

ENDEMICVISION ENVIRONMENTAL SERVICES

# Draft Environmental Impact Assessment: Vryburg Waste Water Treatment Works

2014

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53 MOORREES STREET, MALMESBURY, 7600

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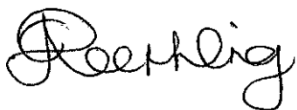
## DECLARATION OF CONSULTANT INDEPENDENCE

This report has been prepared by EndemicVision Environmental Services (EV) with the trading name of EndemicVision Environmental Services (Pty) Limited, with all reasonable skill, care and diligence within the terms of the contract with the client.

EndemicVision Environmental Services Pty (Ltd) is a multidisciplinary environmental management and consulting company with more than 20 years of experience in field. The technical appointments for this project are detailed below.

Team Member	Qualifications	Experience	Project Role
<b>Chrizette Neethling</b>	BSC – Honors BA with specialization in Environmental Management ND Conservation Management NC Business Management	Chrizette Neethling has over 18 years of broad based environmental experience with more than 35 projects completed in mining, biodiversity and development industries. She has a strong background in environmental management systems, reactive regulatory tools to address development and the pro-active conservation tools to enhance projects.	Project Manager
<b>Melanie Jordaan</b>	BA Development & Environment BA – Honors Sociology	Melanie Jordaan has one years experience as a public participation process facilitator as well as experience in the environmental authorization process.  She has a background in social research, data collection and report writing for research projects.	Social and Environmental Technician
<b>Liezel van der Westhuizen</b>	BA Development & Environment BA (Geo-Environmental Science) - Honors	Liezel van der Westhuizen has one years experience in conducting environmental impact assessments.	Environmental Technician

The author of this report, EndemicVision Environmental Services, does hereby declare that it is an independent consultant and has no business, financial, personal or other interest in the activity, application or appeal in respect of which it was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of the persons performing such work. All opinions expressed in this report are its own.



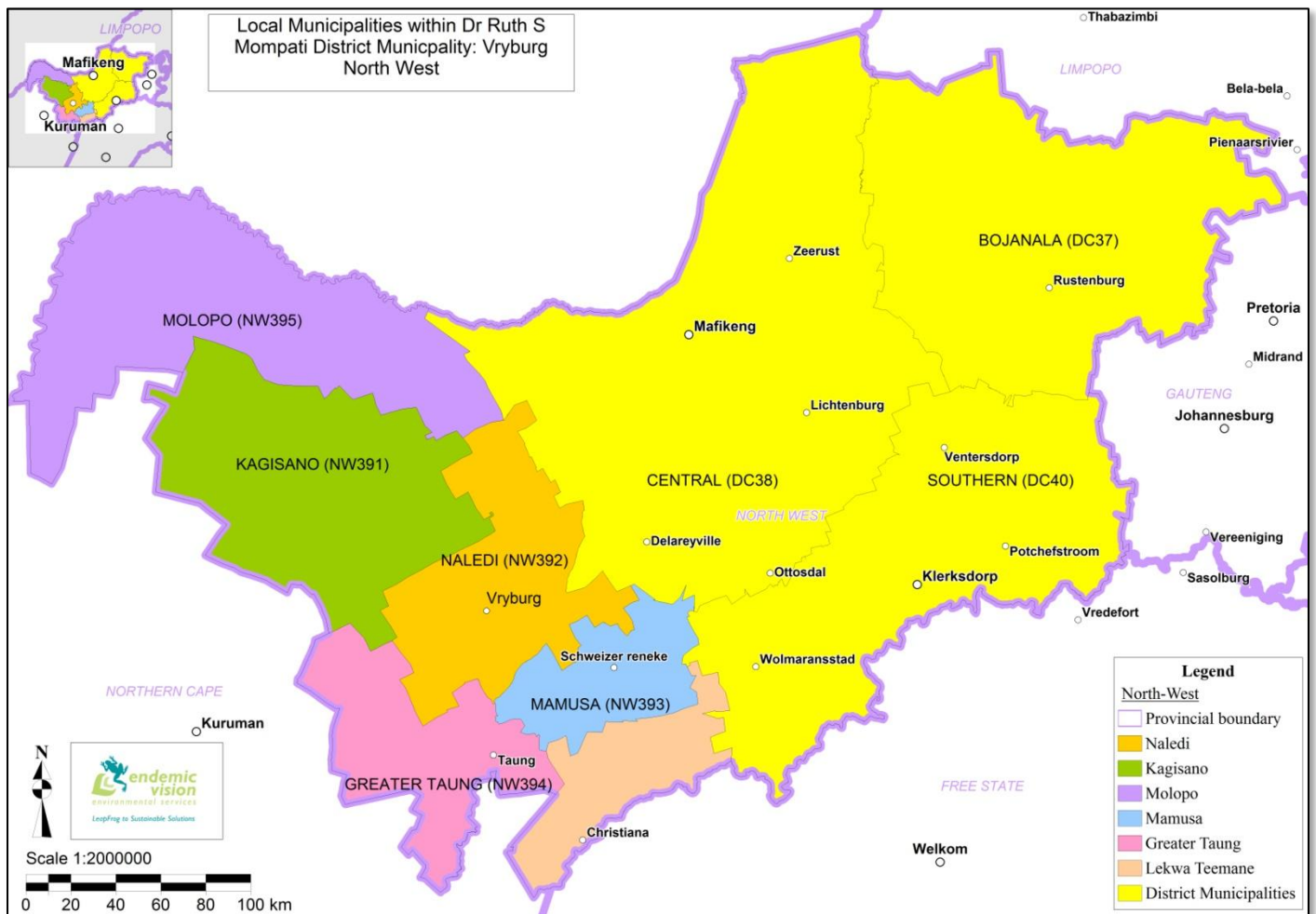
Signed: **C.D. Neethling**

Dated: **10 February 2014**

# INTRODUCTION

Dr Ruth S Mompoti District Municipality (Dr RSM) signed a contract with Onno Fortuin Consulting (OFC) that appointed EndemicVision Environmental Services (hereafter EV) to ensure proper environmental management of the process. The developer is the Dr RSM with the operational agent by means of a memorandum of agreement and service level agreement is the Vryburg local municipality. In terms of compliance both these entities are seen as responsible agents for this project. The environmental management requires the compilation of the necessary studies and applications required to ensure legal compliance is adhered to for the design, construction, operation and decommissioning of a new Waste Water Treatment Works (WWTW). This requires environmental authorisations and specialist studies to evaluate the environmental impacts associated with the development.

Vryburg is a large agricultural town with a population of 48,200 situated in the Dr Ruth Segomotsi Mompoti district of the North West Province of South Africa. It is the seat and the industrial and agricultural heartland of the district of the Bophirima region. It is situated halfway between Kimberley (the capital of the Northern Cape Province) and Mafikeng (the capital of the North West Province). It is on Cecil Rhodes's great northern railroad, which ran from Cape Town through the Kimberley diamond fields, Vryburg, Mafikeng, and northwards beyond Victoria Falls. It is also on the N14 National Road which runs from Gauteng Province in a south-westerly direction through Vryburg, Kuruman and Upington to the mining town of Springbok in the North-western Cape. This road also connects Gauteng Province with Namibia (Wikipedia, 2013).



**FIGURE 1: LOCAL MUNICIPALITIES WITHIN THE DR RSM DISTRICT MUNICIPALITY - VRYBURG, NORTH WEST**

Vryburg needs a new WWTW because of the following reasons:

- Phased Housing Expansion in Vryburg (more than 6500 houses being developed)



- ✿ The current Vryburg WWTW constructed in 1982 is designed with hydraulic load capacity of 4.8 MI/day and the estimated current capacity requirements is 6.5 MI/day
- ✿ The ultimate planned capacity for Vryburg is 24 MI/day The current works have limited expansion possibilities

The new WWTW will be built in two phases by constructing the first phase that can handle 16 MI/day in year one and the second phase that can handle 24 MI/day. The new WWTW will be situated on Portion 2 of the Rosendal 673 farm South East of Huhudi. The distance to Huhudi from the new WWTW is approximately 900 metres.

The process design will be a Biological Nutrient Removal (BNR) Activated Sludge WWTW will require an Environmental Impact Assessment and an Environmental Management Plan (EIA/EMP) in terms of NEM:WA to obtain a Waste License.

A Water Use License (WUL) will be required in terms of the National Water Act, 1998 (Act 36 of 1998) (NWA).

## 1.1. APPLICABLE LEGISLATION

The legal framework contained in this section is only intended to direct the user of this document towards provisions that are, or could be applicable to a particular application for formal legal compliance with which such a person should familiarise him or herself. This is by no means a complete list, since several other provisions, such as servitudes, regulations relating to geographical areas, the zoning of land, historic artefacts could also influence additional requirements.

The following legislation is briefly discussed in context of this project. It should be noted that this is not an all inclusive list and additional legislation may become applicable through different phases of the project and that a legal register and legal auditing should make out part of the municipal management system to ensure overall legal compliance by the municipality.

**TABLE 1: LIST OF APPLICABLE LEGISLATION**

#	Acronym	Act
1	CARA	Conservation of Agricultural Resources Act (43 of 1983)
2	Constitution	Constitution of the Republic of South Africa
3	Haz Act	Hazardous Substances Act (15 of 1973)
4	NEMA	National Environmental Management Act (107 of 1998)
5	NEM: AQA	National Environmental Management: Air Quality Act (39 of 2004)
6	NEM: WA	National Environmental Management: Waste Act (59 of 2008)
7	NHRA	National Heritage Resources Act (25 of 1999)
8	NWA	National Water Act (36 of 1998)
9	OHSA	Occupational Health and Safety Act (85 of 1993)
10	PAJA	The Promotion of Administrative Justice Act (3 of 2000)
11	WSA	National Water Services Act (108 of 1997)

### 1.1.1. CONSTITUTION OF THE REPUBLIC OF SOUTH AFRICA, 1996

The Constitution, which is the cornerstone of the democracy in South Africa, lays the foundation of a more just and equitable society. It guarantees everyone the right to an environment that is not harmful to their health or wellbeing and guarantees the right to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures. It also guarantees all citizens the right of access to water (Department of Public Works, 2012).

### 1.1.2. NATIONAL ENVIRONMENTAL MANAGEMENT ACT (NEMA), No. 107 OF 1998

NEMA reiterates the provisions of section 24 of the Constitution, and contains the internationally accepted principles of sustainability. It is therefore a legal requirement that these principles must be

taken into consideration in all decisions that may affect the environment. Furthermore, the need for intergovernmental co-ordination and harmonisation of policies, legislation, and actions relating to the environment, is emphasised. It is also important to note that the Best Practical Environmental Option (BPEO) is defined in NEMA as “the option that provides the most benefit or causes the least damage to the environment as a whole, at a cost acceptable to society, in the long term as well as the short term”.

The Environmental Management Plan (EMP) is recognised as the tool that can provide the assurance that the project proponent has made suitable provisions for mitigation. The EMP is the document that provides a description of the methods and procedures for mitigating and monitoring impacts. The EMP also contains environmental objectives and targets which the project proponent or developer needs to achieve in order to reduce or eliminate negative impacts. The EMP document can be used throughout the project life cycle. It is regularly updated to be aligned with the project progress from construction, operation to decommissioning. EMPs provide a link between the impacts predicted and mitigation measures specified within the Environmental Impact Assessment (EIA) report, and the implementation and operational activities of the project. EMPs outline the environmental impacts, the mitigation measures, roles and responsibilities, timescales and cost of mitigation. NEMA states that before certain listed development activities can be undertaken, an EIA must be undertaken and Environmental Authorisation obtained. The Department of Environmental Affairs and Development Planning is responsible for evaluating applications in terms of the EIA Regulations. This written decision is now called either an Environmental Authorisation or Environmental Refusal and is listed in a Environmental Authorisation (EA) (Department of Public Works, 2012).

### 1.1.3. NATIONAL WATER ACT (NWA), No. 36 OF 1998

The spirit of NWA recognizes that water is a natural resource that belongs to all people and the state is responsible to protect and manage this resource.

Sustainability and equity are identified as central guiding principles in the protection, use and management of water resources.

The NWA regulates the manner in which persons obtain the right to use water and provides for just and equitable utilization of water resources.

The NWA introduces several new concepts, and regulates all water-related aspects in South Africa based on the above-mentioned Constitutional rights. The principles support the objectives of sustainability and equity which underpin the entire NWA as central guiding principles in the protection, use, development, conservation, management and control of our water resources.

