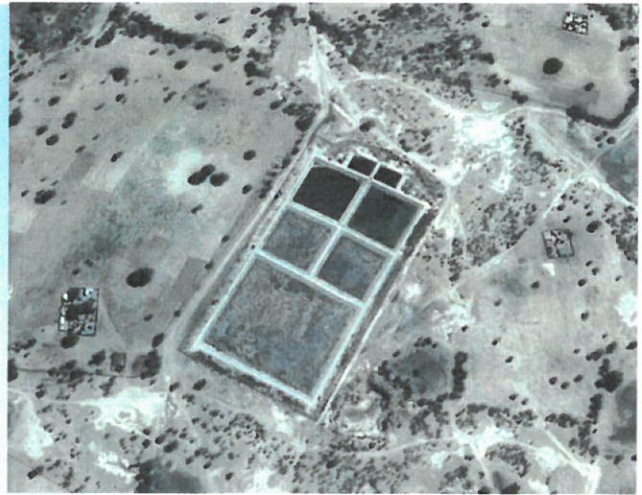


**EXISTING OXIDATION
PONDS IN EHEKE
SETTLEMENT,
OSHANA REGION**



**ENVIRONMENTAL MANAGEMENT PLAN
(OPERATION PHASE)**

Date: 07 May 2021

Prepared For:



Oshana Regional Council
Private Bag 5543
Oshakati
Tel: 065 220 441
Fax: 065 221 292



CONSULTING SERVICES AFRICA
P.O. Box 1620 Oshakati
Tel: +264 (0) 65-230316
Fax: +264 (0) 65-230317
Email: csa@mweb.com.na

Prepared By:



Contact Person:

Evat Kandongo
Consulting Services Africa
Tel: 061 237 427
Cel: 081 124 9493
Email: evatk@csa-nam.com

TABLE OF CONTENTS

NO.	SECTION	PAGE
1	INTRODUCTION	3
1.1	Introduction	4
1.2	Objectives	4
1.3	Relevant Listed Activities and Legislation	4
1.4	Methodology	5
1.5	The Applicant	6
1.6	The Environmental Assessment Practitioner	7
2	GENERAL INFORMATION ABOUT EHEKE VILLAGE AND OXIDATION PONDS	9
2.1	Location and Population of Eheke	9
2.2	Description of Eheke Oxidation Ponds	10
3.	GENERAL ENVIRONMENTAL DESCRIPTION	15
3.1	Socio-Economic Environment	15
3.1.1	Staff structure	15
3.1.2	Infrastructure on Site	15
3.1.3	Site Economic Activities	15
3.1.4	Adjacent Development	15
3.2	Biophysical Environment	15
3.2.1	Climate	15
3.2.2	Hydrogeology and Hydrology	18
3.2.3	Flora and Fauna	20
3.2.4	State of the On-Site Environment	20
4.	POTENTIAL ENVIRONMENTAL AND SOCIO-ECONOMIC IMPACTS	21
4.1	General Considerations	21
4.2	Impact Criteria and Classification	21
4.3	Operation Phase-Related Impacts	22
4.3.1	Socio-Economic Impacts	22
4.3.2	Environmental Impacts	23
5	EHEKE OXIDATION PONDS MANAGEMENT PLAN	25
5.1	General Responsibilities of the Oshana Regional Council and Eheke Settlement Office	25
5.2	Proposed Mitigation Measures to be Performed	26
6.	CONCLUSION	29
7.	REFERENCES	29

LIST OF FIGURES

FIGURE	PAGE
Figure 1 - Eheke settlement is approximately 15km west of Ondangwa	9
Figure 2 – Aerial view of Eheke settlement and oxidation ponds	9
Figure 3 – Configuration of the oxidation ponds	11
Figure 4 – Security fence around the perimeter of the oxidation ponds with trees to be trimmed	12
Figure 5 - Worn out warning sign that should be replaced	12
Figure 6 – Wastewater in anaerobic ponds– some vegetation to be removed	13
Figure 7 – Inlet structure, vegetation to be removed	13
Figure 8– Slow flow into the evaporation pond – some vegetation to be removed	14
Figure 9 – Average annual rainfall	16
Figure 10 – Average annual temperature	17
Figure 11 – Groundwater basins and rock types	18
Figure 12 – Rivers, basins, pans and lakes	19
Figure 13 – Important plant species	20

LIST OF TABLES

TABLE	PAGE
Table 1 – Relevant legislation, policies and guidelines	4
Table 2 - Criteria and Classification of Impacts	21
Table 3 - Eheke Oxidation Ponds Impacts Evaluation – Operational Phase	24
Table 4 – EMP Mitigation Measures	26

1. INTRODUCTION

1.1 Introduction

In a letter dated 15 April 2016, the Environmental Commissioner of the Ministry of Environment and Tourism notified the Oshana Regional Council that the existing oxidation ponds in Eheke settlement require an environmental clearance certificate. On 20 March 2021, the Oshana Regional Council appointed Consulting Services Africa to update the Environmental Management Plan and assist the Oshana Regional Council in applying for the renewal of the environmental clearance certificate. In addition to this updated EMP being required for the renewal of the environmental clearance certificate, it is also needed by the Oshana Regional Council and Eheke settlement office to provide guidance on proper management of the oxidation ponds.

1.2 Objectives

This Environmental Management Plan (EMP) is a basic tool for reducing the magnitude of potential impacts of the Eheke oxidation ponds. It will also be used to measure compliance by the Oshana Regional Council and Eheke settlement. In the future, this EMP will incorporate any conditions of the authorisation set by the Environmental Commissioner regarding operations and maintenance.

The objectives of this EMP are to:

- Promote sustainable development by encouraging conservation and mitigation of negative significant impacts to the natural and social environments.
- Identify laws, regulations and standards that are applicable to the environmental management of the oxidation ponds.
- Identify actions and procedures to be taken by the Oshana Regional Council and Eheke settlement office staff to prevent or minimise negative impacts to the natural and social environments and ensure compliance with this EMP.

