
Scoping (including impact assessment) Report for Zambezi
Regional Council's Proposed Construction of an Oxidation Pond,
Located in Kongola Settlement, Zambezi Region, Namibia.

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Final Report

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CONSULTANT'S EXPERTISE

I.N.K Enviro Consultants cc is the independent firm of consultants that has been appointed by the Zambezi Regional Council to undertake the environmental impact assessment process.

Immanuel N. Katali, the EIA Lead Practitioner holds a B.Arts (Honors) in Geography, Environmental Studies and Sociology and has over six years of relevant experience in conducting/managing Environmental Impact Assessments (EIAs), Socio-Economic Impact Assessments (SIA) and compiling Environmental Management Plans (EMPs) in Namibia. Immanuel is certified as an environmental practitioner under the Environmental Assessment Professionals Association of Namibia (EAPAN).

DECLARATION OF INDEPENDENCE AND DISCLAIMER

The consultant herewith declare that this report represents an independent, objective assessment of the proposed Construction of an Oxidation Pond, on the request of the Zambezi Regional Council.

I.N.K has prepared this report based on an agreed scope of work and acts in all professional matters as an independent environmental consultant to the Zambezi Regional Council and exercises all reasonable skill and care in the provision of its professional services in a manner consistent with the level of care and expertise exercised by members of the environmental profession.

The information, statements and commentary contained in this Report have been prepared by I.N.K from information provided by the Zambezi Regional Council and from discussions held with stakeholders. I.N.K does not express an opinion as to the accuracy or completeness of the information provided, the assumptions made by the party that provided the information or any conclusions reached. I.N.K has based this Report on information received or obtained, on the basis that such information is accurate and, where it is represented to I.N.K as such, complete.

I.N.K is not responsible and will not be liable to any other person or organisation for or in relation to any matter dealt within this report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in this report (including without limitation matters arising from any negligent act or omission of I.N.K or for any loss or damage suffered by any other party relying upon the matters dealt with or conclusions expressed in this report). This report must not be altered or added to without the prior written consent of I.N.K.

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1 INTRODUCTION

1.1 Purpose of the Report

This Scoping Report has been compiled to identify and evaluate environmental (and social) risks and potential impacts of the proposed construction of an oxidation pond, as part of an Environmental Impact Assessment (EIA) study undertaken by the Zambezi Regional Council (hereafter referred to as "ZRC").

The environmental impact assessment aims to:

- Identify potential significant environmental and social impacts associated with the proposed construction of an oxidation pond (positive and negative) and highlight any possible fatal flaws;
- make key recommendations regarding the proposed alternative locations.

The study therefore forms the foundation for the project's sustainability framework and provides the ZRC with an understanding of the potential environmental issues associated with the proposed project.

1.2 Introduction and Background to the Proposed Project

Zambezi Regional Council intends on obtaining an Environmental Clearance Certificate (ECC) for the construction of an oxidation pond. The aims and objectives of the project is to find an alternative/solution to the current practice of unregulated and informal disposal of wastewater in the Kongola settlement.

The proposed project is located in Kongola Settlement, approximately 110 km east of Katima Mulilo town, Zambezi Region, Namibia. The site for the oxidation ponds is located ± 3 km north east of Kongola Settlement on a currently undisturbed piece of land. Two preliminary sites for the oxidation ponds have been identified (refer to Figure 1). The EIA process will identify the best suitable location, from an environmental perspective.

Oxidation pond or lagoon or water stabilization pond is a secondary wastewater treatment that treats waste or sewage coming from industries, residential areas, etc. It uses microorganisms like bacteria, algae and light energy (sunlight) to stabilize the wastewater.

The aim of the project is to treat polluted water or wastewater by removing impurities (pollutants) so that the improved water quality can either be re-used for a certain intended purpose such as irrigation for instance or be discharged back into the environment upon meeting the set environmental standards. The treatment is therefore done to ensure that the polluted water (wastewater) is not a threat to both the biophysical and social environment either in a short or long-term. Not only to prevent to reduce the environmental threat, but also to reduce the loss of usable water in this wastewater.

Prior to commencement of the operation activities, an Environmental Clearance Certificate (ECC) is required on the basis of an approved Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP). It is with this background that, I.N.K Enviro Consultants cc (I.N.K) an independent firm of consultants, was appointed to undertake the Environmental Impact Assessment process for this project.