Water use activities that relate to land-use are strongly influenced by the development strategies and plans for a specific area. Some statutes that could play a role in determining such strategies include the Development Facilitation Act, No 67 of 1985, the Local Government Transition Act, No 61 of 1995, the Conservation of Agricultural Resources Act, No 43 of 1983 and the National Forests Act, No 84 of 1998 (Department of Public Works, 2012).

A Water Act license from the DWA and a Waste Act license from the DEA are necessary for the erection of any new wastewater treatment works in South Africa (Department of Public Works, 2012).

### 1.1.4. WATER SERVICES ACT, No. 108 OF 1997

The Water Services Act (WSA), No 108 of 1997, provides the framework for the provision of water services. Developments for the provision of such water services will usually result in a water use that requires authorisation, irrespective the source of funding for such developments. This implies that the authorisation process should be followed in harmony with the funding mechanisms that are in place, as well as with the EIA-Regulations, if applicable. The purpose of these EIA-Regulations is to regulate the procedure and criteria relating to the submission, processing and consideration of, and decision on, applications for environmental authorisations for the commencement of activities in order to avoid

detrimental impacts on the environment, or where it cannot be avoided, ensure mitigation and management of impacts to acceptable levels, and to optimise positive environmental impacts, and for matters pertaining thereto.

On the basis of the constitutional obligation to protect the environment, stringent pollution prevention measures and the "polluter pays" principle are incorporated into the NWA. According to Fundamental Principle 16: "Water quality management options shall include the use of economic incentives and penalties to reduce pollution and the possibility of irretrievable environmental degradation as a result of pollution shall be prevented". In fulfilment of this principle "waste discharge charges", as intended under section 56(5) of the NWA can be set for uses that may impact on the resource quality (Department of Public Works, 2012).

#### 1.1.5. NATIONAL ENVIRONMENTAL MANAGEMENT AIR QUALITY ACT 39 OF 2004

This Act reforms the law regulating air quality by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development. It provides for national norms and standards regulating air quality monitoring, management and control by all spheres of government and for specific air quality measures.

"Air pollution" for the purposes of the Act means any change in the composition of the air caused by smoke, soot, dust (including fly ash), cinders, solid particles of any kind, gases, fumes, aerosols and odorous substances. It also provides for regulation of "greenhouse gases" means gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and re-emit infrared radiation, and includes carbon dioxide, methane and nitrous oxide.

It applies to both "point source" emissions meaning a single identifiable source and fixed location of atmospheric emission, including smoke stacks and residential chimneys as well as "non-point sources" meaning a source of atmospheric emissions which cannot be identified as having emanated from a single identifiable source or fixed location, including veldt, forest and open fires, mining activities, agricultural activities and stockpiles.

This Act repeals the Atmospheric Pollution Prevention Act 45 of 1965.

#### 1.1.6. NATIONAL HERITAGE RESOURCES ACT 25 OF 1999

This Act recognizes and promotes good management of the national estate, enable and encourage communities to nurture and conserve their legacy so that it may be bequeathed to future generations. Our heritage is unique and precious and it cannot be renewed.

This Act aims to protect the heritage assets of South Africa and provides for the protection and management of certain categories of heritage resources in South Africa.

It acknowledges a 'heritage resource' as any place or object of cultural significance.

Objectives of the Act are primarily the identification, assessment and management of the heritage resources of South Africa must-

- a) take account of all relevant cultural values and indigenous knowledge systems;
- b) take account of material or cultural heritage value and involve the least possible alteration or loss of it;
- c) promote the use and enjoyment of and access to heritage resources, in a way consistent with their cultural significance and conservation needs;
- d) contribute to social and economic development;
- e) safeguard the options of present and future generations; and
- f) be fully researched, documented and recorded.

### 1.1.7. THE CONSERVATION OF AGRICULTURAL RESOURCES ACT 43 OF 1983

The protection of natural resources impacts agricultural efficiency and production. Towards this end resources must be protected against poor veldt management and alien invasive species that can detrimentally impact one of the major industries in South Africa.

The objects of this Act are to provide for the conservation of the natural agricultural resources of the Republic by the maintenance of the production potential of land, by the combating and prevention of erosion and weakening or destruction of the water sources, and by the protection of the vegetation and the combating of weeds and invader plants.

In addition the following should be noted to be read with the act:

*List of Categories for weeds and invader plants - published in R.280 in the Government Gazette Vol. 429: No 22166 of the 30 March 2001.*

### 1.1.8. THE HAZARDOUS SUBSTANCES ACT 15 OF 1973

The Act defines and aims to put control measures and standards for substances that may cause injury or ill-health by reason of their toxic, corrosive, irritant, strongly sensitizing or flammable nature.

In addition, the Hazardous Substances Act controls certain electronic products and provides for the prohibition and control of the importation, manufacture, sale, use, operation, application, modification, disposal or dumping of such substances and products.

The Act aims to control certain substances that are harmful to human health, in order to supplement the common law requirements.

Hazardous substances are divided in different groups for the control thereof.

### 1.1.9. OCCUPATIONAL HEALTH AND SAFETY ACT NO. 85 OF 1993

Apart the performance of the plant, remains a sewage treatment plant a "production" process and is it required to comply with the OHSA. The plant shall be so designed that all the requirements of the OHSA, and its regulations, be adhered to (Department of Public Works, 2012).

### 1.1.10. THE PROMOTION OF ADMINISTRATIVE JUSTICE ACT 3 OF 2000

The act recognize that "administrative action" means any decision taken, or any failure to take a decision, by an organ of state and that this requires regulated management.

The Act aims to promote an efficient administration and good governance; and create a culture of accountability, openness and transparency in the public administration or in the exercise of a public power or the performance of a public function, by giving effect to the right to just administrative action.

### 1.1.11. NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT 59 OF 2008

The Act integrates and systematically approach waste management in order to protect health and the environment for the prevention of pollution and ecological degradation and for securing ecologically sustainable development.

According to the National Environmental Management Waste Act "waste" means any substance, whether or not that substance can be reduced, re-used, recycled and recovered that is surplus, unwanted, rejected, discarded, abandoned or disposed of; which the generator has no further use of for the purposes of production; that must be treated or disposed of; or that is identified as a waste by the Minister by notice in the Gazette, and includes waste generated by the mining, medical or other sector, but a by-product is not considered waste; and any portion of waste, once re-used, recycled and recovered, ceases to be waste.

In this instance residue sludge and outflow water is seen as waste and should be reduced, re-used, recycled and recovered as far as possible.

According to the National Environmental Management Waste Act (16) (1) A holder of waste must, within the holder's power, take all reasonable measures to—

- ✿ avoid the generation of waste and where such generation cannot be avoided, to minimize the toxicity and amounts of waste that are generated;
- ✿ reduce, re-use, recycle and recover waste;
- ✿ where waste must be disposed of, ensure that the waste is treated and disposed of in an environmentally sound manner;
- ✿ manage the waste in such a manner that it does not endanger health or the environment or cause a nuisance through noise, odor or visual impacts;
- ✿ prevent any employee or any person under his or her supervision from contravening this Act; and
- ✿ prevent the waste from being used for an un-authorized purpose.

In order to control and manage disposal sites, the Department of Water Affairs published the Minimum Requirements Series of standards and procedures. These guidelines comprise three volumes:

1. Minimum Requirements for Waste Disposal by Landfill;
2. Minimum Requirements for the Handling of and Disposal of Hazardous Waste; and
3. Minimum Requirements for Monitoring at Waste Management Facilities.

**TABLE 2: MINIMUM REQUIREMENTS FOR WASTE HANDLING, STORAGE AND TRANSPORTATION**

<b>Subject</b>	<b>Minimum Requirement</b>
Qualification as disposal site	If a waste is held at a storage site for a period exceeding three months, the site automatically qualifies as a Waste Disposal Site, and must be registered as such and meet all the requirements of a disposal site.
Temporary storage area	A temporary storage area must have a firm, waterproof base and drainage system. It must be so designed and managed that there is no escape of contaminants into the environment.
Identification of waste	The transporter must be provided with accurate information about the nature and properties of the load.
Documentation	The transport operator must be provided with the relevant transportation documentation for the consignment.
Security of load	The load must be properly loaded and secured on site.
Hazchem placard	The transport operator must be supplied with the appropriate Hazchem placards. The transport operator must ensure that the Hazchem placards are properly fitted to the vehicle.
Vehicle Roadworthiness	The Responsible Person must ensure that before the vehicle leaves the consignor's premises it is not overloaded or showing any obvious defect that would affect its safety.
Escape of hazardous spillage at site	The Department and the Local Authority must be advised immediately, should it prove impossible to contain spillage of a Hazardous Waste on a site.
Protection against effect of accident	The Generator - or his representative, i.e., transporter - must ensure that adequate steps are taken to minimise the effect an accident or incident may have on the public and on the environment.
Spillage on site	The Generator must initiate remedial action to clean up any spillage remaining on a site after an accident.
Notification	All road accidents must be reported to the Department of Transport on the prescribed documentation. In case of an accident, a full report, containing all the information listed in 10.8.2 must be sent to the Department

Source: (DWAF, 1998)

**TABLE 3: MINIMUM REQUIREMENTS FOR WATER MONITORING AT WASTE MANAGEMENT FACILITIES**

<b>Subject</b>	<b>Minimum Requirement</b>
Minimum requirement	The lower limit which must be complied with. The right to appeal against compliance with the prescribed minimum requirements, based upon sufficient motivation, exists.
Monitoring	The meaningful measurement of a variable(s) on a once-off basis during initial impact assessments, or on a routine basis.
Waste Management Facility	All wastes or products stored on a temporary or permanent basis, that could impact on surface or groundwater quality, by leaching into or coming in contact with water. See also Waste Management Documents, "Minimum requirements for waste disposal sites" and "Minimum requirements for the handling and disposal of hazardous waste"
Expertise required	The installation of groundwater monitoring systems requires specialized knowledge, and consultation with an appropriately qualified geohydrologist is a requirement.
Monitoring Network	Monitoring networks must extend beyond zones of impact.
Aquifer Classification	It is a requirement that all future waste facilities be sited on Poor Aquifer Regions. In the event that this is not possible, a risk assessment and extensive motivation should be submitted to the Department for consideration.
Risk Assessment	A risk assessment, to determine the risk of water being polluted, must be performed at all waste sites before the installation of a monitoring

	system. This is to ensure that the design of the monitoring system is adequate. It is a requirement that modellers should demonstrate their competence in the modelling of groundwater systems, otherwise the DWA & F will not accept results from simulations.
Rainfall	Rainfall for the past 24 hours must be recorded at 8h00 every morning.
Evaporation potential	The measurement of pan evaporation is only a requirement at hazardous disposal sites.
Run-off	Run-off quantities and qualities must be recorded continuously, when specified in the permit. Leachate Collection/Toe Seepage. Samples must be collected, preserved and analyzed according to specifications in this manual ( <i>where this table is extracted from</i> ).
Rehabilitation	Rehabilitation on top of waste must be done as soon as is reasonably possible.
Borehole data	Data required from boreholes are: <ul style="list-style-type: none"> <li>• Geological log.</li> <li>• Water intersections (depth and quantity).</li> <li>• Construction information (depth of hole and casing, borehole diameter, method drilled, date drilled).</li> <li>• Use of borehole water, if not solely for monitoring; frequency of abstraction;</li> <li>• Abstraction rate and whether other water sources are readily available.</li> <li>• Water quality (see chapter on chemical analyses).</li> </ul>
Borehole type	Borehole must be drilled by a drilling technique that will not introduce pollution into the aquifer.
Hole diameter	Monitoring boreholes must be of a diameter that will allow easy access to the aquifer, for the purpose of water sampling and for lowering other test instruments.
Hole depth	A monitoring hole must be such that the section of the groundwater most likely to be polluted first is suitably penetrated, to ensure the most realistic monitoring results.
Casing, screens and filters	<ul style="list-style-type: none"> <li>• The materials used for casing, screens and filters in contact with water must be compatible with, and resistant to chemical attack by, the water being monitored.</li> <li>• Casing, screens and filters must allow easy access for monitoring purposes and may in no way block the flow of water through the borehole.</li> <li>• A security cap must be fitted to prevent accidental or wilful interference with a monitoring borehole.</li> <li>• Required minimum dimensions for the concrete block are 750 mm x 750 mm x 150 mm.</li> </ul>
Piezometer tubes	Piezometer tubes must allow easy access for water sampling over the whole of the aquifer.
Borehole protection	Monitoring boreholes must be adequately protected to prevent accidental damage of the holes.
Groundwater levels	Groundwater levels must be recorded within an accuracy of 10 cm using an electrical contact tape, float mechanism or pressure transducer.
Pumping and/or packer tests	Where considered necessary by the geohydrologist or design engineer, pumping and/or tests must be carried out on boreholes to obtain additional data on the geohydrological conditions at that particular position.
Fountains, wells, dams, pans, streams and rivers	<ul style="list-style-type: none"> <li>• Water sources around a waste management facility, within a radius as suggested by the risk assessment, must be sampled and preserved for chemical analysis.</li> <li>• Flow from fountains and in streams must be estimated. If pollution occurs as a result of waste managing, then the Department may request continuous recording of flow and</li> </ul>