1.3 Relevant Listed Activities and Legislation

In Government Notice No. 29 of 2012, *List of Activities that May Not Be Undertaken Without an Environmental Clearance Certificate: Environmental Management Act, 2007*, the Eheke oxidation ponds constitute the following listed activities:

- i. 2.1 - The construction of facilities for waste sites, treatment of waste and disposal of waste.
- ii. 2.3 - The import, processing, use and recycling, temporary storage, transit or export of waste.
- iii. 8.6 - Construction of industrial and domestic wastewater treatment plants and related pipeline systems.
- iv. 9.2 - Any process or activity which requires a permit, license or other form of authorisation, or the modification of or changes to existing facilities for any process or activity which requires an amendment of an existing permit, licensee or authorisation or which requires a new permit, license or authorisation in terms of a law governing the generation or release of emissions, pollution, effluent or waste.

The environmental impacts associated with the operations of the Eheke oxidation ponds are required to be managed in compliance with the EIA Regulations published in Government Notice No. 30 of 2012 read with Section 27 of the Environmental Management Act. There is also other legislation, policies and guidelines that need to be adhered to when operating oxidation ponds. See Table 1 below, which is not exhaustive.

Table 1. Relevant legislation, policies and guidelines

Title of legislation, policy or guideline	Implications for Eheke oxidation ponds
The Namibian Constitution of 1990	The Constitution clearly indicates that the state shall actively promote and maintain the welfare of the people by adopting policies aimed at management of ecosystems, essential ecological processes and biological diversity of Namibia for the benefit of all Namibians, both present and future.
Water Resources Management Act No. 24 of 2004	This Act protects all water resources in Namibia. The Act also laid down conditions to ensure that proper wastewater treatment is provided, including requirement for wastewater discharge permit from the Directorate of Water Affairs.
Environmental Assessment Policy of	The Policy seeks to ensure that the environmental consequences of development projects and policies are considered, understood and

Namibia (1995)	incorporated into the planning process, and that the term ENVIRONMENT is broadly interpreted to include biophysical, social, economic, cultural, historical and political components.
Environmental Management Act No. 7 of 2007	The Act provides a list of projects requiring an Environmental assessment. It aims to promote the sustainable management of the environment and the use of natural resources and to provide for a process of assessment and control of activities which may have significant effects on the environment.
Public Health Act, No. 36 of 1919 and Amendments and Regulations	This Act makes provision for the prevention and control of infectious diseases and epidemics. It also regulates sanitation, food and public water supplies.
Hazardous Substances Ordinance No. 14 of 1974	The Ordinance applies to the manufacture, sale, use, disposal and dumping of hazardous substances, as well as their import and export. Its primary purpose is to prevent hazardous substances from causing injury, ill-health or the death of human beings.
Pollution Control and Waste Management Bill of 1999	The Bill promotes sustainable development and the establishment of the Pollution Control and Waste Management Unit: to prevent and regulate the discharge of pollutants to the air, water and land; to make provision for the establishment of an appropriate framework for integrated pollution prevention and control; to regulate noise, dust and odour pollution; to establish a system of waste planning and management; and to enable Namibia to comply with its obligations under international law in this regard.
National Waste Management Policy, 2010	This policy is focusing specifically on Waste Management and use of various technologies waste treatment and disposal to minimize health risks. It is also geared to have a unified waste management system country wide. This policy provides the necessary guidance on the processes related to waste management in the MOHSS, wider Namibia health and social welfare sectors, and other relevant stakeholders. It is taking into consideration the process of integrated waste management from generation to final disposal. This practice also focus on medical, household, mining, agricultural, and construction waste.
Pond System, Code of Practice: General Guidelines Volume 2, 2008	This manual addresses treatment of wastewater by means of pond systems. It includes design information and strives to present information that may be helpful to owners and operators of pond systems, individuals performing compliance inspections, sampling and writing or assessing technical reports on which permit conditions are based.

1.4 Methodology

The input required to prepare this EMP was obtained by the following means:

- A site inspection performed by CSA staff;
- Meetings and discussions with Oshana Regional Council
- Review of desktop literature;
- Previous experience with the preparation of EMPs for wastewater treatment ponds;

- Consultations with registered professional engineers regarding operation and maintenance practices.

Aspects of the oxidation ponds that could impact the surrounding environment directly or indirectly were identified and analysed.

The impact analysis undertaken to forecast the characteristics of the main potential impacts included three sections:

- Identification - to specify the impacts associated with current and future oxidation pond activities,
- Prediction - to forecast the nature, magnitude, extent and duration of the main impacts, and
- Evaluation - to determine the significance of residual impacts i.e. after taking into account how mitigation will reduce a predicted impact.

Parameters that were taken into account during the impact analysis include:

- Nature of impact (positive, negative, direct, indirect, cumulative),
- Magnitude of impact (severe, moderate, low),
- Extent/location of impact (area/volume covered, distribution),
- Timing of impact (during construction, operation, decommissioning, immediate, delayed, rate of change),
- Duration of impact (short term, long term, intermittent, continuous),
- Reversibility/irreversibility of impact,
- Likelihood of impact (probability, uncertainty or confidence in the prediction), and
- Significance of impact (local, regional, global).

1.5 The Applicant

Mrs Theopolina Mbangula
 Acting Chief Regional Officer
 Oshana Regional Council
 Attention: Mrs Emilia Amaambo
 P/Bag 5543
 Oshakati
 Tel: 065-220441 Fax: 065-221292 Email: ehalaiwa@oshana.gov.na

1.6 The Independent Environmental Assessment Practitioner (EAP)

Consulting Services Africa (CSA) is a multi-disciplinary consulting firm of engineers and environmental managers. CSA has been active in Namibia under several names since its establishment in 1963 as Wolhuter and Associates. CSA is 100% owned by a Namibian citizen: Mr. Evat N. Kandongo (CEO). CSA's head office is in Windhoek, and its regional office in Ongwediva.

CSA is primarily an engineering consulting firm, but also has significant project experience in: environmental impact assessments, socio-economic and baseline studies, renewable energy studies, climate change studies, water resource management, and training of SMEs.

