), unique types of soil formed under seasonal or permanent saturation and with distinctive plants adapted to water-saturated soils.

4.2.2 References

When reference is made to a Code of Practice, Specification or Standard, the reference shall be taken to mean the latest edition at the time of Tender of the Code, Specification or Standard; including addenda, supplements and modifications and revisions thereto, unless otherwise specified.

4.3 ENVIRONMENTAL MANAGEMENT SYSTEM REQUIREMENTS

The Contractor shall establish an Environmental Management System (EMS) in accordance with the requirements of ISO 14001:2015 and shall ensure that all work executed in terms of this Contract will be managed in accordance with this system. This EMS shall include all the requirements of this section of the specification and of the Construction Environmental Management Programme (CEMP_r) as approved for the project, which is included in Part C4: Site Information.

4.3.1 Environmental Management System Objectives

The objective of the EMS will be to manage all the significant environmental aspects associated with the Contract with a view to address and minimise the environmental impacts of the work, to ensure continuous monitoring of environmental performance, and continual improvement in environmental performance throughout the duration of the Contract through:

- Implementing the Specification with its requirements to manage significant aspects;
- Measuring, controlling and monitoring relevant construction activities, significant aspects and mitigation measures;
- Prevention, minimisation and control of pollution and environmental degradation, and
- Conduct regular compliance and efficiency auditing and management review for continual improvement.

4.3.2 Legal and General Obligations

All construction activities shall observe and obey any relevant environmental legislation and shall be undertaken in such a manner so as to minimise impacts on the surrounding environment, the public and adjoining landowners in line with the objectives and targets specified in the approved CEMPr.

The Contractor shall construct and/or implement all the necessary environmental protection measures in each area before any production work will be allowed to proceed.

4.3.2.1 Additional Approvals, Permits and Licensing Requirements

Apply for any additional permit(s) from the Limpopo Department of Economic Development, Environment and Tourism (LEDET) in terms of the Limpopo Environmental Management Act, 2003 (Act 7 of 2003 (LEMA), the National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA) and National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) (NEM: BA) for the removal and transportation of endangered fauna (including herpetofauna and invertebrates) and flora, as identified during the compulsory servitude preconstruction walkdown.

As indicated in Annexure 4/1 for the Remediation Action Plan, the Contractor will need to apply the drift fence approach, for two (2) kilometres (km) at a time, for the rescue and relocation of fauna that may be found during the construction of the pipeline (Search and rescue of fauna and flora species may only commence after acquiring the necessary permits from the Provincial Authorities):

- a) Drift fences with pitfall traps (20 m intervals) must be erected on either side of the construction area (this does not have to be the entire servitude, only the area wherein trenching will occur plus the construction buffer (estimated at 40 m in total width) prior to the commencement of construction and can only be removed once the excavations have been backfilled and suitably compacted, and all large construction equipment has been removed from the area;
- b) The drift fence must be erected around the entire active construction area (for whatever distance the trenching will be done). This includes behind and in front of the active works to stop species entering into the construction zone and not being able to move;
- c) Wooden stakes or steel droppers must be erected at 2 m intervals and must be hammered into the ground to be stable. Suitable fencing material (see equipment section) must be attached to the stakes and material must be weighed down on the ground using cobbles or logs (whatever is accessible) to ensure no species can easily pass below the fence. Pitfall traps (buckets) must be dug into the soil at 20 m intervals and the soil should lie even with the edges of the buckets once in place;
- d) Drift fences must remain until trench backfilling has been undertaken and suitable compaction of earth. Only once works are completed and the construction equipment has moved out of the area may the drift fences be removed;
- e) Drift fences must remain in good working order. Fencing materials that have large holes in them must be replaced and stakes that are broken/bent or any damage as a result of the construction activities must also be replaced. The drift fence must remain impermeable at all times to ensure maximum success of preventing species from entering the active construction area. Pitfall traps and the drift fence must be checked daily for the presence of herpetofauna and arachnids; and
- f) Construction equipment must remain in the construction area and may not damage or drive over any drift fencing.

All required Authorisations, Permits, Licences and/or Approvals are to be in place prior to impacting on the protected environmental features.

4.3.3 Environmental Method Statement

The Contractor's Environmental Management System referred to above, shall be documented in the detailed Environmental Method Statement (MS) to be submitted by the Contractor with his Tender. MS shall be subject to approval by the Engineer in consultation with the Client.

The Contractor shall implement his detailed Environmental MS in line with the various statutory regulations and the requirements of the Specification and shall keep the Environmental MS in operation for the full duration of the Contract.

The Contractor shall keep the detailed Environmental MS updated in accordance with his Quality Management Procedures, updated and/or supplemented with Environmental Method Statements, and make amendments as required by the Engineer and the circumstances that may prevail at the time.

4.3.4 Key Resources

A suitably qualified and competent (natural sciences degree) senior employee (with at least 10 years' working experience) of the Contractor stationed full time on site shall be responsible for implementing the EMS, environmental monitoring and control. This position shall be designated the Environmental Officer (EO). The EO shall be responsible for:

- a) Aiding the Contractor to comply with all the project environmental requirements, objectives and targets;
- b) Facilitating environmental activities and environmental awareness training of all personnel on site, and
- c) Implementing an internal environmental compliance management system.

The EO shall be supported by a team, including relevant specialists, responsible for monitoring, auditing, and executing all tasks required to comply with all the project environmental requirements, objectives and targets.

The Contractor shall have an experienced Horticulturist / Agronomist as part of his team that will be reporting to the EO and be fully responsible for the effective and efficient implementation of Section 47 – Landscaping and Rehabilitation. The Horticulturist shall be a professional person with a bachelor's degree in horticulture, botany, or a related field, with a minimum of 10 years' relevant experience.

As a result of the statutory authorisation process in terms of the existing South African environmental legislation, an independent Environmental Control Officer (ECO) shall be appointed by the Employer to audit and confirm all environmental compliance. The ECO shall conduct monthly inspections of the site during the Construction Phase, quarterly audits during the Defects Liability Phase, and conduct a full compliance audit against the CEMPr and EA annually. The ECO's inspection reports shall be made available to the Contractor for their response and remedial action.

4.3.5 Documentation

EMS documentation that will form part of the detailed Environmental Method Statement shall include as a minimum:

- a) Documented statements of an environmental policy and environmental objectives;
- b) An EMS Method Statement (or manual);
- c) Method statements (procedures) for environmental requirements; and
- d) Register and proformas for records as indicated below.

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This documentation shall ensure the effective planning, operation and control of environmental requirements in terms of the CEMPr.

Records are to be agreed with the Engineer and are to ensure the effective planning, operation and control of processes that relate to its significant environmental aspects.

4.3.5.1 Methods

The Contractor's EMS Method Statement shall specify which processes, procedures and associated resources will be applied by whom and when, to meet the requirements of the Specification. The contents of the EMS Method Statement shall detail as a minimum the following in order to satisfy the Specification relevant to each operation required for the meeting of the project environmental requirements in accordance with the Contract Specification:

- a) Scope;
- b) EMS Objectives, Targets and Key Performance Indicators;
- c) Management roles and responsibilities;
- d) Environmental Resources; and
- e) Control of documents, data and records, including databases, methods statements and reports.

4.3.5.2 Records

The Contractor shall supply the Engineer by the end of the first week of the new calendar month with the following monthly submissions:

- a) Environmental Incidents register;
- b) Environmental Issues register;
- c) Training records (As per Clause 4.5 below);
- d) Training matrix;
- e) Spill clear up records;
- f) Waste management records;
- g) Hazardous Waste Disposal Register;
- h) Hazardous Substances Register;
- i) Servitude management records (e.g. erosion control, weed control);
- j) Sensitive areas records (e.g. wetlands, fauna and flora, heritage sites);
- k) Monitoring databases (e.g. noise, dust, water quality);
- l) Monitoring schedule;
- m) Spoil material volumes reused and disposed, including locality;
- n) Areas landscaped and rehabilitated;
- o) Water use records – construction water;
- p) Method Statement Register; and
- q) Public Complaints / Grievance Register.

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Copies of the following are to be kept on file with the Contractor for reference as required:

- a) Waste transfer notes;
- b) Subcontractor environmental performance records;
- c) Training Records;
- d) Environmental Induction records;
- e) Visitors Induction and Indemnity records;
- f) Environmental Officer Letters of Appointment;
- g) Material Safety Data Sheets for all hazardous substances; and
- h) Internal compliance monitoring records (e.g. Corrective Action Reports, Non Conformance Reports).

The environmental records shall be legible, identifiable, and traceable to the activity involved. Records shall be maintained to demonstrate conformance to all requirements. The Incident Report template is in Annexure 4/6.

4.3.5.3 Reporting

(a) Daily Environmental Reports

Daily environmental reports are to be compiled and copied to the Engineer for information within one working day. All daily environmental reports shall be formally transmitted to the Engineer on a weekly basis. These reports will be designed to facilitate communication, problem solving, flow of information and cooperation between the Engineer and Contractor with regard to environmental matters. These daily environmental reports will include sufficient detail of actual work completed (measured) for inclusion into the monthly Interim Payment Certificates.

(b) Monthly Reports

The environmental management activities, compliance and progress shall be included in the monthly project progress reports, prepared by the Contractor.

(c) Incident and Non-conformance Reports

The Contractor shall establish procedures for the reporting of environmental infringements, improvements to practice, non-conformances and incidents. The Contractor shall act on these reports as soon as reasonably practical. The Contractor shall ensure that these reporting procedures are complied with by all Subcontractors on the Site. All incidents shall be investigated and the results of all investigations are to be assessed with a view to continually improve performance.

The Contractor shall submit to the Engineer at the end of each month, reports and statistics in a format approved by the Engineer on all environmental incidents, infringements, and improvements.

(d) Record Keeping

The EO will be responsible for maintaining all records in relation to the CEMPr requirements on site. Such records will be made available to the Engineer's representatives on request during any audits, as well as at any time as requested by officials of the DFFE, DWS, LEDET and/or the Employer.

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Typically, these records will include:

- a) Daily Environmental Management Reports / Checklists;
- b) Monthly summaries of daily reports;
- c) Incident and non-conformance reports as well as an Incidents register;
- d) Environmental awareness training records;
- e) Waste management records;
- f) Monitoring schedule;
- g) Monitoring databases (e.g. noise, dust, water quality);
- h) Internal and external audits;
- i) Spill clear up records;
- j) Register of hazardous substances;
- k) Water use records – construction water;
- l) Waste transfer notes (including hazardous waste);
- m) List of “toolbox talks” topics; and
- n) Copies of the EA, CEMPr and all permits required during the construction phase.

Record keeping must be undertaken in an orderly fashion with the intent of ensuring easy reference. Records includes Registers (e.g. training register or a complaints register).

The Contractor filing system or structure would typically include the following documents:

- a) Environmental Policy;
- b) Environmental Management Programme;
- c) Environmental Method Statements;
- d) Procedures;
- e) Work Instructions;
- f) Registers;
- g) Photographs; and
- h) Checklists.

4.3.6 Compliance Monitoring

Compliance to the environmental management requirements shall be monitored and reported on through ongoing site inspections, monitoring and evaluation of performance against targets.

Compliance monitoring will commence in the pre-construction phase, where those conditions in the Environmental Authorisation (EA) that need to be adhered to prior to project implementation will need to be checked and recorded, as well as to check compliance with the provisions in the CEMPr. The CEMPr is the responsibility of the implementing agent. Compliance monitoring will be completed at the end of the defects notification period to check the performance of rehabilitation measures and whether the related objectives have been met. A document handling system must be established to ensure accurate updating of CEMPr and availability of all documents required for the effective functioning of the CEMPr. The CEMPr must be updated to contain recommendations to rectify the shortcomings identified in the environmental audit report.

4.3.7 ISO 14001:2015 Auditing

The internal and external environmental system audits shall be carried out internally on a quarterly basis by the Contractor's staff from Head Office and once every six months by an external auditor appointed by the Contractor. Audits shall focus on compliance with:

- a) Environmental Management System processes and documentation (including method statements, report and records);
- b) Contract and Specification requirements;
- c) Legal compliance; and
- d) Requirements of ISO 14001:2015.

The audit reports shall detail corrective and preventive actions for findings.

The Contractor shall submit copies of audit reports within fourteen days after each audit. The external auditor shall, as a minimum, have a formal qualification(s), EMS Auditor Certificate and South African Auditor Training and Certification Association (SAATCA) registration or something similar.

4.3.8 Management Review

The Contractor's Environmental Management System shall be reviewed periodically (but at least every six months) by the Engineer and the Contractor. Input for these management reviews shall include:

- a) Follow-up actions from previous management reviews;
- b) Internal audit results;
- c) Evaluation of compliance with legal and Contract requirements;
- d) Communications and environmental complaints from external parties;
- e) Environmental performance (achievement of objectives, targets, key performance indicators);
- f) Status of corrective and preventive actions;
- g) Changes to environmental requirements including legal and other aspects; and
- h) Recommendations for improvement.

4.3.9 Incident Preparedness and Reporting

An initial report of an environmental incident / accident must be submitted to the Engineer and the Employer within 24 hours of occurrence and an investigation report must be submitted to the Engineer, the Employer and the authorities in line with legislation (S30 of NEMA and S19 and 20 of NWA) within 48 hours of occurrence in a format agreed upon with the Engineer.

Environmental incidents and accidents reporting is regulated by Section 30 of National Environment Management Act (NEMA) 107 of 1998 and Section 19 and 20 of the National Water Act (NWA) 36 of 1998.

Section 30 (S30) of NEMA deals with the control of Incidents. As per Section 30 (1) (a), "incident" means an unexpected, sudden and uncontrolled release of a hazardous substance, including from

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a major emission, fire or explosion, that causes, has caused or may cause significant harm to the environment, human life or property.

Each environmental incident report must contain as a minimum:

- a) The nature of the incident;
- b) The substances involved and an estimation of the quantity released and their possible acute effect on persons and the environment and data needed to assess these effects;
- c) Initial measures taken to minimise impacts;
- d) Causes of the incident, whether direct or indirect, including equipment, technology, system, or management failure; and
- e) Measures taken and to be taken to avoid a recurrence of such incident.

Section 20 (S20) of NWA handles the control of emergency incidents. As per Section 20 (1) (a) and (b), "incident" includes any incident or accident on which a substance a) pollutes or has the potential to pollute a water resource; or b) has, or is likely to have, a detrimental effect on a water resource.

The responsible person, any other person involved in the incident or any other person with knowledge of the incident must, as soon as reasonably practicable after obtaining knowledge of the incident, report to (after approval has been received from the Engineer):

- a) The DWS;
- b) The South African Police Service or the relevant fire department; or
- c) The relevant catchment management agency.

The Contractor must:

- a) Take all reasonable measures to contain and minimise the effects of the incident;
- b) Undertake clean-up procedures;
- c) Remedy the effects of the incident; and
- d) Take such measures as the catchment management agency directs.

Section 19 (S19) of NWA handles prevention and remedying effects of pollution. The Contractor shall handle truck spillages and other onsite incidents in accordance with Section 19 of NWA.

Section 19 states the following:

19 (1) An owner of land, a person in control of land or a person who occupies or uses the land on which -

- (a) any activity or process is or was performed or undertaken; or
- (b) any other situation exists,
which causes, has caused or is likely to cause pollution if a water resource, must take all reasonable measures to prevent any such pollution from occurring, continuing or recurring.
- (2) The measures referred to in subsection (1) may include measures to
 - (a) cease, modify or control any act or process" causing the pollution;
 - (b) comply with any prescribed waste standard or management practice;
 - (c) contain or prevent the movement of pollutants;
 - (d) eliminate any source of the pollution;

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- (e) remedy the effects of the pollution; and
- (f) remedy the effects of any disturbance to the bed and banks of a watercourse.

A similar approach, as per Section 19 of NWA, is required by the Contractor when reporting on an accident that caused an environmental impact.

The Contractor shall prepare and submit to the Engineer a Method Statement for emergencies and incidents. A list of persons and organisations including addresses and phone numbers (Suppliers, Contractor, Employer, local authorities, fire brigade, and hospitals) shall be established and made readily available for emergency environmental incident response.

Frequency of emergency response exercises shall be jointly determined with the Engineer and shall be outlined in the Method Statement.

The Method Statement shall address the eventuality and measures to be implemented in case of an environmental incident, including adequate external communication. This document shall detail the following:

- a) Description of the environmental incident levels and degrees of required response depending on the severity of the incident;
- b) Distribution and issuing of spill response equipment by crews and facilities and procedures for intervention, depending on the level of environmental incident;
- c) Frequency and objectives of emergency response exercises;
- d) Scope of emergency response team, list of persons and organizations including addresses and phone numbers for emergency environmental incidents response; and
- e) Communication flowchart in case of environmental emergency.

Employees must be trained on emergency procedures. For example fires, spills and leaks, including notifying of Engineer and relevant authorities. The following contact details should be included on the emergency list as a minimum:

- a) ECO;
- b) Engineer;
- c) Nearest Hospital;
- d) Police;
- e) EM;
- f) Contractor; and
- g) Fire Department.

The Contractor must ensure the necessary materials and equipment for dealing with spills and leaks is available on site at all work areas. Treatment and remediation of the spill areas shall be undertaken to the reasonable satisfaction of the Engineer.

Once emergency actions have been carried out, the normal corrective and preventive actions shall be undertaken by the Contractor.

The Contractor will be required to provide method statements for situations where the failure of a component of the EMS could result in significant pollution problems. It is preferable to have planned for contingency beforehand, rather than to wait for the failure and a pollution incident to occur.

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The Contractor will be required to have available equipment and materials for the containment, storage and removal of the incident, and to be able to deal rapidly with the more serious pollution incidents, in particular:

- a) Fuel or chemical spillage;
- b) Watercourse pollution (e.g. by oil); and
- c) Fire.

4.3.10 Site Meetings

Environmental management performance and compliance with the environmental Specification will be an item on the agenda of the monthly site meetings. In addition, the Contractor shall attend a monthly coordination meeting for all the environmental role players on the project.

4.3.11 Non-conformance

4.3.11.1 General

If criteria within the EA, CEMPr and Contract Specifications are not fulfilled and corrective action is not taken, an environmental non-conformance may be raised by the EM through the Engineer and a non-conformance notice issued.

Examples of circumstances where this may arise include:

- a) Receipt of a complaint regarding pollution or other environmental impacts caused by the project;
- b) Departure from approved or agreed procedures; and
- c) Non-conformance identified because of any self-assessment, formal audit or other environmental survey or inspection.

4.3.11.2 Corrective Action

Corrective action may include changes to work instructions (frequency of testing, test method etc.), alterations to a method statement or other procedure, further staff training, etc. Non-conformances will be reviewed by the EM and will be discussed in construction meetings as relevant.

An environmental non-conformance can be issued to the Contractor by the Engineer. The Contractor must respond with a corrective action report. It is the responsibility of the Contractor to immediately initiate corrective actions and, once completed, provide details of the actions undertaken on the corrective action report and return it signed to the EM, via the CRE within an agreed timeframe. If the non-conformance is considered to breach legislative requirements, the breach must be reported to the relevant authority and the Employer.

4.3.11.3 Penalties

Penalties for failure to comply with the EA, CEMPr and Contract Specifications provisions are indicated in Annexure 4/5. In cases where the main Contractor engages sub-contractors the responsibility and resultant liability shall lie with the main Contractor engaged under the contract.

4.3.12 Contractor's Method Statements

The Contractor's method statements shall include a risk assessment identifying all environmental hazards associated with the activity. The method statements shall include a commentary on environmental control measures required to prevent problems (or at least limit their effects). Method statements are the key to successful environmental management.

The method statements must be project and site specific and should explain in detail the following:

- a) The manner in which the work is to be undertaken;
- b) The estimated schedule for the works (timing);
- c) The area where the works will be executed (location);
- d) The materials and plant / equipment needed for the works;
- e) The necessary mitigation measures that need to be implemented to adequately safeguard the environment, construction workers and the public (where applicable);
- f) Training of employees;
- g) Roles and responsibilities; and
- h) Monitoring and reporting requirements.

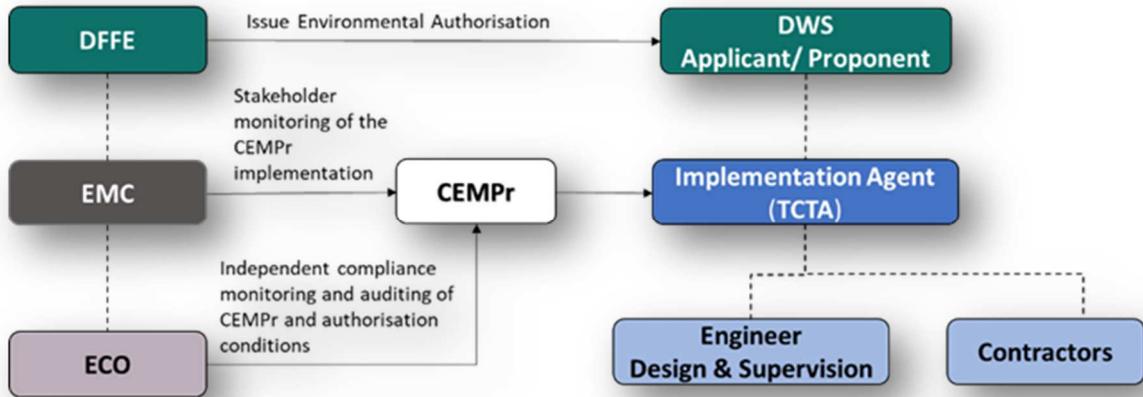
The list of method statements required includes at least the following:

- a) Method statement for preconstruction survey;
- b) Method Statement of sequencing works and complying with construction train limitations;
- c) Method Statement for search, rescue and relocation of fauna and flora;
- d) Method Statement for fencing;
- e) Method Statement for site clearing;
- f) Method statement for establishing the construction camp(s);
- g) Method statement with regard to waste and wastewater management;
- h) Method statement to show procedures for dealing with possible emergencies that can occur, such as fire and accidental leaks and spillage of carbon fuels and oils;
- i) Method statement for dust control;
- j) Method statement for the storage and handling of hazardous substances;
- k) Method statement for management of concrete and batching plants;
- l) Method Statement for the management of grouting activities;
- m) Method statement for sourcing, transport and storage of materials;
- n) Method statement for river diversions, coffer dam and sedimentation ponds arrangement at all river crossings;
- o) Method statement for managing spoil material;
- p) Method Statement of managing borrow pits;
- q) Method statement for controlling alien invasive species and noxious weeds;
- r) Method statement for the decommissioning of the construction works area; and
- s) Method statement for the landscaping and rehabilitation of the construction footprint.

Note that the method statements are contractual requirements between the Employer and the Contractor and therefore not subject to approval by the DFFE. DWS requires method statements related to the Water Use Licence for submission and approval.

4.3.13 Roles and Responsibilities

A high-level outline of the institutional arrangements for the implementation of the CEMPr during the pre-construction and construction phases of the project, as well as adherence to the conditions of the EA, is provided in Figure 4/1 below. Key role-players will be the DFFE, the DWS, the Environmental Monitoring Committee (EMC), the Trans-Caledon Tunnel Authority (TCTA) acting as the Employer in terms of the Contract, the Environmental Control Officer (ECO), the Engineer and the Contractor.



**FIGURE 4/1
INSTITUTIONAL ARRANGEMENTS: ROLES AND RESPONSIBILITIES**

4.3.13.1 Department of Forestry, Fisheries and the Environment (DFFE)

The DFFE is the mandated authority in terms of NEMA that determines whether authorisation can be issued for the project, following a decision-making process conducted as part of the EIA. Conditions are included in the Environmental Authorisation (EA) (Reference Number: 14/12/16/3/3/2/1100), which need to be complied with by the project applicant (DWS), and its implementing agent, TCTA. Refer to Annexure 4/7 for the EA.

DFFE also fulfils a compliance and enforcement role with regards to the EA. The DFFE may perform random inspections to check compliance. The DFFE will also serve as an active member of the EMC and will review the monitoring and auditing reports compiled by the ECO.

Amendments may be required to the CEMPr or the EA, based on adaptive management to the site conditions and the technical requirements of the project. If there are any amendments that trigger a listed activity as NEMA regulations, there is a need for a new environmental authorisation application. These amendments will need to be approved by the DFFE.

4.3.13.2 Department of Water and Sanitation

The DWS is the applicant in terms of NEMA. The DWS is also referred to as the Project Proponent and is ultimately responsible for the development and implementation of the CEMPr and ensuring that the conditions in the EA are satisfied. The liability for non-compliance thus ultimately rests with DWS.

PART C3.1 - SPECIFICATION

The DWS has appointed the TCTA as the implementing agent for the project and arrangements for compliance need to be formalised between these parties.

The DWS is the mandated authority in terms of the NWA that will issue the Water Use Licence.

4.3.13.3 The Contractor

The Contractor(s) is appointed by the implementing agent (TCTA), acting as the Employer in terms of the Contract, to undertake construction of the works as specified in the Contract. In order to carry out the requirements of this CEMPr. The Contractor must make sure that he/she has a clear understanding of all environmental matters relating to the project.

The responsibilities of the Contractor will as a minimum include:

- a) The implementation of, and adherence to, the Contract Specifications in accordance with the requirements of the EA and CEMPr;
- b) To ensure all sub-contractors under his/her supervision adhere to the applicable environmental contract specifications in accordance with the requirements of the EA and CEMPr;
- c) Report any non-compliance to the Engineer of the event occurring;
- d) To ensure that all employees and sub-contractors attend the Environmental Awareness Training and subsequent refresher training, and are familiar with or made aware of the contents of the EA and CEMPr; and
- e) To conduct any remedial work required in terms of the Contract Specifications, the CEMPr and EA as a result of environmental negligence, mismanagement and/or non-compliance.

4.3.13.4 The Environmental Control Officer

The role of the ECO is primarily to act as an independent monitor on behalf of the DFFE and the EMC for the implementation of the MCWAP-2 in accordance with the requirements of the EA and the approved CEMPr. The ECO must be competent, with a minimum of 10 (ten) years' experience, and shall be appointed by the Proponent.

The ECO must undertake monthly monitoring and full biannual compliance auditing, including an audit at the end of construction and one at the end of the defects notification period. The aforementioned reports will be submitted to the Implementing Agent's (Employer's) Environmental Manager, EMC (if applicable) and DFFE for their records.

The role and function of the ECO is to:

- a) Conduct independent, third-party monitoring and auditing;
- b) Regularly monitor and review the progress towards achieving the specific strategies, objectives and performance targets of the CEMPr;
- c) Independently verify that mitigation measures and conditions in the CEMPr are being applied;
- d) Conduct regular site inspections and issue inspection reports;
- e) Review monitoring data and evaluate against performance targets;
- f) Provide independent reporting to DFFE on compliance with the EA and CEMPr;
- g) After consultation with the Implementing Agent and the EMC (if established), inform decision-making authorities when there is non-compliance with conditions of approval;
- h) Undertake periodic formal auditing of the CEMPr compliance;

PART C3.1 - SPECIFICATION

- i) As an independent Consultant, the ECO is not responsible for:
 - i) CEMPr implementation or enforcement;
 - ii) Primary environmental data collection, monitoring and analysis; and
 - iii) Resolving complaints from Interested and Affected Parties (IAPs).

The ECO is not accountable for the implementation of the EA and the CEMPr and is also not linked to the project authorities, the Engineer or the Contractor. Therefore, the ECO does not have the authority to:

- a) Make project-related decisions;
- b) Issue instructions to either the Engineer or the Contractor;
- c) Stop the construction works; and
- d) Demand the implementation of specific mitigation and/or corrective measures to the Engineer or Contractor.

4.3.13.5 Environmental Monitoring Committee

An EMC shall be established before commencement of any construction activities and will serve as an additional mechanism for monitoring the implementation of the CEMPr and compliance with the EA, as well as for improving communication amongst key stakeholders. The EMC meets every two months and special meetings will be convened on special situations. The Contractor is required to attend and present at the EMC meetings. The committee will have an advisory, monitoring and “watch-dog” role for the duration of the construction phase of the project.

4.3.13.6 The Engineer

The Engineer is appointed by the Employer to design the works and monitor construction. The Engineer will be represented on site for the duration of construction by the Chief Resident Engineer (CRE). The Engineer carries a responsibility for monitoring the effective implementation of the environmental management requirements detailed in the CEMPr.

The Engineer is required to have an Environmental Monitor (EM) and Social Monitor (SM) on his team, responsible for daily monitoring of compliance to environmental requirements.

4.3.13.7 The Chief Resident Engineer

The CRE is a member of the Engineer’s staff and responsible for monitoring compliance by the Contractor to the EA and the CEMPr. The Contractor may only take instructions from the CRE. All decisions affecting programme or costs which are influenced by the specifications, procedures or protocols must be approved by the CRE. The CRE also has the authority to stop any construction activity which is in contravention of the relevant specifications. The CRE must make the findings of monitoring reports available to the Implementing Agent (Employer) and the ECO.

4.3.13.8 The Engineer’s Environmental Monitor

The EM is part of the Engineer’s staff and is responsible for the day-to-day monitoring of the construction activities in relation to their compliance with the CEMPr and other relevant specifications. The EM should ensure that any complaints related to the physical environment received from the public, are recorded and dealt with appropriately.