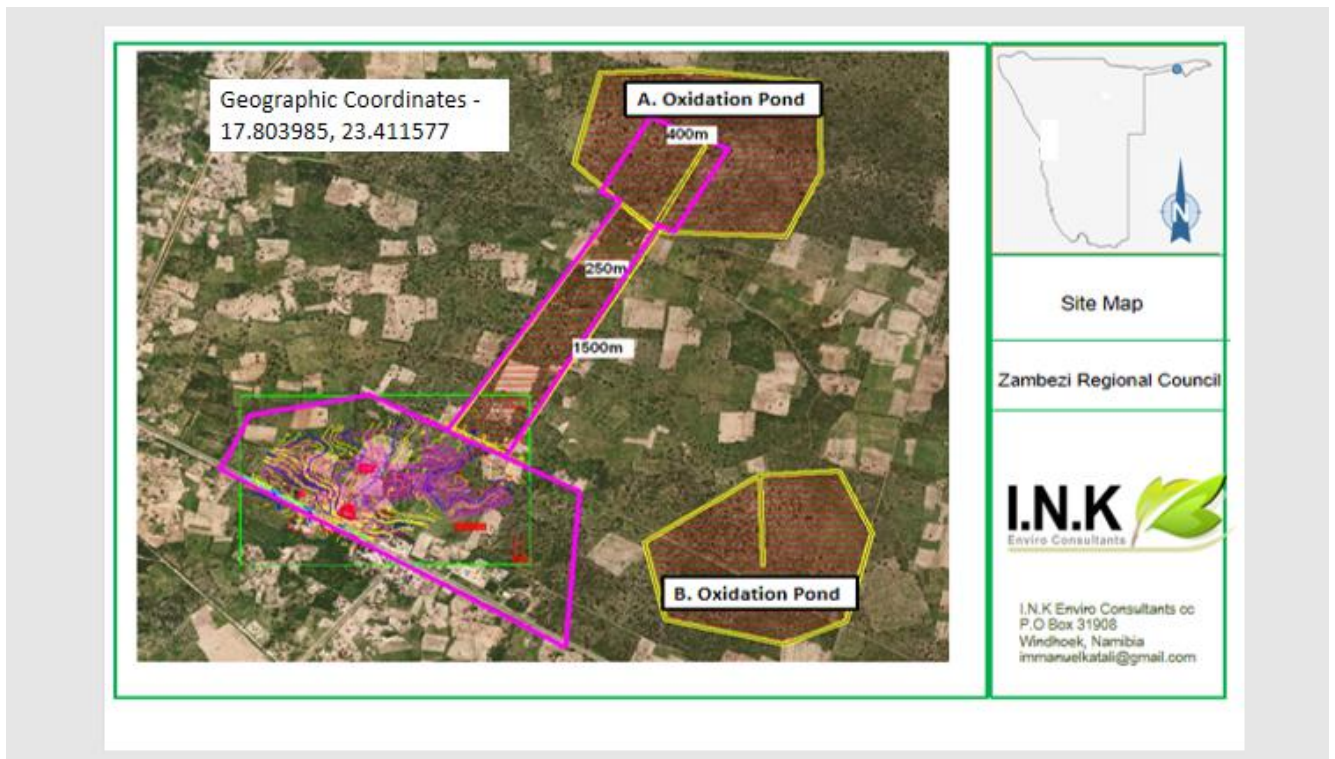


Figure 1: Proposed Locations of the Oxidation Ponds

1.3 EIA Process

Table 1: EIA Process

Objectives	Corresponding activities
Project initiation and Screening phase	
<ul style="list-style-type: none"> Initiate the screening process Initiate the environmental impact assessment process. 	<ul style="list-style-type: none"> Site Visit Identify Key Stakeholders Early identification of environmental aspects and potential impacts associated with the proposed project.
EIA Phase with combined Scoping and Assessment	
<ul style="list-style-type: none"> Notify the decision-making authority of the proposed project Identify interested and/or affected parties (I&APs) and involve them in the scoping process through information sharing. Identify potential environmental issues associated with the proposed project. Consider alternatives. Identify any fatal flaws. Determine the terms of reference for additional assessment work. 	<ul style="list-style-type: none"> Notify government authorities and I&APs of the project and EIA process (telephone calls, e-mails, faxes, newspaper advertisements and site notices). Investigations by technical project team. Compilation of draft scoping report. Distribute scoping (including assessment) and EMP reports to authorities and I&APs for review. Forward the final scoping (combined assessment) and EMP reports and I&APs comments to MEFT for review. MEFT review and Record of Decision.
<ul style="list-style-type: none"> Provide a detailed description of the potentially affected environment. Assessment of potential environmental impacts. Design requirements and management and mitigation measures. Receive feedback on application. 	

Within this framework, the required components of the scoping report are discussed in more detail as part of the scoping methodology in Section 2 below.

EIAs are influenced by national legislation and a range of guidelines. The legislation applicable to this project and the EIA process is discussed further in Section 3 below.

1.4 Project Motivation (Need and Desirability)

As mentioned in section 1.2 above, the aims and objectives of the project is to find an alternative/solution to the current practice of unregulated and informal disposal of wastewater in the Kongola settlement. The proposed project will therefore allow the Kongola Community to practice the

recommended environmental practice of wastewater disposal and contributing and playing its role to environmental sustainability. The wastewater management facility will be a much-needed contribution to the local community's public and environmental health improvement. This would be achieved through efficient treatment of waste in a more environmentally friendly manner and ensure the good health of the surrounding biophysical and social environment.



2 SCOPING METHODOLOGY

2.1 Information collection

I.N.K used various information sources to identify and assess the issues associated with the proposed project. These include:

- Site visits by I.N.K;
- Consultation with Project Technical Team (ZRC) and relevant information shared by ZRC;
- Consultation with MEFT via online application system;
- Consultation with I&APs;
- Atlas of Namibia;
- Google Earth; and
- Internet sources.

2.2 Scoping Report

The main purpose of this Scoping Report is to indicate which environmental aspects relating to the proposed project might have an impact on the environment, to assess them and to provide management and mitigation measures to avoid or minimise these impacts.

Table 2 outlines the Scoping Report requirements as set out in Section 8 of the Environmental Impact Assessment Regulations that were promulgated in February 2012 in terms of the Environmental Management Act, 7 of 2007.

Table 2: Scoping report Requirements stipulated in the EIA regulations

Requirements for a Scoping Report in terms of the February 2012 regulations	Reference in report
(a) the curriculum vitae of the EAPs who prepared the report;	Attached as appendix
(b) a description of the proposed activity;	Section 4
(c) a description of the site on which the activity is to be undertaken and the location of the activity on the site;	Sections 4 & 6
(d) a description of the environment that may be affected by the proposed activity and the manner in which the geographical, physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed listed activity;	Sections 6, and 7
(e) an identification of laws and guidelines that have been considered in the preparation of the Scoping Report;	Section 3
(f) details of the public consultation process conducted in terms of regulation 7(1) in connection with the application, including -	Sections 2.3, 2.4, 2.5

