MOPANI DISTRICT MUNICIPALITY

DRAFT ENVIRONMENTAL IMPACT REPORT AND ENVIRONMENTAL MANAGEMENT PLAN FOR THE PROPOSED UPGRADING OF THE EXISTING MUNICIPAL SEWAGE TREATMENT PLANT AT SEKGOSESE SECONDARY SCHOOL ON PART OF THE FARM ROERFONTEIN 161-LT, SENWAMOKGOPE, LIMPOPO

DEA REF: 12/9/11/L329/5

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POLYGON
ENVIRONMENTAL PLANNING

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ACRONYMS AND ABBREVIATIONS:	
AMSL	Above Mean Sea Level
BES	Bateleur Environmental Services
BID	Background Information Document
BOD	Bio-chemical Oxygen Demand
DAFF	Department of Agriculture, Forestry and Fisheries
DWA	Department of Water Affairs
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMF	Environmental Management Framework
EMP	Environmental Management Programme
ESR	Environmental Scoping Report
ESS	Environmental Scoping Study
GA	General Authorisation
GLM	Greater Letaba Municipality
GPS	Global Positioning System
GRA	Groundwater Resources Assessment Study
GRIP	Groundwater Resource Information Project
Ha	Hectare
HIA	Heritage Impact Assessment
I&AP	Interested and/or Affected Party
IDP	Integrated Development Plan
IHAS	Integrated Habitat Assessment
Kl/d	Kilolitres per day
LDEDET	Limpopo Department of Economic Development, Environment and Tourism
LUMS	Land Use Management Scheme
MAE	Mean Annual S-pan Evaporation
MAMSL	Metres Above Mean Sea Level
MAP	Mean Average Precipitation
MDM	Mopani District Municipality
Mg/l	Milligrams per litre
MRC	Mamaila Royal Council
NEMA	National Environmental Management Act (1998)
NEMWA	National Environmental Management: Waste Act (2008)
NWA	National Water Act (1998)
OLEMF	Olifants-Letaba Environmental Management Framework
PPM	Parts per million
RAS	Return Activated Sludge
RBC	Rotating Biological Contactors
SASS	South African Scoring System
TDS	Total Dissolved Solids
WUL	Water Use Licence
WULA	Water Use Licence Application

CONTACT DETAILS

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1. INTRODUCTION AND PROJECT DESCRIPTION

1.1. Introduction

Polygon Environmental Planning CC was appointed by Mošomo Consulting Civil Engineers to undertake the necessary waste licence application for the Mopani District Municipality's (MDM's) proposed upgrading of the existing municipal sewage treatment plant on the premises of Sekgosese Secondary School in Senwamokgope. An Environmental Impact Assessment (EIA) is being conducted in compliance with the National Environmental Management: Waste Act (NEMWA, 2008).

This Environmental Impact Report (EIR) and Environmental Management Plan (EMP) were compiled following two phases of investigations and stakeholder engagement, viz. the scoping phase and the impact assessment phase. This draft EIR and EMP are currently available for public review and comment for a period of 30 days, and comments will be incorporated into the final EIR and EMP, which will then be submitted to the Department of Environmental Affairs (DEA) for review and decision making.

1.2. Project description

The existing sewerage plant on the site comprises six oxidation ponds, which are meant to receive raw sewage from a large part of Senwamokgope township. However, a suspected blockage or break in the main outfall sewer between Senwamokgope and Sekgosese Secondary School (on whose premises the sewerage plant is situated) has for the past ± 3 years prevented sewage from Senwamokgope from reaching the plant. Only sewage from Sekgosese Secondary School enters the primary pond of the treatment plant, whilst sewage from the township leaks out at the point of the blockage / break.

There are two aspects that need to be addressed:

- Provide a waterborne sewerage system to all the present households and ensure the reticulation of the system and main outfall is adequate to accommodate the total expected future peak flow (this component does not require a waste licence).
- Upgrade the existing oxidation pond system to treat the sewage to the standards set by the Department of Water Affairs (DWA). This is to entail an increasing the treatment capacity as well as upgrading the system to a type of treatment more suitable for handling this volume of sewage.

The 200 stands plus the school which are currently connected to the main sewer outfall yields an estimated effluent of 200 x 0.5 kl/d = l00kl/day plus school with 710 pupils x 40l/pupil/day = 28.4 kl/day. This totals 128.4 kl/day, but presently only the estimated 28.4 kl/day from the school reaches the first pond, due to the blockage / break in the outfall sewer. The treatment works can be described as a facultative pond system and consist of the following elements:

- Inlet structure with manually raked coarse screen and grit channels.
- Primary Pond surface area 2 910 m^2 capacity 4 365 m^3
- Secondary pond no.1 780 m^2 1 170m^3
- Secondary pond no.2 570 m^2 855 m^3
- Tertiary pond no. 1 336 m^2 504 m^3
- Tertiary pond no. 2 350 m^2 526 m^3
- Tertiary pond no. 3 210 m^2 315 m^3
- pump station

Total **5 156 m^2** **7 735 m^3**

The capacity of the existing system is approximately 200 kl/day. The shortfall in treatment capacity can be summarized as follows:

Senwamokgope Sewage Plant:	Design capacity (pond system):	200 kl/d
	Present average dry weather flow:	1 062 kl/d
	Future average dry weather flow:	1 329 kl/d
	Future shortfall:	**1 129 kl/d**
	% overload:	565 %

The design capacity of the sewerage treatment works is proposed to be upgraded from the current 200 kl/day to 1 329 kl/day, which translates to an upgrade from 8.3 kl per hour to 55.4 kl/h.

The type of sewage treatment being proposed is the bio-filter ("Trickling Filter") process. This is a high-rate filter which is characterized by higher hydraulic loadings, and employs high recirculation whereby the filter effluent is returned to and reapplied onto the filter increasing the contact time of the waste with the microorganisms and also helping to seed the lower portion of the filter with active organisms. This process would be compatible with the existing site condition, as the existing primary pond can be converted to an anaerobic reactor digester to cover the function of the primary settling tank as well as a sludge digester. The sludge from the humus tank (final clarifier) is also collected and pumped to the anaerobic reactor for digestion.

The project is proposed to comprise mainly the following:

- Rehabilitate existing sewage system to accommodate new project.
- Upgrade the existing inlet structure and install a partial flume to measure the flow.
- Incorporate an anaerobic reactor-digester in the existing sewage system to cover the functions of primary sedimentation tank and sludge digester.
- Construct a bio-filter and a new humus tank (secondary clarifier).
- Construct new sludge disposal facilities (sludge drying beds).
- Employ chlorination dosing for sterilization of final effluent.
- Make use of the existing ponds as maturation ponds to polish the effluent.

2. PROJECT MOTIVATION

The existing sewage treatment facility on the site has a limited capacity and is not fully functional. Furthermore, due to a suspected blockage in the main sewer outfall, sewage from most of Senwamokgope which is reticulated does not reach the sewerage plant. As a result, untreated sewage from Senwamokgope drains into the soil, most likely at breaks along the outfall, and inadequately treated sewage runs from the existing treatment plant into a nearby stream. This poses a serious risk of pollution of groundwater and nearby rivers (notably the Senwamokgope River, Lebjelebore River and an unnamed stream).

In light of the fact that the residents of Senwamokgope township and surrounding communal areas do not have access to piped water but instead depend on groundwater (according to the GLM IDP 2010/11) and water from rivers (livestock were seen drinking from rivers), contamination of water sources by sewage constitutes a significant health risk to these community members as well as their livestock. It also constitutes an environmental hazard, as sensitive river ecosystems cannot accommodate unlimited pollution.

With this project, MDM aims to provide a **properly planned sewage system** that will not only provide **proper sanitation** for the current inhabitants of Senwamokgope, but also set the stage for future development of the Senwamokgope area. Effluent is to comply with the National Water Act (NWA, Act No 36 of 1998) and the requirements of both DWA and DEA in order to halt the current environmental pollution and the risk to the health of humans and livestock, which is ongoing as long as the existing semi-functional system remains in its current condition. The proposed upgrading is therefore anticipated to **reduce health risks and environmental degradation**.

The motivation for this proposed project is as follows:

- To **minimize** the possibility of **pollution** and contamination of groundwater and surface water resources and to reduce the risk of outbreak of waterborne diseases such as diarrhoeal disease.
- To **increase the re-useable potential** of the effluent.
- To empower the local municipality for sustainable development and **upliftment of living standards** through the development of an improved and properly planned sewage treatment system. This will allow the municipality to provide a sustainable and cost effective service to the community.
- To provide **accredited training programmes** to train treatment plant operators in the proposed treatment processes and to operate and maintain the sewage treatment plant.
- Provide **employment opportunities** in the project area by using labour intensive construction methods where feasible, and utilizing local contractors.

3. INVESTIGATION OF ALTERNATIVES

3.1. Project Alternatives

No project alternatives were investigated within the ambit of this EIA, as the express aim of the project is to provide the community of Senwamokgope with proper sewerage. Furthermore, the site is already utilized for sewage treatment, and this “brownfield” site is simply proposed to be upgraded.

3.2. Site Alternatives

No site alternatives were investigated, as a sewage treatment plant already exists on the proposed site. From both a financial and an environmental perspective, upgrading of the existing facilities (brownfield site) is preferable to establishment of new facilities on a greenfield site, as no new impacts will be introduced to an undeveloped site, but rather only the scale of already existing impacts (whether positive or negative) may be affected. The Mamaila Royal Council has also already given their consent for the use of this particular site.