PART C3.1 - SPECIFICATION

The EM must:

- a) Be well versed in matters pertaining to environmental management;
- b) Understand all relevant environmental legislation and processes;
- c) Understand the hierarchy of environmental compliance reporting and the implications of non-compliance;
- d) Know and understand the background of the project and the implementation programme;
- e) Identify issues and make recommendations in terms of the environmental management requirements;
- f) Undertake daily monitoring of construction fronts, weekly monitoring reports and monthly over performance assessment, to gauge compliance with environmental legislation, conditions of the EA, CEMPr and the Contract Specifications;
- g) Submit the findings of site monitoring to the CRE;
- h) Keep accurate and detailed records of all CEMPr-related activities on site;
- i) Check that the Contractor keeps all the permits and certificates on site as required by the CEMPr;
- j) Advise on the rectification of any pollution, contamination or damage to the project site, rights of way or adjacent land; and
- k) Ensure that the CRE is informed of all applicable DFFE approved changes to the CEMPr.

More specifically the EM should maintain the following on site:

- a) A daily site diary;
- b) A non-conformance register;
- c) A register of site monitoring;
- d) Copies of all Method Statements;
- e) Monitoring reports of the Contractor;
- f) Monitor compliance and audit reports; and
- g) Copies of the EA, CEMPr and all permits required during the construction phase.

4.3.13.9 The Contractor's Environmental Officer

The team (more than one person) of Environmental Officers (EOs) are part of the Contractor's staff and are responsible for all activities related to the day-to-day on-site implementation of the EA, CEMPr and compliance with the environmental specifications. They are also responsible for the compilation of regular (daily, weekly and monthly) Monitoring Reports for the CRE.

The EOs must liaise with the CRE on all environmental and related issues (when necessary) and for ensuring that any complaints received from the public are recorded and dealt with appropriately and expeditiously. The Contractor must ensure that all his/her employees, visitors and sub-contractors receive Environmental Awareness Training as specified.

The EOs should:

- a) Be well versed in environmental matters;
- b) Understand the relevant environmental legislation, international best practices and processes;

PART C3.1 - SPECIFICATION

- c) Understand the hierarchy of environmental compliance reporting, and the implications of non-compliance;
- d) Know the background of the project and understand the implementation programme;
- e) Be able to resolve conflicts and make recommendations (to the Contractor) in terms of the requirements of the CEMPr;
- f) Keep accurate and detailed records of all CEMPr-related activities on site;
- g) Arrange the presentation of environmental awareness training courses/toolbox talks to all visitors, site staff, Contractors and sub-contractors, and monitor the environmental awareness training for all new site personnel employed by the Contractor;
- h) Advise on the rectification of any pollution, contamination or damage to the project site, rights of way and adjacent land; and
- i) The EOs shall be supported by a team of specialists responsible for monitoring, auditing, and executing all tasks required to comply with all the project environmental requirements, objectives and targets.

4.4 SERVITUDE ZONES AND THEIR SPECIAL REQUIREMENTS

The pipeline servitude has been zoned to indicate areas where specific environmental control requirements will be applicable. The Contractor shall plan and execute the Works with specific reference to this zoning. The zoning map has been included in Annexure 4/4.

4.5 ENVIRONMENTAL AWARENESS CREATION AND TRAINING

Environmental Training and Awareness Programme shall be developed by the Contractor, which is to be approved by the Engineer. Training aims to create an understanding of environmental management obligations and prescriptive measures governing the execution of the project. It is generally geared towards project team members that require a higher-level of appreciation of the environmental management context and implementation framework for the project. Awareness creation strives to foster a general attentiveness amongst the construction workforce to sensitive environmental features and an understanding of implementing environmental best practices.

The Contractor shall ensure that all of his employees and those of his Subcontractors attend Environmental Awareness Training courses before the commencement of construction and as and when new staff or sub-contractors are brought on site. The environmental training is compulsory for all employees and structured in accordance with their relevant rank, level and responsibility, as well as the Environmental Specification as they apply to the works and site. This training shall form part of the normal induction process for employees.

The Environmental Awareness Training shall be planned to ensure that attendees:

- a) Acquire a basic understanding of the key environmental features within the project area and its immediate environs;
- b) Become familiar with the environmental controls required on the project; and
- c) Are made aware of any other environmental matters of importance as deemed necessary by the Engineer.

The initial training shall be held within 28 days after the Commencement Date, and subsequent training courses shall be arranged for new employees coming onto site after the initial training course.

PART C3.1 - SPECIFICATION

Provision should also be made for quarterly refresher courses to be undertaken during the course of the Contract where relevant topics, such as emergency response drills, can be communicated.

Environmental awareness shall also be discussed in the regular “tool box talks” with personnel.

Training shall take cognizance of changes in environmental requirements during the different stages of the project.

The Contractor shall erect and maintain information posters at areas frequented by the construction workers (e.g. eating facilities) for the information of his employees depicting actions to be taken to ensure compliance with specific aspects of the environmental Specification and highlighting sensitive environmental features (e.g. grave sites, protected trees).

All visitors to the project site shall also be made aware of the specific environmental management requirements on the project.

The Contractor shall maintain a matrix of training requirements for various levels of employees based on their designated roles and responsibilities, an environmental training record, and will assess the success of this training, all in agreement with the Engineer. Records will be kept of the type of training and awareness creation provided, as well as containing the details of the attendees.

Courses must be provided by suitably qualified persons and in a language and medium understood by the workers. It is noted that Sepedi and Setswana are the dominant languages in the area.

The Contractor must compile a project-specific Environmental Training and Awareness Programme, taking into consideration the abovementioned factors, to be approved by the Engineer.

4.6 NON-HAZARDOUS AND HAZARDOUS SUBSTANCES, POLLUTION AND WASTE

4.6.1 Non-Hazardous Substances Handling and Control

Materials to be suitably stored to prevent environmental contamination and visual impacts. Storage requirements to be determined based on chemical qualities of material, requirements of the Safety Data Sheet (SDS) and in line with the relevant SANS standards.

Where required, stored material to be protected from rain and run-off to avoid environmental contamination. Materials to be appropriately transported to avoid environmental contamination. Loose loads (e.g. sand, stone chip, refuse, paper and cement) to be covered when vehicles travel on public roads. Suitable remedial measures, depending on the nature of the contaminant and the receiving environment, to be instituted for spillages. Materials to be suitably used to prevent environmental contamination.

4.6.2 Hazardous Substances Handling and Control

Hazardous substances must be stored and handled in accordance with the appropriate legislation and standards, which include the Hazardous Substances Act (Act No. 15 of 1973), the Occupational Health and Safety Act (No. 85 of 1993), relevant associated Regulations, and applicable SANS and international standards. The applicable SANS include the following:

- a) SANS 10089: The Petroleum Industry Part 2 (2007): Electrical installations in the distribution and marketing sector;
- b) SANS 10089: The Petroleum Industry Part 3 (2010): The installation, modification and decommissioning of underground storage tanks, pumps/dispensers and pipework at service stations and consumer installations;

PART C3.1 - SPECIFICATION

- c) SANS 10131 (2004): Above-ground storage tanks for petroleum product;
- d) SANS 1830 (2006): Flexible piping for underground use at service stations and consumer installations;
- e) SANS 1535: (2007): Glass-reinforced polyester-coated steel tanks for the underground storage of hydrocarbons and oxygenated solvents and intended for burial horizontally; and (f) SANS 10089: The Petroleum industry Part 1 (2008): Storage and distribution of petroleum products in above-ground bulk installations; and
- f) SANS 310: Storage Tank facilities for hazardous chemicals – Above ground storage tank facilities for flammable, combustible and non-flammable chemicals.

Storage and use of hazardous materials will be strictly controlled to prevent environmental contamination, and must adhere to the requirements stipulated on the SDS. Appropriate signage to be displayed at storage areas for hazardous substances. Where flammable liquids are being used, applied or stored the workplace must be effectively ventilated. No person may smoke in any place in which flammable liquid is used or stored. Install an adequate number of fire-fighting equipment in suitable locations around the flammable liquids store. Where flammable liquids are decanted, the metal containers must be are bonded or earthed. No flammable material (e.g. paper, cleaning rags or similar material) may be stored together with flammable liquids.

Staff that will be handling hazardous materials must be trained to do so. Any hazardous materials (apart from fuel) must be stored within a lockable store with a sealed floor. Suitable ventilation to be provided. All storage tanks containing hazardous materials must be placed in bunded containment areas with impermeable surfaces. The bunded area must be able to contain 110% of the total volume of the stored hazardous material. The Contractor must refer to: SANS 10131:2004 - 5.2.3.2 Bund construction.

The Contractor shall identify and keep records of all hazardous materials likely to be used during the Contract, as required in Section 2 – Occupational Health and Safety. In addition, the Contractor shall prepare procedures and methods to ensure that all legal requirements for the handling and storage of these substances are implemented and that maximum care is taken to avoid spillages or incidents involving these substances to the satisfaction of the Engineer.

SDSs, which contain the necessary information pertaining to a specific hazardous substance, must be present for all hazardous materials stored on the site. Spill kits must be available for the clean-up of hazardous material spillages. Secondary containment where a risk of spillage exists shall be provided. Drip trays to be placed under parked heavy vehicles, equipment and other receptacles of hazardous material to prevent spillages.

In the event of spillages of hazardous substances, the appropriate clean up and disposal measures are to be implemented. Adequate spill-kits should be readily available. Spill reporting procedures to be displayed at all locations where hazardous substances are being stored.

Hazardous materials will be disposed of at registered sites or handed to registered hazardous waste disposal facilities for disposal / recycling. Proof of adequate disposal required. Proper and timeous notification of any pollution incidents associated with hazardous materials.

4.6.3 Pollution Prevention and Clean-up Measures

Pursuant to the requirements of Section 1 - General and Section 8 - Dealing with Water, the Contractor shall set up a contaminated water management system, which shall include facilities for the collection, containment, treatment, re-use and disposal of water to prevent pollution.

PART C3.1 - SPECIFICATION

Generally, the Contractor shall prevent the discharge of water contaminated with any pollutants, such as soaps, detergent, cements, concrete, lime, chemicals, glues, solvents, paints and fuels, into the environment.

The Contractor shall, in accordance with his environmental management system and environmental Method Statements, take all the necessary precautions to prevent pollution of natural resources, and shall clean up any pollution incidents.

In addition to the generality of the above requirement, the Contractor shall provide suitable, sturdy, leak-proof, metal drip trays, with turned up sides, to be placed under all vehicles and Equipment on Site where:

- a) Any permitted maintenance/repairs and/or emergency repairs are effected outside the controlled workshop areas; and
- b) Parked Equipment is leaking oil.

Drip trays shall be cleaned regularly and the contents disposed of in accordance with the requirements for dealing with the particular waste. Drip trays shall be seen as a temporary environmental protection measure, and shall not be a permanent solution to oil leaks etc. that should be repaired appropriately.

During refuelling of Equipment suitable drip trays shall also be utilised, and spill clean-up materials shall be available in the immediate vicinity of the refuelling work.

The Contractor shall notify the CRE immediately of any pollution incidents on Site, initiate remediation measures, identify the cause of the incident and implement measures to the satisfaction of the CRE.

4.6.4 Waste Management

In addition to the requirements of Section 1 - General, the management of solid waste on site shall be strictly controlled and monitored. Waste management activities must comply with the National Environmental Management: Waste Act, 2008 (Act 59 of 2008) (NEM: WA). The storage of general or hazardous waste in a waste storage facility must comply with the Norms and Standards in GN No. R. 926 of 29 November 2013. Vermin / weatherproof bins shall be provided in sufficient numbers and capacity to store domestic waste. These bins must be kept closed to reduce odour build-up and emptied regularly to avoid overfilling and other associated nuisances.

The Contractor shall record volumes of waste generated, recycled and disposed of. Waste skips to be provided at the construction areas and should be sufficient in number. The skip storage area should be kept clean, and skips should be emptied and replaced before overflowing or spillage occurs. The Contractor shall ensure suitable housekeeping.

Littering, including litter in the trench excavation, shall be prevented, and where it may occur on site, it shall be immediately addressed to the satisfaction of the CRE.

The Contractor shall provide an appropriate system for management of solid waste produced on a daily basis. No burying, dumping or burning of any waste materials, vegetation, litter or refuse shall be allowed on Site.

The waste may be temporarily stored on Site in a central waste area that is weatherproof and scavenger-proof, and which the CRE has approved.

PART C3.1 - SPECIFICATION

Waste shall be classified as general or hazardous, depending on its characteristics. This classification shall determine the most appropriate handling methods for each type of waste and the ultimate disposal of the material. Wastes listed in Annexure 1 Waste Classification and Management Regulations of No. R 634 of 23 August 2013 do not require classification in terms of SANS 10234:

1. The wastes specified in item 2 of this Annexure do not require classification in terms of Regulation 4(1), nor assessment in terms of Regulation 8(1).

(a) (2) (a) General waste -

- (i) Domestic waste;
- (ii) Business waste not containing hazardous waste or hazardous chemicals;
- (iii) Non-infectious animal carcasses;
- (iv) Garden waste; (v) Waste packaging;
- (vi) Waste tyres;
- (vii) Building and demolition waste not containing hazardous waste or hazardous chemicals; and
- (viii) Excavated earth material not containing hazardous waste or hazardous chemicals.

(2) (b) Hazardous waste-

- (i) Waste Products:
 - Asbestos Waste;
 - PCB waste; or
 - PCB containing waste (> 50 mg/kg or 50 ppm); and Expired, spoilt or unusable hazardous products.
- (ii) Mixed Waste:
 - General waste, excluding domestic waste, which contains hazardous waste or hazardous chemicals; and
 - Mixed, hazardous chemical wastes from analytical laboratories and laboratories from academic institutions in containers less than 100 litres.
- (iii) Other: Health Care Risk Waste (HCRW)

"Waste classification" means establishing- (a) whether a waste is hazardous based on the nature of its physical, health and environmental hazardous properties (hazard classes); and (b) the degree or severity of hazard posed (hazard categories);

General waste to be expected during construction includes the following:

- a) Trash (waste paper, plastics, cardboard, etc.) and food waste from offices, warehouses and construction personnel;
- b) Uncontaminated construction debris such as used wood and scrap metal;
- c) Uncontaminated soil and non-hazardous rubble from excavation or demolition; and
- d) All general waste shall be further sorted to maximise its re-use and recycling.

Hazardous waste is waste which has the potential, even in low concentrations, to have a significant adverse effect on public health and/or the environment. This would be on account of its inherent chemical and physical characteristics such as toxic, ignitable, corrosive, carcinogenic or other properties. Hazardous waste shall be identified, transported and disposed of by the Contractor in accordance with the requirements of the relevant legislation.

The quantities of waste temporarily stored on site shall not exceed the quantities below unless authorisation in terms of the NEM: WA has been obtained from the competent authority:

- a) 100m³ of general waste;
- b) 35m³ of hazardous waste; and
- c) 500m² waste tyres.

4.6.4.1 Reduction, Re-use, Recycling and Disposal

Waste shall be managed in the following order:

- a) Reduce and Reuse: The Contractor shall make every effort to keep the production of waste volumes to a minimum and reuse wastes, wherever possible.
- b) Prevent: By waste avoidance and minimisation during construction. Construction workers shall be trained and informed about waste minimisation. The person dealing with or who may potentially be exposed to hazardous chemical substances shall be provided with a well-defined list of duties.
- c) Recycle: Where feasible, waste materials shall be recycled and the following will apply:
 - i) Glass, papers and cardboard, metals (other than aluminium), aluminium, organic waste and plastic could be recycled and shall be separated into different containers on site.
 - ii) These containers shall be suitably marked and stored in a covered and enclosed area to protect it from the elements and scavengers.
 - iii) Recycling shall be done by staff wearing suitable PPE, such as gloves and dust masks.
 - iv) Separated materials shall be taken to recycling centres or could be collected by recycling contractors.
 - v) Clear signs and separation areas for waste material shall be provided.
- d) Treat: Waste treatment in order to reduce toxicity and the quantities of waste to targets specified. If used oil accumulates on site it shall be collected by a company that recycles oil. Used oil shall be stored in an enclosed area. The storage area shall have an impervious surface to prevent oil contamination. Old containers of paint, oil, thinners, acids, poisons etc., shall be disposed of as per the manufacturers' waste disposal procedures.
- e) Disposal: Disposal instructions shall be obtained from the supplier of potential polluting or hazardous substances. An approved and registered waste disposal company shall be contracted to remove and dispose of hazardous substances. A certificate of safe disposal shall be obtained from them and kept on record. The Contractor shall ensure that waste is transported so as to avoid waste spills en-route.

4.6.4.2 Waste Disposal Records and Permits

The Contractor shall abide by the Waste Classification and Management Regulations of No. R 634 of 23 August 2013 for the management and disposal of waste. Waste must not be diluted solely to reduce the concentration of its constituents for the purposes of classification in terms of Regulation 4(2), or assessment of the waste in accordance with the Norms and Standards for Assessment of Waste for Landfill Disposal set in terms of section 7(1) of the Act.

Any container or storage impoundment holding waste must be labelled, or where labelling is not possible, records must be kept, reflecting the following:

- a) The date on which waste was first placed in the container;
- b) The date on which waste was placed in the container for the last time when the container was filled, closed, sealed or covered;
- c) The dates when, and quantities of, waste added and waste removed from containers or storage impoundments, if relevant;
- d) 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
- e) The classification of the waste in terms of Regulation 4 once it has been completed.

PART C3.1 - SPECIFICATION

All waste shall be transported to suitable licensed disposal facilities, based on the waste type (general versus hazardous). The Contractor shall provide copies of documentary evidence of proper disposal of all waste removed from the site as well as any permits required for the storage, handling and treatment of any waste. The Contractor must ensure that their waste 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 Act prior to the disposal of the waste to landfill.

4.7 MANAGEMENT OF SITE

4.7.1 Preservation of Soil

The Contractor shall remove and stockpile topsoil and fertile soil in accordance with Section 7 - Clearing of Site, or as directed by the Engineer, in quantities sufficient for reinstatement, in accordance with Section 47 - Landscaping and Rehabilitation. Topsoil shall be removed from, inter alia, working (including quarry, spoil and borrow pits) and relevant areas of the Permanent Works, construction, haul, and other access roads and such like, all as directed by the Engineer.

The removed soil shall be protected from loss by erosion, growth of declared weeds, compaction, mixing with other soil and materials, becoming stacking areas and contamination with other materials including waste and hydrocarbons.

With regards to the management of topsoil, the following should be adhered to:

- a) Determine the average depth of the topsoil prior to excavations;
- b) Identify suitable areas to store topsoil;
- c) Remove topsoil from areas to be affected by construction activities;
- d) Establish and demarcate topsoil stockpiling areas, in order to prevent the mixing of topsoil with subsoil and spoil material;
- e) Wind and water erosion-control measures are to be implemented to prevent loss of topsoil;
- f) Following the construction phase, the topsoil should be placed as the final soil layer prior to seeding;
- g) Topsoil should be stored in such a way that does not compromise its plant-support capacity;
- h) Topsoil from the construction activities should be stored for post-construction rehabilitation work and should not be disturbed more than is absolutely necessary;
- i) Protect topsoil in order to avoid erosion loss on steep slopes;
- j) Protect topsoil from contamination by aggregate, cement, concrete, fuels, litter, oils, domestic and wastes; and
- k) An ecologically-sound storm water management plan must be implemented during construction and appropriate water diversion systems put in place.

4.7.2 Stockpiles

Materials shall be stored within the construction establishment areas or laydown areas approved by the Engineer. Soil, sand and gravel stockpiles shall be so placed as to occupy minimum width compatible with the natural angle of repose of material and measures shall be taken to prevent the material from being spread over too wide a surface. The Contractor shall ensure that all stockpiles do not cause the damming of water or run off and shall also ensure that the materials are not eroded away.

PART C3.1 - SPECIFICATION

The Contractor shall ensure that material is not stockpiled inside the 1:100 year floodline, or if not determined, 100m from the edge of the stream, of any watercourse or waterbody. Stockpiles shall be emplaced so that they shall not obstruct any stormwater or drainage paths.

Stockpiles shall be placed such that an appropriate distance between the stockpiles and adjacent fences are maintained to avoid damage to fences and to maintain the integrity of the fence. Any damage to fences resulting from inappropriate stockpiling shall be repaired immediately at the Contractor's expense.

4.7.3 Watercourses and Waterbodies

The Contractor shall not work within the flood plain or any watercourses or waterbodies without the written approval of the Engineer as required for the execution of the work.

The Contractor shall ensure that all watercourses and waterbodies are protected from contamination or degradation as a result of his activities.

All watercourses and waterbodies shall be protected from contamination and direct or indirect spills of pollutants such as garbage, sewage, cement, oils, fuels, chemicals, aggregate tailings, wash and waste water or organic material resulting from the Contractor's activities. In the event of a spill, prompt action shall be taken to clear polluted or affected areas.

The Contractor shall not permit his employees to make use of any natural water sources for the purposes of swimming, personal washing and the washing of machinery or clothes.

Any discharges or spillages may only occur in line with the requirements of the water use licence / DWS Directive. The requirements for dealing with waste and polluted water are specified in Section 1 - General and Section 8 – Dealing with Water.

Authorisation shall be obtained from the Department of Water and Sanitation before any water is extracted from any source.

4.7.4 Protection of Fauna

The Contractor shall protect fauna living within and around the Site and shall ensure that trapping, poisoning and/ or shooting of animals is strictly forbidden. In this regard the Contractor shall regularly inspect the servitude fences and their immediate surroundings with the aim of removing any snares that may be found, and to identify damage to fences that needs to be repaired.

No pets or livestock are permitted on Site. The Contractor shall ensure that domestic and native animals and game belonging to surrounding landowners are kept away and are safe from the unprotected Works.

The Contractor shall ensure that the working area is kept clean, tidy and free of rubbish that would attract animal or insect pest species, and that no feeding of animals occurs.

Any use of herbicides and pesticides shall first be approved by the Engineer. Where the use of herbicides, pesticides or other poisonous substances is required or has been specified, they shall be stored, handled and applied, with due regard to their potential harmful effects and under the supervision of a registered pest control officer. Any person who for reward or in the course of a business, industry or trade uses an agricultural remedy must register as a Pest Control Operator in terms of the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act

PART C3.1 - SPECIFICATION

No. 36 of 1947) as amended and the regulations relating thereto as published in Government Notice No. R1449 of 1 July 1983.

The Contractor shall also comply with the requirements of the National Environmental Management: Biodiversity Act 10 of 2004 and Limpopo Environmental Management Act and Animal Protection Act, No. 71 of 1962.

All wildlife must be protected, with snaring or hunting strictly prohibited with stated consequences and penalties enforced. Unauthorised use of natural resources from adjacent properties must be avoided and strictly enforced. No fishing allowed. No wilful harm to any animals, unless a direct threat is posed to a worker's health or safety. Handling of snakes only to be allowed by trained and registered herpetologist. Captured animals to be safely released to a similar habitat. Prepare emergency response procedure for dealing with snake bites, as venomous species may occur in the area.

Photographs of protected and sensitive fauna species must be displayed in the construction camp to heighten awareness. If any herpetological species (including the Southern African Python, Giant Bullfrog and African Bullfrog) are encountered or exposed during the construction phase, they should be removed and relocated to suitable natural areas. This remedial action requires the employment of a herpetologist and or ecologist to oversee the removal of any herpetofauna. Training of construction workers to recognise threatened animal species will reduce the probability of fauna being harmed unnecessarily. The Contractor must ensure that no faunal species are disturbed, trapped, hunted or killed during the construction phase. The Contractor will need to apply the drift fence process for relocation of fauna.

4.7.4.1 Bat Cave Measures

The Contractor shall implement the following measures to safeguard the bat cave in the Mooivallei area:

- a) No damage to the bat caves in the Mooivallei area due to construction activities;
- b) Bat species residing within the Mooivallei area (cave) shall not be unnecessarily disturbed. Construction activities must not hinder their access to the cave;
- c) Caution shall be taken to ensure construction footprints are kept to an absolute minimum, including storage of materials, stockpiling etc.;
- d) Toolbox talks shall be provided to personnel and sub-contractors regarding disturbance to bats; and
- e) No blasting around the Bat Cave which is located on Mooivallei Portion 10. The Contractor should consider an alternative method such as chemical blasting.

4.7.4.2 Wildlife farming and wildlife ranching measures

Several properties along the pipeline route has breeding camps that may need to be moved and/or relocated to a more secure area, hunting activities and commercial livestock activities. Refer to Annexure 4/2 for the list of properties that have hunting activities and refer to Annexure 4/3 for a list of properties that have game breeding.

The Contractor's measures for wildlife farming and wildlife ranching shall include:

- a) All breeding camps must have a protective one hundred meter (100) buffer zone adjacent to the fence line of the construction servitude to be established in consultation with the landowner;

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- b) Make provision for wildlife movement and migration, where possible;
- c) Safe translocation of wildlife species encountered on site to areas of protection;
- d) Creating an alternative habitat with high productive potential during rehabilitation procedures by planting pipeline servitude with suitable indigenous grass species that will improve biodiversity;
- e) Implement measures to prevent the use of unauthorised security firearms on the construction site;
- f) Prohibit the transport of live plants or other animals into natural areas;
- g) All wildlife must have sufficient space to move away from construction disturbances;
- h) Planned blasting activities must be communicated to directly and adjacent landowners. Communication methods should be amplified in the method statement;
- i) Design and implement standard operating procedures for unexpected cases of emergency and support to ranchers/farmers i.e. unplanned veld fires, fence breaks and wildlife escapes; and
- j) Avoid disruption of functional wildlife enterprises (including game farming operations, hunting and ecotourism activities).

4.7.4.3 Avifauna Measures

The Contractor shall implement measures to safeguard against areas identified as sensitive to bird species.

The Contractor shall implement measures to safeguard the Martial Eagle nest on Karoobult 126 KQ including the following:

- a) No blasting around the Martial Eagle nest i.e. no blasting to occur from chainage 17 000 to chainage 19 000. The Contractor should consider an alternative method such as chemical rock breaking.

4.7.5 Environmental Monitoring Variables

The various monitoring sites for the different parameters have been identified. The Contractor must make provision to identify and monitor the additional monitoring sites (as mentioned in the sections below).

The Contractor must make provision for a 5 m high shade netting (80% shade) in all noise, dust, and visual, sensitive areas to reduce dust fallout, visual, and noise impacts on sensitive receptors such as Kesarona Primary School, game breeding and hunting areas.

4.7.5.1 Air Quality

Dust monitoring shall be carried out in accordance with the National Environmental Management Air Quality Act (Act No.39 of 2004). The monitoring shall determine the existing dust fallout levels at selected positions along the pipeline alignment, at borrow areas, and along access and haul roads, and also conduct PM10 monitoring at specific locations.

(a) PM10 Monitoring

Where communities or concentrations of homesteads are located in the proximity of the pipeline alignment or borrow pits, the monitoring of PM10 dust particles must also be conducted in order to determine the potential health impact of the fine dust on the receptors in accordance with SANS 1929:2011: Ed2.00 standard. PM10 monitoring must be done specifically at these three (3) sites:

- a) Near the Crocodile River on Mooivalei Portion 1 (24°35'38.53"S 27°17'45.27"E);
- b) Kesarona Primary School: 24°34'24.25"S 27°18'35.18"E, and
- c) Medupi Power Station: 24°34'24.25"S 27°18'35.18"E.

The Contractor must monitor particulate matter at these three (3) stations with the monitoring equipment (Met One E-Sampler) provided by the Client and must compare results to the SANS 1929:2011 24-hour limit of 75 mg/m³ to PM10 to determine compliance. The monitoring frequency for PM10 is continuous for the duration of construction activities.

(b) Monitoring of Dust Buckets

There are one hundred (100) dust fallout buckets monitoring locations that have been established. In addition to these sites, the Contractor shall allow for an additional ten (10) monitoring sites where monitoring shall be done for the full duration of the Contract. The Contractor shall provide, maintain and regularly calibrate dust measurement equipment.

The Contractor shall keep records of all dust level measurements for the duration of the Contract. These records shall be submitted each month to the Engineer in an agreed format, or on the request of the Engineer. The records shall provide calculated average values for each month, include appropriate meteorological data recorded in terms the requirements of Section 1 - General, and shall be accompanied with action plans for improvement where standards are not met.

In the event of dust levels exceeding ambient threshold, according to the National Environmental Management Air Quality Act (Act No.39 of 2004), the Contractor must inform the licencing authority of non-compliance with permitted emission standards. Any non-compliance must be reported to the licensing authority on a monthly basis, and must be reported within 15 (fifteen) days of the reporting month end.

The non-compliance must be reported in the following format:

- a) Source code/name;
- b) Emission standard exceeded;
- c) Root cause analysis;
- d) Calculation of impacts/emissions associated with the non-compliance incidents and dispersion modelling of pollutants, where applicable;
- e) Measures implemented or to be implemented to prevent recurrence; and
- f) Date by which measure will be implemented.

The method for sampling will be according to the American Society for Testing & Materials standard method for collection and analysis of windblown dust deposition (ASTMD1739).