<p>(i) the steps that were taken to notify potentially interested and affected parties of the proposed application;</p> <p>(ii) proof that notice boards, advertisements and notices notifying potentially interested and affected parties of the proposed application have been displayed, placed or given;</p> <p>(iii) a list of all persons, organisations and organs of state that were registered in terms of regulation 22 as interested and affected parties in relation to the application; and</p> <p>(iv) a summary of the issues raised by interested and affected parties, the date of receipt of and the response of the EAP to those issues;</p>	
<p>(g) a description of the need and desirability of the proposed listed activity and any identified alternatives to the proposed activity that are feasible and reasonable, including the advantages and disadvantages that the proposed activity or alternatives have on the environment and on the community that may be affected by the activity;</p>	<p>Sections 1.3 and 5</p>
<p>(h) a description and assessment of the significance of any significant effects, including cumulative effects, that may occur as a result of the undertaking of the activity or identified alternatives or as a result of any construction, erection or decommissioning associated with the undertaking of the proposed listed activity;</p>	<p>Sections 7</p>
<p>(i) terms of reference for the detailed assessment; and</p>	<p>Section 7</p>
<p>(j) a management plan, which includes -</p> <p>(i) information on any proposed management, mitigation, protection or remedial measures to be undertaken to address the effects on the environment that have been identified including objectives in respect of the rehabilitation of the environment and closure;</p> <p>(ii) as far as is reasonably practicable, measures to rehabilitate the environment affected by the undertaking of the activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development; and</p> <p>(iii) a description of the manner in which the applicant intends to modify, remedy, control or stop any action, activity or</p>	<p>Attached as appendix</p>

process which causes pollution or environmental degradation remedy the cause of pollution or degradation and migration of pollutants.

2.3 Public participation process

The public participation process for the proposed project is conducted to ensure that all persons and/or organisations that may be affected by, or interested in the proposed project, were informed of the project and could register their views and concerns. By consulting with relevant authorities and I&APs, the range of environmental issues to be considered in this Scoping Report has been given specific context and focus.

Included below is a summary of the I&APs consulted, the process that was followed and the issues that were identified.

2.4 Oxidation Pond I&APs

The following table (Table 3) provides a list of persons, group of persons or organisations that were informed about the project and were requested to register as I&APs should they be interested and/or affected.

Table 3: Mpukano Combined School Stakeholders

IAP Grouping	Organisation
Government Ministries	<ul style="list-style-type: none"> ▪ Ministry of Environment, Forestry and Tourism (MEFT); <ul style="list-style-type: none"> • Department of Environmental Affairs (DEA);
Local Governance	Kongola Constituency Office
Nearby Residents	Kongola Settlement
Other interested and affected parties	Any other people with an interest in the proposed project or who may be affected by the proposed project.

2.5 Steps in the consultation process

Table 4 sets out the steps that were followed as part of the consultation process:

Table 4: Consultation process with I&APs and Authorities

TASK	DESCRIPTION
Notification - regulatory authorities and I&APs	
Notification to	I.N.K submitted the Application Form (online system) to MEFT.

TASK	DESCRIPTION
Notification - regulatory authorities and I&APs	
MEFT	
IAP identification	A stakeholder database was developed for the proposed project and EIA process. Additional I&APs will be updated during the EIA process as required.
Distribution of background information document (BID)	BIDs were made available to all I&APs on the project's stakeholder database and were available at the scoping meetings. Copies of the BID were available on request to I.N.K. The purpose of the BID was to inform I&APs and authorities about the proposed project, the EIA process, possible environmental impacts and means of providing input into the EIA process. Attached to the BID was a registration and response form, which provided I&APs with an opportunity to submit their names, contact details and comments on the project.
Scoping Meetings	Several consultations were made with I&APs. This included meetings and telephonic conversations.
I&APs review of Scoping Report	The Scoping Report is submitted to all registered I&APs for comments and input which will be incorporated to update to a final EIA report for submission to the Ministry of Environment, Forestry and Tourism (MEFT) for decision-making.
MEFT review of Scoping Report and EMP	A copy of the final Scoping (including assessment) Report, including authority and I&AP review comments, was submitted to MEFT on completion of the public review process via the online application system.

2.6 Summary of issues raised

All issues that have been raised to date by I&APs are as follows:

- Noise Pollution;
- Odour impacts; and
- Employment Opportunities.

2.7 Environmental Team

Immanuel N. Katali, the EIA Project Manager holds a B.Arts (Honors) in Geography, Environmental Studies and Sociology and has over 6 years of experience in conducting EIAs in Namibia. Immanuel is registered as a Practitioner under the Environmental Assessment Professionals of Namibia (EAPAN)



3 ENVIRONMENTAL LAWS, POLICIES AND PERMITS

3.1 Environmental Management Act No. 7 of 2007

Environmental Management Act No. 7 of 2007 and its 2012 EIA Regulations aims to ensure that the potential impacts of the development on the environment are considered carefully and in good time; that all interested and affected parties have an opportunity to participate in the environmental assessment processes and that the findings of the environmental assessments are fully considered before any decisions are made about activities which might affect the environment. The Act aims at promoting sustainable management of the environment and use of natural resources. The Environmental Management Act (EMA) is broad; it regulates land use development through environmental clearance certification and/or Environmental Impact Assessments.

The Act provides for the clearance certification for “ 2.1 The construction of facilities for waste sites, treatment of waste and disposal of waste and 8.6 The construction of industrial and domestic wastewater treatment plants and related pipeline systems”.

3.2 Water Act No. 54 of 1956

The Water Resources Management Act 11 of 2013 is presently without regulations; therefore, the Water Act No 54 of 1956 is still in force:

- Prohibits the pollution of water and implements the principle that a person disposing of effluent or waste has a duty of care to prevent pollution (S3 (k)).
- Provides for control and protection of groundwater (S66 (1), (d (ii))).
- Liability of clean-up costs after closure/abandonment of an activity (S3 (l)). Implication for the proposed project: The project will involve the treatment of wastewater that pose a risk to water resources (pollution), therefore the Proponent will need to ensure that they are in possession of the required licenses and permits from the DWA

3.3 Water Resources Management Act No. 11 of 2013 Act

This act provides for the management, protection, development, use and conservation of water resources; and provides for the regulation and monitoring of water services and to provide for incidental matters. The objects of this Act are to: Ensure that the water resources of Namibia are managed, developed, used, conserved, and protected in a manner consistent with, or conducive to, the fundamental principles set out in Section 66 - protection of aquifers, Subsection 1 (d) (iii) provide for preventing the contamination of the aquifer and water pollution control (Section 68). Implication or

responsibility to Water Acts: The protection (both quality and quantity/abstraction) of water resources should be a priority. Therefore:

- The Proponent should ensure that the permit/license for effluent (wastewater) discharge into the environment (including its use for irrigation) is applied for from the Department of Water Affairs' Water Environment Division of the Ministry of Agriculture, Water and Land Reform.