3.2.1. Site description

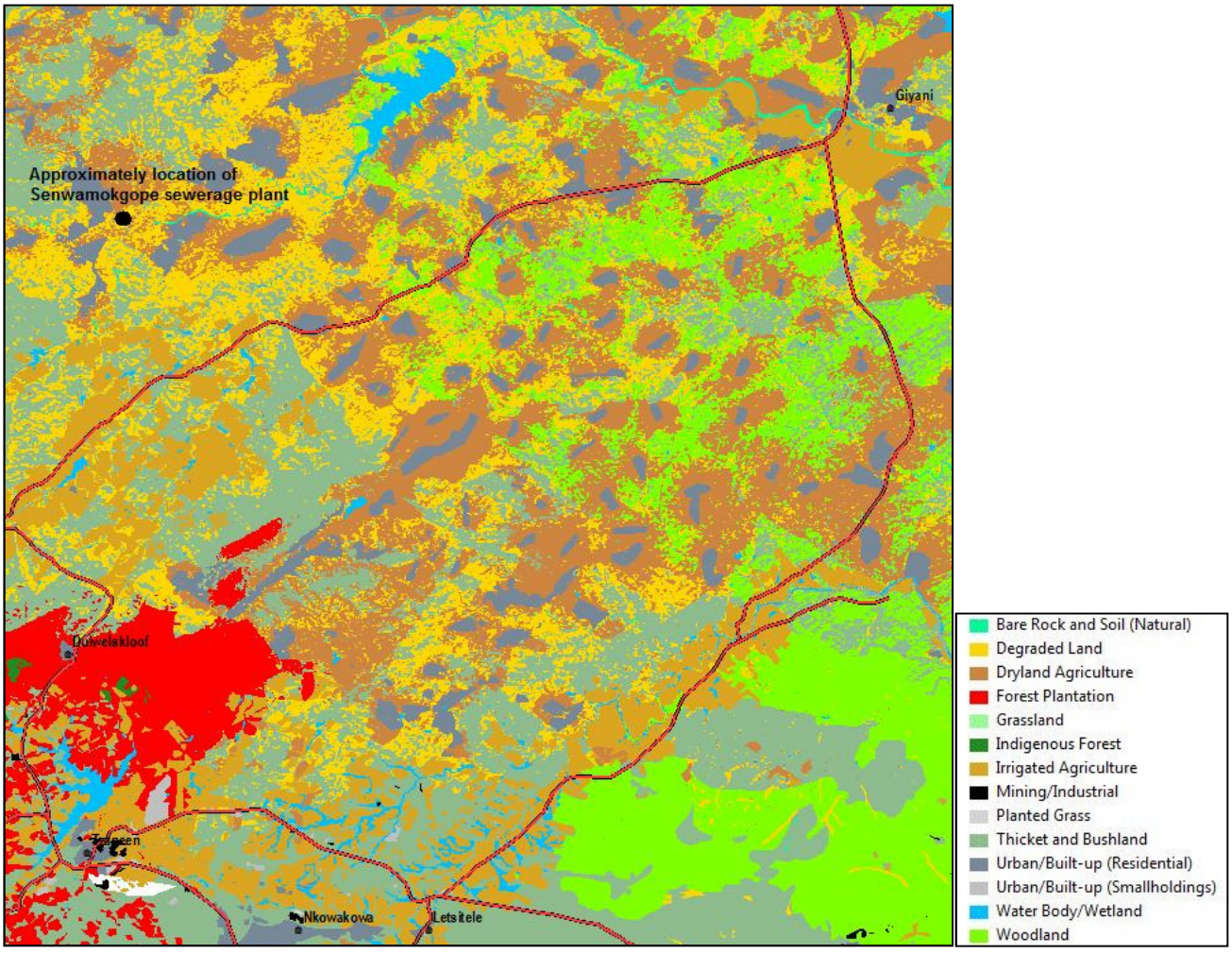
The site consists of a fenced area of approximately 0.6 ha in extent, on the premises of Sekgosese Secondary School in Senwamokgope township. The site forms part of the farm Roerfontein 161-LT and is currently occupied by the existing sewerage plant, which consists of the primary, secondary and tertiary oxidation ponds as described in Section 1.2. The sections between and around the ponds are grassed, and vegetation on the site is degraded. Vegetation immediately around the site ranges from degraded to natural.

The Lebjelebore River runs just northwest of the site and a small unnamed tributary running right next to the plant flows into this river.

The following photographs provide an indication of the current situation onsite; please refer to Appendix B for more site photographs. Figure 3.1 also provides an overview of land use in the surrounding area. It can be seen that in broad terms, the local area is characterised by built-up / urban areas, degraded land, irrigated agriculture and to a lesser extent thicket and bushland (DEA, Olifants-Letaba EMF).

Photos 3.1 and 3.2: Some of the existing oxidation ponds onsite.

Figure 3.1: Land use (DEA, Olifants-Letaba EMF)



3.3. Technology Alternatives

Four different technology alternatives were investigated by Mošomo Consulting Civil Engineers, and evaluated in terms of the following criteria:

- Treated effluent must comply with the National Water Act
- Sludge handling must comply with the National Water Act
- Acceptable screenings disposal
- Robust system – little or no sensitive or vulnerable procedures
- Periodic personnel absenteeism must be able to be tolerated
- Highly skilled operation should be avoided as far as possible
- Power interruptions must be able to be tolerated
- Must be based on well-established and proven principles
- Must comply with the Occupational Health and Safety Act and be safe to workers
- Final effluent must be sterilized
- Execution of tasks must be convenient to prevent neglecting of these duties
- It should be possible to isolate sections of the plant for maintenance without stopping the entire plant
- Unpleasant odours must be minimized
- Monitoring must be incorporated into the plant's operation
- Final effluent should be "polished"
- Plant operators must be trained

The following technologies were assessed, bearing in mind the criteria above:

3.3.1. Bio-filter (Trickling Filter)

The Bio-filter is a high-rate filter which is characterized by higher hydraulic loadings. This process employs high recirculation whereby the filter effluent is returned to and reapplied onto the filter increasing the contact time of the waste with the microorganisms and also helping to seed the lower portion of the filter with active organisms. The process would be compatible with the existing site condition, as the existing primary pond can be converted to an anaerobic reactor digester to fulfil the function of the primary settling tank as well as a sludge digester. The sludge from the humus tank (final clarifier) would also be collected and pumped to the anaerobic reactor for digestion.

The Bio-filter process is a simple and reliable process and does not require a large surface area. It is appropriate for small to medium-sized communities and effective in treating high concentrations of organic material, depending on the type of media. It furthermore has low power requirements and only a moderate level of skill and technical expertise is needed to manage and operate the system. This alternative was therefore selected as the preferred option.

3.3.2. Rotating biological contactors

This treatment process would be compatible with the existing infrastructure and hydraulic profile and would require the same operational skills as for a trickling filter. Rotating biological contactors (RBC) are mainly used for carbonaceous BOD (bio-chemical oxygen demand) removal. This could limit the future use of the effluent, depending on future environmental and regulatory aspects. Advanced levels of treatment such as nitrification / denitrification can be obtained by additional RBC units. This process would, however, require a high level of routine maintenance because of the many mechanical parts, and would also require a higher

energy input than do trickling filters. The RBC process is furthermore susceptible to odour problems in the case of excessive organic loadings. The capacities of RBC's are very limited and to install sufficient units to cater for the expected flow would require a higher capital layout and much higher maintenance costs. The option of RBC was therefore not further considered further in detail.

3.3.3. Aerated lagoons

Aerated lagoons in its simplified form would have the lowest cost in terms of capital outlay as well as operational and maintenance cost implications, but would gain little in terms of effluent quality. If the existing ponds are used as earthen sedimentation basins, large concentrations of algae would still be present in the effluent and the sedimentation basins would require periodic de-sludging. To overcome these problems, a separate settling tank with a return sludge pump station and a sludge disposal system would be required, making this option similar to an activated sludge process. The process would, however, require a higher energy input to keep the sludge in the aerated pond in suspension and completely mixed, and was therefore not considered further.

3.3.4. Activated sludge process

The activated sludge system is a type of suspended growth system used for biological treatment of municipal and industrial wastewater. This is a process in which the mixture of wastewater and micro-organisms is agitated and aerated, which leads to oxidation of dissolved organics. After a certain reaction time, the mixed liquid is discharged to the secondary clarifier where the suspended solids are settled out from the treated wastewater by gravity. The concentrated biological settled sludge from the clarifier is recycled back to the activated sludge reactor as return activated sludge (RAS) to maintain a high population of micro-organism in order to achieve rapid breakdown of organics in the wastewater.

The activated sludge system has three compartments: the anaerobic, anoxic and aerated zones. Nitrification and denitrification occurs in this process. The anoxic and anaerobic zones are mainly used for phosphorus removal, whilst the aerated zone is fitted with appropriate mechanical aerators to aerate the contents and keep it homogeneous. This process provides the best quality effluent within the smallest area, and advanced treatment processes such as nutrient removal can be applied.

The disadvantages of this option are the high cost, high energy input and the higher degree of trained operators and maintenance personnel that is required. This option was therefore not investigated in detail.

3.4. No-go Alternative

The 'no-go' alternative refers to the scenario in which the proposed activity does not take place and the site remains as it is.

If the no-go alternative is taken, the impacts that can be anticipated to be associated with the proposed upgrade of the sewerage plant would not come to pass and the conditions and trends on the property can be expected to remain as per the status quo. Impacts that can be expected to be experienced in case of the no-go alternative being selected include the following:

Table 3.1: Potential impacts associated with the no-go option

POTENTIAL IMPACT	STATUS	EXTENT	MAGNITUDE	LIKELIHOOD	SIGNIFICANCE
Bio-physical aspects					
Continuing groundwater and surface water contamination risk at the semi-functional treatment plant, the outfall sewer break and all over Senwamokgope (pit latrines)	Negative	Local to sub-regional	Unknown	Highly probable	High
Risk of soil and water pollution remains unchanged (no decrease nor increase)	Neutral	Local	Unknown	Highly probable	High
Continuing health risk to humans and fauna (wildlife and livestock) due to water contamination and air pollution resulting from burning of collected screen material at the treatment plant	Negative	Local to Sub-regional	Unknown	Highly probable	High
Odour levels remain at current levels at treatment plant, at areas where untreated sewage flows out, at pit latrines, and in areas where people use the veld for ablutions	Neutral	Local	Low	Highly probable	Low
Hampering of new development in Senwamokgope due to unavailability of effective water-borne sewerage	Neutral	Local	Unknown	Definite	Medium
No uplifting of living standards in Senwamokgope in terms of sewerage provision	Neutral	Local	High	Highly probable	High
No change in current killing or disturbance of fauna	Neutral	Local	Low	Highly probable	Low
No removal of alien invasive plants, nor introduction of new aliens	Neutral	Local	Low	Highly probable	Low
No construction-phase security risk associated with construction workers	Neutral	Local	Unknown	Definite	Unknown
No construction phase job creation associated with either the sewerage plant or the sewerage reticulation, nor support of jobs in related industries through local procurement of materials, equipment & services during construction	Neutral	Local	Low	Definite	Low
No visual impact of construction activities	Neutral	Local	Negligible	Definite	Negligible
No construction-phase noise	Neutral	Local	Low	Definite	Low
No long-term change in current noise and visual impacts	Neutral	Local	Negligible	Highly probable	Negligible

4. APPLICABLE LEGISLATION

4.1. Environmental Legislation

- *National Environmental Management Act EIA Regulations (2006)*

The EIA Regulations (2006), published in terms of section 24(5) read with section 44 of the National Environmental Management Act (NEMA, Act No. 107 of 1998), stipulate the EIA process that is required to be undertaken for the proposed project.

Even though new EIA Regulations officially commenced on 2 August 2010, this application follows the procedure contained in the 2006 regulations, as these are the regulations that were in place when the application for a waste licence was submitted to DEA.

- *National Environmental Management: Waste Act (2008)*

In terms of the National Environmental Management: Waste Act (NEMWA, Act 59 of 2008), certain listed waste management activities require environmental authorisation, and for this purpose requires either a Basic Assessment or a full EIA to be undertaken. The following listed activities, as published in Government Notice 718 (3 July 2009) in terms of NEMWA, are or may be applicable to this proposed project and triggered the full EIA which is currently being undertaken:

Table 4.1: Applicable listed waste management activities in terms of NEMWA

CATEGORY B ACTIVITY NR	ACTIVITY DESCRIPTION
4	The biological, physical or physico-chemical treatment of hazardous waste at a facility that has the capacity to receive in excess of 500kg of hazardous waste per day.
5	The treatment of hazardous waste using any form of treatment regardless of the size or capacity of such a facility to treat such waste.
6	The treatment of hazardous waste in lagoons.
7	The treatment of effluent, wastewater or sewage with an annual throughput capacity of 15 000 m^3 or more.
9	The disposal of any quantity of hazardous waste to land.
11	The construction of facilities for activities listed in Category B of this Schedule (not in isolation to associated activity).

- *National Water Act (1998)*

The following activities, which are classified as water uses in terms of the National Water Act (NWA, Act No. 36 of 1998), will require either authorisation or registration by DWA:

Table 4.2: Applicable water uses in terms of the National Water Act (1998)

SECTION	WATER USE DESCRIPTION
21(a)	Taking water from a water resource.
21(e)	Engaging in a controlled activity identified as such in Section 37(1) or declared under Section 38(1).
21(f)	Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit.
37(1)(a)	Irrigation of any land with waste or water containing waste generated through any industrial activity or by a waterwork.