Previous and current projects of similar nature or complexity include:

- EIAs and EMPs for the upgrading of two gravel roads, DR3608 and MR67 to bitumen standards, approximately 185 km in total length. Two separate EIA reports submitted. Ministry of Works and Transport
- Environmental Scoping and Environmental Management Plan (EMP) for the Osona Village development which is located just south of Okahandja and will involve the construction of hundreds of homes and new municipal infrastructure. Preferred Management Services
- Environmental Scoping and EMP for the City of Windhoek's Gammans Wastewater Treatment Works to produce commercial fertilizer by composting and pelletizing the treatment sludge. City of Windhoek
- EIAs and EMPs for the upgrade of two cattle quarantine camps in the Caprivi Region. Two separate EIA reports submitted. Millennium Challenge Account – Namibia.
- Environmental Scoping and EMP for a new wastewater treatment plant for Engela town. Helao Nafidi Town Council.
- Environmental Scoping and EMP for new wastewater treatment ponds for Groot Aub village. Khomas Regional Council.
- Supervision of the Environmental Monitoring and Auditing for the new wastewater treatment ponds for Engela town. Helao Nafidi Town Council.
- Supervision of the Environmental Monitoring and Auditing for the MR122 road upgrading from gravel road to bitumen standards. Roads Authority is Client.

- Environmental scoping and EMP for a new wastewater treatment plant (ponds) for Onesi Settlement, Omusati Regional Council

Evat Kandongo, CSA, Environmental and Energy Consulting: Mr. Kandongo has been CSA's manager for the office in the north since 1997. He has a BSc in Civil Engineering from the Tampere University of Technology, FINLAND. He has been involved in various EIA's and EMP's for various wastewater projects for CSA and has supervised the construction of oxidation ponds in many areas in the north including the Eheke ponds. He has also been a founder and member of the Sustainable Energy, Environment and Livelihood (SEEL) division of CSA.

2. GENERAL INFORMATION ABOUT EHEKE SETTLEMENT AND THE OXIDATION PONDS

2.1 Location and Population of Eheke

Eheke settlement is located in Oshana Region. Eheke is located approximately 15km west of Ondangwa. See Figure 1 below. The population of Eheke is approximately 1200 (ref 1).

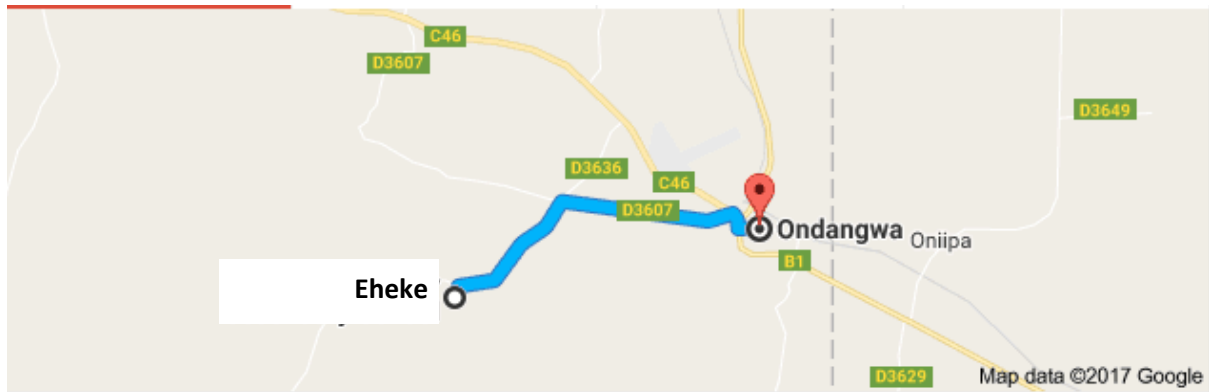


Figure 1 – Eheke settlement is approximately 15km west of Ondangwa

Within Eheke, the oxidation ponds are located approximately 500m south of Eheke residential area. See Figure 2 below.

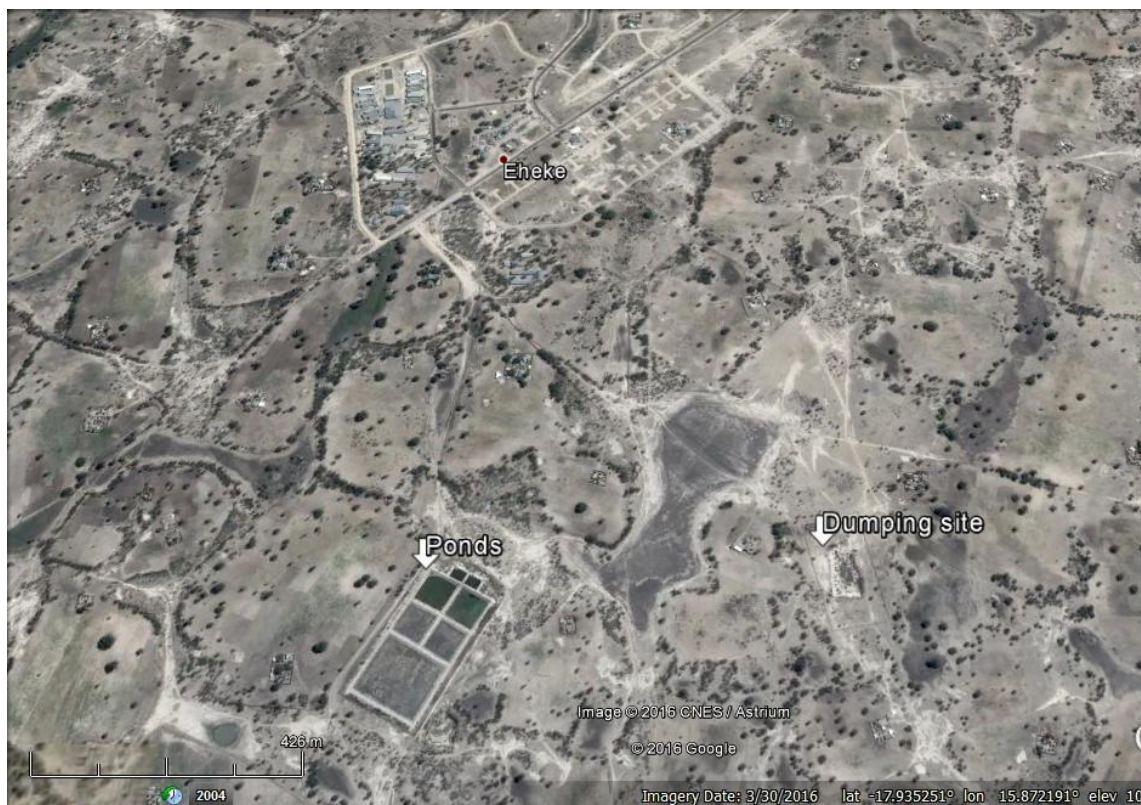


Figure 2 – Aerial view of Eheke settlement and oxidation ponds

2.2 Description of Eheke Oxidation Ponds

The Eheke ponds were constructed in 2007 from imported gravel materials compacted in layers of 150 mm to form embankment walls and the pond floors. The inner faces of the embankment walls were then covered with 100 mm Hyson Cell concrete aprons. The oxidation pond site was designed, approved by Division of Water Resources, and constructed to clean wastewater in a four-step treatment process and then discharge the cleaned wastewater into a large evaporation pond:

Treatment step 1: The wastewater is first screened by a grid which removes large objects.