3.4 Codes of Practice including Vol. 6 – Wastewater Re-Use of July 2012

The project is subject to the Regulations listed in the DWA' Codes of Practice. The recent Code of Practice: Volume 6 of July 2012 contains the following guidelines on the:

- Treatment of wastewater (grey water, domestic wastewater, and industrial effluents)
- Precautions for wastewater re-use systems
- Specific applications for re-use of wastewater (mining, industrial & food processing, agricultural re use, gardening & landscape re-use, aquacultural re-use and other uses)
- Disposal and discharge of treated effluent into nature.

3.5 Other Applicable Laws and Policies

The Republic of Namibia has five tiers of law and several policies relevant to environmental assessment and protection, which includes:

- The Constitution
- Statutory law
- Common law
- Customary law
- International law

Key policies currently in force include:

- The EIA Policy (1995).
- Namibia's Environmental Assessment Policy for Sustainable Development and Environmental Conservation (1994).

As the main source of legislation, the Constitution of the Republic of Namibia (1990) makes provision for the creation and enforcement of applicable legislation. In this context and in accordance with its

constitution, Namibia has passed numerous laws intended to protect the natural environment and mitigate against adverse environmental impacts.

In the context of the proposed project, there are several laws and policies currently applicable. They are reflected in Table 5 below.



Table 1: Relevant Legislation and Policies

YEAR	NAME	Natural Resource Use (energy & water)	Emissions to air (fumes, dust & odours)	Emissions to land (non-hazardous & hazardous)	Emissions to water (industrial & domestic)	Noise	Visual	Impact on Land use	Impact on biodiversity	Impact on Archaeology	Socio-economic	Safety & Health
1990	The Constitution of the Republic of Namibia of 1990	X	X	X	X	X	X	X	X	X	X	X
2007	Environmental Management, Act 7 of 2007	X	X	X	X	X	X	X	X	X	X	X
2012	Regulations promulgated in terms of the Environmental Management, Act 7 of 2007	X	X	X	X	X	X	X	X	X	X	X
1976	Atmospheric Pollution Prevention Ordinance 11 of 1976		X	X					X		X	X
1995	Namibia's Environmental	X	X	X	X	X	X	X	X	X		X

	Assessment Policy for Sustainable Development and Environmental Conservation											
2004	National Heritage Act									X		
2013	Water Resources Management Act, 11 of 2013	X			X						X	

4 PROJECT DESCRIPTION

4.1 Oxidation Pond

Oxidation pond refers to the stabilization pond stabilizing the domestic, trade, industrial wastes etc., by the microbial interaction (primarily bacteria and algae). It seems like a large shallow pond with 2-6 feet height of water body. Oxidation pond requires the presence of sunlight and oxygen for the secondary treatment of domestic and trade wastes. It uses microorganisms like bacteria, algae and light energy (sunlight) to stabilize the wastewater. The oxidation pond is constructed 1-1.5 m deep inside the soil and provided with inlet and outlet systems

The secondary treatment of the organic and inorganic waste coming from raw sewage and industrial effluents is necessary. The direct disposal of the wastewater to the aquatic system can affect the life of water bodies and the quality of water as well.

4.2 Mechanism of Waste Treatment

The mechanism or working of the oxidation pond can be made simple by understanding the following steps Figure 2:

1. The bacteria present in the oxidation pond will oxidize the organic waste of the domestic as well as industrial sewage. By doing this, bacteria release carbon dioxide, water and ammonia; and
2. The algal growth occurs in the presence of sunlight. It utilizes the inorganic wastes formed by the organic matter decomposition and releases oxygen.

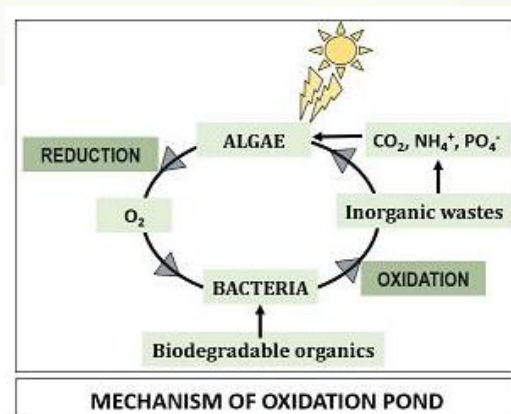


Figure 2: Mechanism of Oxidation Pond

From the above two mechanisms, it is clear that the algae and bacteria work mutually to fulfil each other's requirement. The bacteria use oxygen released by the algae to oxidize the biodegradable organics. The oxidation of organic waste by the bacteria releases carbon dioxide. Later, algae harness carbon dioxide to reduce inorganic wastes like nitrogen, phosphorus compounds etc. (Biology Reader, 2022).