	water quality.
Water/salt balances	Water/salt balances: In instances where excess water is present and this water may have to be discharged into public streams, water and salt balances are required. At larger complexes such as mines, power stations or large industries, this usually implies water and salt balances for each of the contributing components, such as for raw water intake; for materials brought onto, removed from or disposed of on site; and for rainwater contribution and run-off.
Monitoring Networks	<ul style="list-style-type: none"> <li>☞ Monitoring networks at waste management facilities must allow monitoring of the system on a representative basis.</li> <li>☞ Local monitoring networks should extend beyond pollution plumes to allow for the delineation of plumes and investigations into the pollution migration rate.</li> </ul>
Sample bottles and filters	<ul style="list-style-type: none"> <li>☞ Bottles of plastic, with a plastic cap and no liner within the cap are required for most sampling exercises.</li> <li>☞ Glass bottles are required if organic constituents are to be tested for.</li> </ul>
Sample Preservation	It is a minimum requirement that samples be preserved according to specifications in this document.
Sample Frequency	<ul style="list-style-type: none"> <li>☞ Where waste management permits are issued, the minimum sampling frequency will be prescribed.</li> <li>☞ At any groundwater sampling facility, whether permitted or non-permitted, initial sampling should be done at a frequency high enough to obtain statistically valid background information. For any long-term monitoring facility, three initial sampling exercises, all within 90 days and not less than 14 days apart, are suggested. Depending on the variation amongst these values, future sampling may be planned. A three-monthly sampling frequency will in most instances be sufficient.</li> </ul>
Surface water	Continuous monitoring of the discharged flow volume and quality (by electrical conductivity method) is required in instances where polluted water is disposed of into a public stream.
Analytical variables	<ul style="list-style-type: none"> <li>☞ A recognized analytical laboratory that uses approved analytical procedures must analyze water samples.</li> <li>☞ In instances where permits have been issued, permit conditions will specify the frequency of analyses and constituents to be tested for.</li> <li>☞ For all new sites and first time monitoring at existing sites, a comprehensive analysis is required.</li> <li>☞ Indicator analysis may be performed once comprehensive analyses have been completed.</li> <li>☞ This process may continue until undesirable trends are uncovered.</li> </ul>
Reporting to the Department	<ul style="list-style-type: none"> <li>☞ Data must be stored in such a way as to be easily accessible for to the waste manager and to the Department.</li> <li>☞ Data must be processed and interpreted after each sampling exercise.</li> <li>☞ Reporting frequency to the Department will be specific in the waste management permit conditions. Otherwise, the reporting frequency is six-monthly.</li> </ul>

Source: (DAAF, 1998)

## 1.2. PURPOSE AND FRAMEWORK OF THIS DOCUMENT

This report has been compiled as part of an ESIA process according to the regulatory requirements in terms of the 2010 EIA Regulations (GNR. 543, 18 June 2010), promulgated in terms of Section 24(5) of the NEMA.

The objectives of this document are to:



- ✿ Communicate the findings of the ESIA process, including specialist studies, for the Project and alternatives considered;
- ✿ Undertake a robust assessment of potential impacts identified during the Scoping phase and present mitigation measures to ensure proper environmental management;
- ✿ Provide reasonable opportunity for the client, key stakeholders and Interested and Affected Parties (I&APs) to raise any issues or concerns they may have regarding the Project, anticipated impacts and associated mitigation measures;
- ✿ Present responses to the concerns raised, and subsequent efforts towards mitigating the negative, and enhancing positive impacts;
- ✿ Provide a record of comments and responses received from I&APs during the process, together with responses from the project team; and
- ✿ Facilitate an informed, transparent and accountable decision-making process by the relevant authorities.

The report layout is summarised below.

<b>Main Report</b>	<b>DR RSM WWTW ESIA 2013</b>
Annex A	Stakeholder Engagement Process
Annex B	Environmental Management Plan
Annex C	List of Drawings
Annex D	Specialist Reports
	D1 – Ecological Specialist Report
	D2 – Surface hydrology and Storm Water engineering memo
	D3 – Cultural Heritage and Archaeological Report
	D4 – Geotechnical Survey

### 1.3. METHODOLOGY FOR THE EIA PROCESS

The following process has been followed according to NEMWA:

- ✿ Submission of an application for a waste license
- ✿ Submission of an environmental scoping report;
- ✿ Submission of the draft EIA/EMP report allowing adequate input from all relevant stakeholders
- ✿ Submission of the final EIA/EMP taking into account public participation and regulatory timeframes.

Concurrent to this process, clearance is obtained in terms of the South African Heritage Resources Association and submission is made for a water use license to the department of water affairs.

#### 1.3.1. SUBMISSION OF AN APPLICATION FOR A WASTE LICENSE

Application for a waste license was submitted and acknowledged by the Department of Environmental Affairs (DEA) on 26 November 2013. The following DEA reference number for the project has been issued: 12/9/11/L1396/7. The reference number issued by the North West Department of Economic Development, Environment, Conservation and Tourism on 12 December 2013, is the following: NWP/DEA/14/2013.

#### 1.3.2. SCOPING

The scoping phase served as an introduction to the project. It included a description of the proposed project, evaluation of the environmental and social baseline of the area by means of research, desktop studies regarding the different environmental impacts and the methodology that was used during the specialist studies. The Public Participation Process (PPP) was also initiated during this phase. The draft scoping report was presented to the client and community on 05 November 2013 and submitted for commenting to the DEA on 25 November 2013. The commenting period will end on 12 February 2014 where after the scoping report will be made final after incorporating the comments.

Investigations during the scoping phase included aspects such as the physical, biological, cultural archaeological and social environment and a general on-site evaluation of the status of the WWTW plant site. The information in the scoping report was compiled from various sources, including the district and local municipality managers, engineering team, specialists, site visits, literature reviews and community input.

Both the preliminary positive and negative potential impacts that the proposed operations will have on the environment were identified and their relative significance discussed.

The PPP is central to the investigation of environmental impacts as it is important that stakeholders who are potentially affected by the project are given an opportunity to identify issues relevant to them. This is important to ensure that local knowledge, needs and values are understood and utilized. Stakeholders were given the opportunity to review and comment on the Scoping Report from 5 November 2013 until 15 December 2013.

### 1.3.3. DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

The EIA process considers intensive inputs and concurrent development of the EIA and EMP as the project moves towards final design. The draft EIA & EMP will be subject to the following additional inputs:

- ✿ Inputs from the Department of Water Affairs in terms of concurrent Water Use License Application.
- ✿ Inputs from the design engineers in terms of the final draft design. The draft EIA & EMP is presented on concept and draft designs.
- ✿ Considerations from the client in terms of final land-use and demolition of the existing WWTW. The municipal process to secure decisions and funding in this regard is extensive and expected to be finalised during the draft EIA & EMP commenting period.
- ✿ Final inputs in terms of rezoning and subdivision as well as land-owner transfer of the property for the WWTW.

It should be noted that a key driver for this project is the fact that there is currently dumping of health hazardous materials without authorisations and sewage services is in high demand. The request of the municipality and community is to ensure commencement of construction as soon as practically possible.

The Draft EIA & EMP was presented to the client on 12 December 2013 and will be submitted to the regulators and published to the public for commenting on 12 February 2014. By the 3<sup>rd</sup> of April 2014 the commenting period will be complete for the regulators and their and the public's inputs will be incorporated in the final EIA & EMP.

### 1.3.4. THE ENVIRONMENTAL ASSESSMENT

This EIA uses a numerical environmental significance rating process which is based on the accepted impact assessment methodology that uses the probability of an event occurring and the severity of the impact, should an event occur, as factors to determine the significance of a particular environmental risk.

In order to determine the severity of any potential environmental impact, the criteria that are taken into consideration are the spatial extent of the impact, the duration of the impact and the severity of the impact. The probability of an impact occurring is determined by the frequency at which the activity takes place and by how often the type of impact in question has taken place or takes place in similar circumstances. The values assigned to these factors (weighting) are discussed as part of the EIA.

The EIA assesses environmental and social impacts for different activities according to different stages of the proposed project, namely the construction and operational phases. Impact and benefit significance are assessed before and after the application of any mitigation or enhancement measures and refer to effects on both the ecological and social environment.

In addition, the cumulative and residual impacts of the proposed operation on the environment, with reference to similar operations and activities in the area are discussed.

### 1.3.5. ENVIRONMENTAL MANAGEMENT PROGRAMME

The EMP addresses all environmental impacts that have been identified in the EIA phase and provides achievable mitigation measures to reduce the possible impacts on the environment.

The EMP section is divided into the setting of objectives and the provision of management measures. The monitoring and performance assessment section of the EMP details the monitoring and audits that will be implemented to ensure the effectiveness of mitigation.

### 1.3.6. FINAL ENVIRONMENTAL IMPACT ASSESSMENT REPORT

The final EIA & EMP will be updated with the planned comments obtained from the different departments, engineers and community.

The final EIA & EMP will be published on the 4<sup>th</sup> of April, 2014 and the final Record of Decision will possibly be provided by the 25<sup>th</sup> of April, 2014.

## 1.4. GOVERNMENT DEPARTMENTS INVOLVED

The government departments involved in the EIA process and their roles in the project are detailed below.

**TABLE 4: GOVERNMENT DEPARTMENTS INVOLVED IN EIA PROCESS**

<b>Departments Involved</b>	<b>Role in Project</b>
The National Department of Environmental Affairs & Tourism – Waste Division	Competent Authority
The North West Department of Economic Development, Environment, Conservation and Tourism	Commenting Authority
The Free State’s Department of Water Affairs and Forestry	Commenting Authority
The North West Department of Public Works, Roads and Transport	Interested & Affected Party
South African Heritage Resources Agency	Commenting Authority
Dr. Ruth S. Mompoti District Municipality	Client
Naledi Local Municipality	Management Authority

## 1.5. QUALIFICATION OF CONSULTANT

EndemicVision Environmental Services Pty (Ltd) is a multidisciplinary environmental management and consulting company with more than 18 years of experience in field. The technical team appointed for this project is detailed below.

**TABLE 5: PROJECT TEAM**

<b>Team Member</b>	<b>Company</b>	<b>Specialist Field</b>
<b>Chrizzette Neethling</b>	EVision	Environmental Specialist
<b>Liesel van der Westhuizen</b>	EVision	Environmental Technician

<b>Melanie Jordaan</b>	EVision	Environmental and Social Technician
<b>Onno Fortuin</b>	Onno Fortuin Consulting	Engineer
<b>Derek Lambert</b>	Diesel & Munns	Surveyor
<b>Albert van Niekerk</b>	Golder Associates Africa	Civil Engineer
<b>Daniel Meyer</b>	Golder Associates Africa	Process Engineer
<b>Bartho Rivera</b>	Golder Associates Africa	Civil Engineer
<b>Collen Monokofala</b>	Golder Associates Africa	Senior Hydrogeologist
<b>Oliver Maletse</b>	Golder Associates Africa	Water Resource Scientist
<b>Frans Wiegman</b>	Golder Associates Africa	Associate Hydrogeologist
<b>Simon Todd</b>	Simon Todd Consulting	Ecology Specialist
<b>David Morris</b>	McGregor Museum: Department of Archaeology	Heritage Specialist

## 2. PROJECT DESCRIPTION

### 2.1. PROJECT BACKGROUND

The Dr. Ruth S Mompoti District Municipality intends to construct a new WWTW for Vryburg. The motivation for the construction of an entirely new plant is the following:

- ✿ Phased Housing Expansion in Vryburg (more than 6500 houses being developed)
- ✿ The current Vryburg WWTW constructed in 1982 is designed with hydraulic load capacity of 4.8 MI/day and the estimated current capacity requirements is 6.5 MI/day
- ✿ The ultimate planned capacity for Vryburg is 24 MI/day The current works have limited expansion possibilities

The new treatment plant will involve the construction of a BNR activated sludge WWTW covering an area of ±25 ha. The WWTW will be designed for a combined domestic and industrial wastewater. The Basis of Design (BoD) is based on a planning horizon of 20 years, up to 2029.

