Appendix G: Environmental Management Programme

Environmental Management Group (Pty) Ltd

Specialists in Environmental Management Integrating Industry and Infrastructure with the Environment

Environmental Management Group (Pty) Ltd.

ENVIRONMENTAL MANAGEMENT PROGRAMME FOR:

THE DEVELOPMENT OF SENDING WASTEWATER TREATMENT WORKS, KHÂI-MA LOCAL MUNICIPALITY

KHÂI-MA LOCAL MUNICIPALITY

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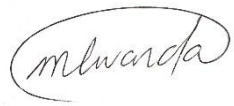

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Scope of assessment and content of an EMPR

Appendix 4 of the EIA Regulations (GN. No. R982 of 4 December 2014, as amended) outlines the required contents of an Environmental Management Programme (EMPr). The checklist below serves as a summary of how these requirements were incorporated into this EMPr.

Table 1 Checklist in terms of Appendix 4 of Regulation 982 of 2014 EIA Regulations.

Scope of assessment and content of EMPr's	
Content Requirement	**Addressed in Report**
(1) An EMPr must comply with section 24N of the Act and include— *(a) details of–* *(i) the EAP who prepared the EMPr; and* *(ii) the expertise of that EAP to prepare an EMPr, including a curriculum vitae;*	Page 3
(b) a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Chapter 2
(c) a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;	Chapter 2
(d) a description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including— *(i) planning and design;* *(ii) pre-construction activities;* *(iii) construction activities;* *(iv) rehabilitation of the environment after construction and where applicable post closure; and* *(v) where relevant, operation activities;*	Chapter 7 & 8
(f) a description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraph (d) will be achieved, and must, where applicable, include actions to — *(i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;* *(ii) comply with any prescribed environmental management standards or practices;* *(iii) comply with any applicable provisions of the Act regarding closure, where applicable; and* *(iv) comply with any provisions of the Act regarding financial provision for rehabilitation, where applicable;*	Chapter 11
(g) the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Chapter 11 & 12
(h) the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Chapter 4
(i) an indication of the persons who will be responsible for the implementation of the impact management actions;	Chapter 4

(i) a full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity, including— *(i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and* *(ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;*	Chapter 8
(j) the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Chapter 3
(k) the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Chapter 10.4
(l) a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Chapter 10
(m) an environmental awareness plan describing the manner in which— *(i) the applicant intends to inform his or her Employees of any environmental risk which may result from their work; and* *(ii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and*	Chapter 9.3
(n) any specific information that may be required by the competent authority.	Chapter 9

1 Definitions:

1. **Alien Vegetation:** alien vegetation is defined as undesirable plant growth which shall include but not be limited to; all declared category 1 and 2 listed invader species as set out in the Conservation of Agricultural Resources Act (CARA) regulations. Other vegetation deemed to be alien shall be those plant species that show the potential to occupy in number, any area within the defined construction area and which are declared to be undesirable.
2. **Aspect:** Element of an organisation's activities, products or services that can interact with the environment.
3. **Auditing:** A systematic, documented, periodic and objective evaluation of how well the environmental management plan is being implemented and is performing with the aim of helping to safeguard the environment by facilitating management control which would include meeting regulatory requirements. Results of the audit help the organisation to improve its environmental policies and management systems.
4. **Built environment:** Physical surroundings created by human activity, e.g. buildings, houses, roads, bridges and harbours.
5. **Contamination:** Polluting or making something impure.
6. **Corrective (or remedial) action:** Response required addressing an environmental problem that is in conflict with the requirements of the EMPr. The need for corrective action may be determined through monitoring, audits or management review.
7. **Degradation:** The lowering of the quality of the environment through human activities, e.g. river degradation, soil degradation.
8. **Ecology:** The scientific study of the relationship between living things (animals, plants and humans) and their environment.
9. **Ecosystem:** The relationship and interaction between plants, animals and the non-living environment.
10. **Environment:** environment means the surroundings within which humans exist and that could be made up of -
    - 10.1. the land, water and atmosphere of the earth;
    - 10.2. micro-organisms, plant and animal life;
    - 10.3. any part or combination of (10.1) and (10.2) and the interrelationships among and between them; and
    - 10.4. the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.
11. **Environmental aspect:** an environmental aspect is any component of a contractor's construction activity that is likely to interact with the environment.
12. **Environmental impact:** an impact or environmental impact is the change to the environment, whether desirable or undesirable, that will result from the effect of a construction activity. An impact may be the direct or indirect consequence of a construction activity.
13. **Environmental authorisation:** an environmental authorisation is a written statement from the Northern Cape Department of Agriculture, Environmental Affairs and Rural Development that records its approval of a planned development.
14. **Hazardous waste:** Waste, even in small amounts that can cause damage to plants, animals, their habitat and the well-being of human beings, e.g. waste from factories, detergents, pesticides, hydrocarbons, etc.
15. **Land use:** The use of land for human activities, e.g. residential, commercial, industrial use.
16. **Mitigation:** Measures designed to avoid, reduce or remedy adverse impacts.

The contractor and project team shall ensure that all activities are undertaken in compliance with applicable legislation, including the National Environmental Management Act (Act No. 107 of 1998), the National Water Act (Act No. 36 of 1998), and associated regulations, standards, and municipal by-laws.

2 Introduction and background:

Environmental Management Group (EMG) (Pty) Ltd, acting as the independent Environmental Assessment Practitioner (EAP), has been appointed by **Mind Shape Developments (Pty) Ltd** on behalf of the **Khâi-Ma Local Municipality** to prepare this Environmental Management Programme (EMPr). This EMPr accompanies the Basic Assessment Process for the proposed development of the Sending Wastewater Treatment Works (WWTW), situated near the settlement of Sending in the Northern Cape.

The purpose of this EMPr is to set out the environmental management principles, procedures, and mitigation measures required to guide the planning, construction, and operational phases of the project. It serves as a practical and enforceable tool to ensure that the proposed activities are undertaken in a manner that avoids, minimises, or rectifies potential environmental impacts, while supporting the municipality's objective of providing safe and reliable sanitation services.

This EMPr is a legally binding document. All contractors, subcontractors, site personnel, and the appointed Environmental Control Officer (ECO) must comply with its provisions. Adherence to this EMPr will support compliance with the National Environmental Management Act (Act 107 of 1998), the associated EIA Regulations, and other applicable environmental legislation and standards.

Through its implementation, the project intends not only to meet regulatory requirements, but to reinforce broader goals of environmental stewardship, resource protection, and sustainable service delivery in the Khâi-Ma Local Municipality.

2.1 Project description:

The Khâi-Ma Local Municipality has initiated a project to develop a new wastewater treatment works (WWTW) to serve the settlements of Sending and Viljoensdraai in the Northern Cape. The existing wastewater management system consists of an informal, unlined oxidation pond located approximately 1.4 km from the Sending settlement, to which wastewater is conveyed by vacuum tanker. This system lacks formal inlet works, impermeable lining, and adequate treatment infrastructure, resulting in poor treatment efficiency, odour generation, seepage, and an increased risk of contamination of underlying soils and nearby drainage features.