An application for registration of the sewage system (and discharge / irrigation of treated effluent) with DWA in terms of the General Authorisation (GA) was submitted to DWA's Polokwane office on 22 November 2010. A Water Use Licence Application (WULA) for the proposed small-scale abstraction of water from the Lebjelebore River for use in construction will be submitted to DWA in due course.

4.2. Other Legislation

Table 3.4: Other applicable legislation

LEGISLATION	RELEVANT SECTIONS	PERTAINS TO
The Constitution Act (No 108 of 1996)	Chapter 2, Section 24	Bill of Rights: Environmental rights
Conservation of Agricultural Resources Act (1983)	Section 5	Prohibition of the spreading of weeds
Fencing Act (No 31 of 1963)	Section 17	Clearing of bush for fencing
Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (No 36 of 1947)	Sections 3 – 10	Control of the use of pesticides, herbicides and fertilizers, and precautions to protect workers in this regard
Limpopo Environmental Management Act	Schedule 2, 3, 11 and 12	Lists of protected animals and plants
National Environmental Management Act (No 107 of 1998) and regulations		Specifies environmental management principles and sets out the process to be followed for EIAs
National Environmental Management: Air Quality Act (No 39 of 2004)	Section 32	Control of dust
	Section 34	Control of noise
	Section 35	Control of offensive odours
National Environmental Management: Biodiversity Act (No 10 of 2004)	Section 57	Restricted activities involving listed threatened or protected species
	Sections 65–69	Regulation of activities involving alien species
	Sections 71, 73 & 75	Regulation of activities involving invasive species
National Environmental Management: Waste Act (No 59 of 2008)	Chapter 4, Part 4	Waste management activities
	Chapter 5	Licensing of waste management activities
	Chapter 7	Compliance and enforcement
National Heritage Resources Act (No 25 of 1999)	Section 34	Protection of structures older than 60 years
	Section 35	Protection of archaeological and palaeontological sites and material as well as meteorites
	Section 36	Conservation of burial grounds and graves
National Water Act (No 36 of 1998)	Section 19	Prevention and remedying effects of pollution, particularly where pollution of a water resource occurs or might occur as a result of activities on land
	Section 20	Control of pollution of water resources following an emergency incident
	Chapter 4 (Sections 21-55)	Governs water use
Water Services Act (No 108 of 1997)	Sections 3 and 4	Provides for the rights of access to basic water supply and basic sanitation.
Occupational Health and Safety Act (No 85 of 1993)	Section 8	General duties of employers to their employees
	Section 9	General duties of employers and self-employed persons to persons other than their employees
Municipal systems Act (No 32 of 2000)	Section 4	Provides for the core principles, mechanisms and processes that are necessary to enable municipalities to move progressively towards the social and economic upliftment of local communities, and to ensure universal access to essential services that are affordable to all

5. ENVIRONMENTAL SCOPING INVESTIGATION – BIO-PHYSICAL INVESTIGATIONS

Bio-physical investigations during the environmental scoping phase consisted of the following specialist studies:

- Ecological investigation conducted by Mr Jacques Moller of Bateleur Environmental Services;
- Limnological investigation conducted by Mr Cornell Vermaak of Endip Wildlife Laboratories;
- Geo-hydrological investigation conducted by Mr Carel Haupt of WSM Leshika Consulting.

During the more detailed impact assessment phase, the following specialist bio-physical investigation was undertaken:

- Geo-hydrological investigation (more detailed) conducted by Mr Carel Haupt of WSM Leshika Consulting.

Potential impacts in terms of climate, topography, soils, geology, hydrology and ecology were scored on the following basis:

- **Status:**
  - *Positive* – the proposed project is to have a positive impact in terms of the particular parameter;
  - *Negative* – the proposed project is to have a negative impact in terms of the particular parameter;
  - *Neutral* – the proposed project is to have neither a positive nor a negative impact in terms of the particular parameter.

- **Extent:**
  - *Local* – the impact is to be felt on the site and in its immediate surroundings, up to a radius of 50km from the site);
  - *Sub-regional* – the impact is to be felt at a distance of up to 100km from the site;
  - *Regional* – the impact is to be felt in the Limpopo Province;
  - *National* – the impact is to be felt across provincial boundaries.

- **Duration:**
  Refers to the period of time over which impacts can be expected to be experienced.

  - *Short term* – 0 to 5 years;
  - *Medium term* – more than 5 years, up to 15 years;
  - *Long term* – more than 15 years;
  - *Permanent* – the impact is irreversible.

- **Magnitude:**
  Refers to the intensity of the potential impact, if it is experienced.

  - *Negligible* – the impact will barely be felt, if at all. No mitigation required;
  - *Low* – the parameter will only be affected to a small extent by the proposed project. No mitigation required, but monitoring is recommended;

- *Medium* – the parameter will be affected by the proposed project, but functions in terms of the parameter can still continue. Mitigation and monitoring required;
- *High* – functioning in terms of the parameter will be significantly affected by the impact. Extensive mitigation and long-term monitoring required.

- **Likelihood:**
  - *Improbable* – it is unlikely that the impact will be experienced;
  - *Possible* – the impact may be experienced. Monitoring required; mitigation may also be required based on the type of impact and its significance;
  - *Highly probable* – the impact will most likely be experienced. Monitoring and mitigation required based on the type of impact and its significance in order to reduce the probability of the impact occurring and/or to reduce the magnitude of the impact;
  - *Definite* – the impact will be experienced. Monitoring and mitigation required based on the type of impact and its significance in order to reduce the probability of the impact occurring and/or to reduce the magnitude of the impact.

- **Significance:**
  Significance is based on a consolidation of the anticipated extent, duration, magnitude and likelihood of the potential impact.

  - *Negligible* – The impact will barely be felt, if at all. No mitigation required;
  - *Low* – The parameter will only be affected to a small extent by the proposed project. No mitigation required, but monitoring is recommended;
  - *Medium* – The parameter will be affected by the proposed project, but functions in terms of the parameter can still continue. Mitigation and monitoring required;
  - *High* – Functioning in terms of the parameter will be significantly affected by the impact. Extensive mitigation and long-term monitoring required.

5.1. Climate

5.1.1. Status quo

The regional climate can be defined in three distinct seasonal occurrences (WSM Leshika, 2010):

- May to July: dry with cool to warm, usually cloudless days and nights;
- August to October: daily temperatures begin to rise with day temperatures generally hot, though the nights still tend to be cool;
- November to April: this is the regional wet season, a hot period with heavy thundershowers. About 85 per cent of the annual rainfall occurs during these months.

Mean annual precipitation (MAP) is 623mm and the mean annual S-pan evaporation (MAE) is 1593 mm for the area (DWA WR2005) (WSM Leshika, 2010).

Rainfall and wind data was obtained from the South African Weather Service for the three nearest weather stations – Mara, Thohoyandou and Tzaneen – but the Tzaneen station (located on Westfalia Estate) only has data going back to 2007. Average values indicated below pertaining to the Mara and Thohoyandou stations therefore cover the period from 2000 to 2009 whilst the values for the Tzaneen-Westfalia station only cover the period 2007 to 2009.

Table 5.1: Rainfall at Mara and Thohoyandou weather stations (average from 2000 to 2009), and Tzaneen-Westfalia weather station (average from 2007 to 2009)

Month	Mara Weather Station	Thohoyandou Weather Station	Tzaneen-Westfalia Weather Station
January	67.85 mm	108.08 mm	174.3 mm
February	83.07 mm	195.11 mm	114.8 mm
March	52.18 mm	120.84 mm	58.87 mm
April	15.2 mm	46.61 mm	57.33 mm
May	7.4 mm	8.31 mm	13 mm
June	7.19 mm	13.23 mm	21.27 mm
July	2.43 mm	8.13 mm	18.2 mm
August	0.32 mm	4.71 mm	12.53 mm
September	8.47 mm	16.41 mm	24 mm
October	29.44 mm	41.53 mm	63.87 mm
November	87.91 mm	113.46 mm	169.53 mm
December	71.49 mm	132.87 mm	181.53 mm

Wind speeds at Mara and Thohoyandou weather stations regularly reach speeds of up to between 5.6 and 8.7 m/second; wind speeds at the Tzaneen weather station, however, rarely exceed 2.5 m/s.

Table 5.2: Wind direction at Mara and Thohoyandou weather stations (average from 2000 to 2009), and Tzaneen-Westfalia weather station (average from 2007 to 2009)

Month	Mara Weather Station	Thohoyandou Weather Station	Tzaneen-Westfalia Weather Station
January	East	South-East	South-South-East
February	East	South-East	South
March	East	South-East	South-South-East
April	East	West	North-East
May	East	West	North-East
June	East	West	North-East
July	East	West	North-East
August	East	West	North-East
September	East	East-South-East	North-East
October	East	East-South-East	South
November	East	East-South-East	South
December	East	South-East	South

5.1.2. Potential impacts

The proposed project is not anticipated to impact upon climate. However, certain climatic factors may affect the impacts of the proposed upgraded sewerage plant. The main issue in which climate would play a role, is

potential production of foul odours, although the system is being designed in such a way that odours will be minimized and should not be a significant impact. In the event of odours being released from the system, however, wind direction would be the main factor determining whether such odours would cause discomfort to neighbours.

Barring the school on whose premises the plant is situated, the area immediately surrounding the site consists of open veld, where odours would not cause any impact. The main odour-sensitive receptors would be Sekgosese Secondary School (directly to the east and on the same property) and Senwamokgope township, to the north of the plant. As wind direction differs greatly between the three nearest weather stations and no wind data are available for Senwamokgope itself, it is difficult to gauge whether the prevailing wind direction is such that possible odours would be transported in the direction of the township.

The probability of foul odours being reduced by the installation of proper sewage treatment is greater than the risk of generation of foul odours posed by the proposed new system. Though there are not currently significant odours outside the sewage plant enclosure (most likely because of the blockage / break on the outfall sewer which prohibits the sewage from Senwamokgope from reaching the plant), foul odours can be expected at the leakages from the main outfall sewer and in areas where the veld is used for ablutions. Odours can also be expected at the pit latrines which are used in large areas. This proposed sewage treatment plant, in conjunction with the rest of the larger project (outfall sewer and expansion of reticulation) is anticipated to significantly aid in reduction of odour impacts from these sources, even though the risk of foul odours at the treatment plant itself may increase.

Table 5.1: Potential impacts in terms of climate

CONSTRUCTION PHASE						
Potential impact	**Status**	**Extent**	**Duration**	**Magnitude**	**Likelihood**	**Significance**
None anticipated	-	-	-	-	-	-
OPERATIONAL PHASE						
Potential transportation of odours to Senwamokgope by wind	Negative	Local	Long term	Low	Possible	Low
Possible reduction in foul odours due to improved sewage treatment	Positive	Local	Long term	Low	Highly probable	Medium

5.2. Topography, Soils, Geology and Geo-Hydrology

A scoping-level geo-hydrological investigation was undertaken by WSM Leshika during July and August 2010 to assess groundwater vulnerability and to evaluate the potential impact of the proposed project on groundwater resources. In February 2011, a more detailed geo-hydrological assessment was conducted, also by WSM Leshika, during which groundwater sampling and analysis was also done.