The Department of Water Affairs Discharge Water Quality Standards for discharge of treated effluent to the local river is below. These concentrations will serve as the target effluent quality to be achieved by the waste water treatment works.

**TABLE 6: SEWAGE WORKS WATER QUALITY DESIGN PARAMETERS**

<b>Substance / Parameter</b>	<b>General Standard (National Water Act 36 of 1998)</b>
Chemical Oxygen Demand (mg/l)	75
pH	5.5 – 9.5
Ammonia (ionised and un-ionised) as Nitrogen (mg/l)	3
Nitrate/Nitrite as Nitrogen (mg/l)	15

Chlorine as Free Chlorine (mg/l)	0.25
Suspended Solids (mg/l)	25
Electrical Conductivity (mS/m)	70 mS/m above intake to a maximum of 150 mS/m
Ortho-Phosphate as Phosphorus (mg/l)	10
Flouride (mg/l)	1
Soap, oil or grease (mg/l)	2.5
Faecal Coliforms (per 100ml)	1000
Dissolved Arsenic (mg/l)	0.02
Dissolved Cadmium(mg/l)	0.005
Dissolved Chromium (VI) (mg/l)	0.05
Dissolved Copper (mg/l)	0.01
Dissolved Cyanide (mg/l)	0.02
Dissolved Iron (mg/l)	0.3
Dissolved Lead (mg/l)	0.01
Dissolved Manganese (mg/l)	0.1
Mercury and its compounds (mg/l)	0.005
Dissolved Selenium (mg/l)	0.02
Dissolved Zinc (mg/l)	0.1
Boron (mg/l)	1

The feasibility level design cover a large range of activities, including:

- ✿ Establishment of design criteria;
- ✿ Determination of design assumptions;
- ✿ Determination of flow and organic load from every candidate option;
- ✿ Design at pre-feasibility level bulk sewers and bulk sewage pump stations;
- ✿ Geographic alignment and routing of water transfer system and site inspections;
- ✿ Compilation of specifications and schedule of quantities; and
- ✿ The design of a total cost of ownership economic model that has optimization capabilities.

The BNR activated sludge process utilizes the same preliminary treatment process from where the raw screened and de-gritted sewage flows to the BNR reactor. The reactor discharges to the secondary clarifiers. The overflow from the clarifiers flows to the chlorine contact channel, followed by the polishing wetlands and discharges to the environment. The RAS from the secondary clarifiers is recycled to the inlet of the BNR reactors. The Waste Activated Sludge (WAS) is wasted directly from the BNR reactors to the WAS thickener. The thickened sludge is dewatered and dried on sludge drying beds prior to disposal and the overflow or filtrate returned to the BNR reactor inlet.

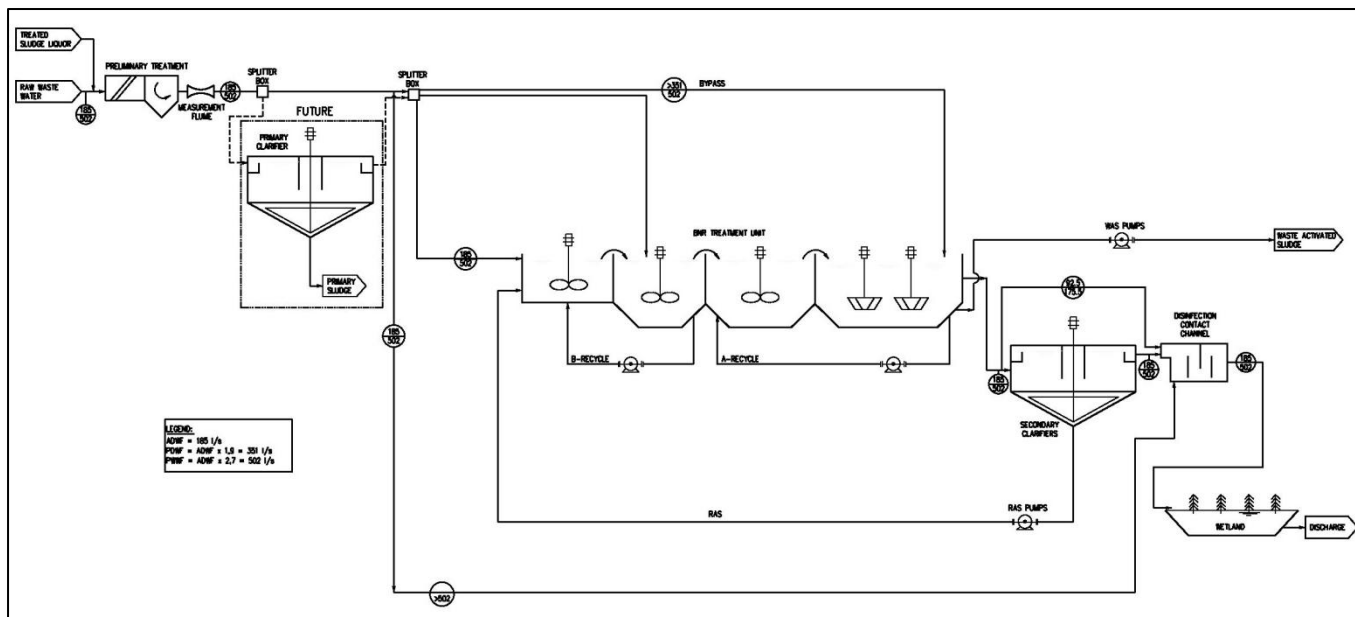
#### 2.1.1. PROCESS FLOW OF THE NEW SEWAGE WORKS

The Raw Waste water will be screened and de-gritted upon arrival at the New Vryburg Waste Water Treatment Works. Afterwards the sewage flows to the BNR reactor.

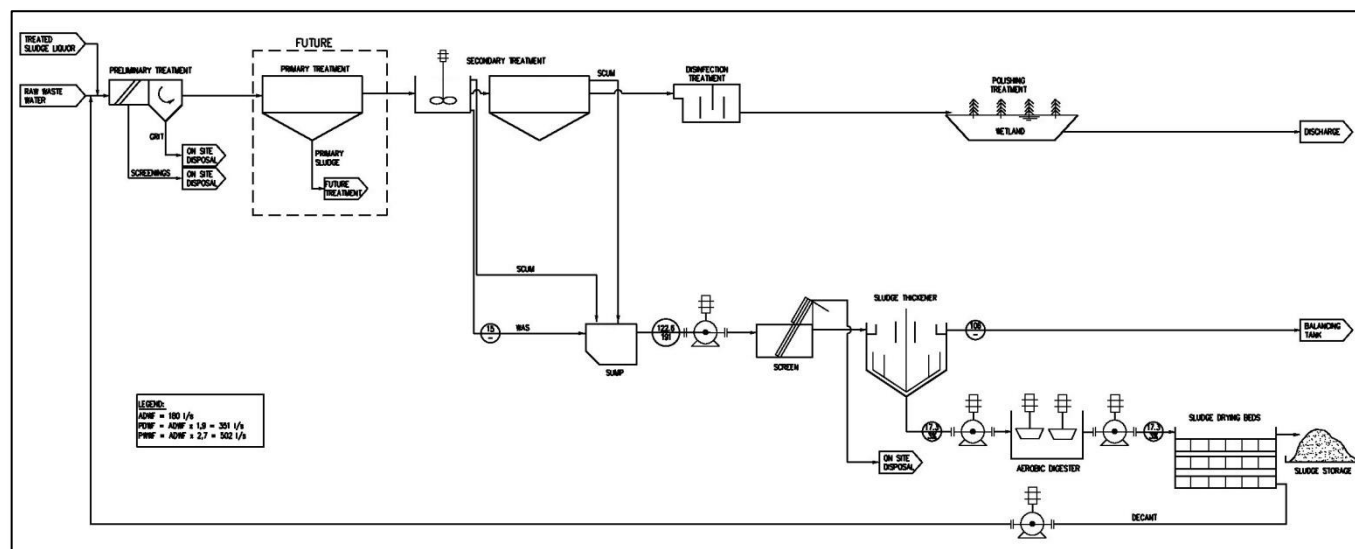
From the BNR reactor, the overflow discharges to the secondary clarifiers. The overflow from the clarifiers flows to the chlorine contact channel, followed by the polishing wetlands and discharges to the environment. The Return Activated Sludge (RAS) from the secondary clarifiers is recycled to the inlet of the BNR reactors. The Waste Activated Sludge (WAS) is wasted directly from the BNR reactors to the WAS thickener. The thickened sludge is dewatered and dried on sludge drying beds prior to disposal and the overflow or filtrate returned to the BNR reactor.

The influent wastewater passes an excess storm flow diversion (>PWWF) that will be downstream of the preliminary treatment process nits (screening and degritting). The excess peak wastewater will be diverted to the last aerobic zone of the BNR Reactor from where it will pass through the Secondary Clarifiers, on to the Chlorine Contact Channel for disinfection and discharge to the polishing wetland before final discharge.

Figure 2 and Figure 3 shows the liquid and solids treatment diagrams.



**FIGURE 2: HYDRAULIC FLOW DIAGRAM - LIQUID TREATMENT**



**FIGURE 3: PROCESS FLOW DIAGRAM - SOLIDS TREATMENT**

### 2.1.2. NEW SEWAGE WORKS INFRASTRUCTURE

In terms of storm water the following infrastructure is considered:

- The pipeline
- The platform of the WWTW that will result in surface run-off
- The inflow infrastructure to the Bles Spruit

#### THE PIPELINE

The pipeline will be constructed underground with an average depth of 2 meters below surface.

Two routes were evaluated for the pipeline from the existing WWTW to the new WWTW. Both routes tie in at the inlet pipeline to the existing WWTW.

**Route one:** This route is a contour based route as normally required. The route consider going underneath around the existing WWTW. This route is considered unfeasible. Route one is more than 4km long. The pipeline ties in to the new WWTW at 300 meter from the 1:50 year flood line and 200 meter from 1:200 year flood line.

**Route two:** Regardless of contours, the shortest alternative was selected and evaluated for engineering feasibility. The pipeline will go between the existing laboratory and gravel road to the new WWTW.

Route two is 3.7 km long at the final site selection. At chainage 3707 enough place need to be ensured to provide buffer from the 1:200 year flood line. For route two the pipeline tie in to the new WWTW at about 370 meters above the 1:200 year flood line and 400 meter above the 1:50 year flood line.

**Route Selection:** Route one has too many level points, is too long and arrives at final location too low into the flood line. Route two is the preferred alternative that will be applied.

#### THE PLATFORM

The WWTW will not build on the ground, but on a raised platform. The platform will allow for natural water flow towards the river. Storm water berms will be constructed to divert any possible inflow towards the WWTW from the surrounding landscape. New WWTW will have a platform high enough and allow natural drainage to the river.