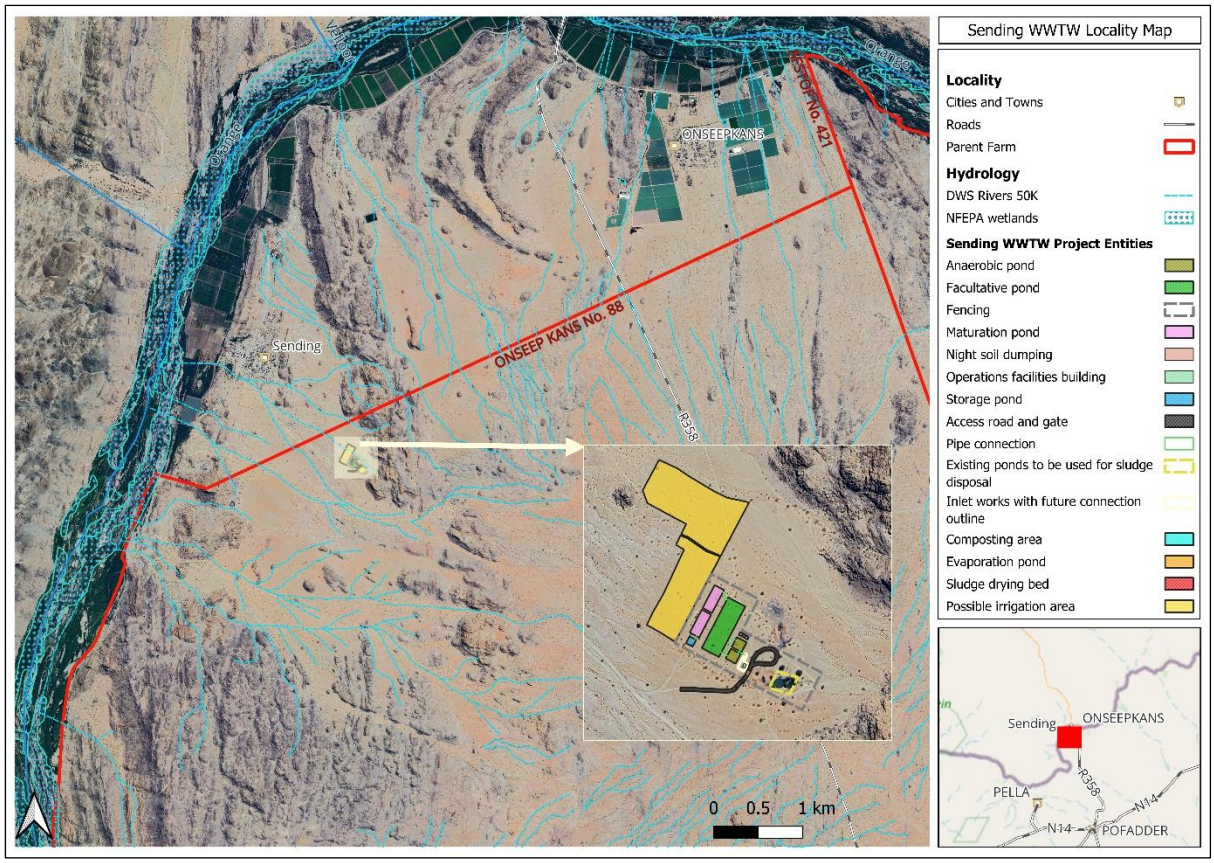

Figure 1 illustrates the locality of the proposed Sending Wastewater Treatment Works within the Khâi-Ma Local Municipality, Northern Cape.

In response to these deficiencies, the municipality proposes the development of a new, formalised and engineered WWTW within an existing disturbed municipal services area, located in proximity to the current informal facility. The proposed development will replace the existing informal system with a compliant wastewater treatment solution.

The proposed WWTW will be based on a conventional oxidation pond treatment system, comprising a series of anaerobic, facultative, and maturation ponds designed to facilitate progressive treatment through sedimentation, biological degradation, and pathogen reduction. All treatment ponds will be lined with impermeable material to prevent seepage and protect soil and groundwater resources.

Wastewater delivered by vacuum tankers will be received at a purpose-built inlet works incorporating screening, grit removal, and flow measurement prior to entering the treatment process. This will improve operational control, protect downstream infrastructure, and enhance overall treatment efficiency.

The facility will further include a lined effluent storage pond, sludge drying beds, inter-pond pipelines, stormwater management infrastructure, internal gravel access roads, perimeter security fencing, and a small operations building to support ongoing

operation and maintenance. The overall design is intended to improve hydraulic retention time, ensure reliable treatment performance, and reduce environmental and public health risks associated with the current system.

Provision is made for the controlled reuse of treated effluent, subject to compliance with the conditions of the applicable Water Use Licence and relevant water quality standards. Treated effluent may be reused for non-potable irrigation purposes via a drip irrigation system to support a planned municipal date palm orchard. This component promotes water conservation, reduces discharge volumes, and supports sustainable land use while minimising risks to soil, groundwater, and surrounding environmental features.

Sludge generated during routine operation and periodic pond desludging will be managed on site using designated sludge drying beds, in accordance with Department of Water and Sanitation guidelines and applicable waste management requirements. Sludge management options include drying and composting, subject to regulatory approval. Where appropriate, stabilised material may be beneficially reused within the municipal orchard or made available to local users, provided all applicable standards and authorisations are met.

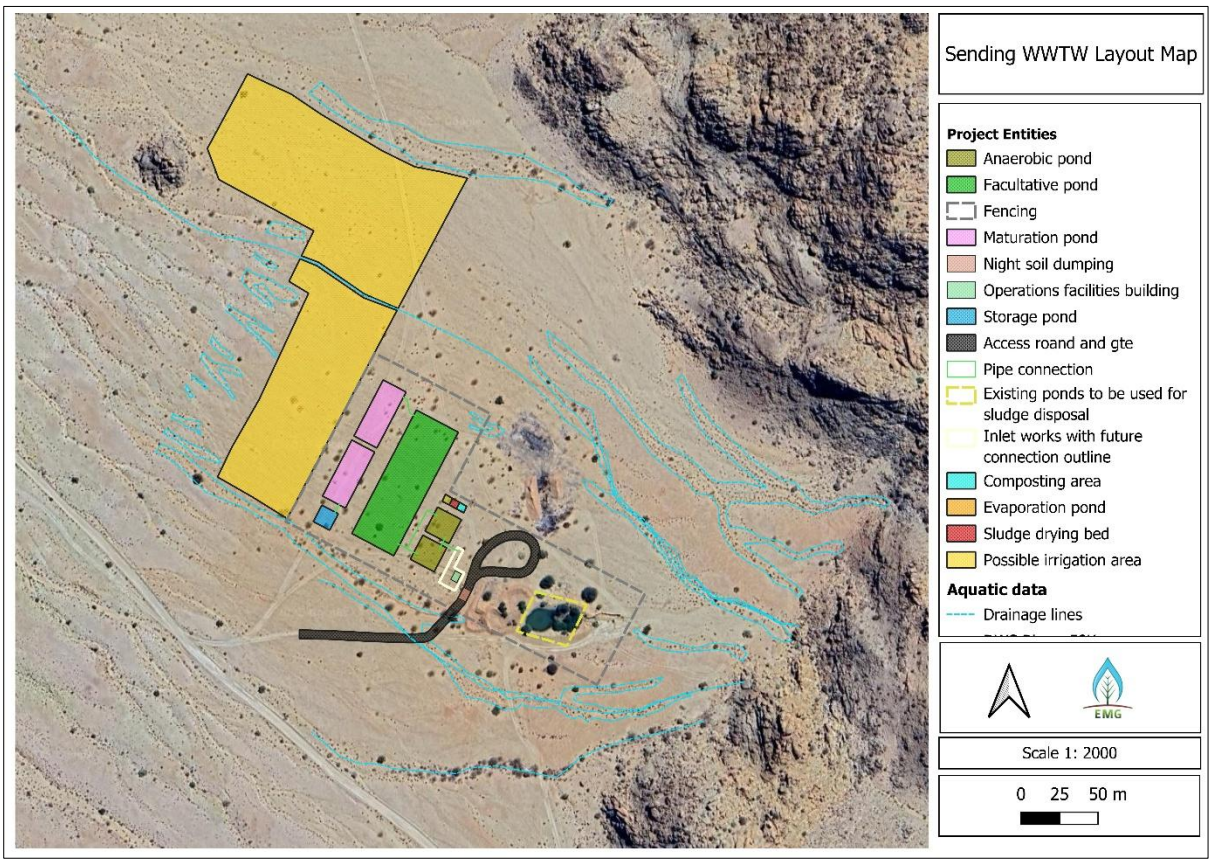

Figure 2 illustrates the proposed site layout of the Sending WWTW, including treatment ponds, ancillary infrastructure, and the effluent management components.