Treatment step 2: The wastewater then flows into one of the deep anaerobic pond for treatment. Note: Currently, wastewater is flowing into both of the Eheke anaerobic ponds.

Treatment step 3: The wastewater then flows out of the anaerobic pond, and is split into two separate flows: one flow for one of the facultative ponds, and the second flow for the other facultative pond.

Treatment step 4: The wastewater from the two facultative ponds then flows into the two maturation ponds.

Last step: Lastly, the cleansed wastewater is discharged to the single, large evaporation pond, where it remains until it evaporates into the atmosphere.

The oxidation ponds were designed so that different types of microbial biomes predominate in the three different types of treatment ponds (anaerobic, facultative and maturation). The different types of microbial biomes have different wastewater treatment capabilities.

There are two anaerobic ponds so that the sludge that has accumulated in one of the ponds can be removed while the other pond is in use. An anaerobic pond typically needs the accumulated sludge to be removed once a year.

The Eheke oxidation pond site is protected by a perimeter fence (see photos below). The signs installed inside the fenced off pond area that warn people of the danger of the ponds, which pose a health and safety risk are worn out and requires to be replaced (see photo below).

Currently there is a wastewater flowing into both of the anaerobic ponds. This situation should be rectified by the Eheke Settlement and the Oshana Region Council technical staff, as it is only intended that one anaerobic pond be utilised at a time. Currently, there is wastewater in one of the facultative ponds as well as in the maturation pond. A slow flow is observed going into the evaporation pond. On the previous visit, there was no water in the maturation ponds or evaporation pond, which appears to indicate that the size of the ponds is greater than the inflow rate of wastewater from Eheke. This changed during the rainy season as the stormwater from the school is channelled to the ponds through the sewer system, hence the increase in volume of water currently in the ponds. This could change in the future as the inflow rate will increase due increase in village population.

The oxidation pond site appears to be in good condition, however the ponds currently require some maintenance to remove vegetation and fix a few minor cracks. The trees alongside the perimeter fence require trimming to give a clear view to the warning signs. See the photos below.

Figure 3 below is an aerial schematic of the ponds. Figures 4-8 are site visit photos of the oxidation pond site.

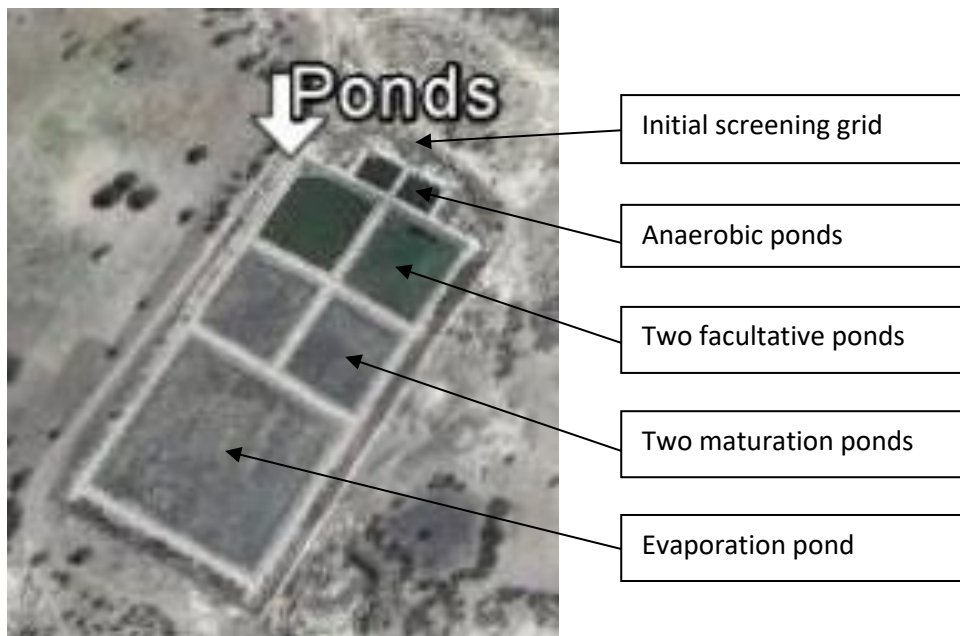


Figure 3 – Configuration of the oxidation ponds



Figure 4 – Security fence around the perimeter of the oxidation ponds with trees to be trimmed



Figure 5 – Worn out warning sign that should be replaced



Figure 6 – Wastewater in anaerobic ponds– some vegetation to be removed



Figure 7 – Inlet structure, vegetation to be removed



Figure 8– Slow flow into the evaporation pond - some vegetation to be removed

3. GENERAL ENVIRONMENTAL DESCRIPTION

Appropriate methods were used to learn about and describe the existing environment. These included a site visit, interviews with local authorities, and a review of relevant literature.

3.1 Socio-Economic Environment

3.1.1 Staff Structure

The proponent for this EMP is the Oshana Regional Council. All funding required for significant oxidation pond-related activities, such as this EMP, is approved and sourced by the Regional Council. The Eheke settlement office is responsible for providing the technical staff required to perform maintenance and repair activities at the oxidation ponds.

3.1.2 Infrastructure on Site

The only infrastructure located in the fenced off site area is the oxidation ponds and the guard house.

3.1.3 Site Economic Activities

No economic activities are taking place at the oxidation ponds.

3.1.4 Adjacent Development

Eheke settlement is located approximately 500m from the oxidation ponds. Within Eheke there is one secondary school, one combined school, one primary school and one pre-primary school. There is also a small business area as well as a church, police substation and a clinic. Of the 297 erven in Eheke, there are only five developed residential plots.

3.2 Biophysical Environment

3.2.1 Climate

Eheke, just like the rest of Namibia, falls within the Subtropical High Pressure Zone, which is characterised by massive dry air. The presence of the Botswana Anticyclone and the South Atlantic Anticyclone makes Namibia the driest country in Sub-Saharan Africa. The Botswana

Anticyclone is most prominent in winter and feeds dry air over Namibia and also obstructs the flow of moist air from the north.