#### INFLOW INFRASTRUCTURE

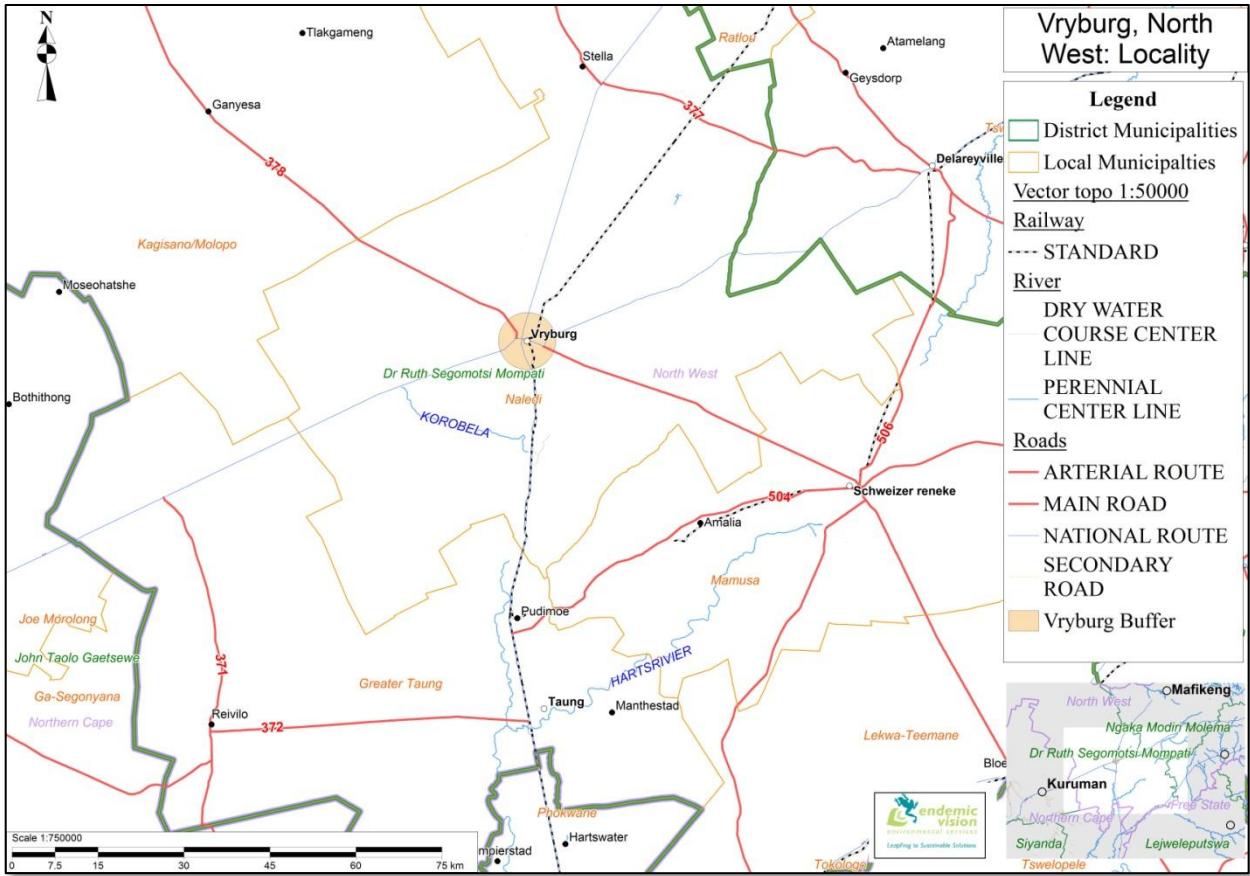
From the platform roads will be constructed with a storm water network along the roads. It is anticipated that the road storm water network will be used from the platform. From the road canals, energy breakers will be installed to break the water flow speed. Gabion mattresses will also be installed before entering the river system. No pipeline to the river will be constructed. On the top end of the platform diversion berms will be installed to protect the platform.

## 2.2. LOCATION & SITE DESCRIPTION

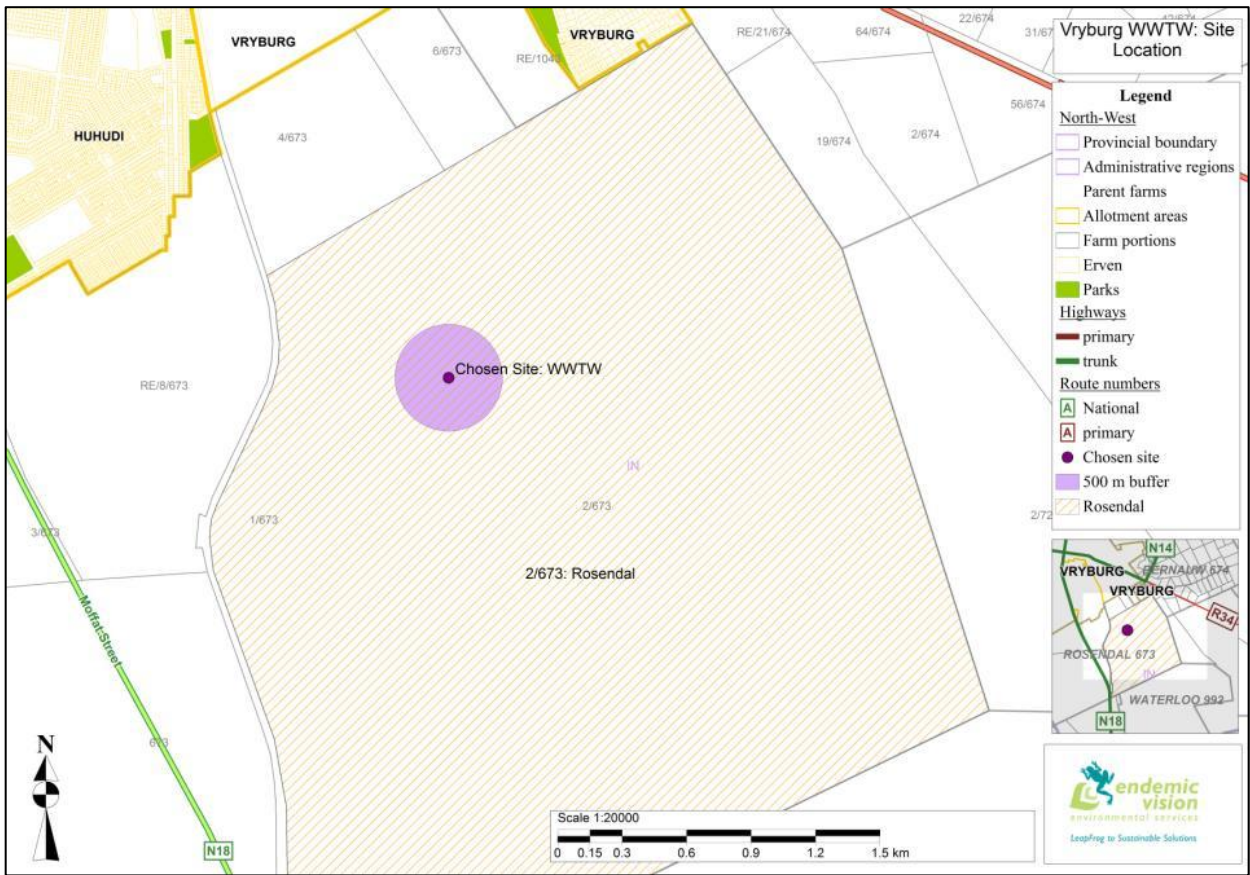
### 2.2.1. REGIONAL SETTING

Vryburg is situated in the North West Province and is located within the Naledi Municipality of the Dr RSM. Figure 4 below is a geographical layout plan showing the position of Vryburg within the context of the Lower Vaal Water Management Area (WMA). Vryburg is an important transport hub with some major transport links leading through Vryburg. The N14 Road linking Gauteng with Upington and Namibia runs through Vryburg. The N18 Road links Botswana through Mafikeng to Kimberley and Cape Town.

The study area falls within the Dr RSM District Municipality and in the Naledi Local Municipality (NLM) in the Vryburg area Portion 2 of on the farm Rosendal 672 in the North West Province. The owner of the property is Mrs AJ van der Merwe but negotiations are in process for Dr RSM to buy a portion of this land. The Bles Spruit, a tributary of the Vaal River, is located on Eastern side of the farm (Figure 5).



**FIGURE 4: VRYBURG, NORTH WEST LOCALITY MAP**



**FIGURE 5: VRYBURG WASTE WATER TREATMENT WORKS: SITE LOCATION**



### 2.2.2. PROPERTY PARTICULARS

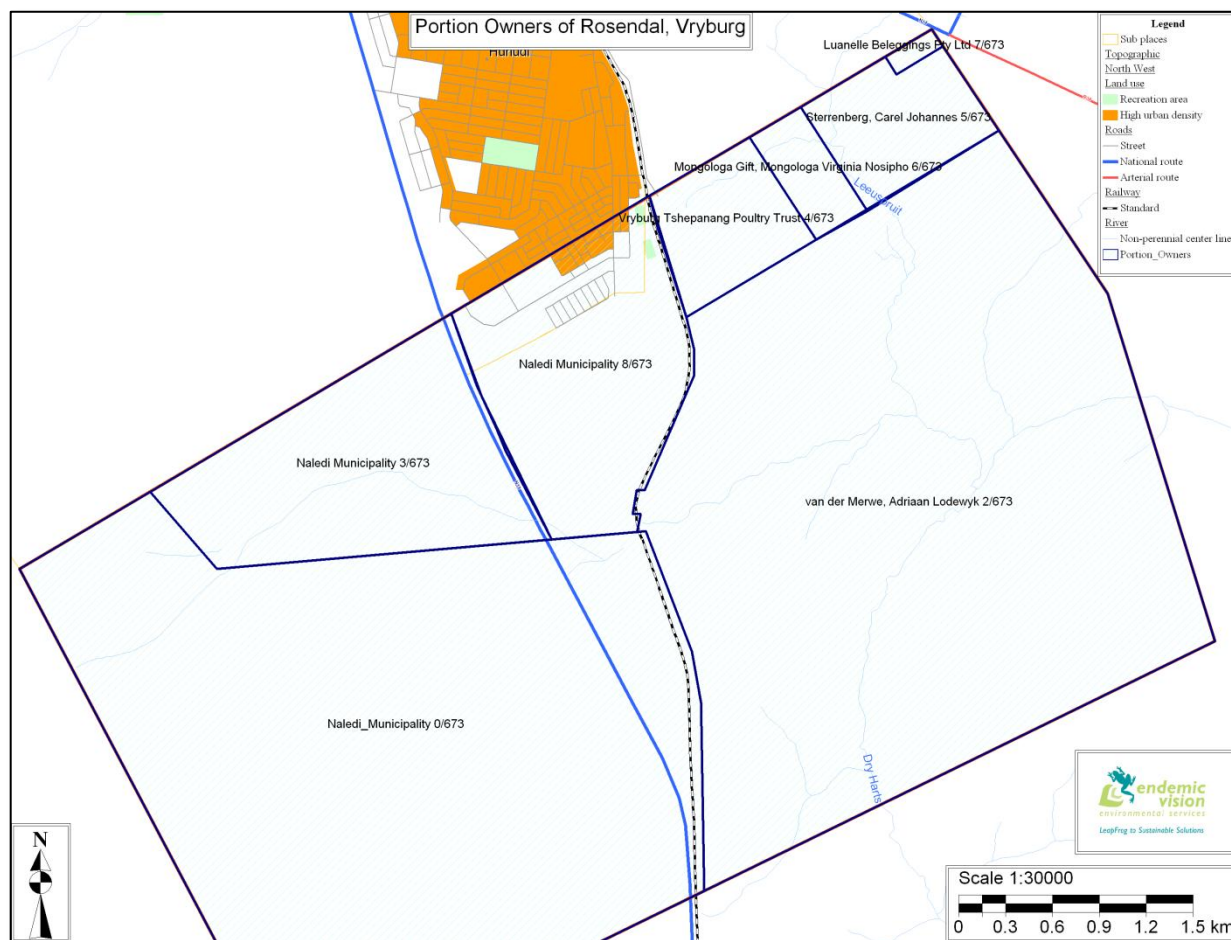
The following details about the property are available (A map of the landowners follow below):

**TABLE 7: LANDOWNERSHIP DETAILS**

Farm Name	Landowner	Title Deed Number
Rosendal 672 Portion 2	AJ van der Merwe	T1364/1970

**TABLE 8: ADJACENT LANDOWNERSHIP DETAILS**

Farm Name	Landowner	Title Deed Number
Rosendal 673	Naledi Municipality	T4140A
Rosendal 673 Portion 4	Vryburg Tshepanang Poultry Trust	T4011/2005
Rosendal 673 Portion 5	CJ Sterrenberg	T3081/2009
Rosendal 673 Portion 6	M Gift & MG Nosipho	T3290/2004
Rosendal 673 Portion 7	Luanelle Beleggings (Pty) Ltd.	T3080/2009
Rosendal 673 Portion 8	Naledi Municipality	T677/2003



**FIGURE 6: LANDOWNERS OF ADJACENT FARMS**

### 2.2.3. SURFACE INFRASTRUCTURE

At present there is only an Eskom power line close to the proposed plant location.

### 2.2.4. EMPLOYMENT

During the construction phase of the plant, ad hoc employment will be created and unskilled labour will be sourced locally. It is envisaged that a local contractor, utilizing local labour, will be appointed for the

earthworks and some civil construction of the new WWTW. The permanent labour at the WWTW plant is expected to increase to between 5 - 15 staff members.

### 2.3. PROJECT MOTIVATION

The current Waste Water Treatment Works in Vryburg was constructed in 1982 with a hydraulic load capacity of 4800 m<sup>3</sup> per day. Since then upgrades have been implemented, but the existing treatment works is under tremendous strain due to growing population numbers and it can hardly cope with the current flow and load of 6500 m<sup>3</sup> per day. Not only is the current inflow crippling the plant's capacity to function optimally, but planned future expansions will increase strain on the plant. Thus, a new waste water plant is needed. The new planned waste water treatment works trigger numerous activities of the General Notices of 18 June 2010 as requirement to the National Environmental Management Act (107 of 1998).