The proposed development will provide a compliant and sustainable wastewater treatment solution for the Sending and Viljoensdraai communities, supporting improved sanitation service delivery and enhanced protection of surface and groundwater resources within a remote and environmentally sensitive setting.

This Environmental Management Programme (EMPr) provides the environmental management framework required to guide the construction, operation, and maintenance of the upgraded WWTW and associated effluent reuse activities, ensuring statutory compliance, protection of natural resources, and responsible implementation throughout the project lifecycle.

3 EMPR phasing

3.1 Pre-construction phase

The pre-construction phase includes all activities undertaken prior to the commencement of physical construction works. This phase comprises final site selection, detailed design, planning, and the acquisition of all required environmental authorisations, permits, and approvals.

The primary objective of this phase is to ensure that environmental considerations and mitigation measures are integrated into the project design and planning, and that all legal and regulatory requirements are met before construction begins. For this project, the pre-construction phase includes confirmation of the preferred site and layout, finalisation of pond designs and lining specifications, stormwater management planning, and incorporation of mitigation measures identified during the environmental assessment processes.

3.2 Construction phase

The construction phase refers to the physical development of the proposed Sending WWTW and associated infrastructure. Activities during this phase include site establishment, earthworks, excavation and shaping of ponds, installation of liners, construction of inlet works, sludge drying beds, effluent storage ponds, internal access roads, fencing, and stormwater control structures.

3.3 Operational Phase

The operational phase commences once construction is completed and the WWTW is commissioned. This phase includes the routine receipt of wastewater delivered by vacuum tankers, followed by treatment through the oxidation pond system comprising anaerobic, facultative, and maturation ponds. It’s important to note that although the current effluent conveyance operations is catered for via vacuum sewer system, however, the proposed WWTW is designed for future expansion which may include a formal waterborne sanitation system.

Operational activities will include the controlled management and monitoring of wastewater flows, regular inspection and maintenance of inlet works (including screening and grit removal), and the management of treatment processes to ensure effective sedimentation, biological degradation, and pathogen reduction.

Treated effluent will be managed in accordance with applicable Water Use Licence conditions and may be reused for non-potable irrigation purposes via a controlled drip irrigation system. This includes the operation and maintenance of effluent storage infrastructure and irrigation areas.

Sludge generated during treatment will be periodically removed and managed on site using sludge drying beds, with further handling, disposal, or beneficial reuse undertaken in accordance with regulatory requirements.

Additional operational activities include routine infrastructure maintenance (pond embankments, liners, pipelines, and access roads), stormwater management, implementation of the Alien and Invasive Species Management Plan, rehabilitation and maintenance of disturbed areas, and ongoing environmental and water quality monitoring to ensure compliance with applicable legislation and authorisations.

3.4 Closure and decommissioning phase

Decommissioning refers to the process of removing the operating assets of any development after completion. It is however not anticipated that the WWTW will close and be decommissioned in the near future as it will be a vital part of infrastructure for the municipal sewer sanitation system.

4 Role players and responsibility matrix:

In order for the EMPr to be successfully implemented, all the role players involved in the project need to co-operate. For this to happen, role players must clearly understand their roles and responsibilities in the project, must be professional, form respectful and transparent relationships, and maintain open lines of communication.

Table 2 Functions and Responsibilities of the Project Team

Key	Function	Responsibility
P	Proponent	Proponent is ultimately accountable for ensuring compliance to the EMPr. The ECO must be contracted by the Proponent (full time or part time depending on the size of the project) as an independent appointment to objectively monitor implementation of relevant environmental legislation, conditions of the EMPr for the project. The Proponent is further responsible for providing and giving mandate to enable the ECO to perform responsibilities. The developer must ensure that the ECO is integrated as part of the project team.
CE	Consulting Engineer	Contracted by the developer to design and specify the project engineering aspects.

		Generally, the engineer runs the works contract. The CE may also fulfil the role of Project Manager on the proponent's behalf (See PM).
PM	Project Manager	The Project Manager has over-all responsibility for managing the project, contractors, and consultants and for ensuring that the environmental management requirements are met. The CE may also act as the PM. All decisions regarding environmental procedures must be approved by the PM. The PM has the authority to stop any decommissioning activity in contravention of the EMPr in accordance with an agreed warning procedure.
ER	Engineers Representative	The consulting engineer's representative on site. Has the power/mandate to issue site instructions and in some instances, variation orders to the contractor, following request by the EO or ECO. The ER oversees site works, liaison with Contractor and ECO.
EO/EM	Environmental Officer / Environmental Manager	The Environmental Officer (EO) is appointed by the Consulting Engineers to act as their environmental representative on site. The EO is not independent but acts on behalf of the Consulting Engineers with a mandate to enforce environmental compliance in terms of the project contract, which incorporates the requirements of this EMPr. The EO is authorised to issue non-conformance notices and hazard notifications where environmental requirements are not being met. In accordance with accepted industry practice, the EO may issue a "cease works" instruction only in exceptional circumstances where serious environmental harm has occurred or is imminent. Such instruction may only be issued in cases of extreme urgency and, where practicable, only in the absence of the Engineer's Representative (ER). The EO shall form an integral part of the project team and must be involved in all planning and implementation activities that may influence environmental conditions on site. For certain project types, including linear infrastructure such as pipelines or fencing, the EO may also act as a liaison between the Contractor and affected landowners, where applicable.

		The EO is required to attend relevant project meetings, conduct regular site inspections to monitor compliance with the EMPr, and provide ongoing reports and feedback on environmental performance, risks, and non-compliances to the project team and the ECO. The EO shall ensure that the contents of this EMPr are communicated effectively to the Contractor's site team. This includes conducting environmental induction and awareness training for all contractors and their workforce prior to site handover and commencement of construction activities. The EO must be suitably qualified and experienced, with demonstrable competence in environmental management and a sound understanding of construction-related methods and practices.
ECO	Environmental Control Officer	An independent appointment to objectively monitor implementation of relevant environmental legislation, conditions of Environmental Authorisations (EA's), and the EMPr for the project. The ECO must be on site prior to any site establishment and must endeavour to form an integral part of the project team. The ECO must be proactive and have access to specialist expertise as and when required, these include botanists, ecologists, etc. Further, the ECO must also have access to expertise such as game capture, snake catching, etc. The ECO must conduct audits on compliance to relevant environmental legislation, conditions of EA, and the EMPr for the project. The size and sensitivity of the development, based on the EIA, will determine the frequency at which the ECO will be required to conduct audits. (A minimum of a monthly site inspection must be undertaken). The ECO must be the liaison between the relevant authorities and the project team. The ECO must communicate and inform the developer and consulting engineers of any changes to environmental conditions as

		required by relevant authoritative bodies. The ECO must ensure that the registration and updating of all relevant EMPr documentation is carried out. The ECO must be suitably experienced with the relevant environmental management qualifications and preferably competent in construction related methods and practices. The ECO must handle information received from whistle blowers as confidential and must address and report these incidences to the relevant Authority as soon as possible. On small projects, where no EO is appointed, the ECO must convey the contents of this EMPr to the Contractor site team and discuss the contents in detail with the Contractor as well as undertake to conduct an induction and an environmental awareness training session prior to site handover to all contractors and their workforce.
C	Contractor	The principal contractor, hereafter known as the 'Contractor', is responsible for implementation and compliance with the requirements of the EMPr and conditions of the EA's, contract and relevant environmental legislation. The Contractor must ensure that all sub-contractors have a copy of and are fully aware of the content and requirements of this EMPr. The contractor is required, where specified, to provide Method Statements setting out in detail how the management actions contained in the EMPr will be implemented.
ESO	Environmental Site Officer	The ESO is Employed by the Contractor as his/her environmental representative to monitor, review and verify compliance with the EMPr by the contractor. This is not an independent appointment; rather the ESO must be a respected member of the contractor's management team. Dependent on the size of the development the ESO must be on site one week prior to the commencement of construction. The ESO must ensure that he/she is involved at all phases of the construction (from site clearance to rehabilitation).