Annual rainfall in Eheke is approximately 400mm on average. See Figure 9 below.

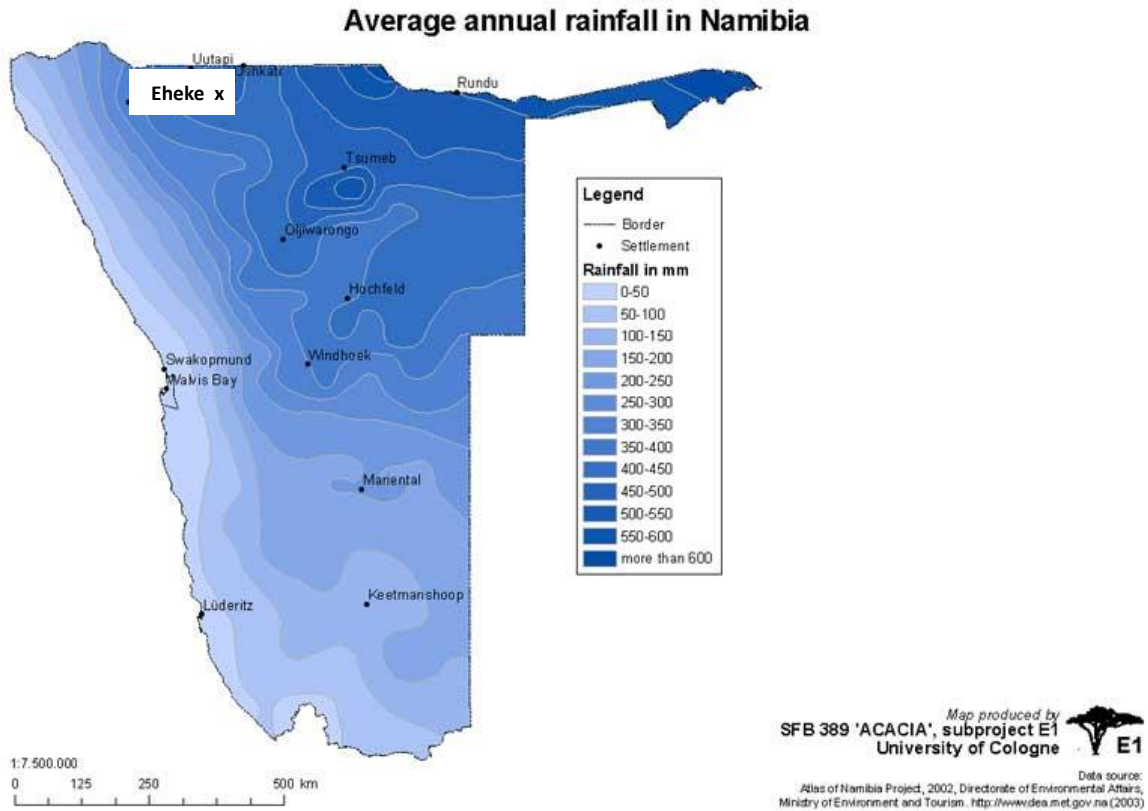


Figure 9 – Average annual rainfall (Ref 2)

As indicated in Fig. 10 below, the average annual temperature in Eheke is greater than 22° C.

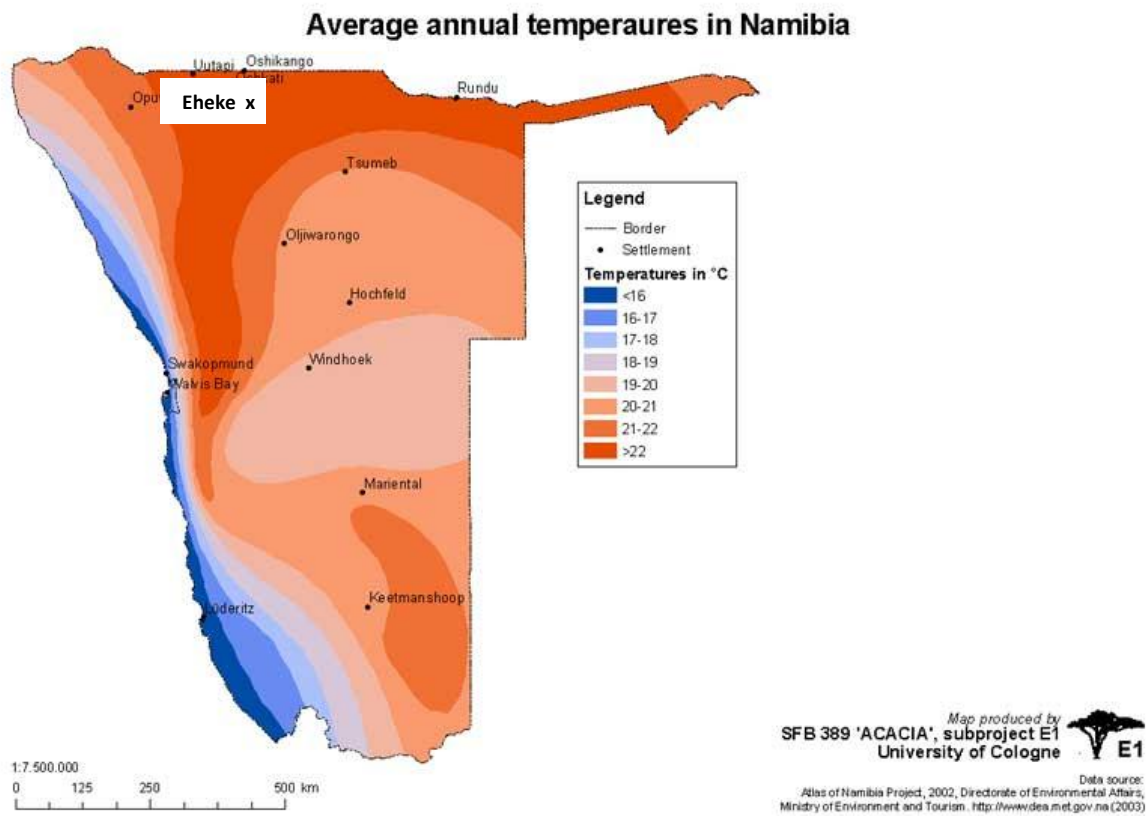


Figure 10 – Average annual temperature (Ref 2)

3.2.2 Hydrogeology and Hydrology

As indicated in Figures 11 & 12 below, Eheke is located within the Owambo groundwater basin and is located on the eastern edge of the area where there are oshanas. The general direction of the overland flow of stormwater is from north to south.