4.7.5.2 Water Quality and Biomonitoring

The Contractor must monitor six (6) sampling positions for the duration of the project and the Contractor shall allow for an additional eight (8) sampling positions where monitoring shall be done for the full duration of the Contract. All analysis, interpretation and recommendations must be undertaken by a suitably qualified Service Provider who is familiar with the planned activities, project area river systems and associated up and downstream land uses.

**TABLE 4/1
SAMPLING POSITIONS FOR WATER QUALITY AND BIOMONITORING**

RIVER	POINT	LATITUDE	LONGITUDE
Crocodile River	CROC1	24°44'39.52"S	27°24'57.27"E
	CROC3	24°38'43.88"S	27°20'5.45"E
	CROC4	24°38'2.82"S	27°18'58.24"E
	CROC5	24°36'32.80"S	27°17'44.97"E
Matlabas	MAT1	24° 4'59.73"S	27°25'14.88"E
	MAT2	24° 3'10.42"S	27°21'35.77"E

In addition to the sampling above, monitoring of the fluvial morphology and sediment transport is required during construction, at commissioning and after commissioning of the project to evaluate whether there are possible negative impacts on the river.

The frequency for the physical and chemical analysis shall include the following baseline parameters:

(a) Weekly

- i) PH;
- ii) Temperature;
- iii) Electrical Conductivity (EC);
- iv) Total Dissolved Solids (TDS);
- v) Total Suspended Solids (TSS);
- vi) Dissolved Oxygen (DO);
- vii) Chemical Oxygen Demand (COD); and
- viii) Turbidity.

The Contractor shall test for microbiological baseline parameters; E.coli and Faecal coliform counts must be done weekly.

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(b) Monthly

- i) Aluminium (Al);
- ii) Ammonium nitrogen (NH₄-N);
- iii) Cadmium (Cd);
- iv) Calcium (Ca);
- v) Chloride (Cl);
- vi) Chromium (Cr);
- vii) Copper (Cu);
- viii) Cyanide (CN);
- ix) Fluoride (F);
- x) Iron (Fe);
- xi) Lead (II) (Pb);
- xii) Manganese (Mn);
- xiii) Mercury (Hg);
- xiv) Nitrate & Nitrite nitrogen (NO₃+NO₂-N);
- xv) Ortho-phosphate (PO₄-P);
- xvi) Sodium (Na);
- xvii) Sodium absorption rate (SAR);
- xviii) Soap, oil & grease (SOG); and
- xix) Zinc (Zn).

The Contractor must conduct a full SANS241 every six (6) months for the duration of the Contract.

(c) Biomonitoring

The Contractor must include monthly biomonitoring for all monitoring points for the following aspects:

- SASS 5;
- Fish population assemblage; and
- Diatoms.

The Contractor must ensure that there are photographic records from a fixed point for all monitoring.

4.7.5.3 Noise Levels

Noise measurements shall be carried out in accordance with the latest version of South African National Standard - Code of practice, SANS 10103 – the measurement and rating of environmental noise with respect to land use, health, annoyance and to speech communication. The Contractor shall ensure that noise measurements are done as per the requirements of said SANS guideline, including equipment specifications, measurement methods, reference periods as well as calibration requirements.

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The Contractor shall ensure that monthly sound level measurements be collected at all previously established measurement locations for the duration of the Contract, allowing for a minimum of fifteen (15) monitoring locations and an additional ten (10) monitoring points. Noise measurements shall comprise of four (4) to six (6) measurements of a minimum of ten (10) minutes each at evenly spread intervals over the course of a day for each monitoring location.

**TABLE 4/2
MONITORING POSITIONS FOR NOISE MONITORING**

No	LATITUDE	LONGITUDE	FARM
1.	24°35'38.27"S	27°17'43.04"E	Mooivallei 342 KQ Portion 1
2.	24°36'1.17"S	27°17'34.63"E	Mooivallei 342 KQ Portion 2
3.	24°36'37.14"S	27°18'4.85"E	Mooivallei 342 KQ Portion 5
4.	24°36'51.73"S	27°18'26.03"E	Mooivallei 342 KQ Portion 4
5.	24°36'50.01"S	27°18'19.35"E	Mooivallei 342 KQ Portion 7
6.	24°37'14.13"S	27°18'48.5"E	Mooivallei 342 KQ Portion 8
7.	24°37'14.13"S	27°18'48.50"E	Mooivallei 342 KQ Portion 9
8.	24°37'29.67"S	27°18'44.61"E	Mooivallei 342 KQ Portion 10
9.	23°43'34.34"S	27°24'16.74"E	Hanglip 508 LQ Rem of Portion 3
10.	24° 5'44.11"S	27°25'16.58"E	Welgevonden 16 KQ Portion 2
11.	24°10'31.32"S	27°26'25.11"E	Haarlem Oost 51 KQ Portion 15
12.	24°18'17.58"S	27°27'15.23"E	Ruigtevley 97 KQ Remainder
13.	24°24'6.81"S	27°25'22.14"E	Diepkuil 135 KQ Portion 2
14.	24°34'22.54"S	27°18'36.01"E	Kesarona Primary School
15.	24° 34.245"S	27° 18.575"E	Community housing behind school

The Contractor shall keep records of all noise level measurements for the duration of the Contract. Noise levels should be analysed and instances of non-compliance with standards identified. These records shall be submitted to the Engineer on a monthly basis in an agreed format, or upon the request of the Engineer, and shall be accompanied with action plans for improvement where standards are not met.

4.7.5.4 Vibration

Vibration shall be monitored as per the requirements in Section 12.

4.7.5.5 Groundwater

The Contractor shall conduct quarterly groundwater monitoring at fifty (50) sites within the project area, for the duration of the project:

- a) Monitoring will be performed on existing boreholes along the pipeline route or those boreholes drilled during geotechnical and geo-hydrological investigations;
- b) The list of fifty (50) boreholes will be provided within the Final Specifications for the development of a monitoring method statement; and
- c) The Contractor must allow for an extra twenty (20) boreholes to monitor.

The Contractor shall conduct the sampling, analysis and reporting on the data collected for the duration of the project and the development of a trend analysis:

- a) All analysis, interpretation and recommendations must be undertaken by a suitably qualified Service Provider who is familiar with the planned activities, project area aquifers and land uses;
- b) The project will require drinking water in selected areas, therefore a full SANS 241 analysis will be required for the boreholes identified for drinking water quality. The Contractor should budget for a maximum of ten (10) boreholes to test for full SANS 241 parameters;
- c) A shortened SANS 241 will be required on the remainder of the boreholes. The Contractor should budget for a maximum of fifty three (53) boreholes to test for the shortened SANS 241 parameters;
- d) Water quality samples must be taken and sent to an accredited laboratory for analysis; and
- e) Analyse selected boreholes for water level.

4.7.5.6 Roads and Traffic

The Contractor shall conduct a condition assessment of roads at the end of construction. The Contractor shall allow for an additional eight (8) roads for this assessment.

The roads likely to be impacted by project vehicles are the following:

- a) Road D1649 – surfaced road;
- b) Road P16/2 – surfaced road;
- c) Road D336 – surfaced road;
- d) Road D2701 – surfaced road;
- e) D769 - gravel road;
- f) Road D175 – gravel road;
- g) Road D1925 – gravel road;
- h) D1675 - surfaced road;
- i) R510 – surfaced road between Swartklip mine and Thabazimbi and to the project site (for potential concrete aggregate supply); and
- j) R516 and R511 – surfaced road between Leeupoort quarry and Thabazimbi and to the project site (for potential concrete aggregate supply).

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The Contract shall map and describe each in terms of length, and include data on the following parameters:

- a) Visual surface condition: A quantitative tool that records the visual condition of the road surface and associated infrastructure such as drains and storm water culverts, etc. (or note the lack thereof) for any irregularities;
- b) In-situ layering: A quantitative assessment or measure of the thickness of the wearing course layers of the unsurfaced roads in particular; and
- c) In situ material strength determination: Execution of Dynamic Cone Penetrometer (DCP) Tests which is a quantitative measure of the strength of underlying in situ soil layers.

4.8 MEASUREMENT AND PAYMENT

Payment for the Contractor's obligations in respect of the Environment shall be made through the Fixed Charges, Time Related Charges and Provisional Sum items as described in Section 1.15. The payment items together shall include full compensation for all personnel (including a dedicated full time Environmental Officer(s)), costs and incidentals in respect of compliance with and enforcement of the Specification.

**ANNEXURE 4/1
REMEDICATION ACTION PLAN**



SCIENTIFIC TERRESTRIAL SERVICES

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**HERPETOFAUNA AND INVERTEBRATE REMEDIATION
ACTION PLAN FOR THE MOKOLO AND CROCODILE RIVER
(WEST) WATER AUGMENTATION PROJECT (PHASE 2A)
(MCWAP-2A), LIMPOPO PROVINCE**

Prepared for

GIBB Consulting

March 2021

Prepared by: Scientific Terrestrial Services
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ACRONYMS

CITES	Convention of International Trade in Endangered Species
CR	Critically Endangered
DD	Data Deficient
EO	Environmental Officer
EN	Endangered
EX	Extinct
EW	Extinct in the Wild
IUCN	The International Union for Conservation of Nature
LC	Least Concern
NE	Not Evaluated
NT	Near Threatened
STS	Scientific Terrestrial Services
SCC	Species of Conservation Concern
TOPS	Threatened and Protected Species
VU	Vulnerable
%	Percentage

GLOSSARY OF TERMS

Brumation	A state or condition of sluggishness, inactivity, or torpor exhibited by reptiles (such as snakes or lizards) during winter or extended periods of low temperature
Carapace	the hard upper shell of a turtle, crustacean, or arachnid.
Dorso-ventrally flattened	When an animal or plant / its organ is compressed along its dorsal (upper) and ventral (lower) side
Herpetofauna	The reptiles and amphibians of a particular region, habitat, or geological period.
Invertebrates	An animal lacking a backbone, such as an arthropod, mollusk, annelid, coelenterate, etc. The invertebrates constitute an artificial division of the animal kingdom, comprising 95 percent of animal species and about 30 different phyla.
Tympanum	A membrane covering the hearing organ
Vertebrates	An animal of a large group distinguished by the possession of a backbone or spinal column, including mammals, birds, reptiles, amphibians, and fishes.



1 INTRODUCTION

This report provides details pertaining to the Herpetofauna (reptiles and amphibians) and Invertebrates (Baboon spiders and Scorpions) found within the study area during the site visits and provides a remediation action plan for the construction and operational phases to minimise fatality of species, with specific mention to Species of Conservation Concern (SCC).

The International Union for Conservation of Nature (IUCN) Red List which has various species classifications (nine classes) that considered various criteria such as population rate of decline, geographic distribution, population disturbance and fragmentation and potential future threats. The classes all consider the risk of extinction of a species. Table 1 below provides a summary of the nine classifications.

Table 1: Classifications used in the IUCN red list.

<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>Extinct</p>  </div> <div style="text-align: center;"> <p>EW</p>  </div> <div style="text-align: center;"> <p>Threatened</p>    </div> <div style="text-align: center;"> <p>NT</p>  </div> <div style="text-align: center;"> <p>Least Concern</p>  </div> </div>	
Extinct (EX)	Species is no longer extant.
Extinct in the Wild (EW)	Species survives only in captivity, cultivation and/or outside native range.
Critically Endangered (CR)	Extremely critical risk of extinction in the wild in the immediate future.
Endangered (EN)	Very high risk of extinction in the wild in the near future.
Vulnerable (VU)	High risk of extinction in the wild in the medium-term future.
Near threatened (NT)	Close to being threatened with extinction in the near future.
Least Concern (LC)	Unlikely to become extinct in the near future.
Data Deficient (DD)	Insufficient data available to determine risk.
Not Evaluated (NE)	Species has not been evaluated and therefore the risk is unknown.

Herpetofauna and invertebrates are considered important for the health and functioning of an ecosystem, several species or genera are of specific importance within South Africa due to their conservation status and their protection status in accordance with the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA) and the associated Threatened and Protected Species (TOPS) regulations compiled for South Africa. The SCC for this report are as follows:

- a. African Bullfrog (*Pyxicephalus adspersus*) (Near Threatened);
- b. Lesser Bullfrog (*Pyxicephalus edulis*) (Least Concern);
- c. Southern African Rock Python (*Python natalensis*) (Protected - TOPS);



- d. Lobatse Hingeback Tortoise (*Kinixys lobatsiana*) (Vulnerable);
- e. Rear-horned Baboon Spider (*Ceratogyrus darlingi*) (Protected - TOPS);
- f. Common Baboon Spiders (*Harpactira* sp.) (Protected - TOPS);
- g. Rough Burrower (*Opisththalmus glabrifrons*) (Protected - TOPS);
- h. Tree Creeper (*Opisthacanthus asper*) (Protected - TOPS); and
- i. Giant Rock Scorpion (*Hadogenes troglodyte*) (Protected - TOPS).

Furthermore, the Convention of International Trade in Endangered Species of wild fauna and flora (CITES) provides three categories (within appendices) for the restriction of trade on various SCC. This categories are as follows:

- **Appendix I** includes species threatened with extinction. Trade in specimens of these species is permitted only in exceptional circumstances.
- **Appendix II** includes species not necessarily threatened with extinction, but in which trade must be controlled in order to avoid utilization incompatible with their survival.
- **Appendix III** contains species that are protected in at least one country, which has asked other CITES Parties for assistance in controlling the trade.

The following sections provide in depth details of the above listed SCC as well as the requirements associated with the rescue and relocation of individuals that may be found during the construction of the pipeline. It must be noted that this report should be read in conjunction with the faunal assessment undertaken by STS (2020)¹ for additional information pertaining to identification, methodology and site visit specifications.

¹ Scientific Terrestrial Services (2021). Biodiversity and invertebrate specialist detailed site sensitivity analyses and design guidance as part of the Mokolo and Crocodile River (West) Water Augmentation project (Phase 2 A) (MCWAP – 2A), Limpopo Project. Reference Number STS 200032.



2 SPECIES OF CONSERVATION CONCERN DESCRIPTION

The following tables provides a summary of the available literature review of the herpetofauna SCC(as listed in Section 1 above) for which this remediation action plan, as defined in Section 3 below has been compiled.

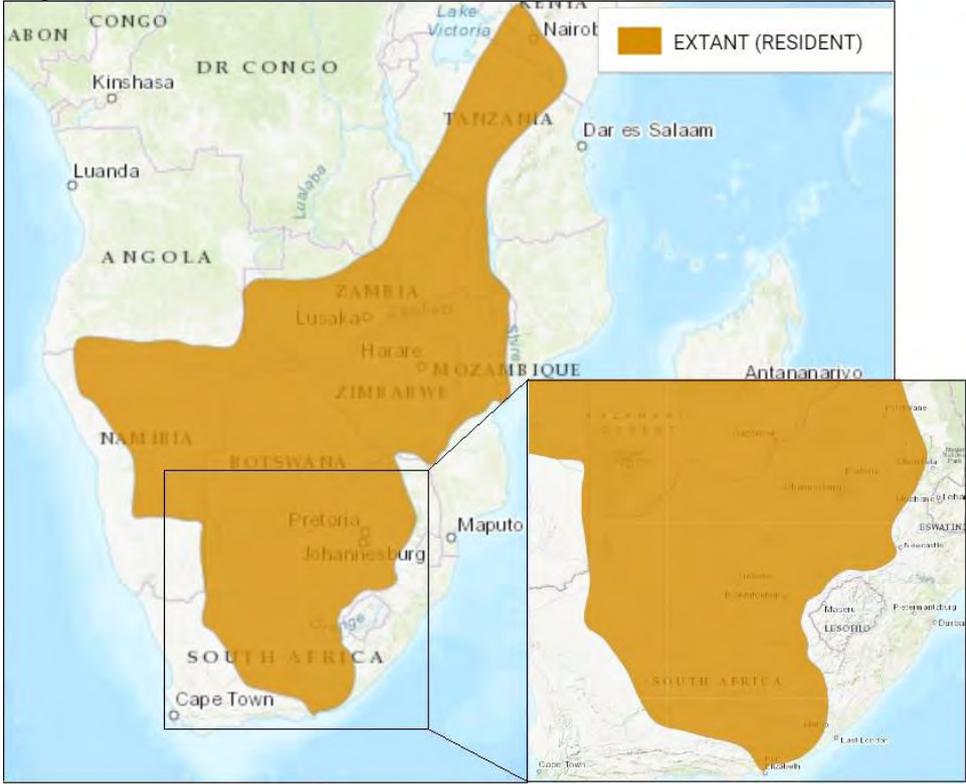
Table 2: Description of SCC within the class Amphibia.

Giant Bullfrog (<i>Pyxicephalus adspersus</i>)		
Photographs from site:		
		
Other Common Names	Highveld Bullfrog African Bullfrog Giant Bullfrog	
Conservation status ²	IUCN Red List	Least Concern. Population is considered to be declining
	CITES	Not Listed
	National Status	Listed as Near Threatened within South Africa. Listed as a protected species under the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).
Description ³	<p><i>Pyxicephalus adspersus</i> is one of the largest amphibian species, with males weighing up to 10 x more than females. The head of this species very broad, with a number of uninterrupted skin ridges present along the back. In adults, the dorsum is dark olive-green, but may vary from brown to grey and even blue while short sections of the longitudinal skin ridges may be white or cream. It has been recorded that a snout length exceeding 140 mm may be assigned to <i>P. adspersus</i> and not <i>P. edulis</i>, however, juveniles cannot easily be distinguished.</p> <p>In juveniles, a pale vertebral stripe is often present, contrasting sharply with the bright green brown colour. The abdomen is white to creamy-yellow, except in the region of the forelimbs, where it is bright yellow in breeding males. Dark mottling may be present in the gular region of males (Du Preez 1996).</p>	
Ecology and habitat ^{2 and 3}	<p>Ecology <i>Pyxicephalus adspersus</i>, considered a fossorial species, and remains in a dormant state, buried underground and emerges at the start of the rains (at least 30 mm downpour is noted to be a trigger over continual light rain). Breeding takes place at night after heavy rainfall and within temporary pans or pools of water (where water needs to be retained for at least 30 days). Species is known to be an explosive breeder, finding a mate and laying upwards of 4,000 eggs within 48 hours. Territorial males are larger than non-territorial males and they have been known to battle aggressively for territory and females. Food source includes a variety of invertebrates and small vertebrates, including small rodents, birds, other frog species and even small snakes. This species exhibits cannibalism in the adult, juvenile and even tadpole stages.</p>	

² Information compiled from IUCN (2020)

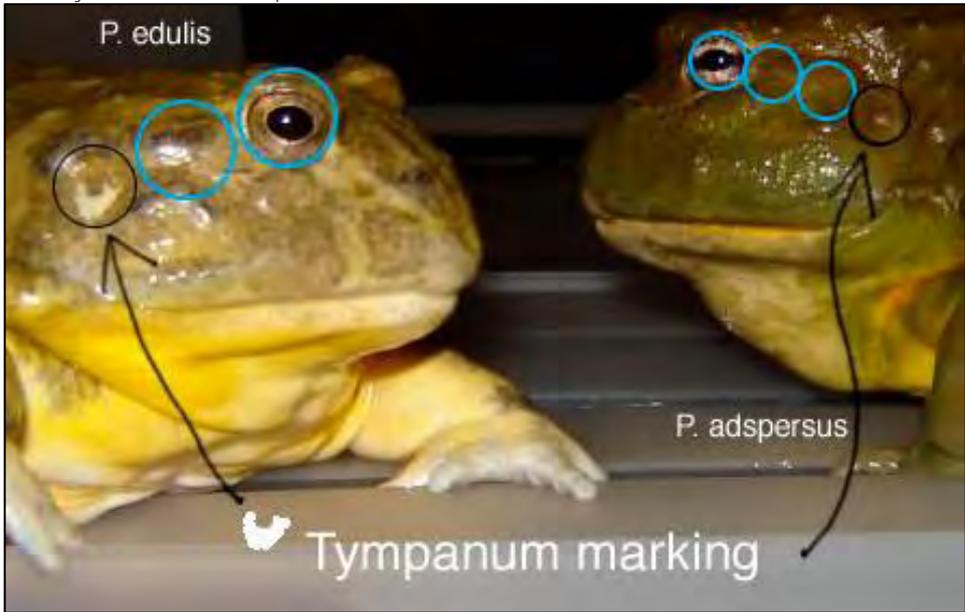
³ FrogMAP. 2021. *Pyxicephalus adspersus* Tschudi, 1838. Animal Demography Unit. Accessed from <http://frogmap.adu.org.za/?sp=850>; on 2021-03-24 10:03:50



	<p><u>Habitat</u></p> <p>This species is considered one of the most adaptable amphibians on earth as it can tolerate some of the harshest environments in Africa. Certain areas of their range are dry for years at a time, reaching temperatures of 40 °C and drop below freezing during winter months. The African Bullfrog (<i>Pyxicephalus adespersus</i>) is fossorial, staying underground within an estivation chamber, or “cocoon” until the rainy season. The “cocoon” is developed through shedding of various layers of skin that insulates it from the external environment. Burrowing has been documented between 0.5 m to 1 m in depth depending on the type of soils and humidity of soil (more humid soils will allow individuals to bur deeper and avoid desiccation).</p>
<p>Distribution and range²</p>	<p>Mostly sub-saharan habitat. Occurs widely in South Africa, Swaziland, Namibia, Botswana, and Zimbabwe, extending north to southern Angola, Zambia, Malawi, Mozambique, Tanzania, and Kenya.</p>  <p>A smaller species, <i>Pyxicephalus edulis</i> occupies a smaller range in southern Africa, from Zimbabwe and northern south Africa to Botswana, Mozambique and Zambia.</p>
<p>Threats⁴</p>	<ul style="list-style-type: none"> • Breeding habitat is lost as a result of agricultural development and urbanisation. • Habitat fragmentation. • Linear infrastructure – roads are a movement barrier and result in mass fatalities due to collisions. • Impoundments, changing flooding patterns thus reducing seasonal wetting. • Pesticides and pollution of water, causing mortality of tadpoles. • Collection for the international pet trade. • Harvesting individuals for consumption (considered a delicacy in some countries).

⁴ Minter, L.R., Burger, M., Harrison, J.A., Braack, H.H., Bishop, P.J., and Kloepfer, D. (eds.) (2004). *Atlas and Red Data Book of the Frogs of South Africa, Lesotho and Swaziland. Volume 9 SIMAB Series.* Smithsonian, Washington D.C



African Bullfrog (<i>Pyxicephalus edulis</i>)	
Photographs from site	
	
Other Common Names	Lesser Bullfrog Edible Bullfrog Bushveld Bullfrog
Conservation status ²	IUCN Red List Least Concern. Population is considered to be declining
	CITES Not listed
	National Status No National status listing. Listed as a protected species under the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).
Description ⁵	<p>This species was formally synonymised with <i>P. adspersus</i> but was recognised as a separate species by Channing I (1994) on the clear basis of the difference in breeding behavior and call. Adults are also slightly smaller than <i>P. adspersus</i>. There is no reliable, diagnostic or morphological characteristics that make for easy differentiation, specifically in smaller specimens and juveniles although main differential between the 2 species is the tympanum markings, which is located closer to the eye and has a white spot in <i>P. edulis</i>.</p> <div style="text-align: center;">  </div> <p>Unpublished works also make reference to possible differences in the interocular bar of the eye and the vertical bars around the mouth of adult specimens, although this is unconfirmed at this stage.</p>
Ecology and habitat ^{2 and 3}	<p><u>Ecology</u> Like <i>Pyxicephalus adspersus</i>, <i>P. edulis</i> is considered a fossorial species, spending up to 10 months of a year in a dormant state, buried underground within a “cacoen” and emerges at the start of the rains. Breeding takes place at night after heavy rainfall and within temporary pans or pools of water. Egg and tadpole guarding was observed within this species as well as channel construction by males</p>

⁵ Information compiled from FrogMAP (2021)



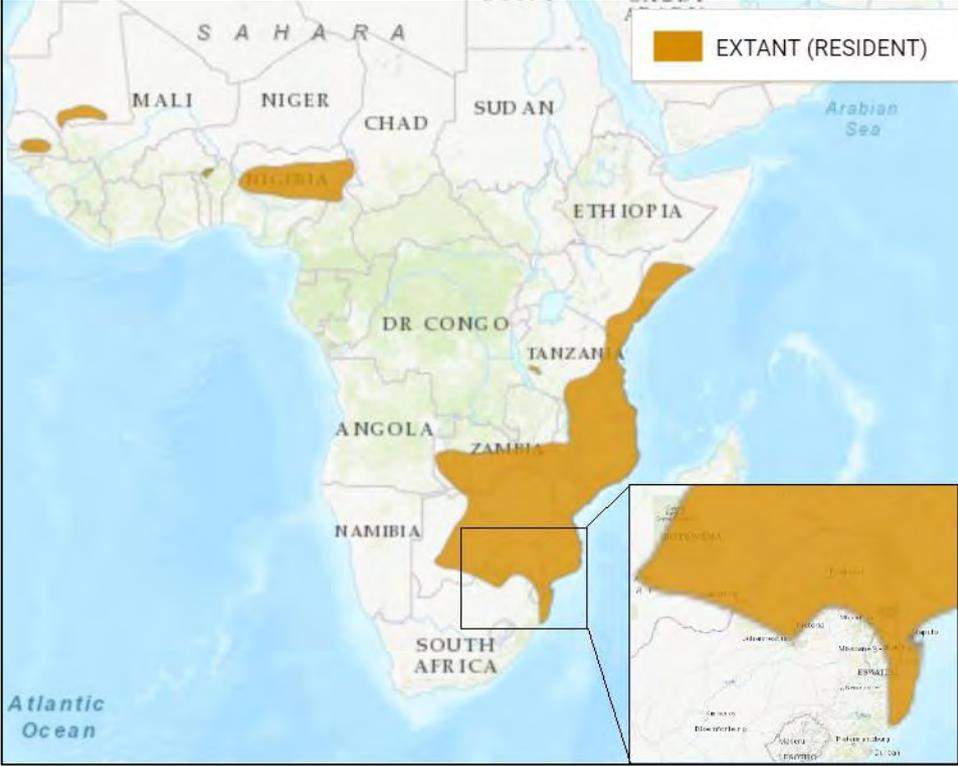
	<p>within a population in the Kruger National Park. Food source includes a variety of invertebrates and small vertebrates, including small rodents, birds and other frog species.</p> <p><u>Habitat</u> <i>Pyxicephalus edulis</i> inhabits several bushveld vegetation types within the Savanna biome including flat, low-lying areas in open, grassy woodlands that become flooded during heavy rainfall resulting in ponding within shallow, seasonal pans. These seasonal pans are considered prime breeding habitat for this species and can support large populations within the surrounding landscape. Roadside furrows, agricultural dams and garden ponds are also known to house this species.</p>
<p>Distribution and range^{3 and 5}</p>	<p>The distribution of this species varies slightly from that of <i>P. adspersus</i>, with a smaller distribution within South Africa, largely restricted to the Limpopo Province. with the distribution pulling down the eastern border of South Africa into Swaziland and eastern KwaZulu-Natal.</p>  <p>A smaller species, <i>Pyxicephalus edulis</i> occupies a smaller range in southern Africa, from Zimbabwe and northern south Africa to Botswana, Mozambique and Zambia.</p>
<p>Knowledge Gap</p>	<p>Fairly recent separation between <i>Pyxicephalus adspersus</i> and <i>Pyxicephalus edulis</i> has been identified (1994), however, some literature still refers to this species as <i>P. adspersus</i>.</p>
<p>Threats</p>	<ul style="list-style-type: none"> Same as listed for <i>P. adspersus</i> in table above.