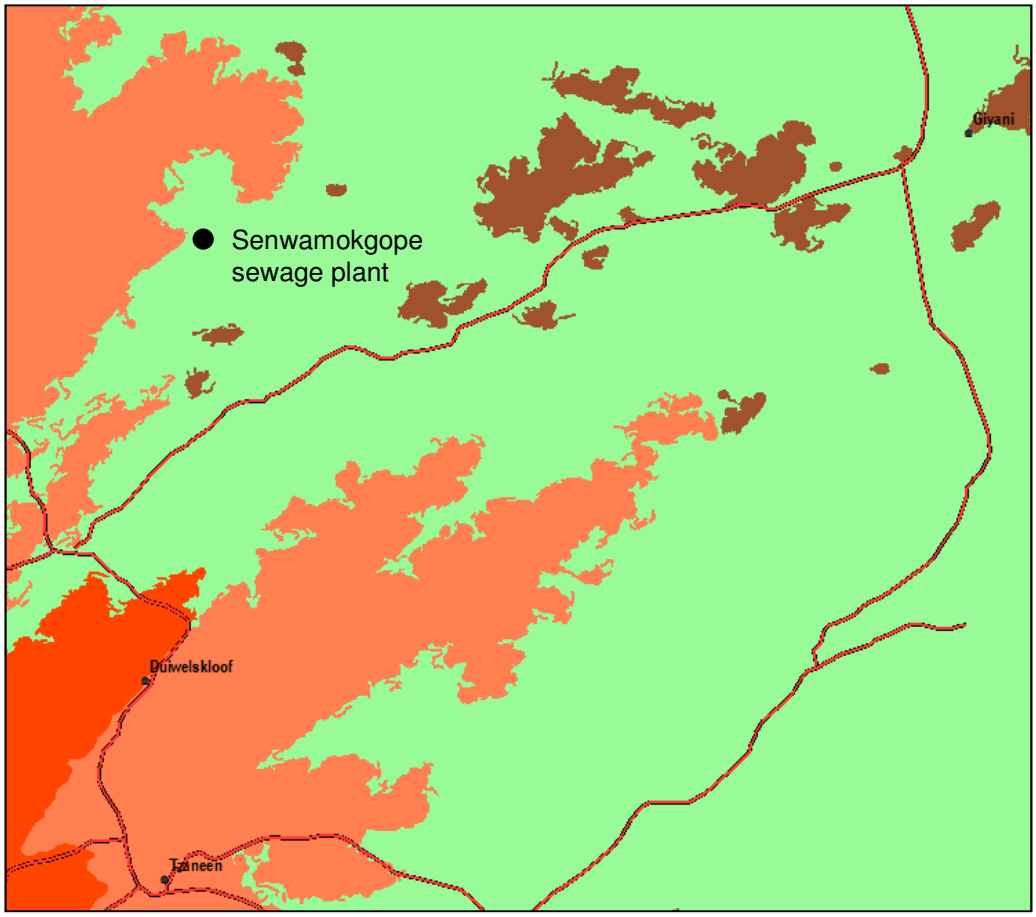
5.2.1. Methodology

The regional geology was gauged from the 1:250 000-scale geological sheet, 2330 Tzaneen. Information on existing boreholes was obtained from the GRIP (Groundwater Resource Information Project) database. Aquifer storage and recharge was estimated from DWA's Groundwater Resources Assessment Study (GRA II, 2003).

5.2.2. Topography and Drainage

The site is located in the B82D quaternary catchment. The area consists of rolling hills with the site varying from about 640 mamsl (metres above mean sea level) at the Senwamokgope stream (which drains into the Middle Letaba River) to about 660 mamsl at the road. No perennial streams exist on the property.

Figure 5.1: Regional terrain morphology (Olifants-Letaba EMF)



5.2.3. Regional geology

Based on the 1:250 000-scale geological sheet, 2330 Tzaneen the site is underlain by Goudplaats Gneiss. The rocks consist mainly of leucocratic quartz rich gneiss. Some mafic amphibolitic zones and dolerite dykes may also occur. According to the geological map and accompanied explanation no specific mineral deposits are present on or close to the site.

5.2.4. Soils

The soils in the area consist of moist brown to grey brown loose sometimes granular silty sand overlain by moist reddish orange loose to medium dense intact clayey sand and gravelly clayey sand. The soils can be classified as SC according to the Unified Classification system. This material is generally only very slightly permeable, but evidence of seasonal perched water tables (i.e. weak ferruginisation) was observed. The calculated permeability of this material is in the order of 10-4 – 10-5 cm/sec (translating to a value of about 0.4 m/day) and as such the soil is confirmed to be only very slightly permeable.

Soils were also analysed by Bateleur Environmental Services as part of their ecological assessment. Soils were found to be of the Glenrosa and Witbank soil forms (BES, 2010).

5.2.5. Hydro-geological evaluation

Ground water is presently used for domestic use and cattle. The following information was obtained from the GRIP database with regards to boreholes in the area (please refer to Appendix F for a map of the positions of these boreholes):

BH nr	Latitude	Longitude	Depth (m)	Water level (m)	Yield (l/s)	Equipment
H10-0071	-23.39464	30.17000				Submersible
H10-0641	-23.39761	30.17170	70.00	6.60	1.50	Mono
H10-0674	-23.39278	30.16383	100.95	23.45	1.40	No equipment
H10-0675	-23.39783	30.15972	99.18	14.99	0.15	No equipment
H10-0803	-23.40970	30.15889	120.00	-	Dry	No equipment

As no monitoring borehole existed downstream of the sewage works a new borehole, H10-0880, was drilled to serve as a new monitoring site. The borehole was drilled to 74m depth and intersected water at 40m and 65m.

5.2.6. Aquifers

The main aquifers in the area are thought to be fractured and weathered aquifers in the granite / gneisses. The aquifer storage is difficult to determine. As the predominant aquifer type is known to be a fractured and weathered aquifer, the storage is estimated from DWA's GRA II (2003) to be about 0.002.

5.2.7. Groundwater levels, flows, recharge and quality

The static water levels vary between 6 and 25 metres below surface in the area and flow is towards the stream in the south-east (Senwamokgope river). It is expected that groundwater contributes to the base flow in the stream; the natural piezometric gradient is therefore thought to be in a south-easterly direction at the site.

Recharge can be described as the replenishment from rainfall to the aquifers. Information from GRA II (2003) gives the average annual recharge as 15.6mm, of which 8.7mm contributes to base flow in the rivers for the B82D catchment.

Results of water sample analysis show that the water quality varies over the area (class 0 – class 4). Problems include Nitrates, Hardness and salts. Please refer to Appendix G (Geo-hydrological report) for the water quality results.

5.2.8. Potential impacts and recommendations

During the construction phase, impacts may be experienced in the form of construction workers using the veld for ablutions, in the absence of toilet facilities. However, it is recommended that portable chemical toilets be provided to prevent such impacts. Furthermore, the surrounding veld is already used for ablutions by community members and school pupils (at Sekgosese Secondary School), and such use by construction workers (though discouraged) would not introduce new impacts.

Operational phase: Effluent from the sewage works has been identified as a potential pollution source, with mainly salts, nitrates and phosphates being of concern. The existing works has been operating for some time with no major apparent negative effects on the environment; however, no monitoring of the ground water has occurred and the real impacts are therefore not known. As the soils were found to be only slightly permeable the risk of pollution from the sewage effluent plant is thought to be **low** if the extension to the works is constructed according to DWA's standards and all ponds or holding dams are sealed or lined.

A reduction is also anticipated in the current rate of groundwater and surface water contamination which results from the blockage / break in the main outfall sewer and from the fact that the sewerage plant is only partially functional. This positive impact is expected to be of medium to high significance.

Table 5.2: Potential impacts in terms of topography, soils, geology and hydrology

CONSTRUCTION PHASE						
Potential impact	**Status**	**Extent**	**Duration**	**Magnitude**	**Likelihood**	**Significance**
Workers using the veld for ablutions	Negative	Local	Short term	Negligible	Possible	Negligible
OPERATIONAL PHASE						
Groundwater contamination	Negative	Sub-regional	Long term	Unknown	Improbable	Low
Reduction in current groundwater pollution by sewage	Positive	Sub-regional	Long term	Medium	Highly probable	Medium

5.3. Surface freshwater

An aquatic study was undertaken by Endip Wildlife Laboratories in July and August 2010 in order to:

- Assess the current ecological status of the aquatic macro invertebrates in the wetland upstream and downstream from the location of the sewerage plant;
- Assess the current chemical and bacterial status of the water in the wetland upstream and downstream from the location of the plant;
- To determine the level of toxicity of the wastewater before and after treatment.

5.3.1. Methodology

Due to the fact that the stream under discussion is seasonal and dry for the most months of the year, also during this study, it was decided to conduct these surveys on the waste water itself, before and after

treatment, in order to determine the quality of water that is to be returned into the environment, thus feeding into the stream eventually.

Surveys were conducted on the raw- and treated waste water to get an idea of the aquatic ecological status of the system. The South African Scoring System (SASS 5) system was performed at the site and all the existing biotopes were sampled. The sampling consisted of surveying each biotope according to specific microhabitat criteria. These may be according to minimum sampling surface area, or according to a minimum amount of time that was spent surveying a specific biotope. The sampling was done by means of the standard 300x300mm net as prescribed by the system.

At the sites, the habitat suitability for species diversity was evaluated using the Integrated Habitat Assessment method (IHAS), which involves the subjective scoring of components of the habitat environment to determine whether the habitat would be suitable for specific invertebrates. This method is still only presented as an index, but at this stage this is a good method of quantifying information of a qualitative nature. This approach also serves as good measure of quality control for the surveyors. This is motivated by the fact that water quality assessments based on the presence of aquatic macro-invertebrates can only be acceptable as accurate, reliable and repeatable if the habitat requirements for these species are met. Poor habitat only can thus not serve as motivation for poor water quality, and *vice versa*.

Each of these biotopes was sampled with the standard equipment according to the specified criteria. Invertebrates collected were classified and identified, as well as scored according to their sensitivity to pollution according to the threshold of potential concern model for limits of tolerance. A final score was calculated and compared to the result classes with explanations of the water quality.

A general fish survey was also to be done, but due to the health risks involved in entering the waste water, the specialist refrained from entering. Only one species of fish (*Clarias gariepinus* – sharp-toothed catfish) was observed from the side and it is improbable that any other species would survive in the waste water.

Water samples were also collected from both pond sites in order to augment the ecological water quality results with that of laboratory analyses. Samples were collected according to the standard procedures for sampling in compliance with the standards of DWA for environmental sampling. Following is a short set of information on some of the important constituents tested for at the sites.

<u>pH</u>

pH is the negative logarithm of the hydrogen ion activity and indicates the acid/base pH is the negative logarithm of the hydrogen ion activity and indicates the acid/base status of the water. pH must be considered together with the redox potential, temperature, conductivity, oxygen, alkalinity, calcium, sulphate and chloride when evaluating the corrosive potential of a water. pH influences the solubility of many constituents, and metals tend to dissolve more rapidly in water at low pH. It also influences the flocculation process used in water purification and the toxicity of many constituents. Two notable examples are cyanide, which is more toxic at lower pH values and ammonium which is more toxic at higher values.

<u>Conductivity</u>

Conductivity gives a rough indication of the total dissolved solids (TDS) of a water sample:
TDS (mg/l) = Conductivity (mS/m) x 6.5

The conductivity value for the protection of aquatic life depends on the species and on local conditions.

Dissolved oxygen

For drinking water and for river/dam water, the oxygen should exceed the recommended limit, while for steam generation oxygen should be absent to prevent corrosion. Vital to aquatic life, oxygen enters the water by diffusion from the atmosphere or through plant photosynthesis. Actual solubility is directly proportional to the partial pressure in the gas phase, to salt concentration and temperature. The dissolved oxygen level in water is constantly changing and represents a balance between respiration and decomposition that deplete oxygen and photosynthetic activity that increases it. Organic waste may overload a natural system causing a serious depletion of the oxygen supply in the water that in turn leads to fish kills.