A	Lead Authority	The authorities are the relevant environmental department that has issued the Environmental Authorisation. The authorities are responsible for ensuring that the monitoring of the EMPr and other authorisation documentation is carried out, this will be achieved by reviewing audit reports submitted by the ECO and conducting regular site visits.
OA	Other Authorities	Other authorities are those that may be involved in the approval process of an EMPr. Their involvement may include reviewing EMPr's to ensure the accuracy of the information relevant to their specific mandate. Other authorities may be involved in the development, review or implementation of an EMPr. For example, if a specific development requires a water use licence for the relevant national authority, then that authority should review and comment on the content of the particular section pertaining to that mandate.
EAP	Environmental Assessment Practitioner	The definition of an environmental assessment practitioner in Section 1 of NEMA is "*the individual responsible for the planning, management and coordination of environmental impact assessments, strategic environmental assessments, environmental management plans or any other appropriate environmental instruments introduced through regulations".*

4.1 Environmental Control Officer

A suitably qualified Environmental Control Officer (ECO) shall be appointed to oversee and monitor environmental compliance for the duration of the construction phase of the project.

The ECO shall be responsible for ensuring that construction activities are undertaken in accordance with the Environmental Authorisation (EA), this Environmental Management Programme (EMPr), and all applicable environmental legislation.

The responsibilities of the ECO include but are not limited to the following:

- Providing environmental induction and awareness training to contractors and site personnel prior to the commencement of construction activities;
- Monitoring and auditing compliance with the EA, EMPr, and relevant legal requirements throughout the construction period;

- Providing guidance and interpretation of the EA and EMPr to the Contractor and project team where required;
- Issuing site instructions and recommendations to the Contractor for corrective actions in the event of non-compliance;
- Compiling ECO reports to document compliance status, incidents, and corrective actions, where required;
- Compiling an Environmental Close-out Report upon completion of construction, or as otherwise required in terms of the Environmental Authorisation;
- Facilitating communication and consultation with relevant environmental authorities, where necessary;
- Advising the project team on environmental permitting or licensing requirements relevant to construction activities, where applicable;
- Conducting regular site inspections for the duration of the construction phase to verify compliance with the EMPr;
- Undertaking additional site visits in the event of environmental incidents, non-compliances, or unforeseen environmental risks;
- Attending site and environmental meetings when required;

The frequency and duration of site inspections shall be determined by the ECO, taking into account the nature of construction activities, environmental sensitivity of the site, and the level of compliance observed.

5 Upholding environmental responsibility: implementing duty of care as mandated by nema section 28

The Duty of Care, as outlined in Section 28 of the National Environmental Management Act (NEMA, Act No. 107 of 1998), establishes a fundamental responsibility for individuals and organisations to take proactive steps in safeguarding the environment. This principle mandates that all persons who cause, have caused, or may cause significant pollution or environmental degradation must implement reasonable measures to prevent, minimise, and rectify such impacts. The Duty of Care is a comprehensive legal obligation that applies across all stages of a project's development, from planning and construction to operation and decommissioning.

Incorporating the Duty of Care into the EMPr ensures that environmental safeguarding is a core consideration throughout the project's lifecycle. By adhering to this principle, projects not only achieve sustainable outcomes and comply with legal requirements but also demonstrate a commitment to environmental stewardship. This holistic approach ensures that all activities are conducted responsibly, mitigating adverse impacts on the environment and promoting long-term ecological health.

To reinforce the Duty of Care, Section 28 provides for specific enforcement mechanisms. Authorities have the power to issue directives to any party that fails to comply with their environmental obligations. These directives can mandate actions

such as conducting environmental impact assessments, implementing mitigation measures, or restoring damaged ecosystems. Non-compliance can lead to significant legal penalties, including fines or even imprisonment, underscoring the seriousness of these responsibilities.

Strategically integrating the Duty of Care into every phase of project planning and execution ensures that environmental considerations are not an afterthought but a foundational aspect of all decision-making processes. This integration requires continuous monitoring and adaptation of strategies to address new environmental challenges as they arise. It also involves engaging with stakeholders to ensure transparency and collaborative problem-solving, further embedding environmental considerations into the fabric of organizational operations and culture.

By committing to the principles outlined in Section 28, projects not only safeguard the environment but also enhance their social license to operate, building trust with communities and stakeholders through clear actions and accountability.

6 Outcomes of this EMPR:

The purpose of this EMPr is to ensure that the development of the Sending WWTW is implemented in a responsible, compliant, and environmentally sustainable manner. The EMPr sets out clear performance expectations, management actions, and monitoring requirements that must be applied throughout the project lifecycle.

The specific objectives of this EMPr are to:

- To provide practical, site-specific guidance for the planning, construction, and operational phases so that all activities are undertaken in a manner that avoids, minimises, or manages environmental harm.
- To safeguard the well-being of surrounding communities by supporting a development that reduces existing pollution risks, improves public and animal safety, and promotes a healthier and more resilient living environment.
- To ensure efficient and responsible use of resources, including strict control of waste generation and adherence to the principles of reducing, re-using, and recycling wherever feasible.
- To ensure that all areas disturbed during construction are rehabilitated to a stable, orderly, and non-polluting condition, thereby preventing long-term environmental degradation.

This EMPr is intended as a working document to guide all contractors, subcontractors, and municipal personnel so that the project can deliver its intended environmental and community benefits.

7 Activities covered by this EMPR:

7.1 Planning stage:

The planning stage includes all pre-construction activities required to ensure legal compliance, environmental readiness, and effective project coordination prior to site establishment. Activities during this phase include:

- Finalisation of the approved project design, layout, and engineering specifications.
- Surveying and demarcation of the authorised development footprint.
- Acquisition of environmental authorisation, water use licence (WUL), and other statutory approvals.
- Preparation of method statements for key activities (e.g., waste management, dewatering).
- Appointment of a suitably qualified Environmental Control Officer (ECO).
- Incorporation of environmental responsibilities and compliance requirements into contractor contracts.
- Notification of relevant stakeholders and surrounding communities, where required.

7.2 Construction phase:

The construction phase will commence once all relevant environmental and statutory approvals have been obtained and site establishment has been completed. This phase involves the development of a new wastewater treatment works within the approved footprint, replacing the existing informal and unlined disposal system. Construction activities will include the following:

- Site establishment, including demarcation and fencing of the approved construction footprint;
- Clearing and preparation of the site within previously disturbed municipal land;
- Earthworks associated with the excavation and shaping of anaerobic, facultative, maturation, and effluent storage ponds;
- Construction of inlet works, including screening and grit removal structures;
- Installation of impermeable geomembrane liners to all treatment and storage ponds;
- Construction of sludge drying beds for the management of accumulated sludge;
- Construction of stormwater diversion and runoff control structures to protect the ponds from external flows;
- Development or upgrading of internal access roads required for construction and operational access;
- Construction of ancillary infrastructure, including perimeter fencing and an operations building;
- Management of construction-related waste, including spoil material, packaging, and general waste; and.
- Site rehabilitation after construction, including:

- Removal of temporary infrastructure.
- Stabilisation of disturbed areas to prevent erosion.