Table 3: Description of SCC within the class Reptilia

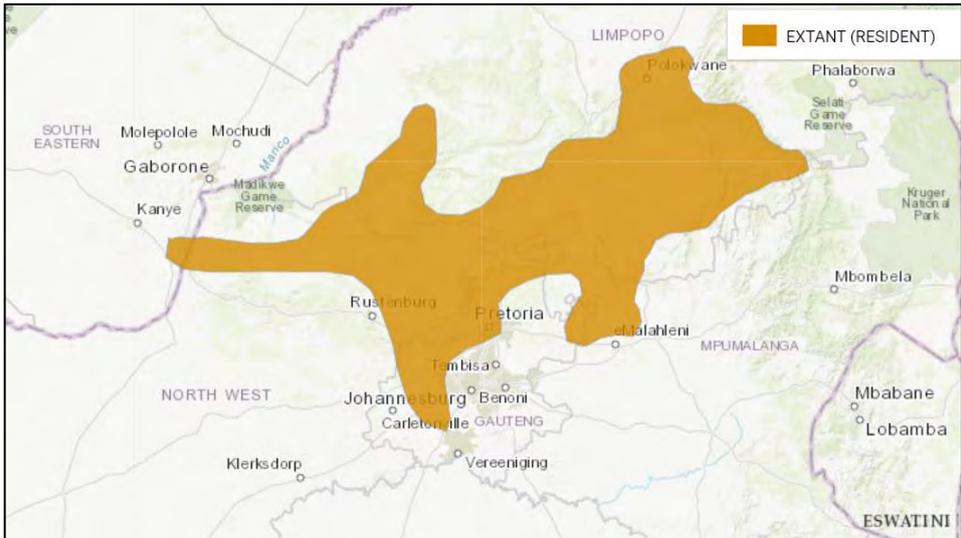
Southern African Python (<i>Python natalensis</i>)		
Representative Photographs		
		
Other Common Names	African Rock Python	
Conservation status ²	IUCN Red List	Not evaluated
	CITES	Appendix II
	National Status	Listed as a protected species under the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).
Description ⁶	<p><i>Python natalensis</i> is the largest native snake in Africa, averaging 3- 5m in length. It has a relatively small, triangular head (when compared to its body size) that has irregular scales that are typically black to brownish-grey in colour. The head also has two light-coloured bands that form a spearhead shape from the snout to the back of the head just above the eyes. The body is yellowish, grey-brown, or grey-green, with dark blotches that form a staircase-like pattern on the back. Belly scales are a white colour with black specks producing a salt-and-peppery pattern. On the tip of the tail, there are two dark bands that are separated by a lighter band. Juveniles are more brightly marked than adults.</p> <p>It has been noted that individuals found in the central and western parts of Africa are somewhat more brightly marked than their northern, eastern and southern counterparts.</p>	
Ecology and habitat ⁶	<p><u>Ecology</u></p> <p><i>Python natalensis</i> are fairly solitary, seeking their own kind only during the breeding season. Although primarily nocturnal as adults, rock pythons may be active during the day to bask in the sun for thermoregulation. Juveniles, however, are mostly active at dawn and dusk, preferring to retreat to the safety of a rock formation or hollow tree during the day and night. Reproduction usually occurs in Spring, where the female will lay between 20 and 100 eggs (frequently documented within burrows, termite mounds or caves). Female provides maternal care to the eggs until hatching (approximately 90 days later) through incubation and protection of the eggs from predators.</p> <p><i>P. Natalensis</i> primary food source is a variety of large rodents, monkeys, small antelope, birds and other reptile species. Some documented records include them eating cubs of large carnivorous wildlife such as lions, leopards, hyena and wild dog. In instances where the species interacts with humans, it has been known to eat small livestock, poultry as well as domestic pets.</p> <p><u>Habitat</u></p> <p>Species stays on the ground (given their large body size) but have been known to climb if the need arises. This species prefers open savannahs where they often frequent rocky outcrops, although</p>	

⁶ Information compiled from Animal Diversity Web (2021)



	<p>association with watercourses is strongly recorded. Also utilise mammal burrows in less rocky areas. This species has been known to easily adapt to disturbed habitats so are often found around human habitation, where food sourced may be high.</p>
<p>Distribution and range^{3 and 4}</p>	<p>African rock pythons occur throughout sub-Saharan Africa, although they avoid the driest deserts and the coolest mountain elevations. Two subspecies are recognised:</p> <ol style="list-style-type: none"> 1. <i>Python sebae sebae</i>, northern African rock python - found from south of the Sahara to northern Angola, and from Senegal to Ethiopia and Somalia (distribution indicated in green below). 2. <i>Python natalensis</i>, southern African rock python – found from Kenya and Zambia southwards to South Africa, predominantly within the eastern extent of the country (distribution indicated in red below). 
<p>Knowledge Gap</p>	<p>Home ranges of these species are largely unknown.</p>
<p>Threats</p>	<ul style="list-style-type: none"> • Habitat loss, resulting in most frequent engagement with humans which result in fatalities due to human fear or due to posing a threat to livestock. • Hunted for medicinal purposes, bushmeat as well as their leather. • Collected for the pet trade.



Lobatse Hinge-back Tortoise (<i>Kinixys lobatsiana</i>)		
Photographs from site		
		
Other Common Names	Lobatse Hinged Tortoise	
Conservation status	IUCN Red List	Vulnerable. Population is considered to be declining
	CITES	Appendix II (as Testudinidae spp)
	National Status	None.
Description ⁷	<i>Kinixys lobatsiana</i> has an elongated shell is dorso-ventrally flattened and the carapace has a broken rayed pattern (often absent in males) on a buff to brown background.	
Ecology and habitat ⁷	<p><u>Ecology</u> Activity is highest during the summer rainfall season and it appears to brumate in abandoned animal burrows or rock crevices in winter. This species is sexually dimorphic, with females being larger and heavier than male counterparts. with females laying up to 6 eggs per clutch (based on record from captive kept individuals).</p> <p><u>Habitat</u> <i>Kinixys lobatsiana</i> is a savanna species that inhabits rocky hillsides in habitats of mixed <i>Acacia</i> and <i>Combretum</i> woodland, tropical Bushveld and Thornveld, where vegetation ranges from dense, short shrubland to open tree savanna. This Species is omnivorous and apart from feeding on herbaceous plants, fruits and mushrooms, its diet includes beetles, snails, and millipedes.</p>	
Distribution and range	<p><i>Kinixys lobatsiana</i> is near-endemic to South Africa to southern africa with the distribution within South africa, through the Gautemng, Mpumalanga, North West and Limpopo Provinces, and a small area of Botswana into the Lobatse District.</p>  <p>The total estimate extent of occurrence is 93 017 km² with a recorded continual decline in population size.</p>	

⁷ Information compiled from Animal Diversity Web (2021)



Knowledge Gap ⁹	To date there is no direct population information available to quantify population numbers. Population decline is thus extrapolated based on documented loss and degradation of available habitat.
Threats ⁸	<ul style="list-style-type: none"> • Distribution falls mainly within Limpopo, for which 15% of the land cover is considered developed or degraded. The remaining 85% of its natural habitat includes the Kruger National Park, where it does not occur. Thus, the species is under threat by any additional habitat changes as a result of urbanisation, agriculture and mining activities. The following summary is relevant: <ul style="list-style-type: none"> ▪ 20 – 25% of the species habitat has been destroyed or degraded over the past 35-40 years. ▪ This is estimated to reach 30 – 40% over the next 30 years. • Use of fire for livestock and biodiversity management may kill large numbers of tortoises. • Population isolation due to preference of rocky hillsides and outcrops when movement corridors are degraded and destroyed. • Collected as food, for medicinal and cultural purposes and in the pet trade resulting in local extinctions. • Slow population growth as females only reach sexual maturity around 9 years of age (based on available research found for <i>K. speki</i>)⁹.

Table 4: Description of SCC within the class Arachnida.

<i>Ceratogyrus darlingi</i> , and <i>Harpactira</i> sp.		
Representative Photographs ¹⁰ : <i>Ceratogyrus darlingi</i> (a) (Left), <i>Harpactira curator</i> (b) (Middle), and <i>Harpactira gigas</i> (c) (Right).		
		
Other Common Names	A: Rear-horned Baboon Spider B: Malvern Starburst Baboon Spider C: Common Baboon Spider	
Conservation status ²	IUCN Red List	Not yet evaluated.
	CITES	Not Listed.
	National Status	Listed as Near Threatened within South Africa. Listed as a protected species under the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).
Description ¹¹	<p>a: This species reaches a body length of about 13 cm and can be ashy grey, mud brown or black. The peltidium features a black foveal horn.</p> <p>b: Females of this species reach about 14 cm, while males may be up to 11 cm. They display a sandy golden coloration with a starburst pattern on the carapace. A 'skull' pattern can sometimes be seen on the abdomen.</p> <p>c: Females reach 5.5 cm and are slightly larger than the males. This species has the typical starburst pattern radiating in light brown lines on a dark brown carapace.</p>	
Eco logy and habitat	Ecology and Habitat These species inhabit silk-lined burrows from which they hunt invertebrates and small vertebrates in semi-arid areas, seldomly leaving their burrows. Species inhabits grassland, Bushveld and Lowveld habitat.	
Distribution and range ¹²	a: Records from Kruger National Park, Messina, D'nyala, and Atherstone provincial Parks, and within Klaserie and Sabi Sands Private Nature reserves within Limpopo Province (De Wet and Schoonbee, 1991).	

⁸ Hofmeyr, M.D & Boycott, R.C (2018)

⁹ Coulson, I.M., A. Hailey. 1997

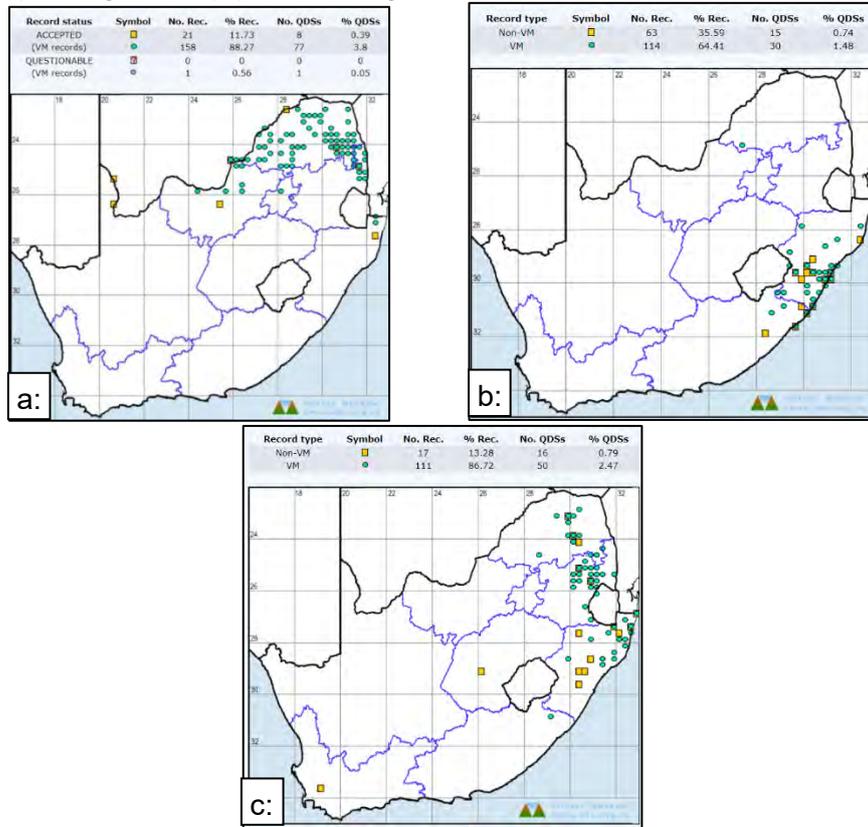
¹⁰ Pictures taken from <https://www.tarantupedia.com/harpactirinae/ceratogyrus/ceratogyrus-darlingi>

¹¹ Information gleaned from <https://www.inaturalist.org/taxa/548218-Ceratogyrus-darlingi>

¹² Map taken from http://vmus.edu.org.za/vm_sp_summary.php



b: This species has a single record near Thabazimbi while the major distribution range lies within Kwa-Zulu Natal and northern Eastern Cape.
 c: This species has a large range which encompasses northern Eastern Cape, Kwa-Zulu Natal, Mpumalanga and Limpopo within the region.



Knowledge Gap	No direct population information available to quantify population numbers. Limited studies have further been undertaken on these species life history and ecology.
Threats	<ul style="list-style-type: none"> Collection for the international pet trade (De Wet and Schoonbee, 1991). Habitat loss through human land use transformation is also surely another primary threat to these species.

Opisthophthalmus glabrifrons, Opisthacanthus asper and Hadogenes troglodytes

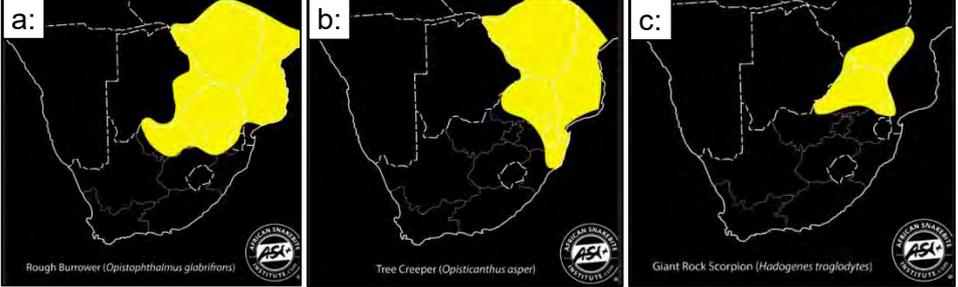
Photographs¹³ Left to Right: *Opisthophthalmus glabrifrons* (a), *Opisthacanthus asper* (b) and *Hadogenes troglodytes* (c).



Other Common Names	a: Rough Burrower b: Tree Creeper c: Giant Rock Scorpion	
Conservation status ²	IUCN Red List	None of the species have been assessed by the IUCN
	CITES	Not listed
	National Status	No National status listing. Listed as a protected species under the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).

¹³ Pictures taken from <https://www.africansnakebiteinstitute.com/>



Description ¹⁴	<p>a: Large scorpion of about 12 cm in length. Can be dark to light brown or even dark orange/yellow with light yellow legs. The head is normally light brown in colour. Pincers are pale brown with dark tips.</p> <p>b: A large scorpion of reaching around 10 cm with the tail extended. The pincers are black with orange or yellow legs and stinger. The species has large black pincers.</p> <p>c: This is the largest species of scorpion in Africa. It is usually black or dark brown and occasionally has yellow legs.</p>
Ecology and habitat ¹⁵	<p><u>Ecology and Habitat</u></p> <p>a: This is a burrowing species that will excavate under rocks or within open grassland. It is active on warm nights. Normally found in grassland or bushveld habitat in rocky areas.</p> <p>b: This species can be found under the bark of trees or in locations around trees at night. The species hunts from the crevices under the bark of trees.</p> <p>c: This species occurs in rocky areas where it inhabits cracks between rocks. Normally on hills and in mountain ranges.</p>
Distribution and range ^{3 and 4}	
Knowledge Gap ¹	<p>Few species specific studies on life history or ecology have been undertaken on the species. Most literature involving scorpions in southern Africa revolves around their biogeography, taxonomy and their venom</p>
Threats	<p>Threats are likely land-use change, collecting for the pet trade and improper fire regimes.</p>

3 REMEDIATION ACTION PLAN

In order to minimise impacts on individual species as a result of the construction of the proposed pipeline, rescue and relocation actions must be implemented during the construction phase to ensure all measures are implemented to ensure maximum survivability of individuals. Although the focus is predominantly on SCC, other common species that have a low mobility (tortoises, chameleons, baboon spiders and scorpions) should also be moved out of the construction area. It is further important that fire NOT be used as a tool to clear vegetation as this will increase mortality of less mobile species and further risk surrounding landscapes.

The following sections consider the requirements that must be undertaken for general herpetofauna while section 3.2 provides a detailed list of requirements for the four SCC.

¹⁴ Pictures taken from <https://www.africansnakebiteinstitute.com/>

¹⁵ Pictures taken from <https://www.africansnakebiteinstitute.com/>



3.1 General Herpetofauna and Invertebrate Species

Various herpetofauna and invertebrate species were observed during the site visit undertaken and must also be considered as part of this remediation action plan. During active searching (as per the details indicated in Section 3.2 below for SCC), which must be undertaken prior to commencement of construction (the day before and the same day), other common species should also be flushed out of the construction zone.

A drift fence with intermittent pitfall traps and 20 m intervals (refer to Table 3 in Section 3.2 for the exact specifications associated with the installation, maintenance and movement of the drift fence) must encompass the entire segment associated with active construction (i.e. if the pipeline trench will be excavated for 500 m, then the drift fence must encompass the trench length and provide sufficient space on either side for the construction equipment).



Figure 1: Example of how drift fences must encompass the active construction segment of the pipeline.

Venomous snake, scorpion and spider species are highly likely and as such it is recommended that a suitably qualified Environmental Officer (EO) be appointed to oversee all rescue and relocation works. A suitable snake handling course must be undertaken by all individuals involved in search and rescue as snake species may also be present during the construction works (most snakes are largely mobile and move large distances in search of food). No herpetofauna or invertebrate species may be killed or collected during this project.

Smaller, less mobile species such as tortoises and chameleons must be actively collected and moved out of the construction zone (as per the methods recommended in Table 5 for the Lobatse Hinge-backed tortoise). Special attention as indicated within Table 7 should be paid to *Ceratogyrus darlingi* (Rear horned Baboon Spider). Other scorpions and Baboon-spiders should be safely collected with the use of suitable gloves and released in similar habitat nearby. Some common species identified during the site visit are illustrated in Figure 2 below.





Figure 2: Common herpetofauna and invertebrates found during the site assessment (top left to right); Kalahari Dwarf Worm Lizard (*Zygaspis quadrifrons*), Bubbling Kassina (*Kassina senegalensis*) and Raucous Toad (*Amietophrynus rangeri*); (2nd row), Bushveld Sand Lizard (*Heliobolus lugubris*); (3rd row left to right) Leopard tortoise (*Stigmochelys pardalis*) and Spekes Hinge-back Tortoise (*Kinixys spekii*); and (bottom left to right) Transvaal Thickettail Scorpion (*Parabuthus transvaalensis*) and lesser baboon spider (*Harpactirella* sp).



3.2 SCC Rescue and Relocation Plan

The following dashboards provide all relevant information pertaining to the rescue and relocation of the SCC. Other snake species or tortoise species can be relocated using the same methodology as provided for the African Rock Python and the Lobatse Hinge-backed Tortoise respectively. For arachnids only *Ceratogyrus darlingi* (Rear horned Baboon Spider) requires specific methods as stated in Table 8 with regard to its relocation. The same methods may be applied to other baboon spiders, yet, these and scorpions may simply be relocated beyond the drift fence in similar habitat.



Table 5: Specifications related to the installation, maintenance and movement of the required drift fence.

Erection of drift fencing	
Need and Desirability	<ul style="list-style-type: none"> Drift fences are necessary to prevent individuals SCC from accessing the construction site as well as to prevent individuals already removed from the construction area from re-entering the construction area. Prevent the need for any relocation permits as SCC will remain within the general area, only being displaced temporarily until the trenches have been backfilled. Prevent herpetofauna and arachnids from getting trapped within the open trench and collision with construction equipment which would result in individual fatalities.
Barrier fence design	
Equipment requirements	<p>i. Fencing should be impervious and can be done using plastic meshing, shade cloth, nylon netting (holes may not exceed 2 cm) or hardware cloth (whatever is easily available) which can be reused and moved according to the construction progress.</p> <div style="display: flex; justify-content: space-around;"> </div> <p><i>Examples of fencing material suitable (left) plastic meshing; (middle) nylon meshing) (right) hardware cloth.</i></p> <ul style="list-style-type: none"> ii. Wooden stacks or steel droppers (as per fence design details). 500 droppers/stakes will be required per kilometre. iii. Cable ties or wire to attach fencing to the stakes. iv. 50 Buckets (20cm in height)
Required Actions (responsibility of the EO who should delegate as appropriate)	
<ul style="list-style-type: none"> i. Drift fences with pitfall traps (20m intervals) must be erected on either side of the construction area (this does not have to be the entire servitude, only the area wherein trenching will occur plus the construction buffer (estimated at 40 m in total width) PRIOR to the commencement of construction and can only be removed once the excavations have been backfilled and suitably compacted, and all large construction equipment has been removed from the area. ii. The drift fence MUST be erected around the entire active construction area (for whatever distance the trenching will be done). This includes behind and in front of the active works to stop species entering into the construction zone and not being able to move. iii. Wooden stakes or steel droppers must be erected at 2 m intervals and must be hammered into the ground to be stable. Suitable fencing material (see equipment section) must be attached to the stakes and material must be weighed down on the ground using cobbles or logs (whatever is accessible) to ensure no species can easily pass below the fence. Pitfall traps (buckets) must be dug into the soil at 20 m intervals and the soil should lie even with the edges of the buckets once in place. iv. Drift fences must remain until trench backfilling has been undertaken and suitable compaction of earth. Only once works are completed and the construction equipment has moved out of the area may the drift fences be removed. v. Drift fences must remain in good working order. Fencing materials that have large holes in them must be replaced and stakes that are broken/bent or any damage as a result of the construction activities must also be replaced. The drift fence must remain impermeable at all times to ensure maximum success of preventing species from entering the active construction area. Pitfall traps and the drift fence must be checked daily for the presence of herpetofauna and arachnids. vi. Construction equipment must remain in the construction area and may not damage or drive over any drift fencing. 	
Examples of drift fences used in the field	
<p>(left) plastic sheeting drift fence and (right) shade cloth drift fences to ensure construction area is cordoned off from the remaining landscape.</p>	



Table 6: Actions for the rescue and relocation of the Giant and lesser Bullfrog.

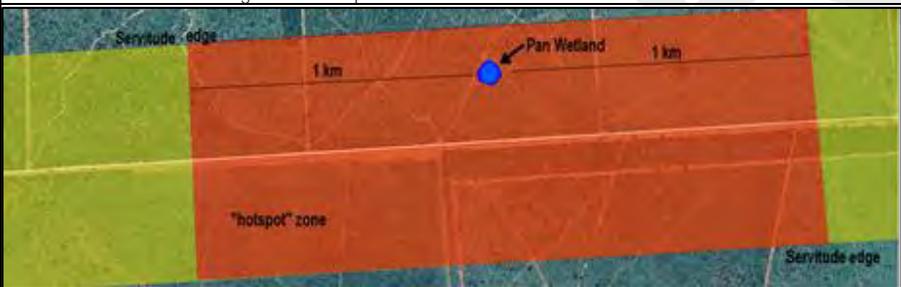
Rescue and Relocation of <i>Pyxicephalus adspersus</i> and <i>P. edulis</i>	
	<p><u>Key Information relevant to the species</u> Will be above ground between October and March (most active between November and January) during or after heavy rainfall. Be aware of mature adults moving to breeding sites.</p>
	<p><u>Breeding sites:</u> Seasonally wet areas associated with wetlands. Pay special attention to areas near wetlands. Can forage up to 1 km from breeding site.</p> <p>Aestivate between April and September. Unlikely to find many species above ground. Be on the look out for Cocoon during excavation works.</p> <p><u>Burrowing sites:</u> Usually in sandy alluvial soils between 0,1- 1 m in depth. Pay special attention to areas where soils are sandy.</p>
<p>Timeframes & specifications</p>	<ul style="list-style-type: none"> Barrier fences must be erected prior to rescue and relocation activities. Active searching and relocation of individuals must be undertaken ON THE DAY PRIOR TO AND ON THE DAY OF CONSTRUCTION COMMENCEMENT. All staff undertaking the works must be on-hand and available. Relocation of individuals during excavation works. Staff must be on hand during active construction to collect and move any specimens
<p>Identification of "hotspot areas"</p>	
<p>Specific attention must be paid to areas within a 1 km radius of any depression wetlands as these are likely 'hotspots' for bullfrogs. This species is known to travel extensive distances overland during breeding season for foraging and in search of mates. Hotspot zones should be demarcated along the length of the servitude and mapped prior to commencement of construction. All personnel must be made aware when entering these hot-spot zones to be on the look out for individuals.</p>	
	
<p>Equipment & requirements</p>	<ol style="list-style-type: none"> Gloves and spades to catch and move individuals. Clean buckets with River sand and a damp cloth to temporarily house individuals. Buckets should have a lid and have breathing holes. Log all findings in a daily record sheet (see Appendix A). Include findings into a monthly EO report.
<p>Required Actions (responsibility of the EO who should delegate as appropriate)</p>	
<ol style="list-style-type: none"> A walkdown should be undertaken within the active segment once all barrier fences have been erected, for the section of servitude that will be excavated. Walkdowns should be done in a zigzag pattern to maximise transects sizes and likelihood of finding individuals. Any individuals found during walking the transects must be carefully picked up with both hands (gloves can be used as individuals may bite). Hold individuals around the middle letting the limbs hand free to prevent the frog from pushing itself out. Injured frogs must also be rescued. 	
<ol style="list-style-type: none"> Place individuals in the bucket and close the lid. Bucket should have a damp cloth in (not wet) if individuals are to be housed for an extended period of time (longer than one hour). Individuals can then be moved and released on the other side of the barrier fence, on the outside of the servitude. Consideration must be given to where the closest wetland is that individuals could have come from/ been moving to and individuals should be placed on that side of the drift fence (i.e. closest pan wetland to the north of construction, thus all individuals must be released north of the drift fence). 	
<ol style="list-style-type: none"> If a bullfrog cocoon is excavated out during the trenching activities, construction works should stop, and the cocoon should be sprayed down with clean water to loosen the ground around it so that the frog can be easily picked up. Do not spray water directly onto the cocoon as this will damage it. Should individuals have been injured as a result of the excavation works, they should be seen to by a suitably qualified wildlife vet and rehabilitated at a suitably qualified rehabilitation facility. GPS locations of where the individual was collected must be taken to ensure individual is re-released in the same location once successfully rehabilitated. Should cocoons be intact and individuals not require medical attention, follow steps ii and iii for relocation. Cocooned individuals will need to be re-buried outside of the servitude. Loosen an area of approximately 2 m² and at minimum 500 mm deep (depending on the depth they were dug-up). Place frog gently in the excavated area and then partially cover with soil (approximately 300mm) DO NOT COMPACT OVER THE COCCON and do not disturb once buried. Allow the frog to conceal itself in its own time within the loosened area. 	



Table 7: Actions for the rescue and relocation of the African Rock Python (and other snake species that may be encountered within the construction area).

Rescue and Relocation of <i>Python natalensis</i>		Required Actions (responsibility of the EO who should delegate as appropriate)
	<p><u>Key Information relevant to the species</u></p> <ul style="list-style-type: none"> Individuals can grow up to 5 m in length. Breeding occurs in Spring between September and December. Likely see an increased movement in species. Females likely to be in burrows, rock crevices or caves. Young hatch approximately 90 days later, between December and March and will leave the nest. Brumation of species during winter is likely. Species will likely remain underground, within termite mounds or sometimes within water resources. 	<ul style="list-style-type: none"> A walkdown should be undertaken for the entire length of the pipeline within the construction area (bounded by the drift fence) as well as any laydown areas or borrow pits prior to commencement of construction works. Walkdowns should be done in a zigzag pattern to maximise transects sizes and likelihood of finding individuals. Individuals can be flushed out. Transects must look under any large rock piles or in dense vegetation tufts. A stick can be used to move vegetation. Should a burrow be encountered, every effort should be made to flush out anything that may be within the burrow to prevent burial once excavation works commence. If possible (and feasible) a snake camera can be used to detect if any faunal species are within the burrow. Should a python species be located within, digging out the individual can be undertaken.
<p>Timeframes & specifications</p>	<ul style="list-style-type: none"> Active searching and relocation of individuals must be undertaken ON THE DAY PRIOR TO AND THE DAY OF CONSTRUCTION COMMENCEMENT. All staff undertaking the works must be on-hand and available. Relocation of individuals during excavation works, especially if termite mounds or burrows will be demolished. Any individuals uncovered during excavations must be relocated out of the servitude. 	<ul style="list-style-type: none"> Any individuals found during walking the transects must be picked up (more than one person may be required for larger individuals) and bagged or placed in a suitably sized container. Hold individuals behind the head with one hand to prevent snake being able to bite. Although non-venomous they can give a nasty bite. Place individuals in the suitably sized container and close the lid. Individuals can then be moved and released on the other side of the barrier fence, although it is recommended they be released away from the construction area as they may move back to the area if released too close. 
<p>Equipment & requirements</p>	<ul style="list-style-type: none"> EO to undertake the searching protocol must have undertaken a snake handling course and understand the correct handling techniques and use of all tools. Snake pole to assist in catching individuals. Gloves to handle individuals. Cloth bag or clean container used to temporarily house individuals. Containers should have a lid and have breathing holes. Log all findings in a daily record sheet (see Appendix A). Include findings into a monthly EO report. <p><u>If eggs are found:</u></p> <ul style="list-style-type: none"> A small container lined with paper towelling. It is imperative that the eggs be placed into the container in the same orientation that they were in the nest. Do not ever rotate the egg. This can destroy the contents of the egg. Instead, mark the egg with a felt tip marker so to easily determine where the top of the egg is and not twist it or turn it. Move eggs very gently and be sure to keep the part that was on top at the top. 	<ul style="list-style-type: none"> If any individuals are discovered during trenching works, excavations must stop and the handler must collect the snake as per step iii above. Any individuals that have been injured must receive adequate veterinary assistance prior to release. Any eggs uncovered must be collected and should be taken to a reptile facility (along with the female if possible) until eggs hatch. GPS co-ordinates of where any eggs were located should be taken and once eggs have hatched, they should be released at or near the same location.

Table 8: Actions for the rescue and relocation of the Lobatse Hinge-back tortoise (and other tortoise species found during the site walkdown).