Likewise, eutrophic waters (waters rich in nutrients) achieve the same result through causing massive proliferation of algae (algal blooms) whose eventual decomposition uses up the available dissolved oxygen. Recommended minimum dissolved oxygen levels for fresh water fish are as follows:
Warm water fish …..... 5.0 mg/L (ppm)
Cold water fish …..... 6.0 mg/L (ppm)
Koi…..... 8.0 mg/L (ppm)
Marine fish…..... .5.0 mg/L (ppm)
Marine Shrimp…..> 5.0 mg/L (ppm), close to saturation*
* Reference for shrimp is page 124 *Marine Shrimp Culture: Principles and Practices* edited by Arlo W. Fast & L. James Lester. CHEMetrics kit recommended K-7510: 0 – 10 ppm & K-7512: 1 – 12 ppm. A dissolved oxygen meter can be used, if calibrated according to manufacturer's instructions. Self-stirring DO probes are easier to work with, if this option is available, but the test kits are often preferred by consumers treating a single pond.

Hardness Total: Hardness refers to the soap-neutralizing power of a water. It is caused principally by calcium and magnesium ions which form insoluble stearates with soap. Hardness is undesirable for certain uses as it causes scaling. Hardness has been inversely correlated with the incidence of cardiovascular disease.

Magnesium: Magnesium is an essential element for human, animal and plant life and is non-toxic. The acceptable intake level for humans is 3,6 – 4,2 mg/kg/day. At high concentrations (400 mg/l for sensitive people and 1 000 mg/l for normal population) magnesium salts may have a laxative effect. For irrigation purposes, magnesium is a necessary plant nutrient as well as a necessary soil conditioner. Together with calcium it is responsible for water hardness.

Temperature: Although temperature is important for protection of aquatic life, it is difficult to define criteria, as these depend on local conditions.

Fluoride: Fluoride is one of the elements which helps to prevent dental caries, but it has chronic long term toxicity in concentrations only slightly above the beneficial level. Fluoride concentrations in excess of 4 mg/l may cause mottling of teeth, and in excess of 15 – 20 mg/l may result in crippling skeletal fluorosis. Fluoride is fatal at around 4 – 5 g and toxic at around 250 – 450 mg. The desirable optimum fluoride concentration in drinking water depends on the average daily intake of water, and thus on the average daily maximum air temperature. For an average maximum air temperature of 16 degrees C, the optimum fluoride concentration is 1.0 mg/l, decreasing to 0.7 mg/l, at 30 degrees C. Fluoride in irrigation water may be inactivated by neutral and alkaline soils.

Manganese: Manganese is an essential element for both plant and animal life. The limit for drinking water is based on aesthetic and not toxic considerations. Manganese, like iron, is a common cause of discoloured water. Prolonged intake of high manganese concentrations can, however, lead to serious neurotoxicity. Manganese is toxic to a number of crops at differing concentrations, but usually only in acid soils

Alkalinity: This is the sum of components (mainly bicarbonate, carbonate, and hydroxide) in the water that tend to elevate the pH of the water above 4.5. These factors are characteristic of the source of water and the natural processes taking place at any given time. Alkalinity represents the buffering capacity of water and its ability to resist a change in pH. Alken-Murray recommends alkalinity above 75 mg/L to offset acid produced by bacteria nitrifying ammonia.The acceptable range for most finfish is 20-200 mg/1 (ppm). CHEMetrics kits recommended K-9810: 10 – 100 ppm & K-9815: 50 – 100 ppm

Chloride: Chloride is one of the major anions to be found in water and sewage. Its presence in large amounts may be due to natural processes such as the passage of water through natural salt formations in the earth or it may be an indication of pollution from sea water intrusion, industrial or domestic waste or deicing operations. Potable water should not exceed 250 mg/L of chloride. When calcium or magnesium is the cation, up to 1000 mg/L can be tolerated without a salty taste to the water. CHEMetrics kit recommended: K-2002: 2 – 20 ppm

Chloride.
Chloride usually occurs together with sodium in water. Chloride has low toxicity to those life forms, which have a mechanism for excreting excess chloride. To life forms which do not have an efficient chloride regulating mechanism e.g. plants, chloride can be toxic. Therefore the median criterion for chloride in irrigation water is 100 mg/l as compared to 1 500 mg/l for livestock watering.

Bacterial water quality samples were collected aseptically and were tested for the detection of the following microbes, namely *E. coli; Enterobacter family; Total coliforms and Pseudomonas genus*.

The membrane filtration method with solid agar media method was used for testing, but dilutions beyond practical measurement had to be used in order to count colony forming units of bacteria, resulting in the use of the streak-plate method being the test of choice. 25 microlitres swab volume was used per site and plates were incubated at 37 degrees C for 24 hours. Membrane Lactose Glucurinade agar was used for detection due to the poly-chromatic features of the agar.

The entire site was recorded on GPS and relevant environmental data noted at the relevant sites. This data is compatible with most database systems and could be converted to GIS shapefiles via text files for use in Arcview by DEA. Sensitivity mapping was done according to three main criteria, namely species diversity, Red Data species occurrence and pristine habitat. The map provided in this report was exported from Trackmaker and is for reading reference only.

5.3.2. Status quo

The following biotopes occurred on site at the time of the survey:

- Marginal vegetation: Grasses, reeds and sedges on water's edge.
- Gravel and mud: The material that constitutes the bottom of the ponds.

Very poor SASS scores were measured, with the raw waste water achieving only 22 index points and treated water ponds only 26. The average score for poor quality waters is 60 to 70, which indicates that the water

quality is extremely poor and hazardous to human health as well as almost lifeless in ecological terms. Almost 50% of the taxa recorded are air-breathers, indicating low levels of dissolved oxygen in the water. This contributes more to the low species diversity and confirms the poor quality of the water. Habitat for invertebrates is also limited, especially in the raw pond, which is very deep with sudden and steep wall slopes, making it unsuitable for both vegetation and animal or insect diversity levels needed to allow this water to be discharged into the environment. Habitat score percentages for the raw and treated ponds reached 20% and 55% each, respectively.

Absolutely no suitable habitat for fish species could be recorded, apart from deep warm waters in the raw pond. Here, sharp-toothed catfish was the only fish species recorded. Marsh terrapins are also present and both thrive on the incoming human faeces, to the extent that these animals only congregate around the raw sewage inlet point. Increased biological oxygen demand due to the decomposition of the faeces not only extracts oxygen from the water, but also increases the water temperature, resulting in toxic changes in water chemistry, especially ammonia. This becomes a major problem and increases the toxicity of the water to levels that are even toxic to humans.

Final sample toxicity description: Highly acute hazard with acute toxicity with toxicity unit of 8. Please refer to the attached toxicity report forming part of the limnological report.

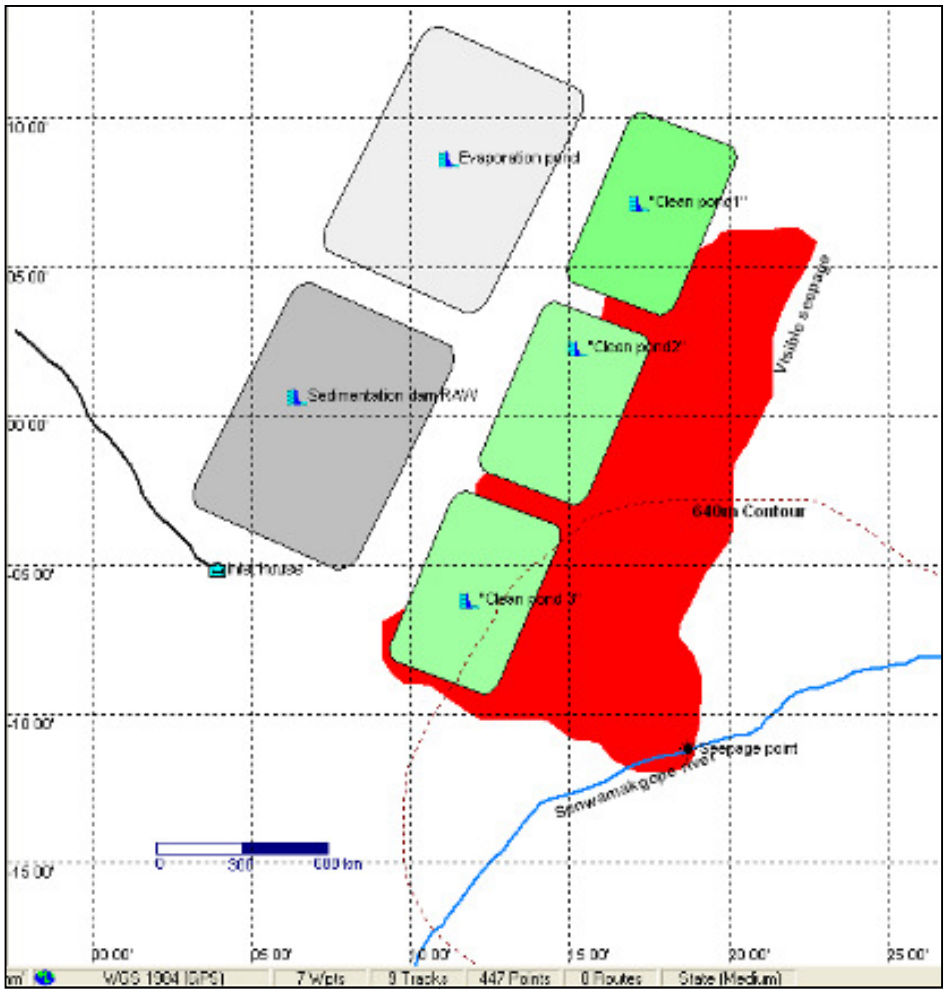
Currently it is completely unacceptable that the waste water is seeping from numerous leaks from the ponds into the Senwamakgope River, which is a mere 400 meters downslope from the plant. The specific point of seepage was visited under the guidance of the plant maintenance worker, who also pointed out that the leak is getting worse.

No surveys could be done on the river, as it was dry, but if the seeping of the waste water is evident with algal growth on the soil surface due to eutrophication during dry months, groundwater contamination is anticipated to be significant.

Bacterial results show that there are levels of *E. coli* that are extremely hazardous to public human health, and the water as well as the grounds around the plant must be avoided by humans. The fact that the school's sanitation systems have been vandalized to the extent that there are not enough toilet facilities left any more, results in people in high numbers using the bush around the school and plant as veld toilets.

All bacterial counts at 10 000 times dilutions of 1 mL resulted in bacterial growth too numerous to count. Chemical standards for the phosphate, nitrate and ammonia can never be complied with under the current treatment measures. The proposed upgrading of the treatment plant is a necessity in order to address the ticking time bomb of poor sewage treatment at the current plant.

Figure 5.2: GPS map indicating the area where the treatment ponds are leaking and seeping into the river (Endip Wildlife Laboratories, 2010).



5.3.3. Potential impacts

The proposed upgrading project is anticipated to impact positively on surface freshwater quality as compared with the current situation, as the proposed new system will ensure more effective sewage treatment and hence bring about a reduction in contamination of nearby water sources such as the Lebjelebore and Senwamokgope Rivers and an unnamed stream near the site.

The new system will still hold the risk of potential water contamination in case of leakage or spillage from the treatment plant; however, this potentially negative risk is felt to have a much lower significance than that of the positive impact of an immediate and long-term reduction in water pollution.