The construction phase presents the highest potential environmental risk due to earthworks, soil disturbance, and increased vehicle and equipment movement. These risks will be managed through strict adherence to the mitigation measures contained in this EMPr, ongoing environmental monitoring, and compliance inspections for the duration of construction.

7.3 Operational Phase

Once the upgraded WWTW has been commissioned, the operational phase begins. This phase focuses on the safe, compliant, and long-term functioning of the oxidation pond system and associated infrastructure.

Activities forming part of this stage include:

- Routine inspection of all treatment and storage ponds, including monitoring of embankment stability, liner condition, and the integrity of inlet and outlet structures;
- Monitoring of influent volumes and effluent quality to ensure compliance with applicable Department of Water and Sanitation standards and conditions of the Water Use License;
- Periodic removal and management of accumulated sludge from anaerobic and facultative ponds, with dried sludge disposed of at an authorised facility in accordance with regulatory requirements or as per approved methodology by DWS;
- Ongoing maintenance of internal access roads, perimeter fencing, security infrastructure, and the operations building to ensure safe and uninterrupted operation;
- Vegetation management within and around the facility to prevent excessive growth, reduce fire risk, and maintain access to infrastructure;
- Implementation of emergency response procedures in the event of overflow, accidental discharge, liner failure, or stormwater intrusion; and
- Continuous record-keeping of operational activities, monitoring results, maintenance actions, and incidents for compliance and reporting purposes.

The operational phase aims to ensure that the facility operates as intended, limits environmental risks, protects surrounding land and water resources, and maintains a reliable sanitation service for the Sending and Viljoensdraai communities.

8 Identification of environmental aspects and impacts:

Before any site establishment or construction activity begins, the Contractor must identify all environmental aspects associated with the upgrade of the Sending Wastewater Treatment Works. This early identification ensures that potential impacts (particularly those highlighted in the Basic Assessment Report) are anticipated and managed in accordance with this EMPr and applicable environmental legislation.

This is a dynamic process and must be revisited throughout construction as site conditions and activities evolve.

8.1 Identification of Environmental Aspects

Environmental aspects refer to elements of the contractor's and operator's activities, products, or services that may interact with the environment and result in environmental impacts. All phases of the project, including site establishment, construction, commissioning, and operation of the wastewater treatment works (WWTW), must be assessed to identify activities that may have an environmental effect.

The identification of environmental aspects must inform the assessment of potential impacts and the implementation of appropriate mitigation measures in accordance with this EMPr.

Examples of environmental aspects relevant to this project include, but are not limited to:

- Waste generation (construction debris, sludge, packaging, and general waste)
- Stormwater runoff and potential contamination from construction areas
- Use, storage, and handling of hazardous substances (fuels, lubricants, chemicals, and cleaning agents)
- Energy consumption associated with construction equipment, generators, and operational activities
- Water use for dust suppression, cleaning, and construction-related activities
- Abstraction and use of natural resources (gravel, sand, topsoil, and construction materials)
- Noise and vibration from construction machinery and transport activities
- Dust emissions during earthworks, excavation, and material handling
- Wastewater, effluent, or contaminated water generated during construction and operational activities
- Vegetation clearance, soil disturbance, and habitat alteration
- Sludge generation, handling, and disposal during operation
- Potential seepage or leakage from treatment ponds and associated infrastructure
- Odour generation associated with wastewater treatment processes
- Effluent quality management and potential non-compliance with discharge or reuse standards

- Establishment and spread of alien and invasive species.

The identification of these aspects must be undertaken prior to the commencement of construction activities and reviewed regularly as the project progresses, including during the operational phase, to ensure that all potential environmental interactions are appropriately managed.

8.2 Assessment and Management of Environmental Impacts

Following the identification of environmental aspects, the Contractor shall assess each aspect to determine its potential impact on the environment. The assessment must consider the **magnitude, duration, extent, and reversibility** of potential impacts.

The Contractor shall then plan and programme construction activities to avoid, minimise, or control these impacts. Where complete prevention is not feasible, contingency and mitigation measures must be developed, implemented, and approved by the Engineer and Environmental Control Officer (ECO) prior to activity commencement.

If an unforeseen incident or environmental mishap occurs (e.g., pipe leak, or unauthorised clearing), the Contractor must:

- Immediately halt the activity causing the impact.
- Notify the Engineer and ECO.
- Implement remedial actions to contain and rectify the damage.
- Demonstrate the ability to rehabilitate or reinstate the disturbed environment to its original condition

Typical Environmental Impacts Associated with the Project

Listed below are examples of environmental impacts that may result from the **upgrade and formalisation of the existing informal wastewater treatment system**, including the construction and operation of the proposed formal Wastewater Treatment Works, if not appropriately managed:

- Pollution of air, soil, or water resources resulting from spills, improper waste handling, or uncontrolled wastewater or sludge management.
- Disturbance or loss of degraded vegetation and habitat within the existing disturbed footprint.
- Soil erosion and sedimentation caused by earthworks and inadequate stormwater control.
- Temporary noise and dust impacts associated with construction activities and vehicle movement.
- Localised visual disturbance resulting from construction activities and infrastructure development.

- Health and safety risks to workers and surrounding communities if activities are not properly controlled.
- Odour generation associated with sludge handling and wastewater treatment processes, particularly during construction and maintenance activities.

By systematically identifying and managing these potential impacts, environmental protection measures can be effectively integrated into all phases of the project, ensuring that the development is implemented in a responsible, compliant, and sustainable manner.

9 Legal requirements:

9.1 General:

Construction activities will be done according to the best environmental practice, as identified in the approved project designs. This EMPr, which forms an integral part of the contract documents, informs the contractor as to his duties in the fulfilment of the project objectives, with reference to the prevention and mitigation of environmental impacts caused by construction activities associated with the project.

The contractor should note that obligations imposed by the EMPr are legally binding in terms of environmental statutory legislation and in terms of the additional conditions to the general conditions of contract that pertain to this project. In the event that any rights and obligations contained in this document contradict those specified in the standard or project specifications then the latter shall prevail.

To further ensure compliance, the Duty of Care principles outlined in Section 28 of NEMA (Act no. 107 of 1998) are integrated into this EMPr. These principles mandate that all individuals and organisations involved in the project take reasonable measures to prevent, minimise, and rectify significant pollution or degradation of the environment. This includes historical pollution and future potential impacts. Key responsibilities under the Duty of Care include:

- Investigating and assessing potential environmental impacts;
- Informing and educating employees about environmental risks and safe practices;
- Modifying activities to prevent environmental harm;
- Containing pollutants and preventing their spread;
- Eliminating sources of pollution and degradation; and
- Remediating any damage caused to the environment.

9.2 Statutory and other applicable legislation:

The contractor is deemed to have made himself conversant with all legislation pertaining to the environment, including provincial and local government ordinances, which may be applicable to the contract. This includes adhering to the Duty of Care

obligations under NEMA, ensuring that all actions comply with the principle of preventing, minimising, and rectifying environmental harm.

9.3 Responsibilities of an internal Environmental Site Officer (ESO):

For the purposes of implementing the conditions contained herein, the contractor shall submit to the engineer for approval the appointment of a nominated representative of the contractor as the ESO for the contract.

Responsibilities:

- The ESO must ensure that the EMPr, including the Duty of Care obligations, is implemented throughout the construction period.
- The engineer will be responsible for issuing instructions to the contractor where environmental considerations call for action to be taken. The ESO shall submit regular written reports to the engineer, but not less frequently than once a month.
- The ESO reports to the ECO on the compliance of the contractor to the provisions set out in the EMPr.
- The ESO must be conversant with the legislation pertaining to the environmental management and give environmental awareness / induction to all personnel involved in the contract.
- Training / induction records must be placed in the Environmental File.
- The ESO must keep the Environmental File updated.