Rescue and Relocation of <i>Kinixys lobatsiana</i>	
	<p><u>Key Information relevant to the species</u></p> <ul style="list-style-type: none"> • Most active during summer (between December and April). • Eggs are laid within a nest, dug down approximately 10 cm and re-buried by the female. • Incubation takes approximately 145 days (based on average time recorded for captive spp) before hatchlings emerge. Will be approximately 45 mm in size. • Brumates in winter within rock crevices or abandoned burrows.
<p>Timeframes & specifications</p>	<ul style="list-style-type: none"> • Active searching and relocation of individuals must be undertaken ON THE DAY PRIOR TO AND THE DAY OF CONSTRUCTION COMMENCEMENT. All staff undertaking the works must be on-hand and available. • Relocation of individuals during excavation works, especially if termite mounds or burrows will be demolished. Any individuals uncovered during excavations must be relocated out of the servitude.
<p>Equipment & requirements</p>	<ul style="list-style-type: none"> i. Stick to assist in moving vegetation for easy visibility. ii. Gloves to handle individuals. iii. Clean container used to temporarily house individuals. Containers should have a lid and have breathing holes. iv. Log all findings in a daily record sheet (see Appendix A). v. If possible, individuals of <i>K. lobatsiana</i> should be weighed and measured for research purposes as there is limited information available on wild populations. vi. Therefore, a kitchen scale and tape measure should be available. vii. Include findings into a monthly EO report. <p><u>If eggs are found:</u></p> <ul style="list-style-type: none"> i. A small container lined with paper towelling to fit all eggs. ii. It is imperative that the eggs be placed into the container in the same orientation that they were in the nest. Do not ever rotate the egg. This can destroy the contents of the egg. Instead, mark the egg with a felt tip marker so to easily determine where the top of the egg is and not twist it or turn it. Move eggs very gently and be sure to keep the part that was on top at the top.
<p>Required Actions (responsibility of the EO who should delegate as appropriate)</p>	
<ul style="list-style-type: none"> i. A walkdown should be undertaken for the entire length of the pipeline within the construction area (bounded by the drift fence) as well as any laydown areas or borrow pits prior to commencement of construction works. Walkdowns should be done in a zigzag pattern to maximise transects sizes and likelihood of finding individuals. ii. Any individuals found during walking the transects must be picked up and placed in a suitably sized container. Care must be taken to check under any vegetation (low lying shrubs and grass turfs) where individual might be located (specifically during the hottest time for the day, individuals may take refuge in the shade). iii. Place individuals in the suitably sized container and close the lid. Individuals can then be moved and released on the other side of the barrier fence. iv. Care must be taking when clearing vegetation for the trenching. Vegetation should be stockpiled separately from soil and should not exceed 2m in height to allow any individuals that may have been displaced during clearing the opportunity to move away. v. The EO must monitor all vegetation stockpiles and collect and relocate any tortoises that may emerge. This is of specific importance for smaller juvenile individuals that may have been easily missed during the active search and rescue. 	
<div style="display: flex; align-items: center;">  <div style="margin-left: 10px;"> <p>Vegetation cleared at a construction side. Tortoise sp displaced during vegetation removal, leaving the stockpile (circled in red).</p> <ul style="list-style-type: none"> vi. Any eggs unearthed must be collected and housed in a container with suitable bedding (and must remain between 25 °C and 30 °C) until they can be taken to a suitable reptile facility that can incubate and hatch the eggs. Once hatched, all hatchlings should be released back to the area where they were collected. </div> </div>	

Table 9: Actions for the rescue and relocation of the *Ceratogyrus darlingi* (Rear horned Baboon Spider).



Rescue and Relocation of <i>Ceratogyrus darlingi</i> and <i>Harpactira</i> sp. (this method may also be utilized for any other baboon spiders).		
	Key Information relevant to the species	Required Actions (responsibility of the EO who should delegate as appropriate)
	<ul style="list-style-type: none"> This is a fast and defensive species with potent venom. Night searches with Ultraviolet light torches are recommended for scorpion searches. These species seldomly leave their burrows and will not venture far from them. Most active during summer. Eggs laid within the burrow. Upon hatching spiderlings will remain in the burrow for several weeks before leaving. They will then begin the construction of their own burrow or utilize leaf litter to burrow between. 	<ol style="list-style-type: none"> A walkdown should be undertaken for the entire length of the pipeline within the construction area (bounded by the drift fence) as well as any laydown areas or borrow pits prior to commencement of construction works for each relevant section. Transects should be planned within all areas where vegetation will be removed or disturbed and searched for burrows to maximise the likelihood of finding individuals. Any individuals found within the transects must be safely excavated and placed within a temporary storage container. All habitat characteristics information (substrate structure and texture; soil moisture; vegetation type and density; food-source availability (invertebrates) and vegetation canopy cover) must be recorded. A location of similar characters beyond the barrier fence must be selected for relocation and the GPS co-ordinates must be logged. At the chosen relocation site place a steel cage over on the ground (Image right – Yeld, 2013). Auger two holes of appropriate sizes 20 cm into the ground.) Gently place the spider onto the ground within the protective cage. Monitoring of the acceptance and survival rate of the spiders should be recorded by the specialist undertaking the relocation. Monitoring of pitfall traps should occur daily during construction and any specimens besides <i>Ceratogyrus darlingi</i> (Rear horned Baboon Spider) may be released 30 m beyond the barrier fence in similar habitat to what the specimens were found in.
Timeframes & specifications	<ul style="list-style-type: none"> Active searching and relocation of individuals must be undertaken within a month of the proposed development construction phase. Only suitably qualified or suitably trained individuals may excavate spiders from their burrows. Relocation of individuals during excavation works should occur beyond the drift net in a location similar in substrate structure and texture; soil moisture; vegetation type and density; food-source availability (invertebrates) and vegetation canopy cover. The individuals should be monitored for three (3) months after they have accepted their new burrows. 	
Equipment & requirements	<ol style="list-style-type: none"> Stick to assist in moving vegetation for easy visibility. Gloves to handle individuals. A large and small spade to excavate burrows. Small soil augers of varying diameters from 10 mm to 30 mm. Steel cages (30cm x 30cm x 7cm). Should allow for the movement of small invertebrates, into and out of the cage. Clean container used to temporarily house individuals. Containers should have a lid and have breathing holes. Log all findings in a daily record sheet as provided in Appendix A. Include findings into a monthly EO report. 	



4 CONCLUSION

This remediation action plan provides detailed methodology for the rescue and relocation of various SCC if encountered within the construction footprint area. The installation, maintenance and movement of the drift fence is an integral factor into the success of this work and ensuring smaller species that are at increased risk of fatality within the construction zone, be prevented from accessing the area. Similarly, the establishment of the drift fence will reduce distances that rescued SCC need to be released (thus saving considerable time) and reduce the need to search out relocation sites. As such, the drift fence must remain in full working order at all times.

It is imperative that a suitably qualified EO be appointed to oversee all activities as detailed herein and keep a daily log. A short monthly SCC rescue and relocation report should be compiled wherein the details of the SCC found and relocation details are reported (the daily record sheets must be appended). These reports must also provide feedback on the monitoring requirements as stated herein for relocated SCC. All monthly reports should be submitted to the relevant authorities.



5 REFERENCES

- Coulson, I.M., A. Hailey.** 1997. Nesting behaviour and clutch and egg size of the hingeback tortoise *Kinixys spekii*, British Herpetological Society bulletin, no. 58.
- Coulson, I.M., A. Hailey.** 2002. Low survival rate and high predation in the African Hingeback tortoise *Kinixys spekii*.
- Davidson, B.** 2000. "Pyxicephalus adspersus" (On-line), Animal Diversity Web. Accessed March 24, 2021 at https://animaldiversity.org/accounts/Pyxicephalus_adspersus/
- De Wet, J.I., Schoonbee, H.J.** 1991. The occurrence and conservation status of *Ceratogyrus bechuanicus* and *C. brachycephalus* in the Transvall, South Africa. KOEDOE 34(2):69-75.
- Du Preez, L.H. (1996).** *Field guide and key to the frogs and toads of the Free State*. University of the Orange Free State, Bloemfontein, South Africa.
- FrogMAP.** 2021. *Pyxicephalus adspersus* Tschudi, 1838. Animal Demography Unit. Accessed from <http://frogmap.adu.org.za/?sp=850>; on 2021-03-24 10:03:50
- FrogMAP.** 2021. *Pyxicephalus edulis* Peters, 1854. Animal Demography Unit. Accessed from <http://frogmap.adu.org.za/?sp=860>; on 2021-03-24 09:03:56.
- Hofmeyr, M.D., Boycott, R.C.** 2018. *Kinixys lobatsiana*, Lobatse Hinged Tortoise, THE IUCN RED LIST OF THREATENED SPECIES. Viewed on www.iucnredlist.org
- IUCN.** 2020. The IUCN Red List of Threatened Species. Version 2020-3. <https://www.iucnredlist.org>. Downloaded on 19 March 2021.
- Minter, L.R., Burger, M., Harrison, J.A., Braack, H.H., Bishop, P.J., and Kloepfer, D. (eds.) (2004).** *Atlas and Red Data Book of the Frogs of South Africa, Lesotho and Swaziland. Volume 9 SI/MAB Series*. Smithsonian, Washington D.C
- Sherman P.** 2006. *Python sebae*. African Rock Python. On-line), Animal Diversity Web. Accessed March 24, 2021 at https://animaldiversity.org/accounts/Python_sebae/
- Scientific Terrestrial Services** 2021. Biodiversity and invertebrate specialist detailed site sensitivity analyses and design guidance as part of the Mokolo and Crocodile River (West) Water Augmentation project (Phase 2 A) (MCWAP – 2A), Limpopo Project. Reference Number STS 200032.
- The National Environmental Management Act, 1998** (Act No. 107 of 1998).
- The National Environmental: Biodiversity Act, 2004** (Act No. 10 of 2004).
- Wilson, J.D., Gibbons. J.W.** 2009. Chapter 13: Drift fences, coverboards and other traps of Amphibian ecology and conservation: A handbook of Techniques. Oxford University Press.
- Yeld, J. (2013, July).** Miners win enviro kudos for saving spiders. iOL <https://www.iol.co.za/news/miners-win-enviro-kudos-for-saving-spiders-1554353>.



APPENDIX B: Details, Expertise and Curriculum Vitae of specialists

(i) Details of the specialist who prepared the report

Stephen van Staden	Msc (Environmental Management) (University of Johannesburg)
Christopher Hooton	BTech Nature Conservation (Tshwane University of Technology)
Kim Marais	BSc (Hons) Zoology (Herpetology) (University of the Witwatersrand)
Daryl van der Merwe	MSc. Plant Science (University of Pretoria)

(a). (ii) The expertise of that specialist to compile a specialist report including a curriculum vitae

Company of Specialist:	Scientific Terrestrial Services		
Name / Contact person:	Stephen van Staden		
Postal address:	PO. Box 751779, Gardenview		
Postal code:	2047	Cell:	084 311 4878
Telephone:	011 616 7893	Fax:	086 724 3132
E-mail:	stephen@sasenvgroup.co.za		
Qualifications	MSc (Environmental Management) (University of Johannesburg) BSc (Hons) Zoology (Aquatic Ecology) (University of Johannesburg) BSc (Zoology, Geography and Environmental Management) (University of Johannesburg)		
Registration / Associations	Registered Professional Scientist at South African Council for Natural Scientific Professions (SACNASP) Accredited River Health practitioner by the South African River Health Program (RHP) Member of the South African Soil Surveyors Association (SASSO) Member of the Gauteng Wetland Forum		

. (b) a declaration that the specialist is independent in a form as may be specified by the competent authority

I, Stephen van Staden, declare that -

- I act as the **independent specialist** in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct

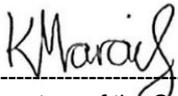


Signature of the Specialist



I, Kim Marais, declare that -

- I act as the **independent specialist** in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct



Signature of the Specialist

I, Christopher Hooton, declare that -

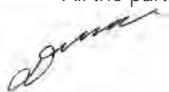
- I act as the **independent specialist (reviewer)** in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct.



Specialist Signature

I, Daryl van der Merwe, declare that -

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct



Signature of the Specialist





SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF STEPHEN VAN STADEN

PERSONAL DETAILS

Position in Company	Managing Member, Group CEO, Water Resource Discipline Lead, Ecologist, Aquatic Ecologist
Date of Birth	13 July 1979
Nationality	South African
Languages	English, Afrikaans
Joined SEGC	2003 (year of establishment)
Founding Director: Scientific Terrestrial Services	2005
Other Business	Trustee of the Serenity Property Trust

MEMBERSHIP IN PROFESSIONAL SOCIETIES

- Registered Professional Scientist at South African Council for Natural Scientific Professions (SACNASP)
- Accredited River Health Practitioner by the South African River Health Program (RHP)
- Member of the South African Soil Surveyors Association (SASSO) Member of the Gauteng Wetland Forum
- Member of the Gauteng Wetland Forum;
- Member of International Association of Impact Assessors (IAIA) South Africa;
- Member of the Land Rehabilitation Society of South Africa (LaRSSA)

EDUCATION

Qualifications

MSc Environmental Management (University of Johannesburg)	2003
BSc (Hons) Zoology (Aquatic Ecology) (University of Johannesburg)	2001
BSc (Zoology, Geography and Environmental Management) (University of Johannesburg)	2000

Short Courses

Integrated Water Resource Management, the National Water Act, and Water Use Authorisations, focusing on WULAs and IWWMPs	2017
Tools for Wetland Assessment (Rhodes University)	2017
Legal liability training course (Legricon Pty Ltd)	2018
Hazard identification and risk assessment training course (Legricon Pty Ltd)	2018
Wetland Management: Introduction and Delineation (WLID1502S) (University of the Free State)	2018
Hydropedology and Wetland Functioning (TerraSoil Science and Water Business Academy)	2018

COUNTRIES OF WORK EXPERIENCE

South Africa – All Provinces
 Southern Africa – Lesotho, Botswana, Mozambique, Zimbabwe Zambia
 Eastern Africa – Tanzania, Mauritius
 West Africa – Ghana, Liberia, Angola, Guinea Bissau, Nigeria, Sierra Leona
 Central Africa – Democratic Republic of the Congo

DEVELOPMENT SECTOR EXPERIENCE

1	Mining: Coal, chrome, Platinum Group Metals (PGMs), mineral sands, gold, phosphate, river sand, clay, fluorspar
2	Linear developments (energy transmission, telecommunication, pipelines, roads)
3	Minerals beneficiation
4	Renewable energy (Hydro, wind and solar)
5	Commercial development
6	Residential development
7	Agriculture
8	Industrial/chemical





SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF KIM MARAIS

PERSONAL DETAILS

Position in Company	Senior Scientist Water Resource Manager
Joined SAS Environmental Group of Companies	2015

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Professional member of the South African Council for Natural Scientific Professions (SACNASP – Reg No. 117137/17)
Member of the Western Cape Wetland Forum (WCWF)

EDUCATION

Qualifications

BSc (Hons) Zoology (University of the Witwatersrand)	2012
BSc (Zoology and Conservation) (University of the Witwatersrand)	2011

Short Courses

Aquatic and Wetland Plant Identification (Cripsis Environment)	2019
Tools for Wetland Assessment (Rhodes University)	2018
Certificate in Environmental Law for Environmental Managers (CEM)	2014
Certificate for Introduction to Environmental Management (CEM)	2013

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

- Biodiversity Action Plans (BAP)
- Alien and Invasive Control Plans (AICP)
- Faunal Eco Scans
- Faunal Impact Assessments

Freshwater Assessments

- Desktop Freshwater Delineation
- Freshwater Verification Assessment
- Freshwater (wetland / riparian) Delineation and Assessment
- Freshwater Eco Service and Status Determination
- Rehabilitation Assessment / Planning
- Watercourse Maintenance and Management Plans
- Freshwater Offset Plan

Aquatic Ecological Assessment and Water Quality Studies

- Riparian Vegetation Integrity (VEGRAI)
- Water quality Monitoring
- Riverine Rehabilitation Plans

Legislative Requirements, Processes and Assessments

- Water Use Applications (Water Use Licence Applications / General Authorisations)
- Water Use Audits
- Freshwater Resource Management and Monitoring as part of EMPR and WUL conditions
- Public Participation processes





SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF CHRISTOPHER HOOTON

PERSONAL DETAILS

Position in Company	Senior Scientist, Member Biodiversity Specialist
Joined SAS Environmental Group of Companies	2013

EDUCATION

Qualifications

BTech Nature Conservation (Tshwane University of Technology)	2013
National Diploma Nature Conservation (Tshwane University of Technology)	2008

AREAS OF WORK EXPERIENCE

South Africa – Gauteng, Mpumalanga, North West, Limpopo, KwaZulu-Natal, Eastern Cape, Western Cape, Northern Cape, Free State

Africa - Zimbabwe, Sierra Leone, Zambia

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

- Floral Assessments
- Faunal Assessments
- Biodiversity Actions Plan (BAP)
- Biodiversity Management Plan (BMP)
- Alien and Invasive Control Plan (AICP)
- Ecological Scan
- Protected Tree and Floral Marking and Reporting
- Biodiversity Offset Plan

Freshwater Assessments

- Freshwater Verification Assessment
- Freshwater (wetland / riparian) Delineation and Assessment
- Freshwater Eco Service and Status Determination
- Rehabilitation Assessment / Planning





**SAS ENVIRONMENTAL GROUP OF COMPANIES –
SPECIALIST CONSULTANT INFORMATION**

CURRICULUM VITAE OF DARYL VAN DER MERWE

PERSONAL DETAILS

Position in Company	Field Biologist, Member Terrestrial Ecology
Joined SAS Environmental Group of Companies	2019

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Member of the South African Environmental Observation Network (SAEON)

EDUCATION

Qualifications

MSc (Conservation Biology) (University of Cape Town)	2019
BSc (Hons) Plant Science (Ecology) (University of Pretoria)	2014
BSc Environmental Science (University of Pretoria)	2013

AREAS OF WORK EXPERIENCE

South Africa – Gauteng, Mpumalanga, North West, Limpopo, Free State, Western Cape and Northern Cape

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

- Faunal Assessments
- Invertebrate Assessments
- Invertebrate Monitoring
- Avifaunal Assessments
- Alien and Invasive Control Plan (AICP)
- Ecological Scan
- Terrestrial Monitoring
- Protected Tree and Floral Marking and Reporting

Legislative Requirements, Processes and Assessments

- Water Use Applications (Water Use Licence Applications / General Authorisations)
- Environmental and Water Use Audits
- Freshwater Resource Management and Monitoring as part of EMPR and WUL conditions



**ANNEXURE 4/2
COMMERCIAL HUNTING FARMS**

Commerical Hunting			
No	Property and Landowner		
	Property Name	Portion	Landowner Name
1	Hanover 341 KQ	Remainder	Janse Van Rensburg
2	Donkerpoort 344 KQ	Portion 10	Paul Fouche
3	Mooivalei 342 KQ	Remainder	Paul Fouche

Commerical Hunting			
No	Property and Landowner		
	Property Name	Portion	Landowner Name
1	Hampton 320 KQ	Remainder	Pieter Ignatius Lourens Du Plessis
2	Stratford 462 KQ		Denis Stander
3	Meklenberg 311 KQ	Remainder	Giel Erasmus
4	Mecklenburg 310 KQ	Portion 1	Johan Hendrik Prinsloo
5	Paarl 124 KQ	Portion 6	Daniel Pienaar
6	Paarl 124 KQ	Remainder	Tertius Roux
7	Karoobult 126 KQ	Remainder	Mathes Van Zyl
8	Leeuwbosch 129 KQ	Portion 1	Johan Coetzee
9	Ruigtevley 97 KQ,	Remainder	Marco Benade
10	Witklip 665 KQ	Portion 4	Paul Nicholas Jordaan
11	Groenrivier 95 KQ	Portion 32	Theunis Johannes Du Preez
12	Groenrivier 95 KQ	Portion RE/37	Kobus van Tonder
13	Matsulan 98 KQ	Remainder	Marthinus Petrus Reyneke
14	Matsulan 98 KQ	Portion 2	Marthinus Petrus Reyneke
15	Haarlem Oost 51 KQ	Remainder	Coenraad Maritz
16	Haarlem Oost 51 KQ	Portion 16	Kevin Myles
17	Haarlem Oost 51 KQ	Portion 15	Kevin Myles
18	Matlabas 94 KQ	Portion 2	Marthinus Petrus
19	Haarlem Oost 51 KQ	Remainder	Coenraad Maritz
20	Welgevonden 949 KQ		Machiel Burger
21	Welgevonden 16 KQ	Portion 2	Nicollete Anna Bothma
22	Welgevonden 16 KQ	Portion 9	Deon van Niekerk
23	Leeuwbosch 129 KQ	Portion	Nicolette Anne Bothma
24	Welgevonden 94 KQ	Portion 5	Nicolette Anne Bothma
25	Reitfontein 15 KQ	Remainder	Robert Roberts
26	Reitfontein 820 KQ	Remainder	Robert Roberts
27	Inkerman 10 KQ	Portion 3	Robert Roberts
28	Groenland 397 LQ	Portion 2	Robert Roberts
29	Mabulskop 406 LQ	Remainder	Johannes Badenhorst
30	Diepspruit 386 LQ	Remainder	Abraham Jansen van Vuuren
31	Zandfontein 382 LQ	Portion 2	Gawie Du Preez
32	Rooipan 357 LQ	Portion 4	Louis Julius Erasmus
33	Rooipan 355 LQ	Portion 2	Abraham Kemp
34	Naauwpoort 363 LQ	Remainder	Petrus du Bruyn
35	Rhenosterpan 361 LQ	Portion 5	Johan De Beer

No	Property and Landowner		
	Property Name	Portion	Landowner Name
36	Rhenosterpan 361 LQ	Remainder	Susanna van Aarde
37	Rhenosterpan 361 LQ	Portion 4	Johannes Grundlingh
38	Rhenosterpan 361 LQ	Portion 3	Rhuan Barnard
39	Rhenosterpan 361 LQ	Portion 6	Rhuan Barnard
40	Zandnek 358 LQ	Portion 1	Hendrik Johannes Lambertus Hills
41	Geelhoutskloof LQ	Portion 1	Hendrik Johannes Lambertus Hills
42	Enkeldraai 718 LQ	Remainder	Tjaart Petrus Sauer
43	Buffelsjagt 744 LQ	Remainder	Hendrik Johannes Lambertus Hills
44	Hooikraal 315 LQ	Remainder	Peter Hallatt
45	Vergulde Helm 321 LQ	Remainder	Hendrik Johannes Lambertus Hills
46	Vaalpensloop 313 LQ	Portion 1	Filomaine Swanepoel
47	Hieromtrent 460 LQ	Remainder	Filomaine Swanepoel
48	Hanglip 508 LQ	Portion 3	Hendrick Pieterse

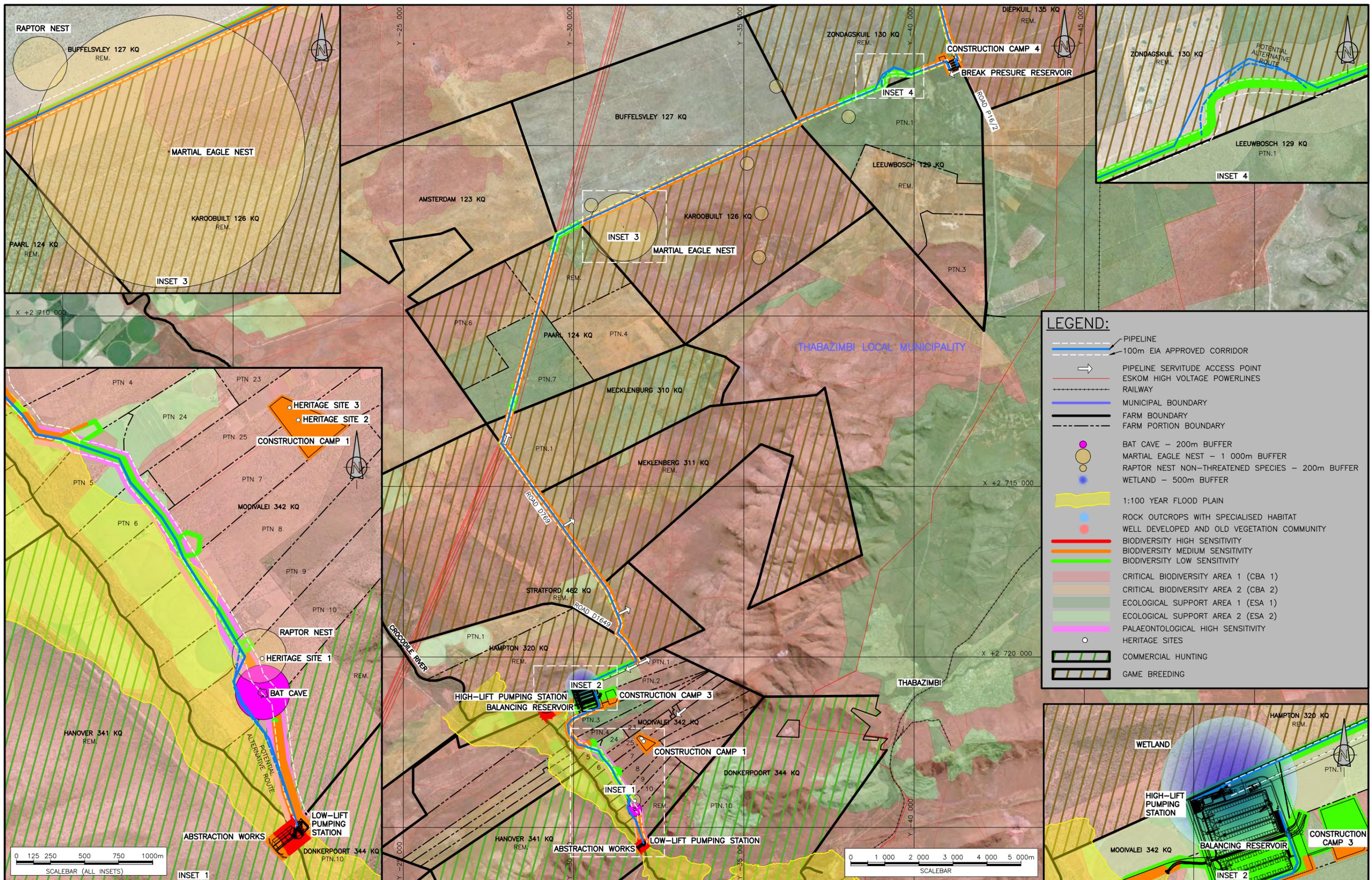
**ANNEXURE 4/3
GAME BREEDING FARMS**

Commerical Hunting			
No	Property and Landowner		
	Property Name	Portion	Landowner Name
1	Hanover 341 KQ	Remainder	Janse Van Rensburg
2	Donkerpoort 344 KQ	Portion 10	Paul Fouche
3	Mooivalei 342 KQ	Remainder	Paul Fouche

Game Breeding			
No	Property and Landowner		
	Property Name	Portion	Landowner Name
1	Hampton 320 KQ	Remainder	Pieter Ignatius Lourens Du Plessis
2	Stratford 462 KQ		Denis Stander
3	Meklenberg 311 KQ	Remainder	Giel Erasmus
4	Mecklenburg 310 KQ	Portion 1	Johan Hendrik Prinsloo
5	Paarl 124 KQ	Portion 6	Daniel Pienaar
6	Paarl 124 KQ	Remainder	Tertius Roux
7	Karoobult 126 KQ	Remainder	Mathes Van Zyl
8	Zondagskuil 130 KQ	Remainder	Daniel Rudolph Smith
9	Diepkuil 135 KQ	Remainder	Willie De Swart
10	Tarantaalpan 132 KQ	Portion 1	Martinus Petrus Reyneke
11	Witklip 665 KQ	Portion 4	Paul Nicholas Jordaan
12	Groenrivier 95 KQ	Portion 32	Theunis Johannes Du Preez
13	Groenrivier 95 KQ	Portion RE/37	Kobus van Tonder
14	Matsulan 98 KQ	Remainder	Marthinus Petrus Reyneke
15	Matsulan 98 KQ	Portion 2	Marthinus Petrus Reyneke
16	Haarlem Oost 51 KQ	Remainder	Coenraad Maritz
17	Haarlem Oost 51 KQ	Portion 16	Kevin Myles
18	Haarlem Oost 51 KQ	Portion 15	Kevin Myles
19	Matlabas 94 KQ	Portion 2	Marthinus Petrus
20	Welgevonden 16 KQ	Portion 2	Nicollete Anna Bothma
21	Welgevonden 16 KQ	Portion 9	Deon van Niekerk
22	Leeuwbosch 129 KQ	Portion	Nicolette Anne Bothma
23	Welgevonden 16 KQ	Portion 5	Nicolette Anne Bothma
24	Reitfontein 15 KQ	Remainder	Robert Roberts
25	Reitfontein 820 KQ	Remainder	Robert Roberts
26	Inkerman 819 KQ - at 100m boundary of the servitude	Reminder	Robert Roberts
27	Groenland 397 LQ	Portion 2	Robert Roberts
28	Mabulskop 406 LQ	Remainder	Johannes Badenhorst
29	Diepspruit 386 LQ	Remainder	Abraham Jansen van Vuuren
30	Zandfontein 382 LQ	Portion 2	Gawie Du Preez
31	Rooipan 357 LQ	Portion 4	Louis Julius Erasmus
32	Naauwpoort 363 LQ	Remainder	Petrus du Bruyn
33	Rhenosterpan 361 LQ	Portion 4	Johannes Grundlingh
34	Rhenosterpan 361 LQ	Portion 3	Rhuan Barnard
35	Rhenosterpan 361 LQ	Portion 6	Rhuan Barnard