Table 5.3: Potential impacts in terms of surface freshwater quality

CONSTRUCTION PHASE						
Potential impact	**Status**	**Extent**	**Duration**	**Magnitude**	**Likelihood**	**Significance**
None anticipated	-	-	-	-	-	-
OPERATIONAL PHASE						
Reduction in current surface water pollution by sewage	Positive	Local to Sub-regional	Long term	Medium	Highly probable	Medium

Contamination of streams in case of spillage / leakage	Negative	Sub-regional	Long term	Unknown	Improbable	Medium-high

5.4. Ecology

An ecological assessment was conducted by Bateleur Environmental Services in May 2010 in order to assess the current status of fauna and flora on the site, gauge the likelihood of Red Data species occurring on the site, and identify potential impacts that may be associated with the proposed project.

5.4.1. Methodology

A literature survey was supplemented by a practical survey in order to create a holistic picture of the specific environment. From there on specific impacts were identified and mitigating strategies developed.

During the site survey, set transects were walked in order to identify grass, tree and forb species. A search was also done for tracks and signs of fauna. The tracks and signs that were found supported relevant literature. A real-time assessment was made for mammal, amphibian, arachnid, insect, bird and reptile species.

5.4.2. Vegetation

Only one plant community was identified on site. Because of the small size of the site, the immediately surrounding area was also surveyed in order to attain a wider picture of the natural background of this area.

Prominent grass species for the site included:
Urochloa mosambicensis,Digitaria eriantha, Heteropogon contortus, Melinis repens, Panicum maximum, Cynodon dactylon, Aristida canescens and Eragrostis rigidior.

Prominent tree species for the site included:
Dichrostachys cinerea, Peltophorum africanum, Sclerocarya birrea, Ziziphus mucronata, Combretum apiculatum, Euclea divinorum, Diospyros mespiliformes, Acacia nigrescens, Terminalia sericea and Philenoptera violacea.

Prominent forbs / flowering plants for the site included:
Waltheria indica, Bidens pilosa, Oxalis obliquifolia, Vernonia galpinii, Asparagus africanus and Indigofera 28onfuse.

The plant community was divided into five vegetation units and classed according to the sensitivity of each. The current vegetation on sites ranges from degraded to natural.

Vegetation unit 1: *Diospyros mespiliforme – Philenoptera violacea* natural undisturbed veld.
Vegetation unit 2: Artificial wetland – overflow dams
Vegetation unit 3: Grass covered areas in between dams.
Vegetation unit 4: Water body – raw sewerage mixed with water.
Vegetation unit 5: Riparian vegetation.

5.4.3. Fauna

The literature survey was found to correlate with the findings of the site survey in terms of species, tracks and signs that were found. By studying the habitat of the site, it was possible to determine fairly accurately the species which would occur on site. Because of the degraded ecosystem, biodiversity was found to be relatively low; very few species would actually occur on site.

Please refer to the ecological report in Appendix D for full species lists.

5.4.4. Protected species

Plants

Protected tree species published in the National Forest Act that were found on the site were:

- Apple leaf (*Philenoptera violacea*)
- Marula (*Sclerocarya birrea*)

These species are not to be removed without relevant permits from the Forestry division of the Department of Agriculture, Forestry and Fisheries (DAFF).

Amphibians

No red data frog species occur in the particular area.

Mammals

List of protected mammal species that may occur in the area:

Scientific Name	Common Name	Conservation Status	Probability of occurrence
Manis temmincki	Pangolin	Vulnerable	Low
Crocuta crocuta	Spotted Hyaena	Protected	Low
Parahyaena brunnea	Brown Hyaena	Protected	Low
Mellivora capensis	Honey Badger	Protected	Low

Reptiles

Only one protected reptile species may occur in the area:

Scientific Name	Common Name	Conservation Status	Probability of occurrence
Python natalensis	African Rock Python	Protected	Low

Birds

List of protected bird species that may occur in the area:

Scientific Name	Common Name	Conservation Status	Probability of occurrence
Ephippiorhynchus senegalensis	Saddle-billed Stork	Endangered	Low
Necrosyrtes monachus	Hooded Vulture	Endangered	Low
Gyps coprotheres	Cape Griffon Vulture	Endangered	Low
Gyps africanus	White-backed Vulture	Endangered	Low
Torgos tracheliotus	Lappet-faced Vulture	Endangered	Low
Aquila rapax	Tawny Eagle	Vulnerable	Low

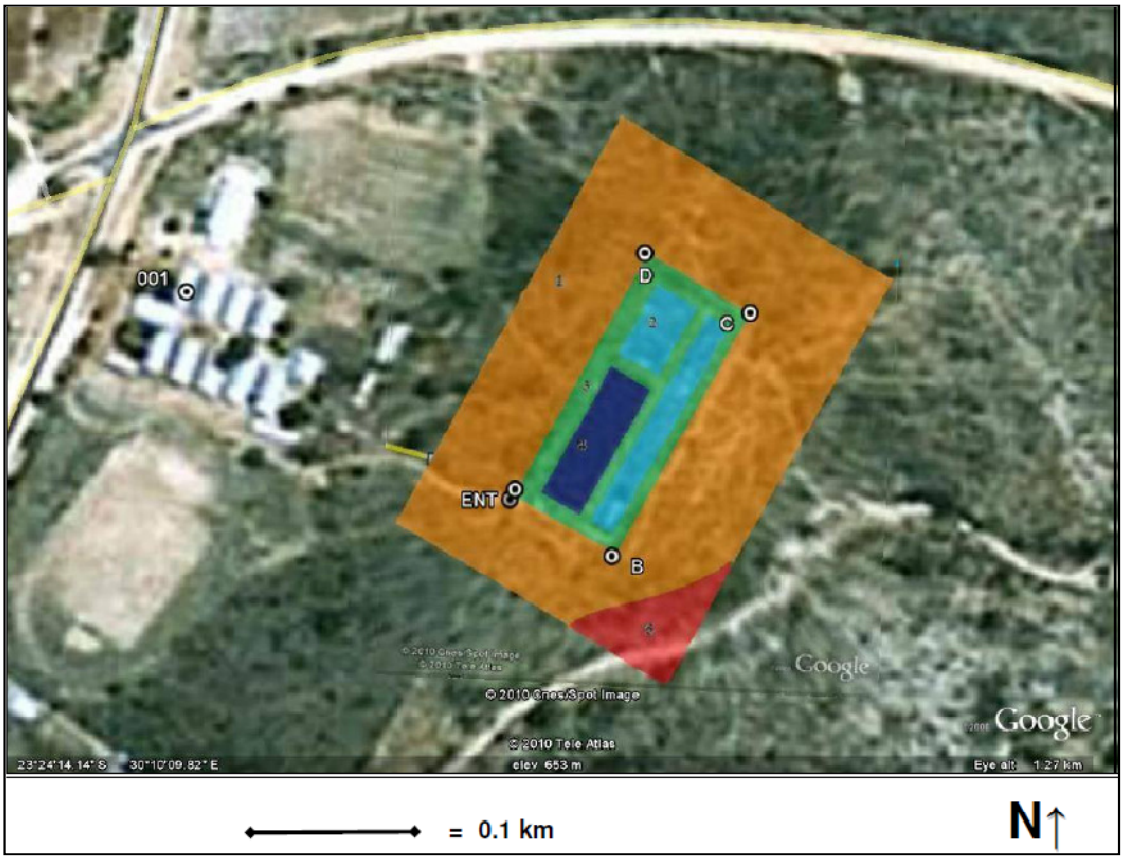
Terathopius ecaudatus	Bateleur	Vulnerable	Low
Polemaetus bellicosus	Martial Eagle	Vulnerable	Low
Trigonoceps occipitalis	White-headed Vulture	Vulnerable	Low
Tyto capensis	Grass Owl	Vulnerable	Low

Total species

A total of 2 protected plant species, one protected reptile species, 10 protected bird species and 4 protected mammal species may occur in the area. However, the probability of these species occurring on the site is low, due to the transformed state of the site.

5.4.5. Potential impacts

The collective ecological sensitivity of the site was rated as **medium-low**. The site of the existing sewage ponds, including both the ponds themselves and the grassed areas in between, is classified as having low sensitivity. The surrounding *Diospyros mespiliforme*, *Philenoptera violaceae* natural undisturbed veld is rated as medium-low sensitivity, and a small section of riparian vegetation to the south-east of the site is classified as medium sensitivity.



Number	Vegetation unit	Classification
1	*Diospyros mespiliforme, Philenoptera violacea,* Natural undisturbed veld.	Medium – Low
2	Artificial wetland- overflow dams	Low
3	Grass covered areas in between dams.	Low
4	Water body-raw sewerage mixed with water.	Low
5	Riparian vegetation.	Medium

Table 5.4: Potential impacts in terms of vegetation

CONSTRUCTION PHASE						
Potential impact	**Status**	**Extent**	**Duration**	**Magnitude**	**Likelihood**	**Significance**
Fire risk associated with "hot" construction activities and workers smoking etc	Negative	Local	Short term	Unknown	Possible	Low
OPERATIONAL PHASE						
Removal of alien plant species, including long-term follow-up removal	Positive	Local	Long term	Low	Possible	Low
Possible spreading of alien plant species due to disturbance of vegetation	Negative	Local	Long term	Low	Possible	Low

Table 5.10: Potential impacts in terms of fauna

CONSTRUCTION PHASE						
Potential impact	**Status**	**Extent**	**Duration**	**Magnitude**	**Likelihood**	**Significance**
Animal fatalities resulting from construction-related activities	Negative	Local	Short term	Negligible	Possible	Negligible
Disruption of the activities of fauna on and around the site due to e.g. noise	Negative	Local	Short term	Negligible	Possible	Negligible
Trapping / hunting / killing fauna by labourers	Negative	Local	Short term	Negligible	Possible	Negligible
OPERATIONAL PHASE						
Reduced health risk to fauna due to improved water quality (particularly aquatic fauna e.g. fish, but also fauna dependent on the river for drinking or foraging, e.g. wildlife & livestock)	Positive	Local to sub-regional	Long term	Medium	Possible	Medium

6. ENVIRONMENTAL SCOPING INVESTIGATION – SOCIO-ECONOMIC INVESTIGATIONS

The only specialist investigation conducted in terms of socio-economic aspects, consisted of a specialist heritage investigation conducted by Shasa Heritage Consultants. Other socio-economic parameters were investigated on a desktop level.

6.1. Heritage Assessment

A Phase 1 Heritage Impact Assessment (HIA) was conducted by Shasa Heritage Consultants in April 2010. The investigation entailed a pedestrian survey of selected areas of the study area, during which standard methods of observation were applied. As most archaeological material occur in single or multiple stratified layers beneath the soil surface, special attention was given to disturbances, both man-made such as roads and clearings, as well as those made by natural agents such as burrowing animals and erosion. Archaeological visibility outside the perimeter of the existing plant was limited as vegetation cover is dense. Special attention was given to disturbances, either natural or man-made, as well as changes in vegetation that may have resulted from previous human intervention.