The engineer shall have the authority to instruct the contractor to replace the ESO if, in the engineer's opinion, the appointed officer is not fulfilling his/her duties in terms of the requirements of the EMPr or this specification.

9.3.1 Training:

All Employees must be given an induction presentation on environmental awareness. Where possible, the presentation needs to be conducted in the language of the Employees. The environmental training should, as a minimum, include the following:

- The importance of compliance with all environmental policies, including the Duty of Care principles;
- The environmental impacts, actual or potential, of their work activities;
- The environmental benefits of improved personal performance;
- Their roles and responsibilities in achieving compliance with the environmental policy and procedures, including the Duty of Care principles, and with the requirement of the environmental management systems, including emergency preparedness and response requirements;
- The potential consequences of departure from specified procedures;
- The mitigation measures required to be implemented when carrying out construction activities.

10 Record keeping:

10.1 General

Mind Shape, as the consulting Engineer will oversee the appointed Contractor, must maintain an internal review and monitoring system to ensure full implementation of this EMPr throughout the construction period. Any procedures requiring refinement to improve environmental performance must be reviewed in consultation with the Environmental Control Officer (ECO). Minor adjustments may be made once agreed upon between Mind Shape and the ECO, while any substantive amendments that alter environmental outcomes or mitigation measures must be submitted to the **Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (DAERL)** for approval before implementation.

The ECO must undertake monthly audits of the site to verify compliance with the EMPr, applicable legislation, and the conditions of the Environmental Authorisation. Additional inspections may be necessary during high-risk or sensitive phases of work, such as major earthworks, pond lining, or final rehabilitation.

Environmental queries or non-compliance observations raised by the ECO must be addressed directly with **Mind Shape** and the **Khâi-Ma Local Municipality**. Should an issue remain unresolved, or where regulatory clarification is required, the matter must be escalated to the **Northern Cape DAERL**, as the provincial authority responsible for environmental compliance and oversight.

At the completion of construction, the ECO must prepare an Environmental Close-Out Audit Report. This report must be compiled in collaboration with Mind Shape and the municipal project team, and must summarise the implementation of the EMPr, highlight any recurring environmental challenges, document corrective measures, and capture lessons to inform future municipal infrastructure projects.

10.2 Record keeping

All documents, records, and evidence related to the implementation of this EMPr must be stored in a secure and easily accessible location on-site or at a designated municipal facility. These records must be kept in good order and must be available at any time for review by the ECO, the project team, or the **Northern Cape DAERL**.

Records to be kept include (but are not limited to):

- Method statements, site instructions, and toolbox talk registers;
- ECO audit reports, monitoring records, and photographic evidence;
- Waste disposal manifests and proof of lawful disposal;

- Incident reports, complaints registers, and corrective action logs;
- All authorisations, approvals, and compliance correspondence.

Records must be retained for at least **two years** after completion of construction, or longer if stipulated in the Environmental Authorisation.

Photographs documenting baseline site conditions, construction progress, and post-rehabilitation conditions must be stored together with the EMPr documentation as part of the project's environmental compliance file.

10.3 Environmental file

An environmental file must be established and maintained on site for the full duration of the construction phase. This file must be readily accessible and made available upon request to the ECO, the Project Manager, the Client (Khâi-Ma Local Municipality), and the relevant environmental authority in the Northern Cape.

The environmental file must contain the following information:

- **All environmental induction/ awareness training documents**, including attendance registers and training material.
- **Environmental complaints register/ I&AP register**, documenting issues raised and corrective actions taken.
- **Environmental emergency procedures, including spill response**, fire management, and contact information for emergency services.
- **Records of all environmental incidents**, spills, non-conformances, and corrective actions undertaken.
- **Fire prevention and management plan**, suited to arid Nama-Karoo conditions.
- **A formal agreement with a toilet service provider**, including a service agreement with the portable toilet provider and maintenance logs.
- **Waste management plan and disposal register**, including weighbridge slips or disposal certificates from licensed facilities.
- **Stormwater action plan** updated as needed during construction.
- **The environmental management plan (EMPr)**, including any method statements and design revisions approved by the ECO.
- **All monthly ECO reports** and any internal environmental audits conducted by the Contractor.
- **Records of rehabilitation**, supported by dated photographs and descriptions of stabilisation measures applied.

10.4 Compliance and penalties

The contractor shall act immediately when a notice of non-compliance is received, correcting whatever is the cause for the issuing of the notice. Complaints received regarding activities on the construction site pertaining to the environment shall be

recorded in a dedicated register, and the response noted with the date and action taken.

Any non-compliance with the agreed procedures of the EMPr, including the Duty of Care obligations under Section 28 of NEMA, is a transgression of the various statutes and laws that define the manner by which the environment is managed. The Duty of Care mandates that reasonable measures must be taken to prevent, minimise, and rectify environmental harm. Failure to adhere to these principles is considered a serious breach.

Therefore, any avoidable non-compliance, dependent on severity, shall be considered sufficient grounds for contact to be made with relevant provincial or national authorities. The responsible provincial or national authorities shall ensure compliance and impose penalties relevant to the transgression as allowed for within its statutory powers. These penalties may include fines or imprisonment, particularly where there is significant environmental harm or failure to take required remedial actions.

In addition to the statutory penalties, the contractor must ensure that all corrective actions are documented, and measures are put in place to prevent recurrence of such non-compliance. This includes revisiting and reinforcing the Duty of Care principles through additional training and adjustments to site practices, as necessary.

10.5 Report availability:

A copy of this EMPr shall be kept at the construction site office and will be accessible to all senior contract personnel. All senior personnel working on the project shall be required to familiarise themselves with the contents of this document.

11 Environmental mitigation specifications for impacts:

The following section outlines specific environmental management measures applicable to the **construction and operational phases** of the project. These mitigation specifications are designed to avoid, minimise, or rectify environmental impacts in accordance with the principles of **NEMA Section 28 (Duty of Care)** and the conditions of the Environmental Authorisation.

11.1 Site Fencing and Access Control:

To ensure safety, fencing should be used to prohibit access by local fauna, pedestrians, or vehicles. The fencing should be kept neat and maintained by the contractor. Any breaches must be repaired immediately. Fenced areas control construction and personnel activities and limit unauthorised access. No fences or gates providing access to the site/campsite can be cut, lowered, removed or damaged, and gates to adjacent properties or public roads must be closed at all times. The following list describes all the conditions, but it is not limited to them:

- Fencing of the campsite and construction area (if applicable) shall be suitably secured to prohibit access by livestock and local fauna.
- No unauthorised pedestrian or vehicular access shall be allowed into fenced off-limits areas.
- Fencing shall be kept neat at all times. The contractor shall be responsible for the maintenance of all fences.
- If temporary fencing is removed temporarily for the execution of work, the contractor shall reinstate it as soon as practicable.
- Breaches in the fencing must be repaired immediately.
- The purpose of the fenced areas is to control construction and personnel activity within the designated areas and limit unauthorised access.
- No fences or gates that provide access to the site/construction campsite may be cut, lowered, removed or damaged in any way.
- Leave private gates, as they are found (open or closed). Gates to adjacent properties or onto public roads must be closed at all times.