No	Property and Landowner		
	Property Name	Portion	Landowner Name
36	Zandnek 358 LQ	Portion 1	Hendrik Johannes Lambertus Hills
37	Geelhoutskloof LQ	Portion 1	Hendrik Johannes Lambertus Hills
38	Enkeldraai 718 LQ	Remainder	Tjaart Petrus Sauer
39	Buffelsjagt 744 LQ	Remainder	Hendrik Johannes Lambertus Hills
40	Hooikraal 315 LQ	Remainder	Peter Hallatt
41	Vergulde Helm 321 LQ	Remainder	Hendrik Johannes Lambertus Hills
42	Vaalpensloop 313 LQ	Portion 1	Filomaine Swanepoel
43	Hieromtrent 460 LQ	Remainder	Filomaine Swanepoel
44	Hanglip 508 LQ	Portion 3	Hendrick Pieterse

**ANNEXURE 4/4
ENVIRONMENTAL CONTROL ZONING MAP**

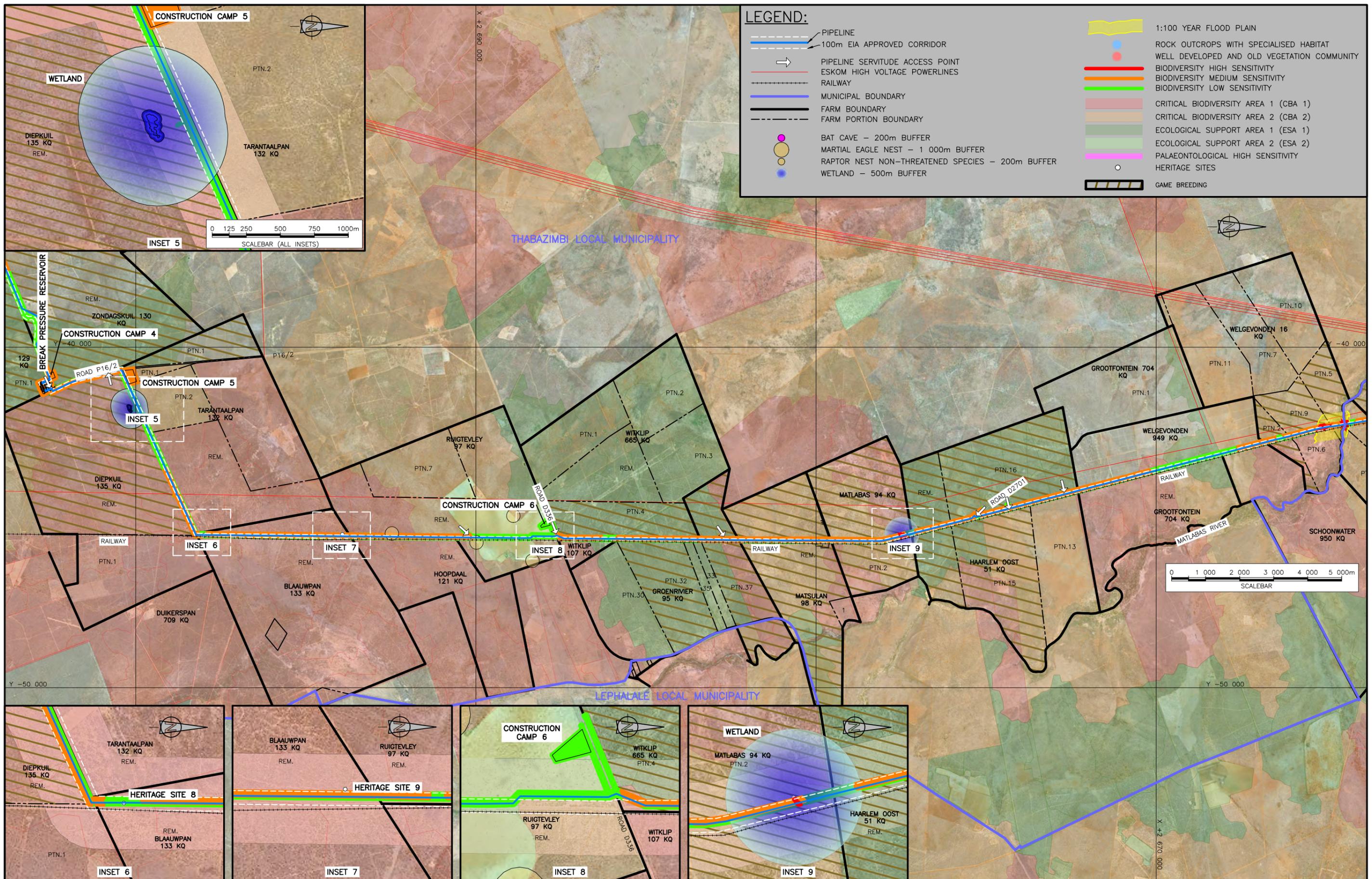


MOKOLO CROCODILE WATER AUGMENTATION PROJECT PHASE 2 (MCWAP-2)

FINAL DEVELOPMENT LAYOUT PLAN FOR AMENDED CONSTRUCTION ENVIRONMENTAL MANAGEMENT PROGRAMME (CEMP_r)
 SHEET 1 OF 4

Revision C



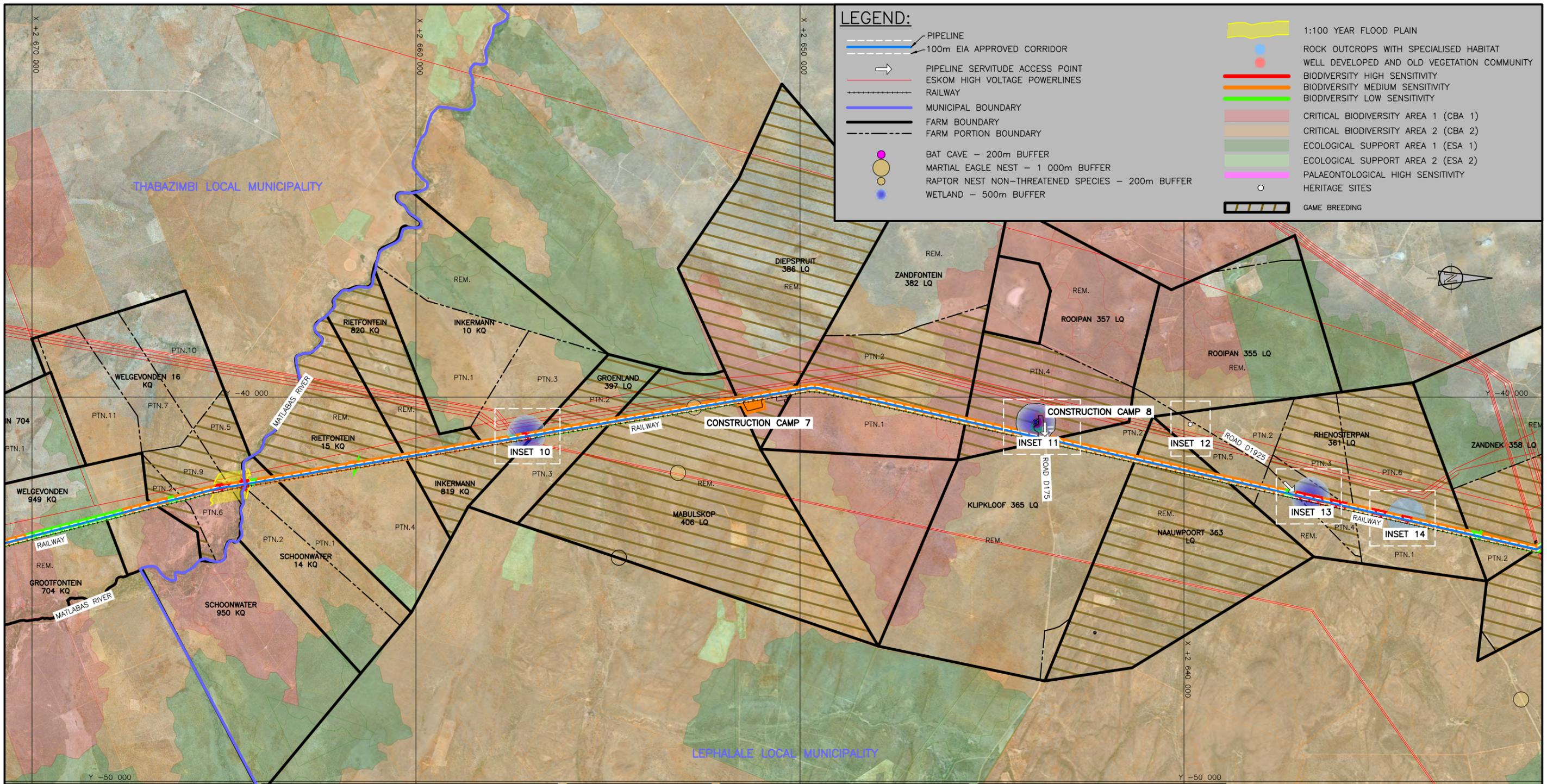


MOKOLO CROCODILE WATER AUGMENTATION PROJECT PHASE 2 (MCWAP-2)

FINAL DEVELOPMENT LAYOUT PLAN FOR AMENDED CONSTRUCTION ENVIRONMENTAL MANAGEMENT PROGRAMME (CEMP_r)
SHEET 2 OF 4

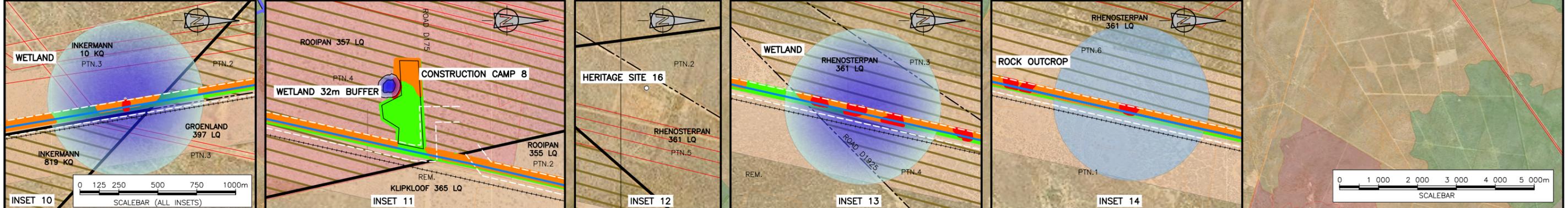
Revision C





LEGEND:

- PIPELINE
- 100m EIA APPROVED CORRIDOR
- PIPELINE SERVITUDE ACCESS POINT
- ESKOM HIGH VOLTAGE POWERLINES
- RAILWAY
- MUNICIPAL BOUNDARY
- FARM BOUNDARY
- FARM PORTION BOUNDARY
- BAT CAVE - 200m BUFFER
- MARTIAL EAGLE NEST - 1 000m BUFFER
- RAPTOR NEST NON-THREATENED SPECIES - 200m BUFFER
- WETLAND - 500m BUFFER
- 1:100 YEAR FLOOD PLAIN
- ROCK OUTCROPS WITH SPECIALISED HABITAT
- WELL DEVELOPED AND OLD VEGETATION COMMUNITY
- BIODIVERSITY HIGH SENSITIVITY
- BIODIVERSITY MEDIUM SENSITIVITY
- BIODIVERSITY LOW SENSITIVITY
- CRITICAL BIODIVERSITY AREA 1 (CBA 1)
- CRITICAL BIODIVERSITY AREA 2 (CBA 2)
- ECOLOGICAL SUPPORT AREA 1 (ESA 1)
- ECOLOGICAL SUPPORT AREA 2 (ESA 2)
- PALAEONTOLOGICAL HIGH SENSITIVITY
- HERITAGE SITES
- GAME BREEDING

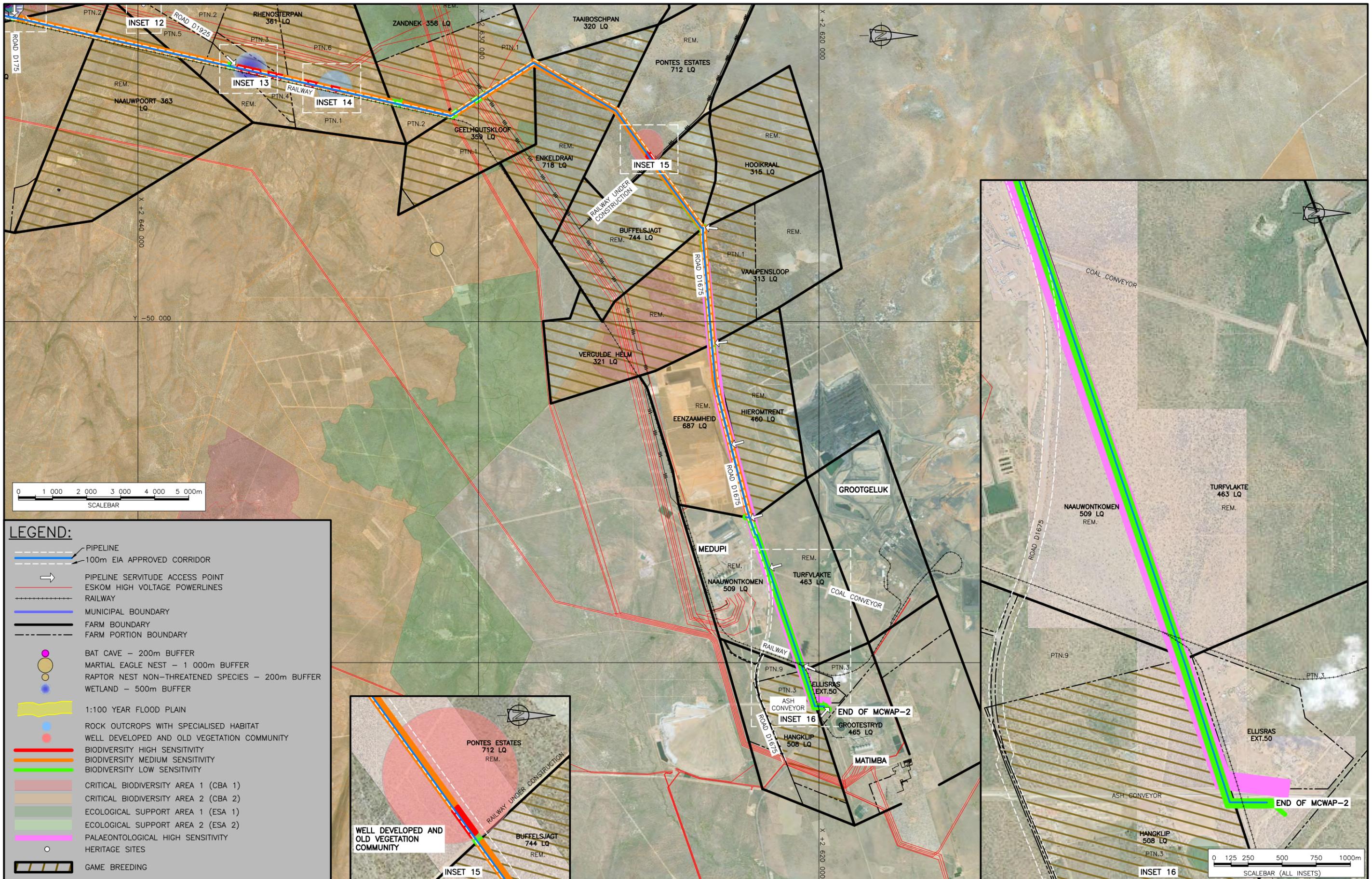


MOKOLO CROCODILE WATER AUGMENTATION PROJECT PHASE 2 (MCWAP-2)

FINAL DEVELOPMENT LAYOUT PLAN FOR AMENDED CONSTRUCTION ENVIRONMENTAL MANAGEMENT PROGRAMME (CEMP_r)
SHEET 3 OF 4

Revision C





MOKOLO CROCODILE WATER AUGMENTATION PROJECT PHASE 2 (MCWAP-2)

FINAL DEVELOPMENT LAYOUT PLAN FOR AMENDED CONSTRUCTION ENVIRONMENTAL MANAGEMENT PROGRAMME (CEMP_r)
SHEET 4 OF 4

Revision C



**ANNEXURE 4/5
ENVIRONMENTAL PENALTIES**

PART C3.1 - SPECIFICATION

The penalty system will be based on two procedures, a stipulated community service task (calculated as project manager man hours or days) or a monetary liquidation liability. Should the environmental monitoring process reveal acts of persistent and/or wilful non-compliance with the Environmental Specifications or EMP, then the Contractor will be penalised according to the specified value of that item (see Table 4/2).

A stipulated community service task is any task in the local region that will improve the environment or prevent further environmental degradation identified by the Engineers Environmental Representative and the ECO. Examples could include repairing erosion dongas, implementing an alien invasive plants eradication program, grading rural school access roads, planting indigenous trees in the community, establishing food gardens at the local schools, planting non-invasive fruit trees in the community, installing rain water systems at the local schools, set up a recycling system in the community (where the community benefits from the program), establish waste infrastructure in the community etc.

Should the local authorities in conjunction with the Engineers Environmental Monitor (EM) Representatives and the ECO, identify any practical tasks available at any point during the Contract, this task will form part of the penalty system. These allocated tasks will then take precedence over the monetary liquidation liability system. Non-compliance to the Environmental Specifications and/or EMP will accumulate project directors man hours and/or days of community service work. The final completion certificate (Taking Over Certificate (TOC)) will only be issued once the Contractor has completed these tasks to the satisfaction of the Engineer.

Should practical tasks not be available, the monetary system will apply. Time and monetary values will be, but are not necessarily limited to the following:

**TABLE 4/3
BREAKDOWN OF ENVIRONMENTAL PENALTIES**

Non-compliance	First time offence (community service task (hours) or monetary liquidation liability (R))	Subsequent offences (community service task (hours) or monetary liquidation liability (R))
Access into designated no-go areas	4 hours; or R10 000	16 hours; or R20 000
Vehicles, plant, equipment or material outside of the demarcated site	2 - 8 hours; or R10 000	16 hours; or R10 000
Persistent un-repaired machinery leaks	2-8 hours; or R1 500	16 hours; or R2 000
Litter on site	1 hour; or R500	2 hour; or R800
Lighting of fires outside of designated areas	6 hours; or R2 500	8 hours; or R3 500

PART C3.1 - SPECIFICATION

Non-compliance	First time offence (community service task (hours) or monetary liquidation liability (R))	Subsequent offences (community service task (hours) or monetary liquidation liability (R))
Eating meals outside of designated areas	2 hours; or R500	2 hours; or R500
Individual not making use of site ablution facilities	2 hours; or R1 000	3 hours; or R1 500
Persons, vehicles, items or plant causing a public nuisance	4 hours; or R1 000	4 hours; or R1 000
Erosion	Cost to repair / rehabilitate	Cost to repair / rehabilitate plus 20%
Oil spills	Cost to clean plus 4 hours; or Cost to clean plus 20%	Cost to clean plus 4 hours; or Cost to clean plus 20%.
Unauthorised damage to the environment	Cost to rehabilitate	Cost to rehabilitate plus 20%
Unauthorised damage to cultural historical sites and/or artefacts of archaeological significance	To a maximum of R120 000	R200 000.
Unauthorised damage or deformation of small trees (smaller than 75mm girth diameter @ a height of 1m)	2 hours; or R2 000 per tree, if the tree is indigenous, an additional 8 hours or R6000 will be added to the penalty. If the plant is protected the relevant authority is to be notified of this act	The permits will be obtained, if needed and 3 hours; or R3 000. If the tree is indigenous, an additional 10 hours or R8000 will be added to the penalty. If the plant is protected the relevant authority is to be notified of this act
Unauthorised damage or deformation of medium trees (75 – 200mm girth diameter @ height of 1m)	4 hours; or R3 500 per tree, if the tree is indigenous, an additional 10 hours or R8000 will be added to the penalty. If the plant is protected the relevant authority is to be notified of this act	6 hours; or R4 500. If the tree is indigenous, an additional 12 hours or R10 000 will be added to the penalty. If the plant is protected the relevant authority is to be notified of this act

PART C3.1 - SPECIFICATION

Non-compliance	First time offence (community service task (hours) or monetary liquidation liability (R))	Subsequent offences (community service task (hours) or monetary liquidation liability (R))
Unauthorised damage or deformation of large trees (larger than 200mm girth diameter @ a height of 1m)	2 days; or R10 000 per tree, if the tree is indigenous, an additional 12 hours or R10 000 will be added to the penalty. If the plant is protected the relevant authority is to be notified of this act	3 days; or R20 000 If the tree is indigenous, an additional 14 hours or R14 000 will be added to the penalty. If the plant is protected the relevant authority is to be notified of this act
Pick, cut, uproot, break, damage or destroy indigenous plants	4 hours per plant; or R1 500 per plant If the plant is protected the relevant authority is to be notified of this act	6 hours; or R5 000 per to a maximum of R2 500. If the plant is protected the relevant authority is to be notified of this act
Pick, cut, uproot, break, damager, destroy or have in possession (and unable to give a satisfactory account of such possession) a protected plant	5 hours per plant; or R2 000 per plant	5 hours; or R2 500
Kill, capture or disturb an animal or take or destroy any egg, larva or nest	2 days; or R5 000	3 days; or R6 000
Setting a snare / trap or hunting / capturing any animal by means of a trap, snare or poison, or with the aid of a light, or by means of a veld fire, or from a vehicle	2 days; or R5 000	3 days; or R6 000
Crossing a river, stream wetland without a method statement	The cost to rehabilitate	The cost to rehabilitate plus an additional 20%
No action or no action within 7 working days on ECO / EM findings	Cost of the corrective action plus R2000 per non-compliance or 4 hours	4 hours and cost of the corrective action plus R4 000 per offence or 4 hours
No action within defects liability period on NCRs issued	8 hours or R4000	16 hours; or R6000
No storm water control measures	2 hours or R1000 per silt fence/ turbidity curtains	4 hours or R2000 per silt fence/ turbidity curtains.

PART C3.1 - SPECIFICATION

Non-compliance	First time offence (community service task (hours) or monetary liquidation liability (R))	Subsequent offences (community service task (hours) or monetary liquidation liability (R))
Exceeding water quality discharge standards, air quality, noise standards, etc	16 hours/ R6000 per offence	22 hours/ R10 000.
Spotting any alien plant with seeds on the servitude	4 hours/R1000 per 100 m ²	8 hours or R2000 per 100 m ² .
Mixing topsoil and subsoil	Value to replace the contaminated topsoil	Value to replace the contaminated topsoil plus 20%
Mismanagement of topsoil	Value to replace the contaminated topsoil	Value to replace the contaminated topsoil plus 20%
Spill kits un-stocked	2 hours/ R500 per 5 kits	4 hours / R1000 per 5 kits for
Mismanagement of toilets, breeding vectors or nauseous smell	4 hours/ R1000 per toilet	6 hours / R2000 per toilet and
Spill kits un-stocked	2 hours/ R500 per 5 kits	4 hours / R1000 per 5 kits
Mixing of waste	2 hours/R500 per 5 bins	4 hours / R1000 per 5 bins
Overflowing of waste skips	2 hours / R500 per skip	4 hours / R1000 per skip
Dust clouds	If exceedances are evident in the monitoring report it will be addressed accordingly	If exceedances are evident in the monitoring report it will be addressed accordingly plus 20%
Securing the servitude	2 hours/ R500 per 50 m	4 hours/ R1000 per 50 m
Water structures such as settlement ponds leaking, or causing damage to the environment	Cost to rectify	Cost to rectify plus 20%
blocking drainage lines/ pooling of water on the servitude or in borrow pits, trenches, excavations or at spoil sites	Cost to rectify	Cost to rectify plus 20%
Sedimentation of water courses and abstraction from an un authorised water body	Cost to rectify	Cost to rectify plus 20%
Undertaking rehabilitation out of sequence and using unauthorised materials/ fertilisers/ seeds/ composts	Cost to rectify	Cost to rectify plus 20%

**ANNEXURE 4/6
TEMPLATE FOR INCIDENT REPORT**

NB! Please ensure that all the information provided in brackets are removed before submitting this report to the all the Authorities.

 <p>environmental affairs Department: Environmental Affairs REPUBLIC OF SOUTH AFRICA</p> 	Document Type:	Emergency Incident Report	
	Title for the incident:		
	Date of the incident :		
Reference:		Initial Submission Date:	
Revision No.:		Compiled by:	

This form provides a template for the emergency incident report required in terms of section 30(5) of the National Environmental Management Act (Act No. 107 of 1998) (hereinafter “NEMA”) in which the responsible person or, where the incident occurred in the course of that person’s employment, his or her employer, must, within 14 days of the incident, report to the Director General, provincial head of department and municipality such information as is available to enable an initial evaluation of the incident, including: (a) the nature of the incident; (b) the substances involved and an estimation of the quantity released and their possible acute effect on persons and the environment and data needed to assess these effects; (c) initial measures taken to minimise impacts; (d) causes of the incident, whether direct or indirect, including equipment, technology, system, or management failure; and (e) measures taken and to be taken to avoid a recurrence of such incident.

In terms of section 30(1)(a) of NEMA, an “incident” means an unexpected sudden occurrence, including a major emission, fire or explosion leading to serious danger to the public or potentially serious pollution of or detriment to the environment, whether immediate or delayed.

In line with section 24 of the Constitution of the Republic of South Africa (Act No. 108 of 1996), “serious” is taken to be a measure of the impact of an incident where such an incident has had, could have had, is having, or will have a negative impact on human health or well-being.

1. RESPONSIBLE PERSON

In terms of section 30(1)(b) of NEMA, the “responsible person” includes any person who: (i) is responsible for the incident; (ii) owns any hazardous substance involved in the incident; or (iii) was in control of any hazardous substance involved in the incident at the time of the incident

1.1 Name:		1.2 Designation:	
1.3 Postal Address:		1.4 Physical Address:	
1.5 Telephone (B/H):		1.6 Telephone (A/H):	
1.7 Fax:			
1.8 E-mail:			
1.9 Nature of Business:			

2. EMERGENCY INCIDENT SUMMARY INFORMATION

Mark the appropriate boxes

2.1 Fire:		2.2 Spill:		2.3 Explosion:		2.4 Gaseous Emission:	
2.5 Injuries		2.6 Reportable injuries:		2.7 Hospitalisation:		2.8 Fatalities:	
2.9 Open water impacts:		2.10 Ground water impacts:		2.11 Atmospheric impacts:		2.12 Soil impacts:	
2.13 Own emergency response involved		2.14 Fire prevention services involved		2.15 Government hazardous materials emergency response involved		2.16 More than 1 governmental emergency response service involved	
2.17 Emission of non-toxic substances at low concentrations		2.18 Emission of non-toxic substances at high concentrations		2.19 Emission of toxic substances at low concentrations		2.20 Emission of toxic substances at high concentrations	
2.21 No evacuation required		2.22 Immediate area evacuated		2.23 Immediate surrounds evacuated		2.24 Evacuation of the general public	
2.25 Others							

3. INITIAL EMERGENCY INCIDENT REPORT

In terms of section 30(3) of NEMA, the responsible person or, where the incident occurred in the course of that person's employment, his or her employer must forthwith after knowledge of the incident, report through the most effective means reasonably available: (a) the nature of the incident; (b) any risks posed by the incident to public health, safety and property; (c) the toxicity of substances or by-products released by the incident; and (d) any steps that should be taken in order to avoid or minimise the effects of the incident on public health and the environment to: (i) the Director General; (ii) the South African Police Services and the relevant fire prevention service; (iii) the relevant provincial head of department or municipality; and (iv) all persons whose health may be affected by the incident.

3.1 Description	3.2 Date:	3.3 Time:	3.4 Medium:	3.5. Name and contact details:
Relevant fire prevention service: (in case of fire)	[submission date]	[submission time]	[Fax, phone, SMS, letter, etc.)	[Who was the report made to?]
LOCAL :				
PROVINCIAL: (Those deal with Environmental issues)				
DIRECTOR GENERAL: (Department of Environmental Affairs)				
Any other Director General of National Department, E.g. Department of Water Affairs				

4. INCIDENT DETAILS

In terms of NEMA section 30(5)(a) and (d), the responsible person must report on the nature of the incident as well as the causes of the incident, whether direct or indirect, including equipment, technology, system, or management failure

4.1 Location of the incident	[Provide physical address of the location where the incident happened including the GPS co-ordinates]		
4.2 Incident start date and time:		4.3 Incident duration:	
4.4 Duration of exposure:			
4.5. Incident description:			
<u>Background of the incident:</u>			
<u>Operation:</u>			
<u>Incident type:</u>			
<u>Root Cause of the incident:</u>			
<u>Contributory Factors to the incident:</u>			
<u>Conclusion:</u>			
4.6. Wind speed and direction		4.7. Ambient air temperature	
4.8. Weather conditions		4.9. Other relevant meteorological conditions	

5. POLLUTANTS RELEASED DURING INCIDENT

In terms of NEMA section 30(5)(b), the responsible person must report on the substances involved and an estimation of the quantity.

List all the pollutants directly released during the incident (i.e. exclude those pollutants that resulted from mitigation measures, e.g. flaring, treatment, dilution etc.)

5.1. Substance or mixture of substances	5.2. Reference Number	5.3. Phase eg solid, liquid or gas	5.4. Total Quantity emitted/released	5.5. Units eg Kg, L etc	5.6. Nature of emission/release
[The name recognised by any national or internationally recognised chemical referencing system]	[Reference to any national or internationally recognised chemical referencing system]	[solid, semi-solid, liquid or gas]	[the total measured or estimated quantity released into the environment]	[the unit of measure in respect to the quantity]	[Emitted from truck, underground pipe, stack, etc.]