**FIGURE 7: "TREATED" EFFLUENT FLOWING INTO THE BLES SPRUIT**



**FIGURE 8: DIRTY SEWAGE EFFLUENT RUNNING INTO THE BLES SPRUIT**

## 2.4. CONSIDERATION OF PROJECT ALTERNATIVES

The purpose of this Section is to present a detailed description of project alternatives considered in the ESIA process. Alternatives are evaluated according to the following framework for all project infrastructure.

**TABLE 9: ALTERNATIVE ASSESSMENT FRAMEWORK**

ALTERNATIVE TYPE	PROJECT INFRASTRUCTURE					
	Roads	Waste Water Treatment Plant	Outfall Sewer	Dams	Pump stations	Power line
<b>Description of item</b>	Service road, gravel, 8 meters wide to allow for dual carriage	24ML per day Sewage Treatment Facility	Underground installed 115 diameter concrete pipe with sacrificial layer and corrosion analysis	Settling tanks for sedimentation settling of treating sewage only	Pump stations to pump 24ML per day bulk flow 24 hours a day, 7 days a week with back-up systems	6.6KV required (overhead high tension line)
(a) location where it is proposed to undertake the activity;	<b>X</b>	<b>X</b>				
(b) the type of activity to be undertaken;					<b>X</b>	<b>X</b>
(c) the design or layout of the activity;		<b>X</b>				<b>X</b>
(d) the technology to be used in the activity;		<b>X</b>	<b>X</b>			
(e) the operational aspects of the activity; and					<b>X</b>	
(f) The option of not implementing the activity		<b>X</b>				

**2.4.1. SITE LOCATION ALTERNATIVES**

The project team evaluated the different location alternatives for the project in terms of the following aspects:

- 🌿 Treatment Process (Main Stream),
- 🌿 Waste streams disposal,
- 🌿 Air emissions,
- 🌿 Environmental and
- 🌿 Financial.

A four point measuring tool was used to classify the qualitative assessment that the project will have on each of the aspects listed above: Positive, Marginal, Negative and No effect. Below is a summary of the decisions:

- 🌿 A gravel service road will be constructed with a width of 8 meters to allow for dual carriage. This road will be constructed along the outfall sewer. In the future, a new access road is required with a level crossing the railway line.

- ✿ The outfall sewer will be put underground. It will be a 115 diameter concrete pipe with sacrificial layer and corrosion analysis.
- ✿ Neither balancing tank nor a storage tank will be constructed. Settling tanks will be used for the processing of treating the sewage – sedimentation settling will take place in the tanks.
- ✿ It is preferred by the engineers not to have a pump station.
- ✿ A 6.6 kV power line is required. This will be an overhead high tension line. There is a possibility that Eskom will be the electricity supplier or otherwise solar energy will be used.
- ✿ A total of 5 sites were investigated until it was decided that the location between site 4 and 5 are the best.
- ✿ The four process alternatives all have the same Preliminary Treatment consisting of an inlet works designed with mechanical screening and degritting. The following four process alternatives were evaluated:
  - Anaerobic ponds with trickling filters;
  - Extended aeration process;
  - Biological Nutrient Reactor (BNR) – Activated sludge process;
  - Biological Nutrient Reactor (BNR) – Activated sludge process with preliminary settling and sludge digestion

#### 2.4.2. NO-GO ALTERNATIVE

The no-go alternative is the option of not building a new WWTW. Should the upgrade of the WWTW not continue the following will occur:

- Contamination of the nearest surface water streams will continue as the water will not be treated to the required quality;
- Bad odours emanating from the existing plant will continue; and
- Ground water will continue to be polluted.

### 3. PUBLIC PARTICIPATION PROCESS

#### 3.1 OBJECTIVES OF THE PUBLIC PARTICIPATION IN THE EIA PHASE

The objective of the Public Participation Process (PPP) is to ensure a legally compliant process with stakeholders to provide project information to them in a meaningful way and obtain information from them as a community to enhance the project.

This objective will be achieved by implementing the following goals:

- ✿ Identification, analysis and engagement of stakeholders in the planning, permitting and construction stages of the project lifecycle in a proactive manner
- ✿ Categorization of the identified stakeholders on the basis of their engagement with the Project relating to the functions of specific Departments
- ✿ Identification of representatives of different categories of stakeholders who will be representing their group in meetings and consultations
- ✿ Devising engagement mechanisms appropriate for this specific engagement process and groups
- ✿ Ensuring that the required systems are in place to report and record any question, complaint, grievance or incident raised by the stakeholders in general and the local community

For the purpose of this PPP, stakeholder engagement is defined as a broad and inclusive interaction that encompasses consultation, disclosure, negotiation, the formation of partnerships, resolution of grievances, and participatory monitoring and reporting. It includes all areas of stakeholder contact during all phases of the proposed Vryburg Waste Water Treatment Works. For the purpose of this

project, The Project from here on will be defined as the planning, permitting, operation and construction of the Vryburg WWTW.

### 3.1.1 WHO ARE THE STAKEHOLDERS OF THE PPP










The Stakeholders can be defined as a group of individuals or a person who has an interest "...in achieving the same goals that guides participation in action and projects". These individuals can also be described as having a vested interest in an activity or a project and once these individuals or organizations want to be involved in a given project or activity, they can be classified as an stakeholder.

The Stakeholders that have been identified up to this point in the project can be classified into four main groups namely, the public sector, the private sector, non-governmental (civil society) organizations (NGOs) and community-based organizations (CBOs).




The key stakeholders in this project are the district and local municipality as well as their respective wards and the local community members of Vryburg. These parties can be described as the political buy-in stakeholders. It is therefore crucial that the following wards be informed and engaged through the ward councilors at each step of the project in order to secure the success of the project:

-  Ward 1
-  Ward 2
-  Ward 3
-  Ward 4







The public sector stakeholders consist of the following national and provincial departments:

-  The North West Department of Economic Development, Environment, Conservation and Tourism
-  The National Department of Environmental Affairs & Tourism – Waste Division
-  The North West Department of Public Works, Roads and Transport
-  The Free State's Department of Water Affairs and Forestry
-  South African Heritage Resources Agency
-  Vryburg Post Office
-  Dr. Ruth S. Mompoti District Municipality
-  Naledi Local Municipality
-  Legal-Aid South Africa



The private sector Stakeholders consists of the following industries:

-  Mafa Cleaning and Projects
-  KLS Attorneys
-  ERA, Vryburg

The NGO sector Stakeholders consists of the following organizations:

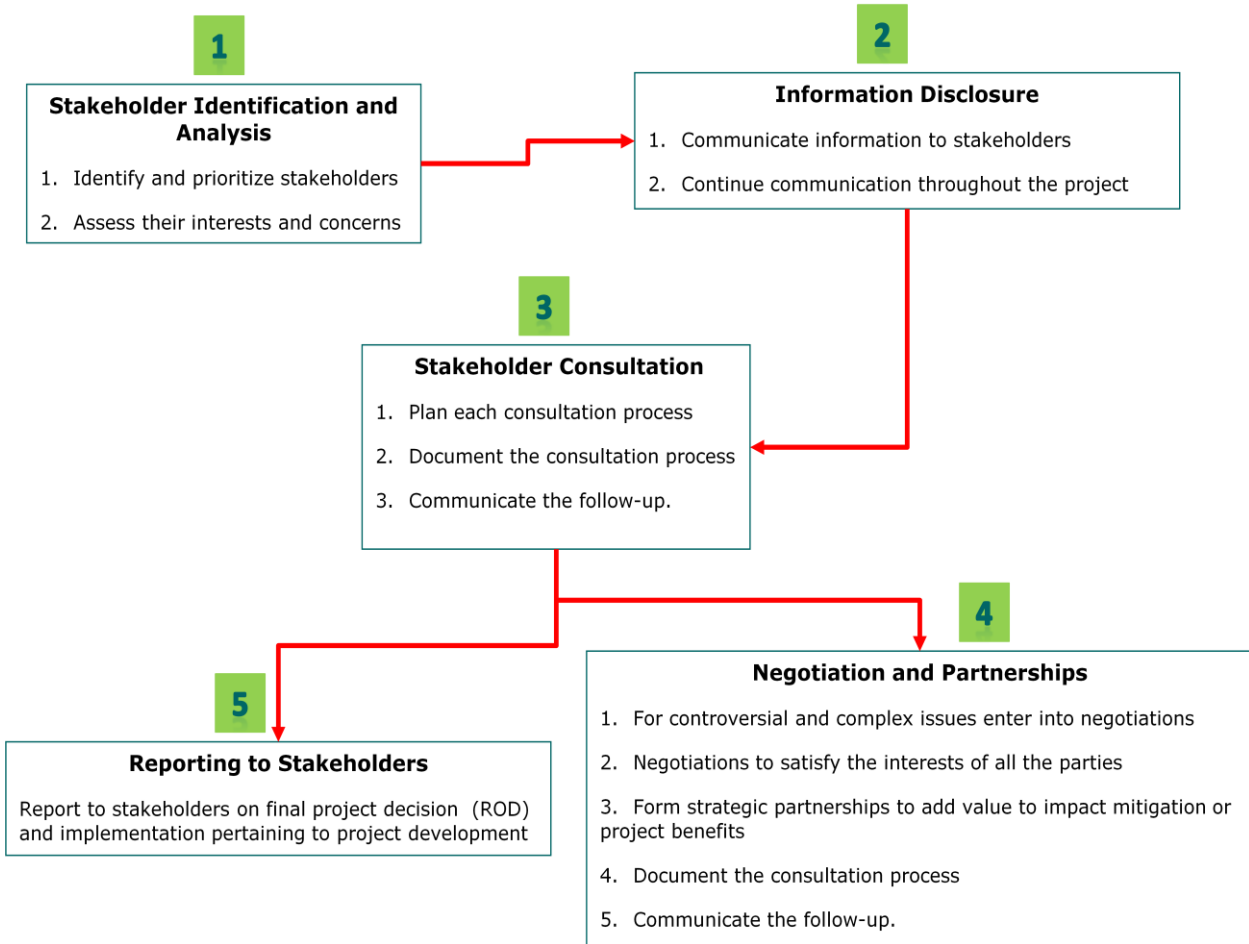
-  Khulisa
-  Age In Action
-  Andrew Babeile Foundation
-  Bophirima Youth Development
-  AfriForum
-  Naledi Community Development Network

The CBO sector Stakeholders consists of the following organizations:

-  Huhudi Health Centre
-  Tswelelopele Centre for the aged & disabled

### 3.2 PUBLIC PARTICIPATION METHODOLOGY

The overarching approach of the stakeholder engagement for The Project development will consist of five steps:

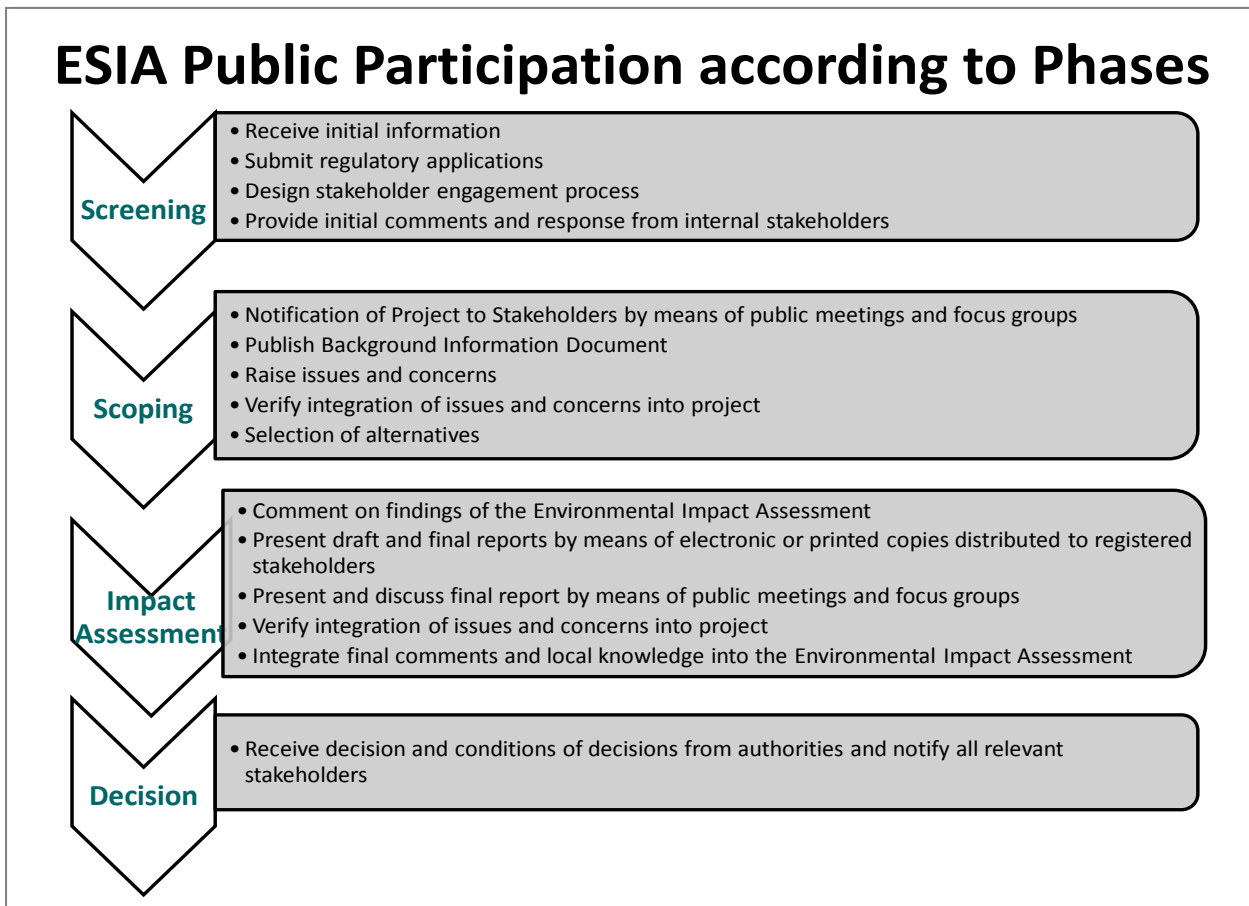


**FIGURE 9: PUBLIC PARTICIPATION APPROACH**



### 3.3 PUBLIC PARTICIPATION ACTIVITIES IN THE IMPACT ASSESSMENT PHASE

The diagram below sets out the four different phases as well as each process's details of the planned project:



**FIGURE 10: ESIA PUBLIC PARTICIPATION PHASES**

### 3.3.1 PUBLIC PARTICIPATION ACTIVITIES TO DATE

To date the following public participation activities have been completed:

**TABLE 10: PUBLIC PARTICIPATION ACTIVITIES UP TO DATE**

Item	Date	Venue	Communication Media	Communication Vehicle	Attendees	Recipients
<b>Project Orientation Meeting 1</b>	2013/06/12	Dr. Ruth S. Mompoti District Municipality Office	Verbal	Electronic mail distribution	Briefing was held for Dr. Ruth District Municipality Ward Councillors	Not Applicable
<b>Project Orientation Meeting Briefing</b>	2013/06/12	Dr. Ruth S. Mompoti District Municipality Office	Verbal	Electronic mail distribution	Dr. Ruth District Municipality & Naledi Local Municipality Ward Councillors	Not Applicable
<b>Project Orientation Meeting 3</b>	2013/07/12	Dr. Ruth S. Mompoti District Municipality Office	Verbal	Electronic mail distribution	Dr. Ruth District Municipality, Naledi Local Municipality Ward Councillors & Naledi Local Municipality Mayor	Not Applicable
<b>Landowner Meeting</b>	2013/06/12	KLS Attorneys Office	Verbal	Hard copy overview of project and ESIA process	Mrs. Van der Merwe. Chrizette Neethling	Mrs. Van der Merwe
<b>Landowner Meeting</b>	2013/08/21	KLS Attorneys Offices	Verbal	Electronic mail distribution	Louis van der Merwe, Ms van der Merwe, Braam Swanepoel, Paul van der Merwe, Walter Jood, Jones Seichoko, Herman Swanepoel, Thys Beukes, Albert van Niekerk, Onno Fortuin	Not Applicable

Item	Date	Venue	Communication Media	Communication Vehicle	Attendees	Recipients
<b>Advertisements Published: Daily Sun</b>	2013/14/10	Not Applicable	Telecommunication	SMS Notification	Not Applicable	Project Team, Project Technical Team, District and Local Municipality's Ward Councillors.
<b>Advertisements Published: The Stellalander</b>	2013/10/02	Not Applicable	Telecommunication	SMS Notification	Not Applicable	Project Team, Project Technical Team, District and Local Municipality's Ward Councillors and Initial Registered I&APs.
<b>Distribution of Background Information Document</b>	2013/10/01	Not Applicable	E-communication	Electronic mail distribution	Not Applicable	Project Team, Technical Team, District and Local Municipality's Ward Councillors.
<b>Distribution and public placement of Notification BID</b>	2013/09/27	Post Office, Municipal Office, Existing	Printed and Posted	Posted copies distributed and placed at each location	Not Applicable	Initial Registered I&APs.

<b>Posters &amp; Invite to Comment and Register</b>		Sewage Works, Library, Police Station, Shopping Mall Notice Board, Community Centre, Education Centre, Provincial Department of Public Works, Tswelopele Centre for the Aged & Disabled and Huhudi Health Centre.				
<b>Distribution of Draft Scoping Report</b>	2013/11/12 & 2013/11/25	Not Applicable	E-communication & Printed and Posted	Electronic mail & Posted mail distribution	Not Applicable	Project Team, Technical Team, District and Local Municipality's Ward Councilors & Initial Registered I&APs and State Regulators ( National Department of Environmental Affairs – Waste Division, Department of Environmental Affairs – North West Province, Department of Water Affairs and Forestry – Free State, South African Heritage Resources Agency and Naledi Local Municipality, Vryburg.)
<b>Public Participation Meeting 1 &amp; Public Participation Meeting 2</b>	2013/11/05	Huhudi & Coleridge Community Centers	Verbal	Electronic mail distribution & SMS Notification	Initial Registered I&APs.	Project Team, Technical Team, District and Local Municipality's Ward Councilors & Initial Registered I&APs.
<b>Meeting 1 with Department of Water Affairs</b>	2013/10/22	Kimberely	Verbal	Electronic mail	EVision Team & DWAF Regulator	Esther Makhungo
<b>Meeting 2 with Department of Water Affairs</b>	2014/02/04	Kimberely	Verbal	Electronic mail	EVision Team & DWAF Regulator	Esther Makhungo
<b>Distribution of Draft EIA / EMP for commenting</b>	2014/01/31	Not Applicable	E-communication & Printed and Posted	Electronic mail distribution & SMS Notification	Not Applicable	Registered I&APs & Regulators

### 3.3.2 NEXT STEPS IN THE ESIA PROCESS

To date a Stakeholder Database has been compiled with the details of the initial Stakeholders of the project. This list has been compiled from businesses, departments, NGOs and CBOs that the District Municipality has supplied to the Independent Environmental Practitioner as well as Stakeholders that have registered at this stage. A Comments & Response Report has also been compiled from initial comments received from I & APs.

Moreover, the first two public meetings have been arranged and commenced on the 6<sup>th</sup> of November, 2013. The public meetings will take place at two different venues and at two different times in the attempt to accommodate individuals from various wards. Two advertisements have also been placed in local and national newspapers, The Stellalander and The Daily Sun, on the following dates:

- ✿ The Stellalander: 2013/10/04 & 2012/10/18
- ✿ The Daily Sun: 2013/10/07 & 2013/10/14

On these same dates a SMS notification was sent to the Project Team, Project Technical Team, District and Local Municipality's Ward Councilors and Initial Registered I&APs.

Following the registration period for I&APs, the Draft Scoping Report, which included the Plan of Study for Impact Assessment was made available for a period of 60 days for public review.

At the end of the public review period of DSR, the stakeholder engagement report will be updated and incorporate the issues raised at the community and public meetings as well as those received in writing on the DSR into the CRR to accompany the Final Scoping Report (FSR). Before the FSR is to be handed in, two public meetings will again be held at two various venues to ensure the community's final responses on the project is captured.

In line with the ESIA Regulations the FSR has to be made available for public comment for a period of 60 days before submission to the competent authority. A copy of this was sent via electronic mail and hard copies sent to the following stakeholders:

Project Team, Technical Team, District and Local Municipality's Ward Councilors & Initial Registered I&APs and State Regulators ( National Department of Environmental Affairs – Waste Division, Department of Environmental Affairs – North West Province, Department of Water Affairs and Forestry – Free State, South African Heritage Resources Agency and Naledi Local Municipality, Vryburg.)

Following the submission of the FSR, registered I&APs will receive a letter to notify them if the competent authority has approved the FSR, and that the impact assessment may proceed. The letter will indicate when the Draft ESIA/EMP Report would be available for public review and the public places where the documents will be on display. In addition, an advertisement announcing the availability of the Draft ESIA/EMP Report and inviting stakeholders to open days will be published in newspapers as indicated newspapers.

As during the Scoping Phase, a period of 60 days will be available for public review of the Draft EIA/EMP Report, specialist studies and CRR. The reports will be distributed for comment.

At the end of the public review period of Final EIA/EMP Report, the stakeholder engagement report will be updated and the issues raised at the public meeting as well as those received in writing on the Final EIA/EMP Report will be incorporated into the CRR to accompany the Final EIA/EMP Report.

In line with the EIA Regulations the Final EIA/EMP Report has to be made available for public comment for a period of 60 days before submission to the competent authority. Registered I&APs will be notified by mail/email of the availability of the Final EIA/EMP Report for public

comment. Upon closure of the comment period, additional comments will be received and submitted as an addendum with the Final

EIA/EMP Report to the competent and commenting authorities.

After the competent authorities have accepted/denied the Final EIA/EMP Report, registered I&APs will be notified of authorities' decision and appeals procedure.

### 3.4 COMMENTS AND RESPONSE REPORT AND ACKNOWLEDGEMENTS

The following comments have been received to date with the registration process of I & APs:

**TABLE 11: INITIAL COMMENT AND RESPONSE REPORT**

Commentator	Organisation	Date	Comments, issues and suggestions raised	Source	Response
Lononcaba Ntlebi	Department of Public Works	2013/10/02	Location of sewage needs services.	Verbal comment	Noted
Mathapelo M. Y. Kgwadi	Tswelopele Center for the aged & disabled	2013/10/02	Carry on with the project.	Verbal comment	Noted
Neo Gaedie	Vryburg Post Office	2013/10/02	Glad.	Verbal comment	Noted
Ntsiki Mtheli	Employee at current Sewage Works	2013/10/02	Current sewage works bad. Broken machines.	Verbal comment	Noted
Lerato Motsamai	Legal-Aid	2013/11/07	Happy about it.	Verbal comment	Noted
Cornelia	Local Vryburg Resident	2013/11/07	Ja ek sal dit waardeer.	Verbal comment	Noted
S. J. Seoinae	Officer at SAPS Huhudi	2013/11/07	It is a good idea.	Verbal comment	Noted
T. I. R. Mauhe	Officer at SAPS Huhudi	2013/11/07	It is good.	Verbal comment	Noted
K. L. Sebuku	Officer at SAPS Huhudi	2013/11/07	It's good.	Verbal comment	Noted
M. I. Lezemyo	Officer at SAPS Huhudi	2013/11/07	Perfect because the air is not fresh.	Verbal comment	Noted