11.2 Vegetation Clearing and Grubbing:

- Contractor shall at all times carefully consider what machinery is appropriate to the task while minimising the extent of environmental damage.
- Topsoil shall be cleared of woody vegetation and specifically exotic vegetation before ripping and removing.
- The topsoil is regarded as the top 300 mm of the soil profile irrespective of the fertility appearance.
- The topsoil, including the existing grass cover is to be shallowly ripped (only the depth of the topsoil) before removal. This is to ensure that organic plant material, and the natural seed base is included in the stripping process.
- Soil stockpiles shall not be higher than 2.5 m or stored for a period longer than one year.
- No vehicles shall be allowed access onto the stockpiles after they have been placed.
- Stockpiles shall not be allowed to become contaminated with oil, diesel, petrol, garbage or any other material, which may inhibit the later growth of vegetation.
- The contractor shall apply soil conservation measures to the stockpiles to prevent erosion. This can include the use of erosion control fabric or grass seeding.
- If at any stage of the clearing operations archaeological artefacts are unearthed or identified the relevant organisations are to be contacted immediately to conduct a thorough scientific investigation of the finds.
- The works shall be cleared of alien vegetation. An effort must be made to remove the entire root system where after the plant shall be left to dry out on a hard surface that will not facilitate the germination of seed.
- Burning of any material is not permitted under any circumstances.
- All unattended trenches/ excavations should be demarcated.

- No new roads or tracks may be created except where such routes are specifically approved.

11.3 Establishing office / camp sites:

Setting up site camps is crucial for various reasons. Firstly, it is necessary to store all the materials that will be used on the construction site. Secondly, it will be used to keep all the administrative documents and records safe. Thirdly, it will store all the vehicles necessary for construction activities and future progress meetings. The following list describes all the conditions, but it is not limited to them:

- The area chosen for these purposes shall be the minimum reasonably required and which will involve the least disturbance to vegetation.
- Fires will only be allowed in facilities or equipment specially constructed for this purpose. If required by applicable legislation, a firebreak shall be cleared around the perimeter of the camp and office sites.
- Lighting and noise disturbance or any other form of disturbance that may have an effect on the landowner/tenant/persons lawfully living in the vicinity shall be kept to a minimum.
- Chemical toilet facilities or other approved toilet facilities should be sited in such a way that they do not cause water or other pollution. The use of existing facilities must take place in consultation with the landowner/tenant.
- In cases where facilities are linked to existing sewerage structures, all necessary regulatory requirements concerning construction and maintenance should be adhered to. The facilities must comply with water act requirements.
- Adequate signage must be provided, and the area must be appropriated secured.
- Adequate parking and security should be provided at the campsites.
- All formal documentation should be kept at the site office and be made available during monthly audits.

11.4 Noise and vibrations:

The primary noise sources will be vehicles and equipment utilised during the construction stage including graders, bulldozers, general purpose vehicles, etc. To manage the impact the following will be done:

- Working schedule for the activities with high noise level will be arranged between 08:00 AM to 17:00 PM.
- Only well-maintained vehicles and equipment should be operated on-site, and all machinery should be serviced regularly during the construction stage.
- Avoiding unnecessary simultaneous noisy activities.
- No amplified music shall be allowed at the site.
- Selecting ‘quiet’ construction equipment and working method and avoiding unnecessary revving and hooting.

- Providing ear protection for activities that are likely to create noise in order to protect worker's health and safety.

11.5 Erosion control:

Construction activities will require the removal of vegetation cover, potentially resulting in soil erosion and subsequent impacts on surface water quality due to uncontrolled rainwater run-off or mechanical/wind action. The following measures are necessary to minimise impacts:

- Clearance of vegetation should be restricted to the absolute minimum required to facilitate construction activities to proceed. Disturbance of topsoil and vegetation rootstock must be minimized as far as possible.
- Areas which are not planned to be constructed within two (2) months must not be cleared so as to reduce risk of erosion.
- Construction activities shall take place only within the approved demarcated area. Appropriate drainage facilities must be constructed to make sure water runs smoothly downstream.
- Erosion control measures that can be implemented in areas that are susceptible to erosion include:
    - Use of silt fences and sandbags.
    - Brush packing with cleared vegetation
    - Mulch, stone chip packing
    - Planting of vegetation
    - Hydroseeding / hand sowing
- Topsoil layer will be kept for rehabilitation and will be adequately stored to protect it from erosion.
- Areas where construction has been finished should immediately be rehabilitated up to industry relevant standards.
- Any obstruction within the stormwater management plan needs to be removed.

11.6 Contamination of land:

Land contamination may occur as a result of fuel and oil leaks or spills and/or poor fuel, chemical and waste storage. The following measures are necessary to mitigate / avoid the adverse effects of land contamination:

- The storage areas shall be securely fenced and appropriately marked to indicate the goods in the storage. Material Safety Data Sheets should be kept for all hazardous materials on site.
- All hazardous substances and stocks such as diesel, oils, detergents, etc., shall be stored in areas with impervious flooring such as concrete and properly bunded.
- Dedicated impervious areas should be designated for concrete mixing and the spillage from concrete mixed should be cleaned immediately.

- Cleaning of cement mixing and handling equipment must be done using proper cleaning trays.
- Visible residues from concrete or washings must be promptly removed and disposed of appropriately.
- Cement batching areas must be located in an area where residues are contained, and that the location does not fall within storm water channels.
- Drip pans, other impervious surface, shall be installed in such storage areas with a view to prevent soil and water pollution.
- The waste management strategy on the construction site should be hinged on the waste hierarchy model of '*reduce, reuse and recycle'* waste in order to reduce the ultimate impact on the environment.
- All used oils, grease or hydraulic fluids shall be placed in appropriate impervious containers and these receptacles will be removed from the site on a regular basis for disposal at a licensed disposal facility or sent for recycling/reuse with a registered facility.
- No vehicles may be serviced near waterbodies. All servicing should take place at the site office yard and care should be taken to prevent spillage of hydrocarbons.
- Residues from machinery maintenance and other sources contaminated with hazardous waste should be stored in proper containers that avoid seepage to ground.
- Spills should be cleaned up immediately by removing the spillage together with the polluted soil and by disposing of them at a recognised facility.
- Adequate waste receptacles shall be made available, and all waste shall be adequately stored so that it does not pose a pollution risk.
- General waste is to be disposed of through the municipal service. Any other waste will be disposed of through only licensed waste disposal facilities.
- Volatile waste items such as plastic bags, cement bags, etc. should be temporarily stored in a suitable manner as to prevent it from being dispersed via wind.
- All waste management strategies employed by the contractor should comply with environmental / waste management legislation.
- Waste should be regularly removed from the site to a registered landfill.
- The contractor should develop and comply to an on-site specific waste management plan.
- No waste may be buried in an on-site waste pit.
- No burning of waste material on site.
- Construction labourers should be sensitised to dispose of waste in a responsible manner and not to litter.

11.7 Surface and ground water quality:

Poor chemical storage and poor waste management practices may lead to the contamination of water sources. Sewage and sanitary effluent have the potential to

adversely affect the quality of receiving water bodies unless properly managed. To eliminate the risk of contamination, the following measures have to be instituted:

- Suitable covered receptacles for waste shall be available at all times and conveniently placed for the disposal of waste.
- Spills or overflows from chemical or other toilets used by construction staff must be dealt with by a sanitation expert immediately.
- Chemical toilets must be available during construction and trap containers containing any oil, grease or other industrial substance must be treated and discharged at a recognised facility.
- Toilets must be placed more than 50 metres from any watercourse.
- Any effluents containing oil, grease or other industrial substances must be collected in a suitable receptacle and treated prior to discharge or removed from the site for appropriate disposal at a recognised facility.