6. SECONDARY POLLUTANTS RESULTING FROM INCIDENT

In terms of NEMA section 30(5)(b), the responsible person must report on the substances involved and an estimation of the quantity released.

List all the pollutants that resulted from mitigation measures, e.g. flaring, treatment, dilution etc.

6.1. Substance or mixture of substances	6.2. Reference Number	6.3. Phase	6.4. Total Quantity emitted/released	6.5. Unit	6.6. Nature of emission
[The name recognised by any national or internationally recognised chemical referencing system]	Reference to any national or internationally recognised chemical referencing system]	[solid, semi-solid, liquid or gas]	[the total measured or estimated quantity released into the environment]	[the unit of measure in respect to the quantity]	[Emitted from truck, underground pipe, stack, etc.]

7. POLLUTANT CONCENTRATIONS

In terms of NEMA section 30(5)(b), the responsible person must report on the substances involved and an estimation of the quantity released.

List all the pollutants detailed in previous section:

7.1. Substance or mixture of substances	7.2. Reference Number	7.3. Estimated pollutant concentration on different radius			
		7.3.1. 10m	7.3.2. 100m	7.3.3. 500m	7.3.4. >2000m
[The name recognised by any national or internationally recognised chemical referencing system]	[Reference to any national or internationally recognised chemical referencing system]	[estimate the concentration of the pollutant in water, soil and/or air within a 10m radius of the epicentre of the incident] [provide the units used in a case of estimating concentration (e.g. ppm)]	[estimate the concentration of the pollutant in water, soil and/or air within a 100m radius of the epicentre of the incident] [provide the units used in a case of estimating concentration (e.g. ppm)]	[estimate the concentration of the pollutant in water, soil and/or air within a 500m radius of the epicentre of the incident] [provide the units used in a case of estimating concentration (e.g. ppm)]	[estimate the concentration of the pollutant in water, soil and/or air within a > 2000 m radius of the epicentre of the incident] [provide the units used in a case of estimating concentration (e.g. ppm)]

¹ Concentration at the plume

² Concentration that was falling on the ground

8. INCIDENT IMPACT

In terms of NEMA section 30(5)(b), the responsible person must report on possible acute effects on persons and the environment and the responsible must provide data needed to assess these effects;

8.1. Minor injuries	[Describe the number and types of any minor injuries that resulted from the incident or efforts to manage the incident or the impacts thereof]
8.2. Reportable injuries	[Describe the number and types of any injuries requiring statutory reporting that resulted from the incident or efforts to manage the incident or the impacts thereof]
8.3. Hospitalisation	[Describe the number and types of any injuries that required professional medical care that resulted from the incident or efforts to manage the incident or the impacts thereof]
8.4. Fatalities	[Describe the number and cause of any fatalities that resulted from the incident or efforts to manage the incident or the impacts thereof]
8.5. Biological impacts	[Describe any impacts on biological life, other than human life, e.g. fish kills, plant mortality, etc.]
8.6. Impact area	[Describe the area possibly affected by the incident or the impacts thereof including: (i) size of the area; (ii) socio-economic context; (iii) population density; (iv) sensitive environments (if any), etc.]
8.7. Data	Attach relevant impact reports, medical reports, death certificates, post mortem reports, environmental monitoring data, etc. as Annexes C1, C2,... to this report

9. EXISTING PREVENTION PROCEDURES AND/OR SYSTEMS

9.1. Foresight	[Briefly describe whether the incident could have, or had, been foreseen, e.g. was it included in any environmental impact assessment, risk assessment, health and safety plan, etc.]
9.2. Procedures and/or systems	Attach any relevant safety, health and environmental plans (including any statutory planning requirements) that detail what actions should be taken in the event of the incident that is the subject of this report
9.3. Procedure and/or systems failures	[Describe any failures or shortfalls in procedures and/or systems that may have contributed to the incident] All procedures and checklist in place and signed off.
9.4. Technical measures	[Describe any technical measures, equipment, 'fail-safe' devices, etc. that are in place to prevent the occurrence of the incident] Communications & discussions in place.
9.5. Technical failure	[Describe any failures of technical measures, equipment, 'fail-safe' devices, etc. that are in place to prevent the occurrence of the incident]

10. INITIAL INCIDENT MANAGEMENT

In terms of NEMA section 30(5)(c), the responsible person must report on initial measures taken to minimise impacts.

10.1. Evacuation	[Describe any evacuation activities including information on the number of people evacuated and whether these people were staff or otherwise]
10.2. Technical measures	[Describe all technical measures taken to address the incident]
10.3. Mitigation measures	[Describe all measures taken to minimize the impact] SOPEP gear activated
10.4. Emergency Services	[Describe any governmental emergency services involvement] SAMSA/TNPA advised

11. CLEANUP AND/OR DECONTAMINATION

In terms of NEMA section 30(5)(c), the responsible person must report on initial measures taken to minimise impacts.

11.1. Cleanup and/or decontamination	<i>[Report on initial cleanup and or decontamination (remediation) measures taken to minimise the impact of the incident on human health and the environment. Provide copy of safe disposal certificate (if any) and details of the company that undertook the cleanup]</i>		
11.2. Permissions and Instructions			
Provide details of any permission and/or instructions received from any organ of state during initial incident management, cleanup and/or decontamination			
11.3. Type	11.4. Statute	11.5. Issued By	11.6. Name and contact details
[Describe the nature or type of permission or instruction]	[Provide a reference to the legal mandate for the permission or instruction]	[Provide contact details for the permitting or instructing authority]	[provide a summary of the activities carried out in terms of the permission or instruction]

12. MITIGATION MEASURES

In terms of NEMA section 30(5)(e), the responsible person must report on measures taken and to be taken to avoid a recurrence of such an incident.

12.1. Measure	12.2. Objective	12.3. Cost	12.4. Timing
[Briefly describe each of the measures taken, and to be taken, to avoid a recurrence of such incident]	[Briefly describe the objective of the measure, i.e. the desired outcome of the measure]	[Estimate the cost of the measure in terms of capital costs and/or recurrent costs]	[Provide information on the timing for the full implementation of the measure]

13. AUTHORISATIONS

Provide details on all authorisations (including permits, licenses, certificates, etc.) in respect of the activity to which this incident relates.

13.1. Type	13.2. Statute	13.3. Issued By	13.4. Issue & Expiry Date
[Describe the nature or type of authorisation, e.g. Registration Certificate]	[Provide the reference for the authorisation, e.g. section X of the National Environmental Management Act (Act No. 107 of 1989)]	[Provide contact details for the issuing authority]	[provide the date of issue and expiry]

14. HISTORY

Provide details of all similar incidents involving the responsible person in the past (i.e. from 1998). Similar incidents include those that: (i) involved similar circumstances; (ii) involved similar emissions; (iii) involved similar personnel; and/or (iv) involved similar impacts.

14.1. Incident title	14.2. Report reference	14.3. Date of incident	14.4. Summary of event
[Provide the title used in the relevant emergency incident report]	[Provide the reference in respect of the relevant emergency incident report]	[Date of incident]	[Provide a summary of the event]

Signed by, or as a mandated signatory for, the responsible person:		Date:	
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APPENDIX 1

List of affected people as results of the incident

NAME	ADDRESS	PHONE	FAULT	REMARKS

APPENDIX 2

Layout map of the area likely to be affected or affected as a result of the incident

Disclaimer

Any other information not covered in the reporting template must be included.

CAUTION

In terms of section 30 (11) of NEMA as amended, it is an offence not to report an incident and liable on conviction to a fine not exceeding R 1 million or imprisonment for a period not exceeding 1 year, or to both such a fine and such imprisonment.

**ANNEXURE 4/7
ENVIRONMENTAL AUTHORISATION (14/12/16/3/3/2/1100)**



environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

Private Bag X 447· PRETORIA · 0001· Environment House · 473 Steve Biko Road, Arcadia · PRETORIA

DEA Reference: 14/12/16/3/3/2/1100

Enquiries: Ms Mathodi Mogorosi

Telephone: 012-399-9388 **E-mail:** mmogorosi@environment.gov.za

Mr. Robert Gillmer
Department of Water and Sanitation
Private Bag X313
PRETORIA
0001

Tel: (012) 336 6933
Email: GillmerR@dws.gov.za

PER E-MAIL / MAIL

Dear Mr Gillmer

APPLICATION FOR ENVIRONMENTAL AUTHORISATION IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, ACT NO. 107 OF 1998, AS AMENDED: GN R982/983/984/985, AS AMENDED: MOKOLO AND CROCODILE RIVER (WEST) WATER AUGMENTATION PROJECT (PHASE 2A) (MCWAP – 2A), WITHIN THE THABAZIMBI AND LEPHALALE LOCAL MUNICIPALITIES, IN THE WATERBERG DISTRICT MUNICIPALITY, LIMPOPO PROVINCE

With reference to the above application, please be advised that the Department has decided to grant authorisation. The Environmental Authorisation (EA) and reasons for the decision are attached herewith.

In terms of Regulation 4(2) of the Environmental Impact Assessment Regulations, 2014, as amended (the EIA Regulations), you are instructed to notify all registered interested and affected parties, in writing and within 14 (fourteen) days of the date of the EA, of the Department's as well as the provisions regarding the submission of appeals that are contained in the Regulations.

In terms of the Promotion of Administrative Justice Act, 2000 (Act No 3 of 2000), you are entitled to the right to fair, lawful and reasonable administrative action; and to written reasons for administrative action that affects you negatively. Further your attention is drawn to the provisions of the Protection of Personal Information Act, 2013 (Act no. 4 of 2013) which stipulates that the Department should conduct itself in a responsible manner when collecting, processing, storing and sharing an individual or another entity's personal information by holding the Department accountable should the Department abuses or compromises your personal information in any way.

Your attention is drawn to Chapter 2 of National Environmental Management Act, 1998 (Act No. 107 of 1998) National Appeal Regulations published under Government Notice R993 in Government Gazette No. 38303 dated 08 December 2014 (National Appeal Regulations, 2014), which prescribe the appeal procedure to be followed. Kindly include a copy of this document (National Appeal Regulations, 2014) with the letter of notification to interested and affected parties in this matter.

MS

Should any person wish to lodge an appeal against this decision, he/she must submit the appeal to the appeal administrator, and a copy of the appeal to the applicant, any registered interested and affected party, and any organ of state with interest in the matter within 20 days from the date that the notification of the decision was sent to the registered interested and affected parties by the applicant; or the date that the notification of the decision was sent to the applicant by the Department, whichever is applicable.

Appeals must be submitted in writing in the prescribed form to:

The Director: Appeals and Legal Review of this Department at the below mentioned addresses.

By email: appealsdirector@environment.gov.za;

By hand: Environment House
473 Steve Biko
Arcadia
Pretoria
0083; or

By post: Private Bag X447
Pretoria
0001

Please note that in terms of Section 43(7) of the National Environmental Management Act, Act No. 107 of 1998, as amended, the lodging of an appeal will suspend the environmental authorisation or any provision or condition attached thereto. In the instance where an appeal is lodged, you may not commence with the activity until such time that the appeal is finalised.

To obtain the prescribed appeal form and for guidance on the submission of appeals, please visit the Department's website at https://www.environment.gov.za/documents/forms#legal_authorisations or request a copy of the documents at appealsdirector@environment.gov.za.

Yours faithfully



Mr Sabelo Malaza
Chief Director: Integrated Environmental Authorisations
Department of Environmental Affairs

Date: 18/03/2019

CC:	Mr. D Henning	Nemai Consulting	Tel: 011-781-1730	Email: donavanh@nemai.co.za
	Mr. T Ngoasheng	Limpopo Department of Economic Development, Environment and Tourism	Tel: 015-290-7058	Email: NgoashengTR@ledet.gov.za





environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

Environmental Authorisation

In terms of Regulation 25 of the Environmental Impact Assessment Regulations, 2014, as amended

**Mokolo and Crocodile River (West) Water Augmentation Project (Phase 2A) (MCWAP – 2A),
within the Thabazimbi and Lephalale Local Municipalities, Limpopo Province**

Waterberg District Municipality

Authorisation register number:	<i>14/12/16/3/3/1/1100</i>
Last amended:	<i>First issue</i>
Holder of authorisation:	<i>DEPARTMENT OF WATER & SANITATION</i>
Location of activity:	<i>LIMPOPO PROVINCE: Within Wards 1 & 9 of Thabazimbi Local Municipality, and Wards 1, 2 & 3 of Lephalale Local Municipality</i>

This Environmental Authorisation does not negate the holder of the authorisation's responsibility to comply with any other statutory requirements that may be applicable to the undertaking of the activity.

MS

Decision

The Department is satisfied, on the basis of information available to it and subject to compliance with the conditions of this Environmental Authorisation, that the applicant should be authorised to undertake the activities specified below.

Non-compliance with a condition of this Environmental Authorisation may result in criminal prosecution or other actions provided for in the National Environmental Management Act, Act No. 107 of 1998, as amended and the EIA Regulations, 2014, as amended.

Details regarding the basis on which the Department reached this decision are set out in Annexure 1.

Activities authorised

By virtue of the powers conferred on it by the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment Regulations, 2014, as amended, the Department hereby authorises –

DEPARTMENT OF WATER AND SANITATION

(hereafter referred to as the **holder of the authorisation**)

with the following contact details –

Mr. Robert Gillmer

Department of Water and Sanitation

Private Bag X313

PRETORIA

0001

Tel: (012) 336 6933

Cell: (083) 791 0833

E-mail: GillmerR@dws.gov.za

to undertake the following activities (hereafter referred to as “the activity”) indicated in Listing Notice 1, Listing Notice 2 and Listing Notice 3, as amended (GN R983, R984 and R985, as amended):

Listed activities	Activity/Project description
<p><u>GN R. 983 Item 9:</u> <i>The development of infrastructure exceeding 1 000 metres in length for the bulk transportation of <u>water</u> or storm water—</i> <i>(i) with an internal diameter of 0,36 metres or more; or</i> <i>(ii) with a peak throughput of 120 litres per second or more;</i> <i>excluding where—</i> <i>(a) such infrastructure is for bulk transportation of water or storm water or storm water drainage inside a road reserve or railway line</i> <i>(b) where such development will occur within an urban area.</i></p>	<p>Water pipelines that form part of the transfer scheme, based on 75 million m³/a transfer capacity. Pipe diameter up to 2400mm.</p>
<p><u>GN R. 983 Item 12:</u> <i>The development of—</i> <i>(i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or</i> <i>(ii) infrastructure or structures with a physical footprint of 100 square metres or more;</i> <i>where such development occurs—</i> <i>(a) within a watercourse;</i> <i>(b) in front of a development setback; or</i> <i>(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;</i></p>	<p>Various infrastructure with a physical footprint of 100 square metres or more within watercourse(s) / within 32m from watercourse(s), including:</p> <ul style="list-style-type: none"> • Abstraction works (Crocodile River); • Gauging weirs - Crocodile River, Bierspruit and Sand River; • Pipeline crossings - tributaries of the Limpopo River system (including the Matlabas River main stem and tributaries) as well as tributaries of the Mokolo River system; and • Access roads' crossings - tributaries of the Limpopo River system.

Listed activities	Activity/Project description
<p><u>GN R. 983 Item 13:</u> <i>The development of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic metres or more, unless such storage falls within the ambit of activity 16 in Listing Notice 2 of 2014.</i></p>	<p><u>Balancing Dam:</u></p> <ul style="list-style-type: none"> • Size - 620 x 440 m; • Storage capacity – 3 days, 68 000m³ for 75 million m³/a transfer <p><u>Break Pressure Reservoir:</u></p> <ul style="list-style-type: none"> • Dimensions - 260 x 300m; • Storage capacity – 8 hours, 90 000m³ for 75 million m³/a; <p><u>Operational Reservoir:</u></p> <ul style="list-style-type: none"> • Dimensions - 260 x 300m; • Storage capacity - 8 hours, 90 000m³ for 75 million m³/a.
<p><u>GN R. 983 Item 14:</u> <i>The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with cubic metres or more but not exceeding 500 cubic metres.</i></p>	<p>"Dangerous goods" that are likely to be associated with the greater project, are fuel stores, as well as any dangerous goods to</p> <p>Threshold of 80m³ expected to be exceeded. Fuel and other dangerous goods will be stored at all site establishments.</p>
<p><u>GN R. 983 Item 19:</u> <i>The infilling or depositing 10 cubic metres into, or the dredging, excavation, removal or moving pebbles or rock of more than 10 cubic metres from a watercourse;</i></p>	<p>/ within 32m from watercourse(s), including:</p> <ul style="list-style-type: none"> • Gauging weirs - Crocodile River, Bierspruit and Sand River; • Pipeline crossings - tributaries of the Limpopo River system (including the Matlabas River main stem and tributaries) as well as tributaries of the Mokolo River system; and

Listed activities	Activity/Project description
	<ul style="list-style-type: none"> • Access roads' crossings - tributaries of the Limpopo River system.
<p><u>GN R. 983 Item 24:</u></p> <p><i>The development of a road-</i></p> <p><i>(i) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice</i></p> <p><i>(ii) with a reserve wider than 13,5 meters, or where no reserve exists</i></p> <p><i>but excluding a road—</i></p> <p><i>(a) which is identified</i></p> <p><i>Listing Notice 2 of 2014;</i></p> <p><i>(b) where the entire road falls within an urban area; or</i></p> <p><i>(c) which is 1 kilometre or shorter.</i></p>	<p>Access roads to the various sites (construction and operational phases) are expected to exceed thresholds.</p>
<p><u>GN R. 983 Item 27:</u></p> <p><i>The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for—</i></p> <p><i>(i) the undertaking of a linear activity; or</i></p> <p><i>(ii) maintenance purposes undertaken in accordance with a maintenance management plan.</i></p>	<p>Clearance of large areas associated with the construction footprint, which includes the following large project components:</p> <ul style="list-style-type: none"> • Balancing Dam - 620 x 440m; • Break Pressure Reservoir - 260 x 300m; • Operational Reservoir - 260 x 300m; • Laydown areas, and • General site establishment.
<p><u>GN R. 983 Item 28:</u></p> <p><i>Residential,</i></p> <p><i>institutional</i></p> <p><i>for agriculture,</i></p> <p><i>afforestation</i></p> <p><i>development:</i></p>	<p>agricultural and game farming purposes. This includes the Balancing Dam which is 600m x 370m and ancillary structures (including workshops, offices and stores), which mostly occur on land used for</p>

Listed activities	Activity/Project description
<p><i>(ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;</i></p> <p><i>excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.</i></p>	<p>agricultural purposes, outside of an urban area.</p>
<p><u>GN R. 983 Item 30:</u></p> <p><i>Any process or activity identified in terms of section 53(1) of the National Environmental Biodiversity Act, 2004 (Act No. 10 of 2004).</i></p>	<p>Possible occurrence of sensitive biodiversity features at affected areas.</p>
<p><u>GN R. 984 Item 31:</u></p> <p><i>The decommissioning of existing or infrastructure for—</i></p> <p><i>(i) any development and related operation activity or activities listed in this Notice, Listing Notice 2 of 2014 or Listing</i></p>	<p>Above mentioned Activity 4 of GN R 984 and below activity 10 of GN R 985 are only required for temporary storage (during construction activities) of dangerous goods, thereafter all storage equipment and containers will be decommission and removed from the site once construction activities have been completed.</p>
<p><u>GN R. 983 Item 56:</u></p> <p><i>The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre—</i></p> <p><i>(i) where the existing reserve</i></p> <p><i>or</i></p> <p><i>(ii) where no reserve exists, where the existing wider than 8 metres;</i></p>	<p>Access roads to the various sites (construction and operational phases). Relocation of roads that will be inundated by abstraction weir.</p>
<p><u>GN R. 983 Item 67:</u></p> <p><i>Phased activities for all activities—</i></p> <p><i>(i) listed in this Notice, which commenced on or after the effective date of this Notice or similarly listed in any of the previous</i></p>	<p>Possible phased activities that may collectively trigger this listed activity.</p>

Listed activities	Activity/Project description
<p><i>or after the effective date of such previous NEMA Notices;</i></p> <p><i>(ii) listed</i></p> <p><i>in Listing Notice 2 of 2014 or similarly listed in any of the previous NEMA notices, which commenced on or after</i></p> <p><i>where any phase of the activity</i></p> <p><i>but where a combination of the phases, including expansions or extensions, will exceed a specified threshold.</i></p>	
<p><u>GN R. 984 Item 4:</u></p> <p><i>The development and related operation of facilities or infrastructure, for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of more than 500 cubic metres.</i></p>	<p>"Dangerous goods" that are likely to be associated with the greater project, are fuel stores, as well as any dangerous goods to be used during the construction phase.</p> <p>Fuel and other dangerous goods will be stored at all site establishments.</p>
<p><u>GN R. 984 Item 6:</u></p> <p><i>The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national provincial legislation governing</i></p> <p><i>release of emissions, pollution</i></p> <p><i>(i) activities which are identified and included in Listing Notice 1 of 2014;</i></p> <p><i>(ii) activities which are included in the list of waste management activities</i></p> <p><i>of the National</i></p> <p><i>Act, 2008 (Act No. 59 of 2008) in which case the</i></p> <p><i>National</i></p> <p><i>2008 applies;</i></p>	<p>Approval will be required for the scouring of sediment back to the Crocodile River from</p>

Listed activities	Activity/Project description
<p>(iii) the development of facilities or infrastructure for the treatment of effluent, polluted water, wastewater or sewage where such facilities have a daily throughput capacity of 2 000 cubic metres or less; or</p> <p>(iv) where the development is directly related to aquaculture facilities or infrastructure where the wastewater discharge capacity will not exceed 50 cubic metres per day.</p>	
<p><u>GN R. 984 Item 11:</u></p> <p>The development of facilities or infrastructure for the transfer of 50 000 cubic metres or more water per day, from and to or between any combination of the following —</p> <p>i) water catchments;</p> <p>(ii) water treatment works; or</p> <p>(iii) impoundments;</p> <p>excluding treatment works where water is to be treated for drinking purposes.</p>	<p>Transfer scheme from Crocodile River (West) to Lephalale with a capacity of 75 million m³/a.</p>
<p><u>GN R. 984 Item 15:</u></p> <p>The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for—</p> <p>(i) the undertaking of a linear activity; or</p> <p>(ii) maintenance purposes undertaken in accordance with a maintenance management plan.</p>	<p>Cumulative area to be cleared for entire project (except linear components) exceeds 20 hectares.</p>
<p><u>GN R. 984 Item 16:</u></p> <p>The development of a dam where the highest part of the dam wall, as measured from the outside toe of the wall to the highest part of the wall, is 5 metres or higher or where the highwater mark of the dam covers an area of 10 hectares or more.</p>	<p>Abstraction weir at Vlieëpoort. The lowest part of weir would be approximately 4m - 6m high above the river bed level.</p>

Listed activities	Activity/Project description
<p><u>GN R. 985 Item 2:</u></p> <p><i>The development of reservoirs, excluding dams, with a capacity of more than 250 cubic metres.</i></p> <p><i>e. Limpopo</i></p> <p><i>ii. Outside urban areas</i></p>	<p>Threshold exceeded by break pressure reservoir, operational reservoir and balancing dam.</p>
<p><u>GN R. 985 Item 4:</u></p> <p><i>The development of a road wider than 4 metres with a reserve less than 13,5 metres.</i></p> <p><i>e. Limpopo</i></p> <p><i>i. Outside urban areas</i></p>	<p>Access roads to the various sites (construction and operational phases) are expected to exceed thresholds.</p>
<p><u>GN R. 985 Item 10:</u></p> <p><i>The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres.</i></p> <p><i>e. Limpopo</i></p> <p><i>i. All areas</i></p>	<p>"Dangerous goods" that are likely to be associated with the greater project, are fuel stores, as well as any dangerous goods to be used during the construction phase. Threshold of 30 m³ expected to be exceeded. Fuel and other dangerous goods will be stored at all site establishments.</p>
<p><u>GN R. 985 Item 12:</u></p> <p><i>The clearance of an area of 300 square metres or more of indigenous vegetation of indigenous vegetation purposes undertaken in accordance with a maintenance management plan.</i></p> <p><i>e. Limpopo</i></p> <p><i>i. Within any critically ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;</i></p>	<p>Clearance of large areas associated with the construction footprint.</p>

Listed activities	Activity/Project description
<p>ii. <i>Within critical biodiversity areas identified in bioregional plans;</i></p>	
<p><u>GN R. 985 Item 14:</u></p> <p><i>The development of—</i></p> <p><i>(i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or</i></p> <p><i>(ii) infrastructure or structures with a physical footprint of 10 square metres or more;</i></p> <p><i>where such development occurs—</i></p> <p><i>(a) within a watercourse;</i></p> <p><i>(b) in front of a development setback; or</i></p> <p><i>(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;</i></p> <p><i>excluding the development of infrastructure or structures within existing</i></p> <p><i>increase the development footprint of the port or harbour.</i></p> <p><i>e. Limpopo</i></p> <p><i>i. Outside urban areas</i></p>	<p>Various infrastructure within watercourse(s) / within 32m from watercourse(s), including:</p> <ul style="list-style-type: none"> • Abstraction works - Crocodile River; • Gauging weirs - Crocodile River, • Pipeline crossings - tributaries of the Limpopo River system (including the Matlabas River main stem and tributaries) as well as tributaries of the Mokolo River system; and • Access roads' crossings - tributaries of the Limpopo River system.
<p><u>GN R. 985 Item 18:</u></p> <p><i>The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.</i></p> <p><i>e. Limpopo</i></p> <p><i>i. Outside urban areas</i></p>	<p>Access roads to the various sites (construction and operational phases) are expected to exceed thresholds.</p>
<p><u>GN R. 985 Item 23:</u></p> <p><i>The expansion of—</i></p> <p><i>(i) dams or weirs where the dam or weir is expanded by 10 square metres or more; or</i></p>	<p>Upgrade of existing bridge(s) along access road(s).</p>

M. J

Listed activities	Activity/Project description
<p><i>(ii) infrastructure or structures where the physical footprint where such expansion occurs-</i></p> <p><i>(a) within a watercourse;</i></p> <p><i>(b) in front of a development setback adopted in the prescribed manner; or</i></p> <p><i>(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;</i></p> <p><i>excluding the expansion of infrastructure or structures within existing the development footprint</i></p> <p><i>e. Limpopo</i></p> <p><i>i. Outside urban areas</i></p>	
<p><u>GN R. 985 Item 26:</u></p> <p><i>Phased activities for all activities—</i></p> <p><i>i. listed geographical area, which commenced on or after the effective date of this Notice; or</i></p> <p><i>ii. similarly listed and as it applies to a specific geographical area, which commenced on or after the effective date of such previous where any phase of the activity was below a threshold but where a combination of the phases, including expansions or extensions, will exceed a specified threshold</i></p> <p><i>All the areas as identified for the specific activities in this Notice.</i></p>	<p>Possible phased activities that may collectively trigger this listed activity.</p>

as described in the Environmental Impact Assessment Report (EIAr) dated November 2018 at:
 21 Digit SG code and property description:

Abstracts Water & Low-alt PS	Establishing Dams	Break Pressure Reservoir	Operational Reservoir	Pipeline CR	Pipeline EOT	Pipeline DA	Electricity Grid	Sand River DW	Paarl Hoop GW	SG Code	Farm Name	Portion
✓										TOKQ0000000034100000	Hanover 341 KQ	RE
✓				✓						TOKQ0000000034400010	Donkerpoort 344 KQ	10
✓				✓						TCKQ0000000034200000	Mooivalei 342 KQ	RE
				✓						TOKQ0000000034200010	Mooivalei 342 KQ	10
				✓						TOKQ0000000034200009	Mooivalei 342 KQ	9
				✓						TOKQ0000000034200008	Mooivalei 342 KQ	8
				✓						TOKQ0000000034200007	Mooivalei 342 KQ	7
				✓						TOKQ0000000034200006	Mooivalei 342 KQ	6
				✓						TOKQ0000000034200005	Mooivalei 342 KQ	5
				✓						TOKQ0000000034200024	Mooivalei 342 KQ	24
				✓						TOKQ0000000034200004	Mooivalei 342 KQ	4
				✓						TOKQ0000000034200003	Mooivalei 342 KQ	3
	✓			✓						TOKQ0000000034200002	Mooivalei 342 KQ	2
	✓			✓						TOKQ0000000034200001	Mooivalei 342 KQ	1
				✓						TOKQ0000000032000000	HAMPTON 320 KQ	0
				✓						TOKQ0000000032000001	HAMPTON 320 KQ	1
				✓						TOKQ0000000046200000	STRATFORD 462 KQ	
				✓						TOKQ0000000031100000	MEKLENBERG 311 KQ	
				✓						TOKQ0000000031000000	MECKLENBURG 310 KQ	
				✓						TOKQ0000000012400007	Paarl 124 KQ	7
				✓						TOKQ0000000012400006	Paarl 124 KQ	6
				✓						TOKQ0000000012400000	Paarl 124KQ	RE
				✓						TOKQ0000000012300000	Amsterdam 123 KQ	
				✓						TOKQ0000000012600000	Karobult 126 KQ	0
				✓						TOKQ0000000012700000	Buffelsvlei 127 KQ	
		✓		✓						TOKQ0000000012900001	Leeuwbosch 129 KQ	1
				✓						TOKQ0000000013000001	Zondagskuil 130 KQ	1
				✓						TOKQ0000000013000002	Zondagskuil 130 KQ	2
				✓						TOKQ0000000013000000	Zondagskuil	0
				✓						TOKQ0000000013500002	Diepskuil 135 KQ	2
				✓						TOKQ0000000013500003	Diepskuil 135 KQ	3
				✓						TOKQ0000000013500006	Diepskuil 135 KQ	6
				✓						TOKQ0000000013200001	Tarantaalpan 132 KQ	1
				✓						TOKQ0000000013200002	Tarantaalpan 132 KQ	2