4.3 Oxidation Pond Process

The process involved in the conversion of industrial and domestic wastewater into simple form includes:

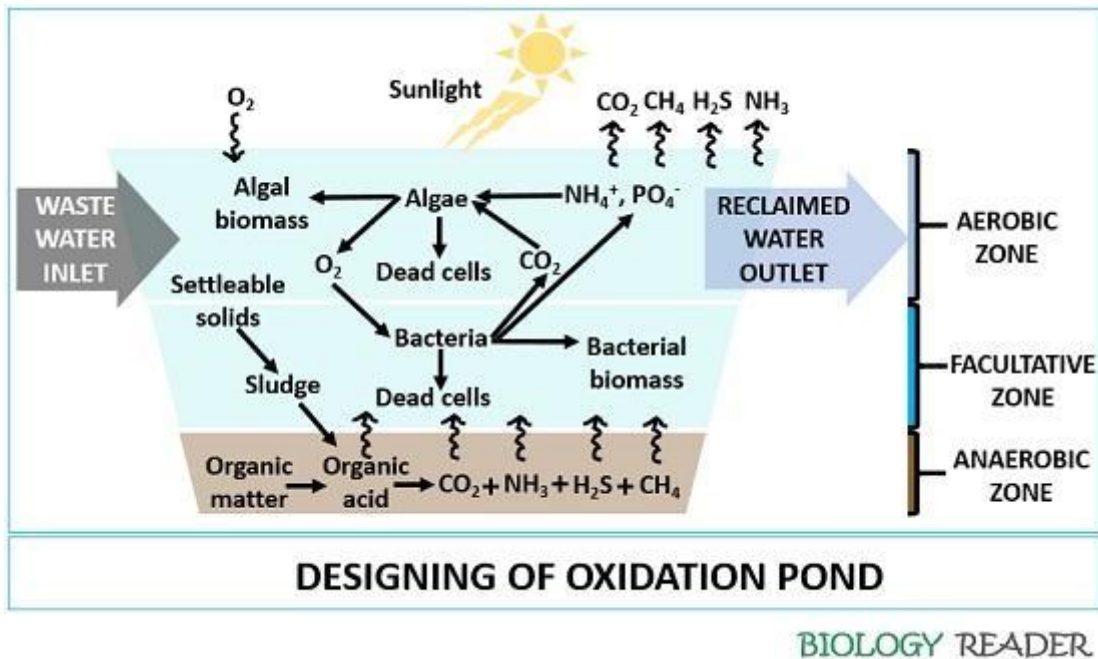


Figure 3: Oxidation Pond Design

Firstly, the industrial or domestic wastewater influents enter the oxidation pond through the inlet system.

Then, the bacteria utilize the biodegradable organics and convert them into inorganic compounds by releasing carbon dioxide. *Achromobacter*, *Proteus*, *Alcaligenes*, *Pseudomonas*, *Thiospirillum*, *Rhodothecae* etc., are the following genera of the bacteria that predominate in the stabilization pond.

The algal biomass in the oxidation pond utilizes the inorganic compounds in the presence of sunlight and carbon dioxide released during the oxidation of organic waste. *Chlorella*, *Euglena*, *Scenedermus* and *Microcystis* are the most common genera of algae predominating in the stabilization pond.

The remaining non-biodegradable or solid organic wastes settle down in the bottom of the stabilization pond as sludge. The anaerobic bacteria convert them during the night and in the absence of oxygen. The anaerobic bacteria first convert the insoluble organic waste into soluble organic acids like ethanol. Further decomposition of organic acids by the anaerobic bacteria release H_2S , NH_3 , CH_4 , CO_2 etc.

The treated water releases out through the outlet system of a stabilization pond. By employing the dredging method, one can separate the sludge deposits from the stabilization pond. The filtration method or the combination of chemical treatment and settling process separates the algal and bacterial biomass (Biology Reader, 2022).

4.4 Construction Phase

4.4.1 Power supply

During construction, power will be supplied using mobile generators at all sites.

4.4.2 Refuelling and maintenance of generators

The only identified equipment that will require refuelling of diesel and/ or petrol is generators used as power source. This will be done within the perimeters of the site. Drip trays will be installed during the refuelling

process and spill kits available during the process. Other vehicles and machinery used during the construction activities will be refuelled off site.

4.4.3 Water Supply

Water supply for construction purposes and human consumption will be stored in mobile water storage tanks. Water will be obtained from the Kongola Settlement.

4.4.4 Waste management during construction activities

Relatively small quantities of waste will be generated during the construction phase. All general waste should be transported to the nearest waste disposal site.

Potential hydrocarbon spills from vehicles and trucks might lead to soil and water contamination and needs to be treated as a hazardous waste if not bio-remediated. Hazardous waste shall be removed and disposed at a designated (permitted) Hazardous waste facility.

4.4.5 Sanitation for Construction

Portable toilets with associated septic tanks will be used. The septic tanks will be emptied on a regular basis ensuring no spillages in the proposed sites of infrastructure construction. The effluent shall be disposed of at a licenced facility.

Due to health and safety concerns, personnel may not relieve themselves in the surrounding environment.

4.4.6 Rehabilitation of temporary construction sites and laydown area

The removal of all temporary construction equipment will be undertaken at the end of construction activities. This will be done as per Environmental Management Plan recommendations.

4.5 Operational Phase

This is the phase during which the newly constructed and equipped oxidation ponds will be operational, i.e., treating the wastewater (effluent) from the Kongola settlement wastewater system and maintenance done by the Kongola settlement office or an independent contractor. The ponds are expected to be operated 24 hours, 7 days (everyday).

4.5.1 Input and Treatment Process

General operating procedure of oxidation: When treating waste at the oxidation ponds, the algae that is required for the process, is grown using energy from the sun and carbon dioxide and inorganic compounds released by bacteria in the water. During the process of photosynthesis, the algae release oxygen needed by aerobic bacteria. According to the Encyclopaedia Britannica (2020), mechanical aerators are sometimes installed to supply yet more oxygen, thereby reducing the required size of the pond. Sludge deposits in the pond must eventually be removed by dredging. Algae remaining in the pond effluent can be removed by filtration or by a combination of chemical treatment and settling.

4.5.2 Wastewater Treatment Output

Irrigation and Other Applications in the COP Vol. 6 The slurry (effluent) will be stored in the ponds. The final effluent will be treated so that it is compliant with and have a quality equal or better than the specified

quality for the General Standards as laid out in the Government Gazette Regulation R553 of 5 April 1962, in Section 21(1) and 21(2) of the Water Act (Act No 54 of 1956). In other words, the remaining (dry) slurry will be treated in accordance with acceptable environmental standards so that it can be used in the environment for irrigation purposes in Kongola or nearest areas where it may be required. The National Department of Water Affairs' Code of Practice (COP) Volume 6 (Vol.6) on Wastewater Re-use of July 2012 will be also used as guide to ensure that the treated effluent meets the standards and requirements for wastewater re-use. Other post-treatment applications as listed in the COP would also be explored and considered to ensure that the volumes of treated effluent that is not taken up for irrigation does not all end piled in nature (environment) as mere waste.