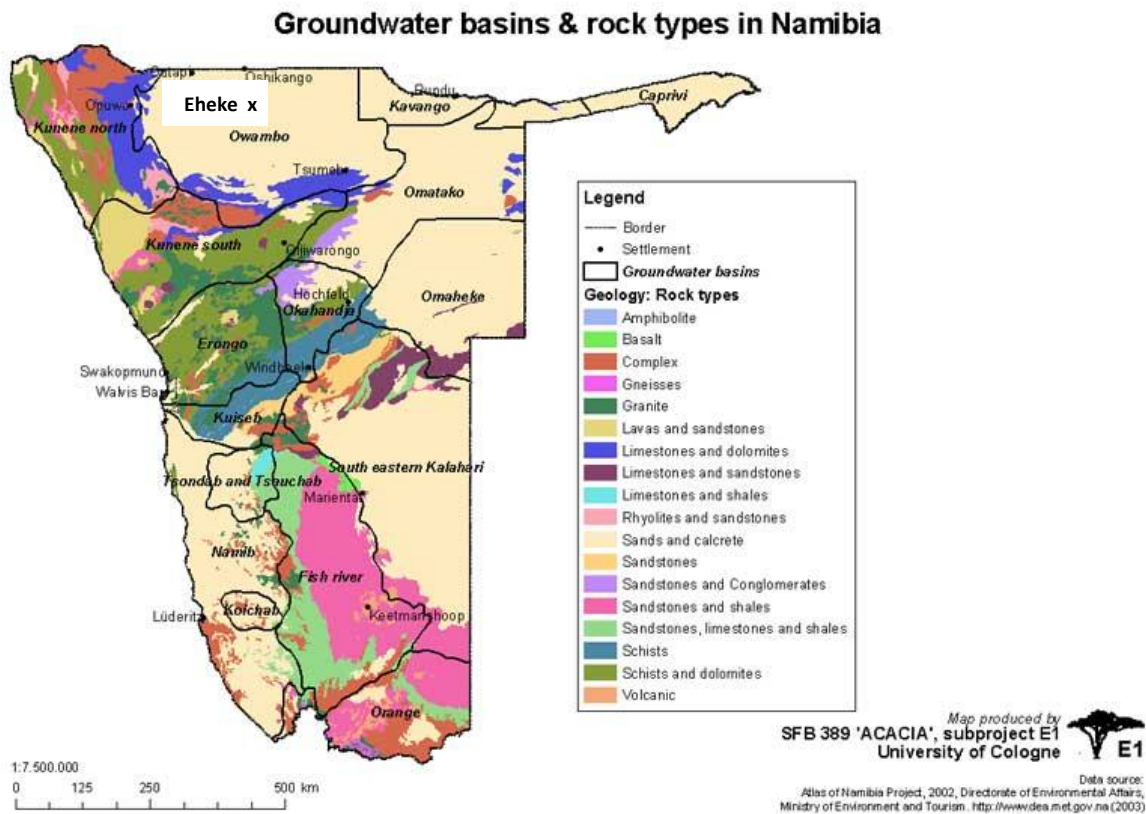


Figure 11 – Groundwater basins and rock types (Ref 2)

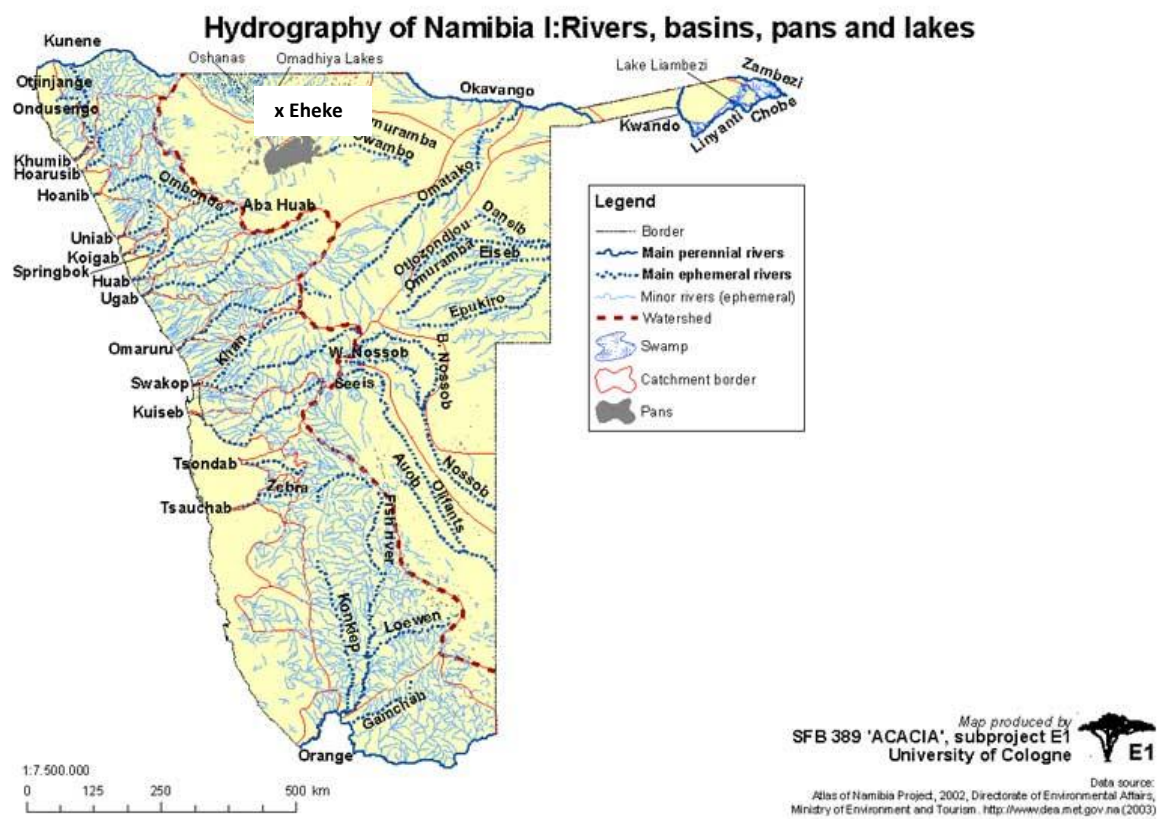


Figure 12 – Rivers, basins, pans and lakes (Ref 2)

shown in the photos of Section 2. This vegetation was however removed in January 2021, but due to good rainfall received, the vegetation has grown back in and around the ponds.