Department of Environmental Affairs
Environmental Authorisation Reg. No. 14/12/16/3/3/2/1100

Abstraction Work & Low lift PE	Borehole Data	Break Pressure Test/Well	Operational Reserve	Pipeline CK	Pyramid D1	Pocahita D4	Bucapruitt GW	Isand River GW	Paul Hugo GW	SG Code	Farm Name	Portion
				✓						TOKQ0000000013200004	Tarantaalpan 132 KQ	4
				✓						TOKQ0000000013200000	Tarantaalpan 132 KQ	RE
				✓						TOKQ0000000013300000	Blaauwpan 133 KQ	RE
				✓						TOKQ0000000009700005	Ruigtevley 97 KQ	5
				✓						TOKQ0000000009700006	Ruigtevley 97 KQ	6
				✓						TOKQ00000000066500004	Witklip 665 KQ	4
				✓						TOKQ00000000009500037	Grøenrivier 95 KQ	37
				✓						TOKQ00000000009800000	Matsulan 98 KQ	RE
				✓						TOKQ00000000009400000	Matlabas 94 KQ	
				✓						TOKQ00000000005100000	Haarlem Oost 51 KQ	RE
				✓						TOKQ00000000005100016	Haarlem Oost 51 KQ	16
				✓						TOKQ00000000005000000	Grootfontein 50 KQ	RE
				✓						TOKQ00000000005000001	Grootfontein 50 KQ	1
				✓						TOKQ00000000001600001	Welgevonden 16 KQ	1
				✓						TOKQ00000000001600000	Welgevonden 16 KQ	RE
				✓						TOKQ00000000001600002	Welgevonden 16 KQ	2
				✓						TOKQ00000000001600009	Welgevonden 16 KQ	9
				✓						TOKQ00000000001600005	Welgevonden 16 KQ	5
				✓						TOKQ00000000001400001	Schoonwater 14 KQ	1
				✓						TOKQ00000000001500000	Rietfontein 15 KQ	RE
				✓						TOKQ00000000008200000	Rietfontein 820 KQ	RE
				✓						TOKQ00000000001000003	Inkermann 10 KQ	3
				✓						TOLQ00000000039700002	Groenland 397 LQ	2
				✓						TOLQ00000000040600000	Mabulskop 406 LQ	0
				✓						TOLQ00000000038600000	Diepspruit 386 LQ	0
				✓						TOLQ00000000038200001	Zandfontein 382 LQ	2
				✓						TOLQ00000000038200002	Zandfontein 382 LQ	1
			✓	✓						TOLQ00000000035700004	Rooipan 357 LQ	4
				✓						TOLQ00000000035700000	Rooipan 357 LQ	RE
					✓					TOLQ00000000035500002	Rooipan 355 LQ	2
					✓					TOLQ00000000036300000	Naaupoort 363 LQ	0
					✓					TOLQ00000000036100005	Rhenosterpan 361 LQ	5
					✓					TOLQ00000000036100002	Rhenosterpan 361 LQ	2
					✓					TOLQ00000000036100000	Rhenosterpan 361 LQ	0
					✓					TOLQ00000000036100004	Rhenosterpan 361 LQ	4
					✓					TOLQ00000000036100006	Rhenosterpan 361 LQ	6
					✓					TOLQ00000000035800001	Zandnek 358 LQ	1
					✓	✓				TOLQ00000000031400000	Enkeldraai 314 LQ	0

M.S

Department of Environmental Affairs
Environmental Authorisation Reg. No. 14/12/16/3/3/2/1100

Abstraction Weir & Low-lift P3	Balancing Dams	Brink Pumps/Reservoir	Operational Reservoir	Pipeline C/I	Pipeline D1	Pipeline D2	Intermittent GW	Sand River GW	Psalm Hugo GW	SG Code	Farm Name	Portion
					✓	✓				TOLQ0000000071800000	Enkeldraai 718 LQ	0
					✓	✓				TOLQ0000000035900001	Geelhoutskloof 359 LQ	1
					✓					TOLQ0000000032000000	Taaiboschpan 320 LQ	0
					✓					TOLQ0000000071200000	Pontes Estates 712 LQ	0
					✓					TOLQ0000000030200002	Loopleegte 302 LQ	0
							✓			TOKQ0000000035200000	GROOTFONTEIN 352 KQ	0
								✓		TOKQ0000000034800022	KLIPGAT 348 KQ	22
								✓		TOKQ0000000034800003	KLIPGAT 348 KQ	3 RE
									✓	TOKQ0000000037300003	HAAKDOORNDRIFT 373 KQ	3
									✓	TOKQ0000000037300000	HAAKDOORNDRIFT 373 KQ	0

Project Components	Preferred Alternatives	Coordinates
Vleëpoort abstraction weir	-	Central point: 24°38'00.80"S, 27°18'59.63"E
Low-lift pumping station	-	Central point: 24°37'59.66"S, 27°18'59.68"E
Low-lift rising main	-	Start point: 24°38'00.31"S, 27°19'00.39"E End point: 24°35'54.47"S, 27°18'05.05"E
Balancing dam	-	Central point: 24°35'43.72"S, 27°17'59.18"E
Desilting works	-	Central point: 24°35'51.49"S, 27°18'06.98"E
Sediment Storage Compartments	-	Central point: 24°35'39.62"S, 27°18'12.42"E
High-lift pumping station	-	Central point: 24°35'33.54"S, 27°17'50.80"E
Pipeline (rising main, gravity main and delivery line) (preferred route alternatives)	Central Route	1) Start point: 24°35'30.68"S, 27°17'55.45"E 2) Bend point 1: 24°35'06.27"S, 27°18'53.69"E 3) Bend point 2: 24°34'40.13"S, 27°18'31.42"E 4) Bend point 3: 24°34'30.36"S, 27°18'35.41"E 5) Bend point 4: 24°31'38.55"S, 27°16'30.32"E 6) Bend point 5: 24°28'19.01"S, 27°17'28.58"E 7) Bend point 6: 24°25'55.64"S, 27°23'09.38"E 8) Bend point 7: 24°25'46.21"S, 27°23'37.23"E 9) Bend point 8: 24°25'33.97"S, 27°24'13.39"E 10) Bend point 9: 24°25'31.98"S, 27°24'25.69"E 11) Bend point 10: 24°24'24.48"S, 27°24'02.18"E 12) Bend point 11: 24°23'12.01"S, 27°26'55.36"E 13) Bend point 12: 24°12'18.29"S, 27°26'59.22"E 14) Bend point 13: 23°56'55.01"S, 27°23'26.22"E 15) Bend point 14: 23°53'41.79"S, 27°24'12.09"E 16) Bend point 15: 23°53'38.31"S, 27°24'12.28"E 17) Bend point 16: 23°53'38.61"S, 27°24'03.35"E 18) End point: 23°53'31.98"S, 27°24'03.29"E
	Alternative D1	19) Start point: 23°53'35.59"S, 27°24'13.39"E

Project Components	Preferred Alternatives	Coordinates	
		20) Bend point 1:	23°46'42.99"S, 27°25'52.56"E
		21) End point:	23°45'22.16"S, 27°24'56.07"E
	Alternative D4	22) Start point:	23°45'22.16"S, 27°24'56.07"E
		23) End point:	23°44'03.94"S, 27°25'45.82"E
BPR	BPR (Central Route)	Central point:	24°25'36.02"S, 27°24'19.42"E
OR	-	Central point:	23°53'33.95"S, 27°24'07.22"E
Bierspruit Gauging Weir	-	Central point:	24°40'53.10"S, 27°19'20.62"E
Sand River Gauging Weir	-	Central point:	24°40'47.22"S, 27°27'12.75"E
New Paul Hugo Gauging Weir	-	Central point:	24°41'40.86"S, 27°24'32.92"E
Access Roads	*	Start point:	24°37'58.26"S; 27°18'58.34"E
		End point:	24°37'20.34"S; 27°18'47.29"E
		Bend point 1:	24°37'53.63"S; 27°19'01.13"E
		Bend point 2:	24°37'28.73"S; 27°18'53.43"E

the location indicated in the locality plan, attached as Annexure 2 of this authorisation.

- for the Mokoio and Crocodile River (West) Water Augmentation Project (Phase 2A) (MCWAP – 2A), within the Thabazimbi and Lephalale Local Municipalities, in the Waterberg District Municipality, Limpopo Province; hereafter referred to as "the property".

The water transfer infrastructure will comprise of the following major scheme components:

- Vlieëpoort Abstraction Weir on the Crocodile River (West);
- Low-lift Pumping Station;
- Low-lift Rising Main (2 pipes);
- Sedimentation Works;
- Balancing Reservoir;
- High-lift Pumping Station;
- High-lift Rising Main to Break Pressure Reservoir;
- Break Pressure Reservoir;
- Gravity Pipeline from Break Pressure Reservoir to Operational Reservoir;
- Operational Reservoir;
- Gravity pipeline from Operational Reservoir to Medupi Tee-off via Steenbokpan; and
- Ancillary infrastructure (gauging weirs, River Management System in the Crocodile River (West) and its tributaries), access roads, accommodation, offices, workshops and security measures).

Conditions of this Environmental Authorisation

Scope of authorisation

1. The preferred pipeline alignment: Sections 1, 2 and 3 – Central Route; Section 4 – Alternative D1; and Section 5 – Alternative D4), with preferred Option 1 (Portion 1 and 2 of the farm Mooivalei 342 KQ) for the Balancing Dam and Central Route Alternative 1 – Configuration 1a for the rising and gravity main and reservoirs, for the Mokolo Crocodile River (West) Water Augmentation Project (Phase 2A) (MCWAP – 2A), within Wards 1 and 9 of Thabazimbi Local Municipality, and Wards 1, 2, and 3 of Lephalale Local Municipality in the Limpopo Province is approved as per the geographic coordinates cited in the table above.
2. Authorisation of the activity is subject to the conditions contained in this Environmental Authorisation, which form part of the Environmental Authorisation and are binding on the holder of the authorisation.
3. The holder of the authorisation is responsible for ensuring compliance with the conditions contained in this Environmental Authorisation. This includes any person acting on the holder's behalf, including but not limited to, an agent, servant, contractor, sub-contractor, employee, consultant or person rendering a service to the holder of the authorisation.
4. The activities authorised may only be carried out at the property as described above.
5. Any changes to, or deviations from, the project description set out in this Environmental Authorisation must be approved, in writing, by the Department before such changes or deviations may be effected. In assessing whether to grant such approval or not, the Department may request such information as it deems necessary to evaluate the significance and impacts of such changes or deviations and it may be necessary for the holder of the authorisation to apply for further Environmental Authorisation in terms of the regulations.
6. The holder of an Environmental Authorisation must apply for an amendment of the Environmental Authorisation with the Competent Authority for any alienation, transfer or change of ownership rights in the property on which the activity is to take place.
7. This activity must commence within a period of five (05) years from the date of issue of this Environmental Authorisation. If commencement of the activity does not occur within that period, the authorisation lapses and a new application for Environmental Authorisation must be made in order for the activity to be undertaken.

8. In line with the intent and purpose of the EIA Regulations, 2014 (as amended) regarding activities which do not include operational aspects, this EA will no longer be valid once all activities associated with above-mentioned authorised activity 4 and 10 of GN R. 984 and 985 respectively, have been decommissioned and the site rehabilitated to the satisfaction of the EMC.
9. Construction must be completed within five (05) years of the commencement of the activity on site
10. Commencement with one activity listed in terms of this Environmental Authorisation constitutes commencement of all authorised activities.

Notification of authorisation and right to appeal

11. The holder of the authorisation must notify every registered interested and affected party, in writing and within 14 (fourteen) calendar days of the date of this Environmental Authorisation, of the decision to authorise the activity.
12. The notification referred to must –
 - 12.1. specify the date on which the authorisation was issued;
 - 12.2. inform the interested and affected party of the appeal procedure provided for in the National Appeal Regulations, 2014;
 - 12.3. advise the interested and affected party that a copy of the authorisation will be furnished on request; and
 - 12.4. give the reasons of the Competent Authority for the decision.

Commencement of the activity

13. The authorised activity shall not commence until the period for the submission of appeals has lapsed as per the National Appeal Regulations, 2014, and no appeal has been lodged against the decision. In terms of Section 43(7), an appeal under Section 43 of the National Environmental Management Act, Act No. 107 of 1998, as amended will suspend the Environmental Authorisation or any provision or condition attached thereto. In the instance where an appeal is lodged you may not commence with the activity until such time that the appeal has been finalised.

Management of the activity

14. The Environmental Management Programme (EMPr) submitted as part of the Application for EA must be amended and submitted to the Department for written approval prior to commencement of the activity. The recommendations and mitigation measures recorded in the EIAr dated November 2018 must be incorporated as part of the EMPr. Once approved, the EMPr must be implemented and adhered to. The EMPr must be amended to include:
 - 14.1. The requirements and conditions of this environmental authorisation;
 - 14.2. All recommendations and mitigation measures recorded in the EIAr and the specialist reports as included in the final EIAr dated November 2018; and
 - 14.3. A final development layout plan (with micro-siting of the pipelines' route) and all mitigation measures as dictated by the final development layout plan.
15. The final development layout plan to be included in the EMPr must indicate the following:
 - 15.1. The final position of the pipeline within the approved sections of the 100m corridor;
 - 15.2. The specific and final position of the major scheme components and associated ancillary infrastructure e.g. gauging weir, river management system, access roads, offices, construction camps etc ;
 - 15.3. All existing infrastructure associated with the development particularly along the pipeline route;
 - 15.4. All sensitive features e.g. wetlands, pans, drainage channels, and heritage sites that will be affected by the pipeline; and
 - 15.5. All "no-go" and buffer areas.

Frequency and process of updating the EMPr

16. The EMPr must be updated where the findings of the environmental audit reports, contemplated in Condition 23 below, indicate insufficient mitigation of environmental impacts associated with the undertaking of the activity, or insufficient levels of compliance with the Environmental Authorisation or EMPr.
17. The updated EMPr must contain recommendations to rectify the shortcomings identified in the environmental audit report.
18. The updated EMPr must be submitted to the Department for approval together with the environmental audit report, as per Regulation 34 of GN R982 of 04 December 2014, as amended. The updated

EMPr must have been subjected to a public participation process, which process has been agreed to by the Department, prior to submission of the updated EMPr to the Department for approval.

19. In assessing whether to grant approval of an EMPr which has been updated as a result of an audit, the Department will consider the processes prescribed in Regulation 35 of GN R982 of 04 December 2014, as amended. Prior to approving an amended EMPr, the Department may request such amendments to the EMPr as it deems appropriate to ensure that the EMPr sufficiently provides for avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity.
20. The holder of the authorisation may apply for an amendment of an EMPr, if such amendment is required before an audit is required. In assessing whether to grant such approval or not, the Department will consider the processes and requirements prescribed in Regulation 37 of GN R982 of 04 December 2014, as amended.

Monitoring

21. The holder of the authorisation must appoint an experienced independent Environmental Control Officer (ECO) for the construction phase of the development that will have the responsibility to ensure that the mitigation/rehabilitation measures and recommendations referred to in this environmental authorisation are implemented and to ensure compliance with the provisions of the approved EMPr.
 - 21.1. The ECO must be appointed before commencement of any authorised activities.
 - 21.2. Once appointed, the name and contact details of the ECO must be submitted to the *Director: Compliance Monitoring* of the Department.
 - 21.3. The ECO must keep record of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken by the ECO.
 - 21.4. The ECO must remain employed until all rehabilitation measures, as required for implementation due to construction damage, are completed and the site is ready for operation.

Recording and reporting to the Department

22. All documentation e.g. audit/monitoring/compliance reports and notifications, required to be submitted to the Department in terms of this Environmental Authorisation, must be submitted to the *Director: Compliance Monitoring*

23. The holder of the Environmental Authorisation must, for the period during which the Environmental Authorisation and EMPr remain valid, ensure that project compliance with the conditions of the Environmental Authorisation and the EMPr are audited, and that the audit reports are submitted to the *Director: Compliance Monitoring* of the Department at Directorcompliance@environment.gov.za.
24. The frequency of auditing and of submission of the environmental audit reports must be as per the frequency indicated in the EMPr, taking into account the processes for such auditing as prescribed in Regulation 34 of GN R982 of 04 December 2014, as amended.
25. The holder of the authorisation must, in addition, submit an environmental audit reports to the Department within 30 days of completion of the construction phase (i.e. within 30 days of site handover) and a final environmental audit report within 30 days of completion of rehabilitation activities.
26. The environmental audit reports must be compiled in accordance with Appendix 7 of the EIA Regulations, 2014, as amended, and must indicate the date of the audit, the name of the auditor and the outcome of the audit in terms of compliance with the Environmental Authorisation conditions as well as the requirements of the approved EMPr.
27. Records relating to monitoring and auditing must be kept on site and made available for inspection to any relevant and Competent Authority in respect of this development.

Notification to authorities

28. A written notification of commencement must be given to the Department no later than fourteen (14) days prior to the commencement of the activity. Commencement for the purposes of this condition includes site preparation. The notice must include a date on which it is anticipated that the activity will commence, as well as a reference number.

Operation of the activity

29. A written notification of operation must be given to the Department no later than fourteen (14) days prior to the commencement of the activity operational phase.

Site closure and decommissioning

30. Should the activity ever cease or become redundant, the holder of the authorisation must undertake the required actions as prescribed by legislation at the time and comply with all relevant legal requirements administered by any relevant and Competent Authority at that time.

Specific conditions

Conditions for Non-operational aspects

31. Baseline monitoring needs to be undertaken to determine the pre-construction state of the receiving environment, the baseline monitoring will serve as a reference to measure the residual impacts of the project by evaluating the deviation/s from the baseline conditions and the associated significance of the adverse effects;
32. The ecological status of the Matlabas River needs to be determined during the high-flow period, prior to construction. The high flow survey needs to address potential impacts of the valve scouring on water quality, erosion and sedimentation of the Matlabas. Furthermore, a study of the potential introduction of nuisance and invasive species into the Matlabas must be conducted. This must include a diatom assessment of the Crocodile and Matlabas Rivers to determine risk during valve scouring and leaks. This will determine the requirements for crossing the watercourse (i.e. open trench), as well as for scouring (i.e. draining water from the pipeline, typically during maintenance);
33. A team consisting of a terrestrial ecologist, aquatic ecologist, botanist, heritage specialist and social specialist must be established, this team must conduct an environmental sensitivity survey of the entire project footprint prior to construction. The aforementioned team must work hand in hand with the design and technical team and must inform the determination of the final position of the pipeline within the authorised areas, as well as the final development layout plan that is to be submitted to the Department for approval as per conditions 13 and 14 above.
34. A high flow baseline assessment of the Bierspruit and Sandspruit must be conducted prior to construction, as no surface water was available during the low flow survey.
35. Provision for a fishway at the Vlieëpoort abstraction weir should be included based on the considerations mentioned under maintenance of connectivity.
36. A sediment study must be conducted by a fluvial-geomorphologist to determine the baseline sediment balance associated with the Vlieëpoort Abstraction Weir, the potential risks and benefits of sediment abstraction and return during the operational phase of the MCWAP-2.
37. A flow gauge must be installed at the Vlieëpoort abstraction weir to inform farmers of the availability of water.
-

38. The River Management System must be in place prior to the commissioning of the authorised transfer scheme.
39. No activities, which require a water use license, must be allowed to encroach into a water resource without a water use authorisation being in place from the Department of Water and Sanitation.
40. With the exception of the activities and structures required to traverse a watercourse, a recommended buffer zone of 30m from the edge of the riparian zone, a riverine buffer zone of 32m from the delineated riparian zones of the Crocodile River (West) and Matlabas Rivers, as well as their tributaries and National Freshwater Ecological Priority Area wetlands identified (pans and floodplains) must be strictly adhered to during the construction phase of the project.
41. The location for the construction camp at Rooipan 357 LQ which is adjacent to a pan and within the buffer zone of 15m must be relocated further east of the present proposal. The final location of the construction camp must be included in the final amended EMPr.
42. During the excavation of watercourses, flows should be diverted around active work areas where required. Water diversion must be temporary and re-directed flow must not be diverted towards any stream banks that could cause erosion.
43. A traffic monitoring programme (TMP) must be implemented and roads maintained. The TMP must form part of the amended EMPr to be submitted as per condition 13 and 14.
44. The EMPr must be amended to include a layout plan of the final pipeline route within the corridor.
45. A permit must be obtained from the relevant nature conservation agency for the removal or destruction of indigenous, protected or endangered plant or animal species and a copy of such permit/s must be submitted to the Department for record keeping. Copies of the permit/s must be included in the final EMPr to be submitted to this Department for approval before commencement of construction activities.
46. No exotic plants may be used for rehabilitation purposes. Only indigenous plants of the area may be utilised.
47. Vegetation clearing must be kept to an absolute minimum. Mitigation measures as specified in the Specialist Studies / EIAr dated November 2018 must be implemented to reduce the risk of erosion and the invasion of alien species.
48. A Phase 1 palaeontology assessment must be conducted to assess the value and prominence of fossils along the Central Route.
49. All heritage sites identified with a significance of medium and high, must be preserved in situ by designing the development footprints in such a way that a buffer area of at least 50m is maintained from construction activities. In cases where the preservation of such sites and buffer areas are not possible, site-specific mitigation measures must be implemented.

50. An archaeological and heritage workshop must be conducted with the project ECO before construction commences to allow the ECO to undertake constant monitoring of construction activities.
51. A determination on the risk to the bat cave (subterranean chambers) in Mooivallei area must be made in consultation with a suitable specialist, and subject to the findings, the necessary mitigation measures must be instituted and included in the amended EMPr.
52. Construction must include design measures that allow surface and subsurface movement of water along drainage lines so as not to impede natural surface and subsurface flows. Drainage measures must promote the dissipation of storm water run-off.
53. Affected and neighbouring land owners that will be impacted and affected by construction activities must be given 12 months' notice before commencement of construction activities to enable them to make necessary arrangements.
54. The holder of EA must comply with Thaba Tholo's (and other landowners, as relevant) biosecurity protocols in relation to the construction and maintenance of the pipeline on the related properties.
55. A Rehabilitation Management Plan must be developed, and it must include additional measures identified during construction to supplement the reinstatement and rehabilitation provisions included in the EMPr for the construction phase. This plan must be submitted to the DEA for approval before completion of construction activities.
56. An integrated waste management approach must be implemented that is based on waste minimisation and must incorporate reduction, recycling, re-use and disposal where appropriate. Any solid waste must be disposed of at a landfill licensed in terms of Section 20 (b) of the National Environment Management Waste Act, 2008 (Act No.59 of 2008).

Environmental Monitoring Committee

57. An environmental Monitoring Committee (EMC) must be established by the holder of the authorisation before commencement of construction activities.
58. The EMC must meet before the commencement of construction activities (to appoint a chairperson discuss terms of reference), from then on the EMC must sit once every two months, special meetings can be convened on special situations.
59. The EMC must comprise of, but not limited to, the following representatives:
 - Chairperson;
 - National Environmental Department (Observer);
 - National Environmental Department : Chief Directorate: Compliance Monitoring

- The holder of the authorisation;
- Implementing Agency
- Provincial Environmental Department;
- Hartbeespoort Irrigation Board
- Makoppa Agriculture
- Cocodile River West Irrigation Board
- Mooivallei Land Owners and or other representative from any other affected Land Owner Associations;
- Provincial Roads Department;;
- Non-Governmental Organisations;
- Local Government; and
- The Environmental Control Officer.
- Community Liaison Officer

General

60. A copy of this Environmental Authorisation, the audit and compliance monitoring reports, and the approved EMPr, must be made available for inspection and copying-

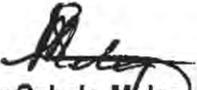
60.1. at the site of the authorised activity;

60.2. to anyone on request; and

60.3. where the holder of the Environmental Authorisation has a website, on such publicly accessible website.

61. National government, provincial government, local authorities or committees appointed in terms of the conditions of this authorisation or any other public authority shall not be held responsible for any damages or losses suffered by the holder of the authorisation or his/her successor in title in any instance where construction or operation subsequent to construction be temporarily or permanently stopped for reasons of non-compliance by the holder of the authorisation with the conditions of authorisation as set out in this document or any other subsequent document emanating from these conditions of authorisation.

Date of Environmental Authorisation: 18/03/2019



Mr Sabelo Malaza

Chief Director: Integrated Environmental Authorisations

Department of Environmental Affairs

Annexure 1: Reasons for Decision

1. Information considered in making the decision

In reaching its decision, the Department took, *inter alia*, the following into consideration -

- a) The information contained in the EIAr dated November 2018;
- b) The comments received from the Department of Water and Sanitation; Department of Forestry and Fisheries; and interested and affected parties as included in the EIAr dated November 2018;
- c) Mitigation measures as proposed in the EIAr dated November 2018 and the EMPr;
- d) The information contained in the specialist studies contained within Appendix I of the EIAr; and
- e) The objectives and requirements of relevant legislation, policies and guidelines, including Section 2 of the National Environmental Management Act, Act No.107 of 1998, as amended.

2. Key factors considered in making the decision

All information presented to the Department was taken into account in the Department's consideration of the application. A summary of the issues which, in the Department's view, were of the most significance is set out below.

- a) The findings of all the specialist studies conducted and their recommended mitigation measures.
- b) The need for the proposed was sufficiently addressed. Fifteen percent (15%) of the country's total power generation is situated in Waterberg. The assurance of water supply to the current power stations is not acceptable and places the country's power supply at risk.
- c) There are major developments planned for the Waterberg coalfields that are located in the Lephalale area. As a direct result of those developments, the demand for water in the Lephalale area is expected to significantly increase into the future. Based on the water infrastructure, the current water availability and water use allows only limited spare yield existing for future allocations for the anticipated surge in economic development. To address the limited availability of water in the Lephalale area, the Department of Water and Sanitation conducted a feasibility study (completed in 2010) of the Mokolo Crocodile River (West) Water Augmentation Project to establish how the future water demands could be met.

- d) The availability of water for the proposed transfer of water as part of MCWAP-2A was modelled during the Reconciliation Study 2015 (DWS, 2015), which took into consideration the Existing Lawful Water Uses, including the Hartbeespoort Irrigation Board, Crocodile River (West) Irrigation Board and the Makoppa Irrigation Area. The return flows from growing urban areas that feed into the Hartbeespoort Dam provide surplus water that is available and targeted for the proposed water transfer, which is more than the natural yield of the Crocodile River (West).
- e) Eskom confirmed that the MCWAP 2 substation can be accommodated into the network without any capacity constraints. The proposed substation will be supplied from the new Thabatshipi – Thabazimbi Combined 132 kV Power Line.
- f) Eskom will submit a separate application to DEA to seek approval for the bulk power required for MCWAP-2A
- g) As a positive impact, MCWAP-2A will supplement the Flue-Gas Desulphurisation (FGD) water demand from Medupi Power Station. The FGD technology is used to reduce the sulphur dioxide emissions from the facility. This is also a condition in Eskom's World Bank loan
- h) The EIAr dated November 2018 identified all legislation and guidelines that have been considered in the preparation of the EIAr dated November 2018.
- i) The methodology used in assessing the potential impacts identified in the EIAr dated November 2018 and the specialist studies have been adequately indicated.
- j) A sufficient public participation process was undertaken and the applicant has satisfied the minimum requirements as prescribed in the EIA Regulations, 2014, as amended, for public involvement.

3. Findings

After consideration of the information and factors listed above, the Department made the following findings -

- a) The identification and assessment of impacts are detailed in the EIAr dated November 2018 and sufficient assessment of the key identified issues and impacts have been completed.
- b) The procedure followed for impact assessment is adequate for the decision-making process.
- c) The proposed mitigation of impacts identified and assessed adequately curtails the identified impacts.
- d) The information contained in the EIAr dated November 2018 is accurate and credible.

- e) EMPr measures for the pre-construction, construction and rehabilitation phases of the development were proposed and included in the EIAr and will be implemented to manage the identified environmental impacts during the construction phase.

In view of the above, the Department is satisfied that, subject to compliance with the conditions contained in the Environmental Authorisation, the authorised activities will not conflict with the general objectives of integrated environmental management laid down in Chapter 5 of the National Environmental Management Act, Act No. 107 of 1998, as amended, and that any potentially detrimental environmental impacts resulting from the authorised activities can be mitigated to acceptable levels. The Environmental Authorisation is accordingly granted.

Annexure 2: Locality Plan