4.6 Decommissioning Phase

Decommissioning referred to herein is for the decommissioning of the construction works and sites at the end of the construction phase. The decommissioning phase will particularly entail the following:

- Dismantling and removal of all infrastructures and structures that will no longer be required for the operational and maintenance phase. These structures include camping sites, storage tanks, onsite temporary offices, ablution facilities and other supporting structures erected for construction. These will be transported to designated storage facilities offsite.
- Removal of all project related vehicles, machinery, and equipment from site to designated parking and storage sites off site, respectively.
- Carrying away the waste storage containers and disposal of waste to designated and approved waste management sites.
- Closure of all access roads that may have been created for the construction phase and no longer required for operational phase.
- Levelling of stockpiled topsoil and where possible, backfilling of all construction excavated pits and trenches.

4.6.1 Power supply

During construction, power will be supplied using mobile generators at all sites.

4.6.2 Refuelling and maintenance of generators

The only identified equipment that will require refuelling of diesel and/ or petrol is generators used as power source. This will be done within the perimeters of the site. Drip trays will be installed during the refuelling process and spill kits available during the process. Other vehicles and machinery used during the construction activities will be refuelled off site.

4.6.3 Water Supply

Water supply for construction purposes and human consumption will be stored in mobile water storage tanks. Water will be obtained from the Kongola Settlement.

4.6.4 Waste management during construction activities

Relatively small quantities of waste will be generated during the construction phase. All general waste should be transported to the nearest waste disposal site.

Potential hydrocarbon spills from vehicles and trucks might lead to soil and water contamination and needs to be treated as a hazardous waste if not bio-remediated. Hazardous waste shall be removed and disposed at a designated (permitted) Hazardous waste facility.

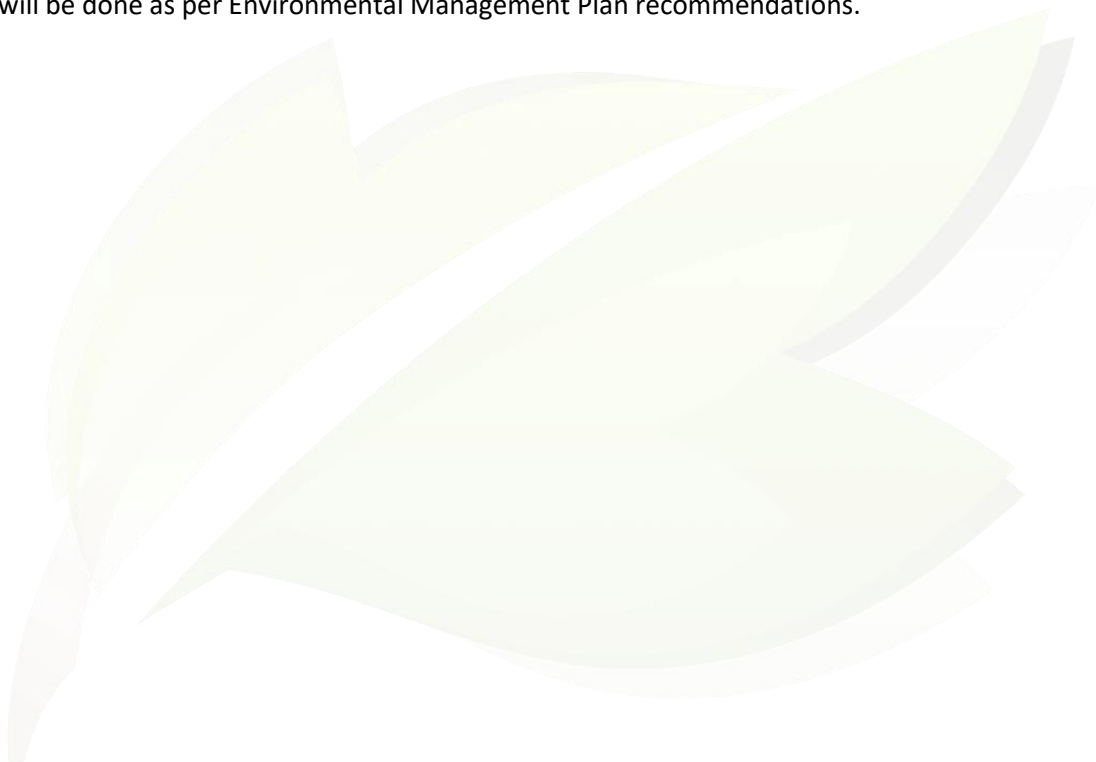
4.6.5 Sanitation for Construction

Portable toilets with associated septic tanks will be used. The septic tanks will be emptied on a regular basis ensuring no spillages in the proposed sites of infrastructure construction. The effluent shall be disposed of at a licenced facility.

Due to health and safety concerns, personnel may not relieve themselves in the surrounding environment.

4.6.6 Rehabilitation of temporary construction sites and laydown area

The removal of all temporary construction equipment will be undertaken at the end of construction activities. This will be done as per Environmental Management Plan recommendations.



5 PROJECT ALTERNATIVES

5.1 Alternative Site Locations for Oxidation Ponds

It was identified that the proposed site to the north-east is the most suitable for the oxidation pond. This is due to the fact that it is furthest from any closest sensitive receptor, therefore providing minimal social impacts.

5.2 Alternative Site Locations for the Waste Disposal Site

The proposed waste disposal site was selected on the criteria that it is furthest away from any villages/homesteads and it is in a relatively flat terrain/topography. The site selected is isolated and is best suitable site for waste disposal. Therefore, no other alternative was identified.