4. POTENTIAL ENVIRONMENTAL AND SOCIO-ECONOMIC IMPACTS

4.1 General Considerations

The objective of assessing the potential effects of the Ekeke oxidation ponds is to make it possible to identify and plan actions that would avoid or reduce any undesirable effects. This section of the EMP addresses the interactions of the oxidation ponds with the natural and socio-economic resources in and around it. These interactions are typically called “impacts”. It is worthwhile separating the impacts into two groups: direct (or primary) impacts that result from direct interaction of some components of the oxidation ponds with one or more environmental resources; and indirect (or secondary) impacts that occur as a result of the direct impacts. Note that a classification of a negative impact does not necessarily imply a long-term adverse impact on the environment.

4.2 Impact Criteria and Classification

A number of impacts (positive and negative) have been identified. These impacts are based on an evaluation of the operation of the oxidation ponds. Classification of possible impacts and criterion used are highlighted in Table 2 below.

Table 2: Criteria and Classification of Impacts

Assessment Evaluation Criteria	Rating (Severity)	
Impact Type	-	Negative
	=	No Impact or Negligible Impact
	+	Positive
Extent of impact	I	Immediate (site specific)
	L	Local
	R	Regional
	N	National
	IT	International
Duration of impact	ST	Short term (0-5 years)
	MT	Medium term (5-15 years)
	LT	Long term (lifetime of the development)
Intensity of impact	L	Low (where natural, cultural and social functions and processes are not affected)
	M	Medium (where the affected environment is altered but natural, cultural and social functions and processes can continue)

	H	High (where the affected environment is altered to the extent that natural, cultural and social functions and processes will temporarily or permanently cease)
Probability of impact	LP	Low probability (possibility of impact occurring is low)
	P	Probable (where there is a distinct possibility that it will occur)
	HP	Highly probable (where the impact is most likely to occur)
	D	Definite (where the impact will occur)
Significance of impact	L	Low (where natural, cultural and social and economic functions and processes are not affected). In the case of adverse impacts, mitigation is either easily achieved or little will be required, or both. In the case of beneficial impacts, alternative means of achieving this benefit are likely to be easier, cheaper, more effective and less time-consuming
	M	Medium (where the affected environment is altered but natural, cultural, social and economic functions and processes can continue). An impact exists but is not substantial in relation to other impacts that might take effect within the bounds of those that could occur. In the case of beneficial impacts, other means of achieving this benefit are about equal in time, cost and effort.
	H	High (where the affected environment is altered to the extent that natural, cultural, social and economic functions and processes will temporarily or permanently cease). In the case of adverse impacts, there is no possible mitigation that could offset the impact, or mitigation is difficult, expensive, time consuming or a combination of these. In the case of beneficial impacts, the impact is of a Substantial order within the bounds of impacts that could occur.

4.3 Operation Phase-Related Impacts

4.3.1 Socio-Economic Impacts

Impact: Employment Opportunities

The Ekeke oxidation ponds do contribute positively towards direct job opportunities for the technical staff of the Ekeke settlement office. The oxidation ponds require maintenance to ensure they continue to operate effectively. Such maintenance activities contribute to employment of local residents.

Impact: Human well-being

The oxidation ponds clean the wastewater, and allow for a safe sewage / sanitation system in Ekeke. This represents an important positive impact on human well-being.

Impact: Safety

The ponds pose a potential risk to individuals who enter the fenced off pond site. The safety risks include: unhealthy contact with the potentially hazardous wastewater, and the potential for drowning if someone happens to willingly or by mistake submerge themselves in the standing wastewater. This represents a potential negative impact.

Impact: Mosquitos

Oxidation ponds can serve as breeding grounds for mosquitos, especially if there is vegetation growing in the ponds. This is a potentially negative impact of the oxidation ponds.

Impact: Smell

Oxidation ponds can cause an unpleasant smell. This is one of the reasons why oxidation ponds are to be located a significant distance from human settlements. This represents a potential negative impact.

Impact: Cost savings

Oxidation ponds are the least expensive and least complicated wastewater treatment plant option in terms of operation (Ref. 3). This allows valuable public funds to be utilised on other beneficial projects instead of being used on the operation of a more complicated wastewater treatment plant. This represents a positive impact.

4.3.2 Environmental Impacts

Impact: Contamination of groundwater resources

Each treatment pond of the Eheke oxidation ponds has an impermeable layer that serves to prevent dirty wastewater from contaminating groundwater resources. There is a risk that an impermeable layer fails for some reason and then allows the wastewater to potentially infiltrate groundwater resources. This represents a potential negative impact.

Impact: Contamination of adjacent land areas

Each pond of the Eheke oxidation ponds has embankment walls that are stabilised by concrete. Nonetheless, there is a risk that the condition of the embankment walls will deteriorate in the future and allow wastewater to leak onto adjacent land. There is also the risk that the evaporation pond completely fills up at some time in the future and allows wastewater to spill over onto adjacent land. This represents a potential negative impact.

Impact: Wildlife Habitat, Indigenous Flora and Fauna

A desktop literature search on the potential for oxidation ponds cause health and safety risks for wildlife did not yield anything to be noted. Nonetheless, oxidation ponds may pose potentially negative health and safety risks for some wildlife as a result of the quality of the wastewater or the possibility for drowning.

Table 3 - Eheke Oxidation Ponds Impacts Evaluation – Operational Phase

OPERATIONAL PHASE							
	Identified Impact	Impact Type	Extent	Duration	Intensity	Probability	Significance
1	Surface water pollution	-	I	ST	L	LP	L
2	Groundwater pollution	-	L	LT	M	LP	L
3	Soil erosion	-	I	ST	L	LP	L
4	Soil pollution (sludge)	-	I	LT	L	D	L
5	Air pollution	=					
6	Land use potential	-	I	LT	M	D	M
7	Habitat transformation	-	I	LT	M	D	M
8	Fauna displacement	=					
9	Damage to Flora	=					
10	Traffic impacts	=					
11	Visual & aesthetic impacts (smell)	-	I	LT	L	HP	M
12	Social	+	L	LT	L	D	M
13	Economic	+	R	LT	L	D	H

5. EHEKE OXIDATION PONDS MANAGEMENT PLAN

This EMP requires the involvement of the Oshana Regional Council and local Eheke settlement office technical staff.