According to the most recent archaeological cultural distribution sequences by Huffman (2007), this area falls within the distribution area of various cultural groupings originating out of both the Urewe Tradition (eastern stream of migration) and the Kalundu Tradition (western stream of migration). The facies that **may** be present are:

Urewe Tradition:	Kwale branch:	*Mzonjani facies* AD 450 – 750 (Early Iron Age)
	Moloko branch:	*Icon facies* AD 1300 - 1500 (Late Iron Age)
Kalundu Tradition:	Happy Rest sub-branch:	*Doornkop facies* AD 750 - 1000 (Early Iron Age)
		Eiland facies AD 1000 – 1300 (Middle Iron Age)
		Klingbeil facies AD 1000 - 1200 (Middle Iron Age)
		Letaba facies AD 1600 - 1840 (Late Iron Age)

None of the above-mentioned archaeological remains or other heritage remains of importance were noted on the terrain. No archaeologically induced ecologically disturbed area was observed either. However, the archaeological cultures referred to above **may** be present as obscured subterranean deposits.

6.1.1. Potential impacts

No impacts on heritage resources are anticipated to be associated with the proposed project, as no such resources were found on the site. However, the possibility of heritage resources being uncovered during construction cannot be precluded.

Table 6.1: Potential heritage impacts

CONSTRUCTION PHASE						
Potential impact	**Status**	**Extent**	**Duration**	**Magnitude**	**Likelihood**	**Significance**
None expected	-	-	-	-	-	-
OPERATIONAL PHASE						
None expected	-	-	-	-	-	-

6.2. Social Aspects

6.2.1. Status quo: Greater Letaba Municipality (information adapted from GLM IDP 2010/11)

Location

The proposed development site forms part of the Greater Letaba Municipality within the Mopani District of the Limpopo Province. Senwamokgope is one of only three proclaimed towns within the GLM, the other two being Modjadjiskloof and Ga-Kgapane. The majority of residents within the municipal boundaries reside in rural villages, of which approximately 128 are scattered throughout the municipal area (GLM IDP 2010/11).

Population

The GLM is home to approximately 247 736 people, and is characterized by a very young population, with 36.4% of the populace being younger than 15 years in 2008. From the age of 15 upwards, females outnumber males, with the gap between the genders widening in the higher age brackets. Because this discrepancy only becomes evident from working age, the unequal gender distribution is believed to be the

result of male absenteeism resulting from migrant labour – men migrating outside the municipal area in search of work (GLM IDP 2010/11).

Income, employment and education

Approximately 55.9% of households (which is more than the district average) are headed by females; this is again attributed in a large part to migrant labour siphoning off working-age males. The majority of households with no income are headed by women; these households depend on social grants and free basic services. Though numbers are not available, it seems that a significant number of households are child-headed, and these households suffer from high poverty and illiteracy levels (GLM IDP 2010/11).

GLM suffers from very high poverty levels. 60.8% of households receive no income, and only 3.1% receive a combined household income of R6,400 or more (GLM IDP 2010/11).

Though education levels have risen dramatically from 2001 to 2008, illiteracy still stands at a disconcertingly high 28.5%, which negatively affects the employability of the illiterate portion of the population. Public participation during development of the IDP revealed a shortage of schools in certain parts of the municipality. Amongst others, the village of Mamaila in the Senwamokgope area suffers from overcrowding of schools (GLM IDP 2010/11).

Economic activities and opportunities

The majority of employed persons work in the following sectors:

- Community, social and personal services
- Agriculture and forestry
- Wholesale and retail trade

GLM has several tourism facilities and great potential for expansion of the tourism industry. There is also significant potential for expansion of services that support the healthy agricultural sector, for instance local provision of fertilisers and machinery which are currently sourced from outside the municipal boundaries. Manufacturing based on the locally produced timber, for instance local furniture manufacturing and arts and crafts, also holds potential as a sector that should be developed locally.

There is a shortage of wholesalers in the area, with most retailers and informal vendors purchasing their products in Tzaneen or Polokwane for resale within GLM. Wholesalers are most acutely needed in the northern parts of the municipal area, which lack easy access to Tzaneen and Polokwane.

Infrastructure and services

Water: The Sekgosese area, where Senwmamokgope is located, relies solely on groundwater, which is obtained through a large number of boreholes, most of which are managed by the Mopani District Municipality. Groundwater quality overall is satisfactory for human consumption. Sekgosese is now set to be included in the supply area of the Middle Letaba Regional Water Scheme; however, the challenge is that availability in the Middle Letaba Dam may not be sufficient to supply the entire area that is slated to become part of the supply area (GLM IDP 2010/11).

Sewerage: As indicated earlier, part of Senwamokgope township is connected to the treatment plant at Sekgosese Secondary School, but due to a blockage or break in the main outfall sewer, sewage from the township does not reach the plant and instead leaks out of the pipeline. This problem is expected to be remediated by the proposed upgrading of the plant (GLM IDP 2010/11).

Electricity: GLM distributes electricity only in Modjadjiskloof; Eskom distributes electricity throughout the remainder of the municipal area. The backlog of connections is currently approximately 19.7%. Free basic electricity is provided to 3 032 residents, while a further 2 189 households who have been approved for free basic electricity are not collecting their vouchers (GLM IDP 2010/11).

Housing: There is still a backlog in the provision of RDP houses. A number of factors play a role in this, one of the main challenges being the unavailability of land to develop integrated settlements in, amongst others, Senwamokgope. Land claims and illegal occupation of land are other factors curtailing the activities of the Department of Local Government & Housing (DLG&H). It is positive to note that 84.8% of households in the GLM live in brick houses, and only 4% live in informal settlements. The remaining 6.5% live in traditional housing such as huts (GLM IDP 2010/11).

Health care: Senwamokgope lacks clinics due to the unavailability of a suitable site for such a facility. A clinic is, however, available in Mamaila village. GLM as a whole has 1 hospital (in Ga-Kgapane), 1 health centre (in Modjadjiskloof) and 20 clinics. 91% of the municipal population lives within 5km of a clinic, but for services that are not provided at clinics, much of the population travel to hospitals and health centres outside the municipal area for treatment, for instance facilities in Tzaneen and Polokwane. The 2010/11 municipal IDP states a need for a health centre in Senwamokgope and emergency medical services in Sekgosese (GLM IDP 2010/11).

Roads: Provincial road links are generally in a good condition. Access roads to certain villages and internal streets in village are in many cases problematic, with few tarred internal streets and inadequate crossings at streams. Roads in the area that are in need of upgrading include two roads between Sekgosese and Maphalle (D3164 and D3205) and the D3210 road in Senwamokgope (GLM IDP 2010/11). Senwamokgope itself is generally well served by paved internal streets in a good condition.

Emergency services

There is a need for emergency medical services in Senwamokgope. There is a police station in Senwamokgope (the Sekgosese Police Station), but none in the surrounding villages. The Sekgosese police station has 40 officers but only 13 vehicles (GLM IDP 2010/11), which might make service delivery in the extensive villages difficult. Inadequate roads in villages are also expected to hamper transportation of police to incident sites.

Waste management

Municipal solid waste removal takes place only in the proclaimed towns; the GLM has a backlog of approximately 88.6% in terms of household refuse removal. There is currently no landfill site within the municipal area, but land has been acquired for the establishment of a landfill at Maphalle. Once the landfill site has been established, GLM plans to establish waste transfer stations in various villages to facilitate refuse removal (GLM IDP 2010/11).

Development constraints

Constraints to development within GLM relate mainly to the following:

- **Land claims:** ± 48% of land within the municipal area is under land claims. Coupled with the long timeframes associated with evaluation of land claims on the part of the Land Claims Commission, this creates uncertainty on the part of landowners, who are in many cases loathe to invest further in their

properties for purposes of e.g. agricultural expansion or residential / commercial development until the Land Claims Commission has taken a decision on the land claim. The uncertainty also deters outside investment. This puts job creation under pressure and hinders economic growth (GLM IDP 2010/11).

- **Lack of funding:** Approximately 50% of land within the municipal area is registered to the state or to traditional authorities. Occupants such as subsistence farmers therefore cannot get financial backing for investment in the land that they occupy (GLM IDP 2010/11).

- **Proximity to Tzaneen:** Though the proximity of the larger economic hub of Tzaneen is advantageous to GLM residents in some respects, it does pose an obstacle to development of suppliers and support services particularly in the southern part of the GLM, due to the competition posed by similar businesses in Tzaneen (GLM IDP 2010/11).

- **Skills shortage:** Most of the local labour force have limited or no skills. This has led to a situation where a large portion of the population is unemployed whilst there are vacancies for which the local population's skills are simply not suited. Skills training is required in areas such as business development, fruit and vegetable processing, timber processing, agricultural production and tourism (GLM IDP 2010/11).

- **Access to markets:** Due mostly to poor roads and long distances between villages and established markets, most small-scale farmers do not have access to markets outside their villages or outside the municipal area and therefore have to sell their produce locally, which limits the income that they can generate from the sale of their produce. Proposed shopping centres in Ga-Kgapane and Senwamokgope may help to alleviate this challenge (GLM IDP 2010/11).

- **Water shortages for agriculture:** Water shortages, particularly in the northern part of the municipality, pose a constraint to agricultural production (GLM IDP 2010/11).

- **Lack of industrial estate:** There is no dedicated industrial estate, necessitating industries to occupy space amongst other businesses. Industries furthermore do not pay preferential rates. Both these factors hamper the expansion of industries locally (GLM IDP 2010/11).

- **Lack of tourism infrastructure:** Tourism infrastructure, such as accommodation, conference facilities, tourism facilities and places to stop for refreshments, is not well developed. There is also a lack of a coordinated tourism development plan for the municipality (GLM IDP 2010/11).

- **Lack of financial institutions:** Financial institutions are limited to one bank branch in Modjadjiskloof and a number of ATMs scattered throughout the municipal area. Residents and business owners currently have to travel to Tzaneen for banking services, and often then do their shopping in Tzaneen as well, resulting in an unnecessary outflow of money from GLM to adjacent areas (GLM IDP 2010/11).

- **Lack of tourism awareness:** There is a lack of understanding in local communities regarding the potential value of tourism as well as regarding opportunities for becoming involved in this industry (GLM IDP 2010/11).

Spatial analysis

There is a need for a Land Use Management Scheme (LUMS) to provide for coordinated spatial development. The GLM is currently characterized by the following spatial attributes (GLM IDP 2010/11):

- Great disparities in levels of service provision to different areas
- Disparities between areas in terms of economic activities.

- Land restitution is becoming too challenging
- Long travelling distances between home and work, particularly for the disadvantaged
- Fragmented urban component

Senwamokgope is a municipal growth node and population concentration point, and serves as a service point to surrounding villages. Government offices have a presence in the township, and there are 6 formal businesses and 8 informal.

6.2.2. Potential impacts

The following **short-term** socio-economic impacts may be expected during the **construction phase** of the proposed project:

- Creation of employment opportunities, mostly in the form of unskilled labour hired on a short-term basis during upgrading of the sewerage plant and the associated extension of the reticulation network;
- Support of local job opportunities through support of local businesses in the procurement of materials, equipment and services to be used in the construction phase, as well as the support of local shops by construction workers who are likely to purchase items such as food locally while onsite;
- The possibility exists that workers may be rowdy and noisy; the risk of increased criminal activity also exists. Increased security will be required at Sekgosese Secondary School;
- Construction-related noise resulting mostly from construction machinery (particularly during earthworks), offloading of materials, and the rumble of heavy construction vehicles / plant on the road. This may disturb the academic atmosphere at Sekgosese Secondary School.

Socio-economic impacts over the **long term**, during the **operational phase**, may relate to the following:

- Homes that currently make use of pit latrines will be connected to the waterborne sewerage network. This is anticipated to raise the standard of living of the affected households;
- Sewage from homes that are currently connected to the sewerage network, does not reach the treatment plant due to the break or blockage. This will be remedied through the proposed project, and sewage from these homes will be treated at the upgraded plant;
- Reduction in health risks (for people and livestock) due to better treatment of sewage and associated reduction in pollution risk of groundwater and streams;
- Possible stimulation of development in Senwamokgope (for instance residential or commercial development) through the availability of sewerage infrastructure. Such possible development would, in turn, hold its own suite of impacts.