5.3 The “no project” option

With reference to section 1.3, the aims and objectives of the project is to find an alternative/solution to the current practice of unregulated and informal disposal of general waste in the Kongola settlement. The proposed project will therefore allow the Kongola Community to practice the recommended environmental practice of waste disposal and contributing and playing its role to environmental sustainability.

Therefore, the challenge facing the project proponent is its contribution towards achieving these goals while at the same time preventing and/or mitigating potential negative social and environmental impacts.

Without the implementation and adherence of the commitments in the EMP, the project will be a “fatal flaw”.

6 DESCRIPTION OF THE CURRENT ENVIRONMENT

6.1 Climate

According to Enviro Dynamics (2014), the Zambezi Region receives more than 600mm annually, has average maximum temperatures between 32 and 35°C and average minimum temperatures between 2 and 4°C. The area receives summer rainfall (October to April). Rainfall is highly variable and is often received in intense bursts characteristic of convectional rainfall.

6.2 Heritage Resources

No archaeological sites were noted within the perimeter of the sites during I.N.K.'s visit or identified by the locals.

6.3 Hydrogeology

The Kalahari Aquifer is the main aquifer in the project area. The aquifer is generally composed of Kalahari Sequence sediments with varying consolidation. Karoo Sequence rocks underlay the Kalahari in the area but are usually not intersected by production boreholes.

The general groundwater flow is from the northwest to the east and southeast, as groundwater head is generally higher from the westerly direction and lowers towards the east. The regional groundwater flow follows the general flow direction of the Zambezi River (SLR, 2016).

6.4 Topography

The Zambezi region is extremely flat. The specific sites are all relatively flat, densely vegetated and it is unlikely that any sites of archaeological significance will occur here, although some may occur around the base of large trees in the vicinity of the sites. The sites are all dominated by vegetation (bush and large trees) and therefore providing risks of having to cut down certain big trees for the construction. However, attempts will be provided to prevent cutting down and clearing of all vegetation in the area.

6.5 Vegetation

The vegetation of areas surrounding these sites is not unique, being typical woodland savannah which is representative of the majority of the area.

6.6 Noise

Existing noise sources within and around the project site include:

- Natural sounds from wind, animals, and birds;

The immediate surroundings of the project site has inhabitants of Kongola. The sensitivity of noise receptors usually increases at night when conditions are quiet, and ambient noise levels are at their lowest. However, no construction activities are anticipated at night time.

6.7 Regional Demographics

Of the employed population in the Zambezi Region's, 42.3% is employed in agriculture, forestry and fishing (NSA, 2014). This shows a heavy reliance on these industries and is indicative of focussed skills in these fields. Of the employable population, only 59.6% of the population is currently employed, with over two thirds of the employable population unemployed. This is significantly lower than the National average of 66.9%. There is therefore a significant need for additional employment opportunities in the Region.



7 ENVIRONMENTAL ASPECTS AND POTENTIAL IMPACTS

The activities associated with the proposed construction of the dam have the potential to impact on the environment. Environmental aspects and potential impacts were identified during the screening and scoping phases, in consultation with authorities, land owners, I&APs and the environmental team. Given the relatively small scale of the proposed project and taking the existing environment into consideration, the potential impacts were qualitatively assessed by I.N.K.

Table 7-2 and Table 7-3 below provide a summary of the activities associated with the proposed project during the construction phases respectively, the associated environmental aspects and potential impacts on the environment and also a qualitative assessment of these impacts (before and after mitigation).

Table 6 shows the methodology used to conduct the qualitative assessment. Both the criteria used to assess the impacts and the method of determining the significance of the impacts is outlined. This method complies with the Environmental Impact Assessment Regulations: Environmental Management Act, 2007 (Government Gazette No. 4878) EIA regulations. Part A provides the approach for determining impact consequence (combining severity, spatial scale and duration) and impact significance (the overall rating of the impact). Impact consequence and significance are determined from Part B and C. The interpretation of the impact significance is given in Part D. Both mitigated and unmitigated scenarios are considered for each impact.

Table 5: Assessment Methodology and Criteria

PART A: DEFINITION AND CRITERIA					
Definition of SIGNIFICANCE		Significance = consequence x probability			
Definition of CONSEQUENCE		Consequence is a function of severity, spatial extent and duration			
Criteria for ranking of the SEVERITY/NATURE of environmental impacts	H	Substantial deterioration (death, illness or injury). Recommended level will often be violated. Vigorous community action. Irreplaceable loss of resources.			
	M	Moderate/ measurable deterioration (discomfort). Recommended level will occasionally be violated. Widespread complaints. Noticeable loss of resources.			
	L	Minor deterioration (nuisance or minor deterioration). Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints. Limited loss of resources.			
	L+	Minor improvement. Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints.			
	M+	Moderate improvement. Will be within or better than the recommended level. No observed reaction.			
	H+	Substantial improvement. Will be within or better than the recommended level. Favourable publicity.			
Criteria for ranking the DURATION of impacts	L	Quickly reversible. Less than the project life. Short term			
	M	Reversible over time. Life of the project. Medium term			
	H	Permanent. Beyond closure. Long term.			
Criteria for ranking the SPATIAL SCALE of impacts	L	Localised - Within the site boundary.			
	M	Fairly widespread – Beyond the site boundary. Within 20 km of the site boundary.			
	H	Widespread – Far beyond site boundary. Regional/ national			
PART B: DETERMINING CONSEQUENCE					
SEVERITY = L					
DURATION	Long term	H	Medium	Medium	Medium
	Medium term	M	Low	Low	Medium
	Short term	L	Low	Low	Medium
SEVERITY = M					
DURATION	Long term	H	Medium	High	High
	Medium term	M	Medium	Medium	High
	Short term	L	Low	Medium	Medium
SEVERITY = H					
DURATION	Long term	H	High	High	High
	Medium term	M	Medium	Medium	High
	Short term	L	Medium	Medium	High
			L	M	H
			Localised Within site boundary Site	Fairly widespread Beyond site boundary Local	Widespread Far beyond site boundary Regional/ national
SPATIAL SCALE					
PART C: DETERMINING SIGNIFICANCE					
PROBABILITY (of exposure to impacts)	Definite/ Continuous	H	Medium	Medium	High
	Possible/ frequent	M	Medium	Medium	High
	Unlikely/ seldom	L	Low	Low	Medium
			L	M	H
CONSEQUENCE					
PART D: INTERPRETATION OF SIGNIFICANCE					
Significance	Decision guideline				
High	It would influence the decision regardless of any possible mitigation.				
Medium	It should have an influence on the decision unless it is mitigated.				
Low	It will not have an influence on the decision.				