5.1 General Responsibilities of the Oshana Regional Council and Eheke Settlement Office

The following are the responsibilities of the Oshana Regional Council:

- Familiarity with all aspects of the EMP;
- Regularly monitor the implementation of the EMP to ensure full compliance for the entire duration of the oxidation ponds' lifecycle;
- Continual budgeting and resource allocation for maintenance and repair of the oxidation ponds.

The following are the responsibilities of the Eheke settlement office staff:

- Continual maintenance and repair of the oxidation ponds;
- Training of staff on how to maintain and repair the oxidation ponds and comply with the EMP;
- Monitor the performance of any contractors that are hired to perform maintenance and/or repairs;
- Notification of relevant authorities if a significant pollution incident occurs;
- Receive, record and respond to any complaints and input provided by Eheke residents related to the operation or performance of the oxidation ponds;
- Maintain records of all maintenance and repairs that are performed on the oxidation ponds.

5.2 Proposed Mitigation Measures to be Performed

Table 4 – EMP Mitigation Measures

EMP MITIGATION MEASURES					
EMP Ref:	Aspect / Impact	Action	Phase	Frequency of Action	Responsibility
1	Solids removal	Removed collected solids from the screening grid using appropriate tools. Workers must wear the personal protective equipment listed in EMP item 8 below. Put the screened solids into a solid, leak-proof plastic container, and then empty the collected solids into Eheke solid waste dump.	Operational	Weekly	Eheke Settlement Office
2	Vegetation control	Remove vegetation growth from the ponds and pond embankment walls and dispose at the Eheke solid waste dump.	Operational	Monthly, or whenever it is visible	Eheke Settlement Office
3	Soil erosion control	Check the embankment walls of all ponds and repair where soil erosion has occurred.	Operational	Monthly, or whenever it is visible	Eheke Settlement Office
4	Safety and health risks for unauthorised persons entering the pond site	Check the entire length of the perimeter security fence and repair immediately if there is a breach.	Operational	Weekly	Eheke Settlement Office

EMP Ref:	Aspect / Impact	Action	Phase	Frequency of Action	Responsibility
5	Sludge removal in anaerobic ponds	<ul style="list-style-type: none"> Shut off wastewater flow to the anaerobic pond that is to be cleaned and direct flow to the other anaerobic pond. Allow standing wastewater to evaporate and the sludge to dry out in the anaerobic pond to be cleaned. Carefully remove the dried sludge, either manually or mechanically. Pay careful attention to not damage the impermeable membrane layer. Mix the removed, dried sludge together with natural soil. It may be used for public landscaping purposes. 	Operational	Every 2 – 5 years when the pond is approximately ½-full of sludge	Eheke Settlement Office
6	Record keeping	<p>Establish and maintain a record book to keep track of the following:</p> <ul style="list-style-type: none"> Input and/or complaints from Eheke residents and technical staff regarding the performance of the oxidation ponds, noting issues such as bad smell, mosquitos, dead animals found on site, etc. Significant incidents that impact the environment or persons; for example: spill-overs from any of the ponds onto adjacent land areas, unauthorised entrance by any persons, etc. Maintenance and repairs performed on the oxidation pond site. Details should be provided, such as the method used to effectively remove vegetation. 	Operational	As required	Eheke Settlement Office
7	Reporting of significant safety & environmental incidents	Any significant safety or environmental incidents involving, for example: unauthorised entrance and damage to the pond site, potential contamination of groundwater resources, spill-over or leakage of wastewater onto adjacent land area should be immediately reported by the Eheke Settlement Office to the Oshana Regional Council. The Oshana Regional Council should then inform the relevant authority, such as the police, MAWF Division of Water Resources, MET Directorate of Environmental Affairs, etc.	Operational	As required	Eheke Settlement Office And Oshana Regional Council

EMP Ref:	Aspect / Impact	Action	Phase	Frequency of Action	Responsibility
8	Personal protective clothing	<p>All technical staff who work at the oxidation ponds site are to be provided with personal protective clothing and are responsible for wearing it at all times when working inside the dump site. Such clothing shall include but not be limited to:</p> <ul style="list-style-type: none"> • Protective and waterproof gloves • Protective and waterproof boots • A full-body, long-sleeved workers uniform • Protective eyewear • Respiratory protection 	Operational	To be provided to staff immediately and worn by staff at all times when working inside the dump site	Eheke Settlement Office
9	Monitor EMP Implementation	<p>Oshana Regional Council staff to visit the oxidation ponds twice a year accompanied by Eheke settlement office staff to monitor the implementation of, and compliance with, the EMP.</p> <p>A summary of the visit should be recorded, and any issues of non-compliance should be communicated to the Eheke settlement office with a request for immediate action to re-establish compliance.</p>	Operational	Semi-annually	Oshana Regional Council

6. CONCLUSION

This Environmental Management Plan (EMP) is a practical tool for the Oshana Regional Council and Eheke settlement office to implement to reduce the magnitude and frequency of potential negative impacts. It is also a tool for the Competent Authority, the Environmental Commissioner of the Ministry of Environment and Tourism, to measure compliance by the Oshana Regional Council and Eheke settlement office. Any conditions of the Environmental Clearance Certificate granted by the Competent Authority should be incorporated into this EMP and implemented by the Oshana Regional Council.

7. REFERENCES

1. Per communication with Eheke Settlement office staff on 05 May 2021.
2. University of Cologne / Atlas of Namibia; J. Mendelsohn, A. Jarvis, C. Roberts, and T. Robertson; published by David Phillip in 2002. Website: http://www.uni-koeln.de/sfb389/e/e1/download/atlas_namibia/main_namibia_atlas.html
3. "Waste Stabilisation Ponds"; EAWAG (Swiss Federal Institute of Aquatic Science and Technology), Dorothee Spuhler (SEECON International gmbh); 2014; webpage: <http://www.sswm.info/category/implementation-tools/wastewater-treatment/hardware/semi-centralised-wastewater-treatments/w>