11.8 Water usage:

- Any water that is used which does not emanate from municipal supply must be registered and authorised by the Department of Water and Sanitation (DWS) prior to usage.
- The contractor shall promote responsible water use by all personnel.
- Any activity which adversely affects sensitive aquatic fauna and flora shall be forbidden.
- The wash water (grey water) collected from the cleaning of equipment on-site should not be left standing for long periods of time as this promotes parasite and bacterial proliferation.
- Grey water should be recycled:
    - Used for dust suppression;
    - Used to water a vegetable garden, or to support a small nursery;
    - Used (reused) to clean construction equipment.
- Grey water that is not recycled should be removed on a regular basis to a authorised treatment facility.
- Washing of personnel or any equipment must not be allowed on site. Should it be necessary to wash construction equipment these should be done at an area properly suited and prepared to receive and store polluted waters.
- Washing of equipment shall be done in a container to prevent any runoff of contaminated washing water. No washing in dams or streams are allowed.
- Any activity which brings about the run-off of sediments into any watercourse should be prohibited.
- Any activity which adversely affects aquatic fauna and flora should be prohibited.
- The flow of the watercourse may not be affected during construction without the relevant Section 21 C and I Water Use Licence (WUL).

11.9 Fauna and flora:

Fauna and flora are negatively impacted by the clearance of vegetation, noise from construction activities (disturbance) and gathering/ hunting of flora and fauna by workers. The following measures are necessary to mitigate impacts:

- Clearance of vegetation must be restricted to the absolute minimum required to facilitate access and undertaken construction activities.
- Vegetation clearance / exotic species eradication must be conducted on a three (3) monthly basis.
- All removed plant material needs to be disposed of appropriately.
- No trees or shrubs will be felled or damaged for the purpose of obtaining firewood.
- The rehabilitation activities require the re-planting of vegetation in any areas cleared for the construction activities. This will promote soil stability, improve the visual aspects of the environment and provide faunal habitat.
- Hunting/gathering/trapping of wild fauna by construction workers must not be permitted.
- Protected plant species found on site needs to be fenced and demarcated until the flora permits from the Department of Forestry, Fisheries and the Environment are obtained.
- Excavations and trenches must be demarcated with the proper barricading in order to prevent fauna and humans from falling into these excavations.
- The Contractor is responsible for the removal of alien vegetation within areas affected by the construction activities including cleared ground and topsoil stockpiles.
- Equipment used must be regularly washed down to avoid transporting seeds (invasive species) or plant diseases.
- Localised habitat features such as nests, dens or burrow sites must be avoided as much as possible. In addition, care should be taken in working in areas of active nesting, spawning, and feeding areas.
- All mitigation measures from specialist reports should also be implemented.

11.10 Historical archaeological and heritage impacts:

- All construction activities should be restricted to within the boundaries of the footprint.
- SAHRA and a qualified archaeologist be consulted immediately in the event of accidental archaeological exposure.
- In the unlikely event of accidental archaeological exposure, all excavations must stop immediately.
- No loose chance finds such as stone age artefacts (arrow heads, stone flake blades etc.) may be collected.

- The on-site environmental representative must consult the appointed ECO regarding any such discoveries.
- All mitigation measures from specialist reports should also be implemented.

11.11 Rehabilitation:

- On completion of operations, all buildings, structures or objects on the camp/office site shall be demolished and removed.
- Where office/camp sites have been rendered devoid of vegetation/grass or where soils have been compacted owing to traffic, the surface shall be scarified or ripped to aerate and promote the infiltration of water.
- On completion of operations, the areas shall be cleared of any contaminated soil, which must be dumped as per the waste management plan.
- All infrastructure, equipment, plant, temporary housing and roads and other items used during the construction period will be removed from the site and rehabilitated if necessary.
- Waste material of any description, including receptacles, scrap, rubble and tyres, will be removed entirely from the area and disposed of at a registered waste disposal facility. It will not be permitted to be buried or burned on the site.
- Disturbed areas should be left in a safe and stable manner. Preventative measures may be necessary to construct adequate drainage structures including ditches and other structures to facilitate the movement of surface water.
- Photographs of the camp and office sites, before and during the construction and after rehabilitation, shall be taken at selected fixed points and kept on record.
- The disturbed surfaces shall then be ripped or ploughed and the topsoil previously stored shall be spread evenly to its original depth over the whole area. The area shall then be fertilised if necessary (based on a soil analysis).
- Exotic species will have to be continually removed to prevent their proliferation.
- The site shall be seeded with a vegetation seed mix adapted to reflect the local indigenous flora.
- If a reasonable assessment indicates that the re-establishment of vegetation is unacceptably slow, there might be need that the soil be analysed and any harmful effects on the soil arising from the construction operation be corrected and the area be seeded with a seed mix to his or her specification.

11.12 Handling of emergencies:

- The contractor must identify all situations that can lead to emergency situations and provide response strategies. The situations should include fire and major chemical spill.
- Contact details of all relevant departments and emergency service providers must be readily available on-site.

- Equipment for dealing with emergencies such as spill kits, firefighting equipment, first aid boxes etc shall be made available and personnel properly trained in its use.
- All staff on site must be trained on how to handle emergency situations and emergency drills/ rehearsals should be conducted periodically to ensure that staff prepared.
- All emergencies / incidents must be reported and distributed to the relevant parties.

11.13 Operational Phase Environmental Management Measures

The following mitigation measures apply for the duration of the operational phase of the Sending Wastewater Treatment Works and associated effluent reuse activities:

Wastewater Treatment and Effluent Quality

- The WWTW shall be operated in accordance with the approved design and Water Use Licence conditions.
- Influent and effluent quality shall be monitored at frequencies prescribed by the WUL to ensure compliance with applicable discharge or reuse standards.
- Any non-compliant effluent shall be retained within the system and corrective operational measures implemented immediately.

Effluent Storage and Reuse

- Treated effluent shall be stored in a lined effluent storage pond prior to reuse.
- Effluent reuse shall be limited to non-potable purposes and implemented through a drip irrigation system for the planned municipal date palm orchard, subject to land availability and regulatory approval.
- Irrigation rates shall be managed to prevent ponding, runoff, soil saturation, or contamination of surface and groundwater resources.
- Effluent reuse areas shall be regularly inspected for signs of erosion, salinisation, or vegetation stress.

Protection of Surface and Groundwater

- All treatment ponds and storage facilities shall be regularly inspected for liner integrity and signs of leakage.
- Stormwater diversion structures shall be maintained to prevent clean runoff from entering the treatment system and to prevent contaminated water from reaching the ephemeral drainage line.
- No untreated or partially treated wastewater shall be discharged to the environment.

Sludge Management

- Sludge shall be removed from ponds only when necessary and dewatered on designated sludge drying beds.
- Dried sludge shall be disposed of or reused at authorised facilities in accordance with applicable waste legislation and licence conditions.

Odour and Nuisance Management

- The pond system shall be operated to maintain appropriate retention times and loading rates to minimise odour generation.
- Complaints relating to odour or nuisance shall be recorded and investigated, and corrective actions implemented where required.

Operational Waste Management

- Solid waste generated during operations shall be stored in appropriate containers and removed regularly to a licensed waste disposal facility.
- Hazardous substances used for maintenance shall be stored in bunded, secure areas with spill response measures in place.

Monitoring and Record Keeping

- Operational records, including maintenance logs, monitoring results, incidents, and corrective actions, shall be maintained on site and made available to the relevant authorities upon request.
- Any environmental incidents shall be reported and addressed in accordance with legal requirements.

12 Method statements:

The Contractor shall prepare and submit site-specific Method Statements for all environmentally sensitive activities prior to the commencement of such activities. These shall include, but not be limited to, earthworks, vegetation clearing, works near drainage lines, handling of hazardous substances, waste management, erosion control measures, and the establishment of construction camps and access routes.

Each Method Statement shall describe the proposed activities, materials and equipment to be used, associated environmental risks, and the mitigation measures to be implemented to ensure compliance with the approved EMPr, Environmental Authorisation conditions (where applicable), and relevant environmental legislation.

No related works shall commence until the Method Statements have been reviewed and approved by the Engineer and the Environmental Control Officer (ECO). Method Statements shall be updated and resubmitted for approval where changes to construction methods occur or where unforeseen environmental risks are identified during implementation.