Table 6: Environmental aspects and potential impacts associated with the construction of oxidation ponds and waste disposal sites

ACTIVITY	ASPECT	POTENTIAL ENVIRONMENTAL IMPACT	SIGNIFICANCE DISCUSSION	MITIGATION (with & without)	SEVERITY	DURATION	SPATIAL SCALE	CONSEQUENCE	PROBABILITY	SIGNIFICANCE
Construction and Operation phases										
Site Preparation and general construction activities	Air Quality and Noise	The site preparation activities and movement of vehicles on the roads will generate some dust. Noise will be generated by construction activities, i.e. excavations, movement of vehicles on the roads.	Noise could impact (i.e. disturb) animals and people in the immediate surroundings of the activities. However, due to the nature of the activities and the short period of construction, these potential impacts are not considered to be significant. However, seeing that the activities are conducted in close proximity to homesteads, the severity of the impact is regarded medium in the unmitigated scenario. The Project Team must always respect their work environment and implement the relevant management and mitigation measure to keep disturbance to a minimum.	Without	M	L	M	M	L	L
				With	L	L	L	L	L	L
	Socio-economic	Potential positive impact on socio-economic (job creation/opportunities)	No significant negative social impacts are expected due to the location, magnitude and nature of the proposed activities and workforce. However, a few job opportunities will be created. This is a positive impact.	Without	L+	L	L	L	L	L+
				With	M+	L	M	M	M	M+

	Biodiversity	Potential impact on fauna and flora (poaching and general disturbance and clearing of vegetation)	<p>Site preparation activities for the construction may have potential impacts resulting in the general disturbance and/or physical destruction of vegetation and/or fauna. The sites are all located in grassland areas with the dominance of the Savanna Woodland. Tree cover in the area is vast and hence any cutting down of big trees for the construction should be avoided.</p> <p>However, due to the fact that the construction team will not be very big, potential poaching and collection of firewood impacts can easily be managed through appropriate management and mitigation measures outlined in the EMP.</p>	Without	H	M	H	H	L-M	M-H
				With	L	L	L	L	L	L
	Heritage / Archaeology	Activities could result in possible damage to/destruction of heritage resources.	The magnitude of the proposed activities is limited to the construction of the oxidation ponds and waste site. No archaeological sites are expected or were identified within the perimeters of the sites.	Without	L	L	L	L	L	L
				With	L	L	L	L	L	L
	Waste Management	Potential impact on the environment (pollution, impact on biodiversity, environmental degradation).	<p>Waste generated on site (i.e. domestic waste and hydrocarbon contaminated material, empty lubrication bottles, etc.) has the potential to pollute the environment, cause environmental degradation, if not properly managed and could result in visual impacts of the surrounding area. However, relatively small quantities of waste will be generated, reducing the likelihood of potential impacts.</p>	Without	M	M	M	M	M	M
With				L	L	M	L	L	L	

			In the context of the activities that will take place, any waste pollution impacts are however regarded significant and the unmitigated scenario is assessed as such.								
Hydrocarbon spills and sewage management	Potential impact on soil (contamination) and surface water and ground water pollution	In the event of hydrocarbon or sewage spillages, soil could become contaminated and surface water and groundwater polluted; however, the relatively small volumes of hydrocarbons that could be spilled makes this potential impact less significant. The proposed activity will be limited to only the footprint of the proposed sites. Soil loss and contamination could have an impact on grazing animals. However, the area to be disturbed is very localised, and impacts can be easily mitigated.	Without	L-M	L	M	L-M	L-M	L-M	L-M	L-M
			With	L	L	L	L	L	L	L	L
Odour from Oxidation Ponds	Potential impact people	The ponds will potentially emit a 'smell' into the atmosphere during the operations that could potentially impact the people living in the nearby settlement. Some by-products of anaerobic digestion used in wastewater treatment facilities during the operational phase may give off a strong nauseating smell. This may affect the locals in proximity of the ponds. Odours from wastewater treatment facilities can result in complaints from the neighbouring communities (residents). The severity of the impact is regarded medium in both the mitigated and unmitigated scenario.	Without	M	M	M	M	M	M	M	M
			With	M	M	M	M	M	M	M	M

8 CONCLUSIONS

The environmental aspects associated with the oxidation ponds has been successfully identified and assessed as part of this EIA Scoping process.

Mitigation measures have been identified and recommended by I.N.K Enviro Consultants cc to promote the positive impacts of the project, as well as to avoid / minimise the negative impacts to acceptable levels. An EMP was further developed which identifies potential impacts of the project during the operation phase. The EMP is a legally binding document, which the proponent must adhere to.

I.N.K concludes that should the management actions and mitigation measures provided in the EIA and EMP report be implemented, the project would have an acceptably low significant impact on the surrounding biophysical and social environment.

9 WAY FORWARD

The way forward for the EIA scoping phase is as follows:

- I&APs review the reports
- I.N.K consider comments received and finalised the reports
- MEFT review the final Scoping (including impact assessment) Report and MEFT provide record of decision.

10 REFERENCES

Mendelsohn, J., Jarvis, A., Roberts, C. and Roberts, T., 2002. Atlas of Namibia: A portrait of the land and its people. David Philip Publishers, Cape Town, RSA

Namibia Statistics Agency. 2011. *Caprivi Regional report*. NSA, Windhoek.