Table 6.2: Potential socio-economic impacts

CONSTRUCTION PHASE						
Potential impact	**Status**	**Extent**	**Duration**	**Magnitude**	**Likelihood**	**Significance**
Employment creation and/or sustaining of jobs in construction-related fields	Positive	Local	Short term	Low	Highly probable	Low
Supporting local businesses through local procurement of materials, equipment & services	Positive	Local to Sub-regional	Short term	Low	Highly probable	Low
Support of local businesses by workers involved in construction	Positive	Local	Short term	Negligible	Highly probable	Negligible

Trespassing and/or potential increase in criminal activity	Negative	Local	Short term	Unknown	Possible	Unknown
OPERATIONAL PHASE						
Increased access to waterborne sanitation, and concomitant reduction in health risks and increase in standard of living	Positive	Local	Long term	High	Definite	High

6.3. Visual Aspects

6.3.1. Status quo

The site is already utilised for a sewerage plant and is surrounded by open field with natural vegetation to three sides and Sekgosese Secondary School directly to the east. The site is **not** located in a position of high visibility – it is situated out of sight of the main road (Lemondokop road) and is not abutted by any existing development. The site is also not visible from the school buildings themselves, but rather is situated on an outlying portion of the premises.

6.3.2. Potential impacts

Negligible construction-phase visual impacts can also be expected in the form of clearing of the site and construction activities themselves.

The proposed upgrading of the sewerage system will **not** introduce a new long-term visual impact into the landscape, as the site is already occupied by a sewerage plant. The impact of the proposed upgrading is therefore anticipated to be negligible in this regard.

Table 6.3: Potential visual impacts

CONSTRUCTION PHASE						
Potential impact	**Status**	**Extent**	**Duration**	**Magnitude**	**Likelihood**	**Significance**
Construction activities and site clearing	Negative	Local	Short term	Low	Highly probable	Negligible
OPERATIONAL PHASE						
Visual impact of the treatment plant	Negative	Local	Long term	Negligible	Probable	Negligible

6.4. Noise

6.4.1. Status quo

Being situated in a rural setting, the current ambient noise levels in the vicinity of the site are relatively low. Noise is mostly associated with the voices of pupils at Sekgosese Secondary School, as well as some background noise from vehicles travelling on the nearby Lemondokop road.

6.4.2. Potential impacts

Construction-phase impacts are anticipated to be mainly associated with construction activities themselves, including machinery involved in earthworks, off-loading of material from trucks, etc, and the voices of

construction workers. These impacts will be short-term in duration, occurring only whilst construction is underway.

Given the short-term nature of anticipated construction phase noise impacts and the low magnitude of the expected impacts, noise impacts potentially associated with construction of the sewerage system are anticipated to be of low significance. The only nearby sensitive noise receptor is Sekgosese Secondary School.

By its very nature, the proposed sewerage system will not generate significant long-term noise levels once it is operational. The system will operate relatively silently, and no operational-phase noise impacts are expected.

Table 6.4: Potential impacts in terms of noise

CONSTRUCTION PHASE						
Potential impact	**Status**	**Extent**	**Duration**	**Magnitude**	**Likelihood**	**Significance**
Noise associated with construction activities	Negative	Local	Short term	Low	Probable	Low
OPERATIONAL PHASE						
Noise associated with operation of the treatment plant	Negative	Local	Long term	Negligible	Improbable	Negligible

6.5. Cumulative impacts

As is the case for any activity, impacts are not limited to those directly or even indirectly associated with the proposed activity – potential cumulative impacts need to be considered as well, so that activities can be seen not as stand-alone entities but as part of the larger picture of which they inevitably form part.

Should this proposed upgrading project be implemented, it may serve to stimulate further development in Senwamokgope, particularly (but not limited to) the area that will be newly served by waterborne sanitation. Such possible spin-off development would pose its own suite of impacts, both positive and negative.

Table 6.5: Potential cumulative impacts

OPERATIONAL PHASE						
Potential impact	**Status**	**Extent**	**Duration**	**Magnitude**	**Likelihood**	**Significance**
Reduction in water pollution	Positive	Local – sub-regional	Long-term	High	Highly probable	High
Facilitation of further development	Positive or negative	Local	Long-term	Unknown	Possible	Unknown

7. PUBLIC PARTICIPATION PROCESS

7.1. Background Information Document and Comment and Registration Form

A Background Information Document (BID) was compiled in English and SePedi in order to provide a background and description of the proposed project and the EIA process being followed. The BID was distributed to stakeholders and adjacent landowners along with the locality map and comment and registration form. The comment and registration form provided I&APs and stakeholders with a convenient method of

submitting their contact details to the consultants in order to register on the project database, as well as to raise any issues, comments or concerns that they had in terms of the proposed project.

7.2. Advertisement of Commencement of EIA Process

The commencement of the EIA process was advertised for a period of 31 days (15 July to 15 August 2010) in the following ways (please refer to Appendix I for copies of newspaper advertisements, photographs of site notices and the list of stakeholders who were directly notified):

- Placement of notices in the local newspapers the Letaba Herald (English notice) and the Mopani Herald (SePedi notice);
- Display of site notices (each containing both the English and the SePedi adverts) at Sekgosese Secondary School, Senwamokgope Primary School, GLM Sekgosese Sub-office and Mamaila tribal office;
- Direct notification of identified stakeholders via fax, e-mail and/or post.

7.3. Public Meetings

The first Public Meeting was held on Saturday, 31 July 2010 at Senwamokgope Primary School. The purpose of the Public Meeting was to afford stakeholders and members of the public the opportunity to interface with the project team to obtain information about the proposed project and to have their comments, queries and/or concerns addressed. During the meeting, the project team presented the proposed project and the EIA process being followed.

The meeting was well-attended and the community members showed overwhelming support for the proposed sewerage upgrade. Please refer to Appendix K for a copy of the minutes of the Public Meeting.

The second Public Meeting has been scheduled for Saturday, 12 March 2011, again at Senwamokgope Primary School. The purpose will be to provide stakeholders and the public with another opportunity to discuss queries regarding the project with members of the project team.

7.4. Issues Raised

Comments and issues raised during the Public Participation Process thus far have been incorporated into the Issues Trail (Appendix M), which provides a summary in English of all issues raised, the forum through which these issues were raised and the response provided. Copies of correspondence with I&APs are also included in Appendix M.

Stakeholders have been generally positive about the proposed project, as it is anticipated to raise the standard of living for the residents of Senwamokgope and reduce health risks associated with

7.5. Availability of Draft ESR for Review and Comment

The draft ESR was available for public review and comment for a period of 30 days, from 19 August to 19 September 2010. Copies of the report were available at the office of Mamaila Royal Council in Mamaila Village, Greater Letaba Municipality (GLM) Sekgosese sub-office and the offices of Polygon Environmental Planning in Tzaneen. Copies of the report (whether in hard copy or on CD) were submitted directly to a

number stakeholders for their comment (notably DWA, LIHRA, SAHRA, GLM and Mamaila Royal Council). All comments received with regards to the report within the comment period have been incorporated into the final ESR for submission to DEA.

7.6. Availability of Draft EIR and EMP for Review and Comment

This draft EIR and EMP are currently available for public review and comment for a period of 30 days, from 3 March to 2 April 2011. Copies of the report are available at the office of Mamaila Royal Council, GLM Sekgosese sub-office and the offices of Polygon Environmental Planning. Copies of the report have also been submitted directly to a number of stakeholders for their comment (notably DWA, LIHRA, SAHRA, GLM and Mamaila Royal Council).

8. CONCLUSIONS

No fatal flaw issues were identified during the EIA. Indeed, the investigations and public participation have led to the conclusion that the proposed upgrading of the sewerage treatment plant would in fact be an **improvement upon the current situation** of limited sewage treatment and dilapidated sewerage infrastructure, both from a bio-physical and a socio-economic perspective.

Measures for the prevention, mitigation and/or management of impacts that may be anticipated to be associated with the proposed project are contained in the attached EMP; these will need to be adhered to during both the construction and operational phases, as well as during potential future decommissioning of the system. **It is felt that adherence to these measures can sufficiently limit and manage potential impacts, so that the proposed upgrading of the sewage treatment system can be recommended from an environmental perspective.**

A summary of the potential impacts identified during the EIA are contained in Table 8.1.

Table 8.1: Summary of potential impacts

POTENTIAL IMPACT	STATUS	EXTENT	DURATION	MAGNITUDE	LIKELIHOOD	SIGNIFICANCE	MITIGATION / MONITORING
Construction phase							
Workers using the veld for ablutions	Negative	Local	Short term	Negligible	Possible	Negligible	Monitoring required during construction
Fire risk associated with "hot" construction activities and workers smoking etc	Negative	Local	Short term	Unknown	Possible	Low	Management and monitoring required during construction
Animal fatalities and disturbance of fauna resulting from construction-related activities	Negative	Local	Short term	Negligible	Possible	Negligible	Management and monitoring required during construction
Employment creation and/or sustaining of jobs – construction phase	Positive	Local	Short term	Low	Definite	Low	Mitigation required to maximise positive impacts
Supporting local businesses through local procurement of materials, equipment & services	Positive	Local to Sub-regional	Short term	Low	Highly probable	Low	Mitigation required to maximise positive impacts
Trespassing and/or potential increase in criminal activity	Negative	Local	Short term	Unknown	Possible	Unknown	Management and monitoring required
Visual impact of construction activities and site clearing	Negative	Local	Short term	Low	Probable	Negligible	No further studies required
Noise associated with construction activities	Negative	Local	Short term	Low	Probable	Low	Monitoring required
Operational phase							
Potential transportation of odours to Senwamokgope by wind	Negative	Local	Long term	Low	Possible	Low	Monitoring required
Possible reduction in foul odours due to improved sewage treatment	Positive	Local	Long term	Low	Highly probable	Low	No mitigation required
Reduction in current groundwater and surface water pollution by sewage	Positive	Local to Sub-regional	Long term	Medium	Highly probable	Medium-high	Management and monitoring required throughout operational lifetime of system. Six-monthly reporting to DWA
Uplifting of living standard due to increased access to waterborne sanitation, and concomitant reduction in health risks.	Positive	Local to Sub-regional	Long term	High	Definite	High	No mitigation needed

Reduced health risk to fauna (wildlife, livestock & aquatic fauna) due to improved water quality	Positive	Local to Sub-regional	Long term	Medium	Possible	Medium	No mitigation needed
Possible pollution of surface water and groundwater	Negative	Local	Long term	Unknown	Improbable	Medium-high	Management and monitoring required Six-monthly reporting to DWA
Removal of alien plant species, including long-term follow-up removal	Positive	Local	Long term	Low	Possible	Low	Management and monitoring required
Possible spreading of alien plant species due to disturbance of natural vegetation	Negative	Local	Long term	Low	Possible	Low	Management and monitoring required
Visual impact of the treatment plant	Negative	Local	Long term	Negligible	Possible	Negligible	No mitigation needed
Noise associated with operation of the treatment plant	Negative	Local	Long term	Negligible	Improbable	Negligible	No mitigation needed
Stimulation of further local development	Positive / Negative	Local	Long term	Unknown	Highly probable	Unknown	No mitigation as part of this project, but the applicant/s will need to adhere to relevant environmental regulations

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