## 4. DESCRIPTION OF AFFECTED ENVIRONMENT

### 4.1 PHYSICAL FEATURES AND CHARACTERISTICS

#### 4.1.1 GEOLOGY

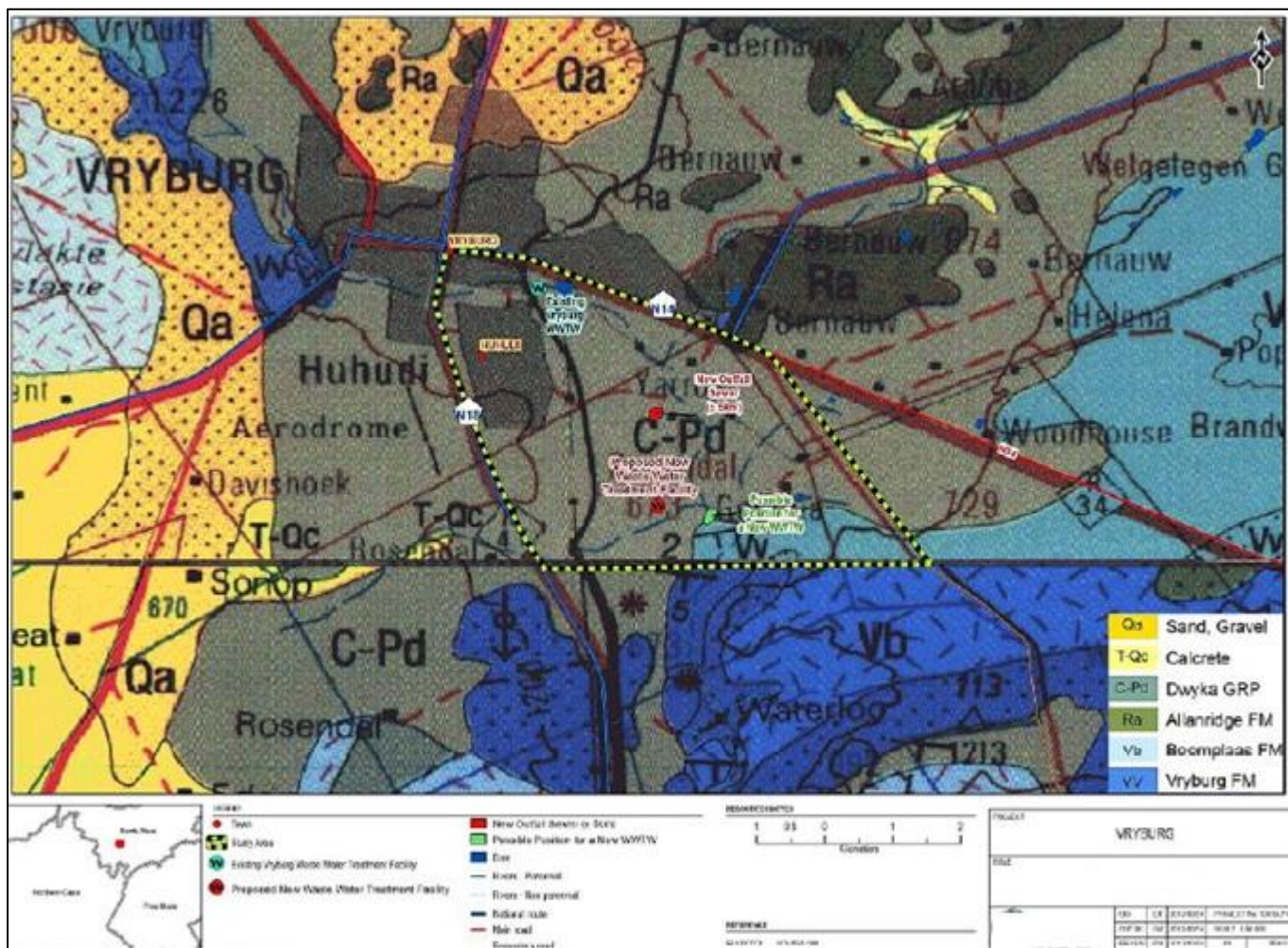
The greater part of farm Rosendal 673 is underlain by *Permocarboneous* glacial sediments of the Dwyka Group (Karoo Supergroup, C-Pd). In the Vryburg region this succession mainly consists of glacial tillite (boulder mudstone) and interglacial shale. Exposures levels are typically very poor, since the mud rock matrix weathers very readily, and consequently the Dwyka outcrop area represented at surface only by scattered erratic boulders (Keyser & Du Plessis, The geology of Vryburg Area, 1993).

Glacial striations of Dwyka age incised into older resistant quartzitic rocks of the Vryburg Formation on the farm indicate southerly ice transport directions (Schutte, 1994). Northern outcrops of the Dwyka Group may contain low diversity non-marine trace fossil assemblages (predominantly fish and arthropod traces, *Rhizocorallium*) within interglacial mud rocks as well as scattered vascular plant remains (e.g. *Glossopteris* leaves, petrified wood) but the likelihood of significant fossil heritage in the Vryburg area is considered to be low.

In the southern and eastern portions of Rosendal 673 much older sedimentary rocks of the Schmidtsdrif Subgroup crop out where the Dwyka cover rocks have been removed by erosion. These ancient Precambrian rocks are almost flat-lying, with a gentle dip towards the south. This is the basal subdivision of the Late Achaean to Early Proterozoic Ghaap Group (Transvaal Supergroup) in the Griqualand West Basin, Ghaap Plateau Subbasin (Moore, Tsikos, & Polteau, 2001). The Ghaap Group represents some 200 Ma of chemical sedimentation - notably iron and manganese ores, cherts and

carbonates with subordinate silicastic rocks - within the Griqualand West Basin that was situated towards the western edge of the Kaapvaal Craton (Eriksson & Alternmann, 2001).

Importantly, intrusions of dolomite are known in the area and a geotechnical survey required to ensure no development will take place on dolomitic zones. The figure below shows the geology formations around Vryburg.



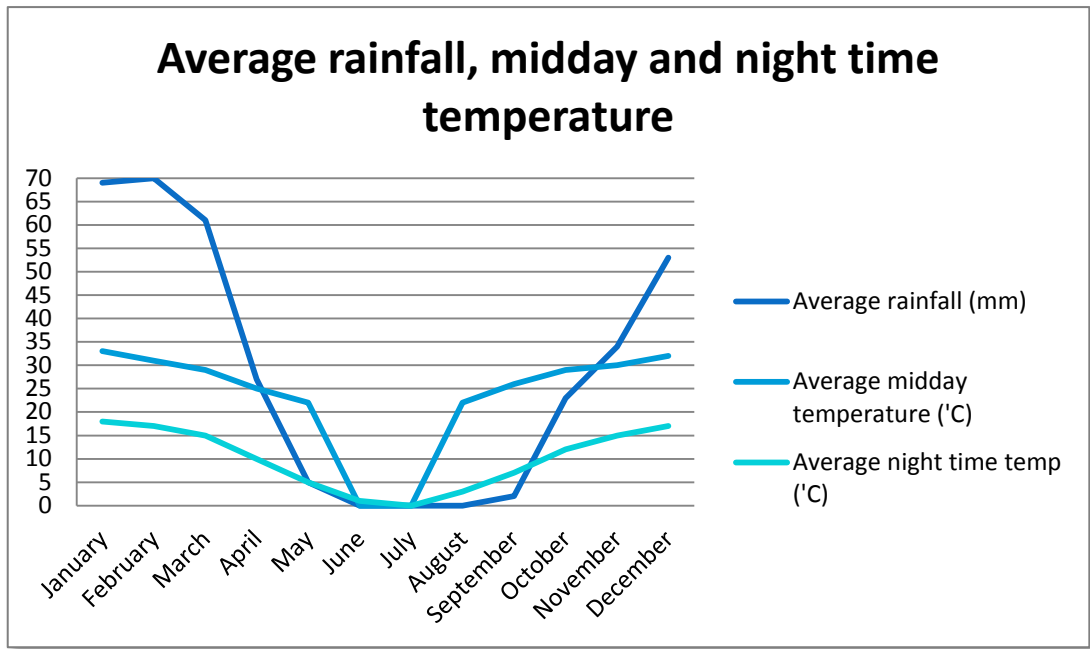
**FIGURE 11: GEOLOGY FORMATIONS AROUND VRYBURG**

#### 4.1.2 CLIMATE

According to Tainton (1981), climate in the broad sense is a major determinant of the geographical distribution of species and vegetation types. According to Chambers, the definition of climate as the follows: “the average weather conditions of a particular region of the world over a long period of time, with regard to temperature, rainfall, air pressure, etc. (Chambers Dictionary, 2012).” Within areas, the local conditions of temperature, light, humidity and moisture vary greatly and these factors which play an important role in the production and survival of plants. In terrestrial environments, limitations related to water availability are always important to plants and plant communities. The spatial and temporal distribution of rainfall is very complex and has great effects on the productivity, distribution and life forms of the major terrestrial biomes (Barbour, Diamond, & Yoder, 1996). Furthermore, aspects like topography, slope and altitude may further result in differences in precipitation and water availability to plants within the study area.

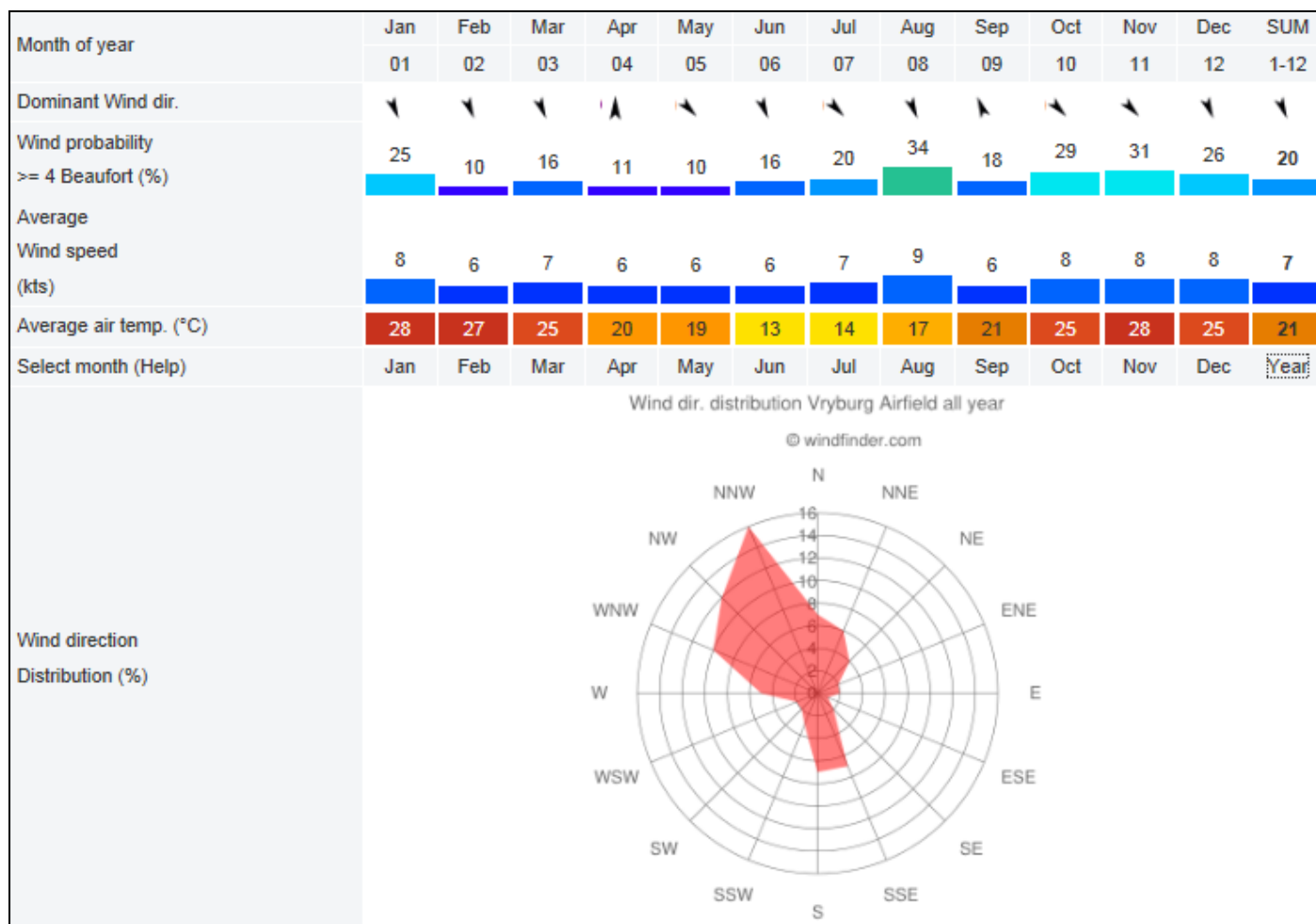
Vryburg is situated in a semi-arid summer rainfall climate zone. Vryburg normally receives an average of 344 mm of rain per year, with most rainfall occurring mainly during summer months. The chart below shows the average rainfall values for Vryburg per month. It receives the lowest rainfall (0 mm) in June and the highest (70 mm) in February. The monthly distribution of average daily maximum

temperatures shows that the average midday temperatures for Vryburg range from 19°C in June to 32.9°C in January. The region is the coldest during July when the mercury drops to 0°C on average during the night. Consult the chart below for an indication of the monthly variation of average minimum daily temperatures (SAexplorer, 2011). The figure below is a chart of the average rainfall as well as midday and night time temperatures that occur in Vryburg.



**FIGURE 12: CHART OF THE AVERAGE RAINFALL, AVERAGE MIDDAY TEMPERATURE AND AVERAGE NIGHT TIME TEMPERATURE**

Wind statistics were obtained from the *Windfinder* website. Statistics are based on observations taken between 12/2011 - 10/2013 daily from 7 am to 7 pm local time. It can be seen that the dominant wind prone month is August. The prevailing wind direction is North North-West. The figure below shows every month of the year's wind statistics (Windfinder, 2013).



**FIGURE 13: WIND STATISTICS FOR VRYBURG**

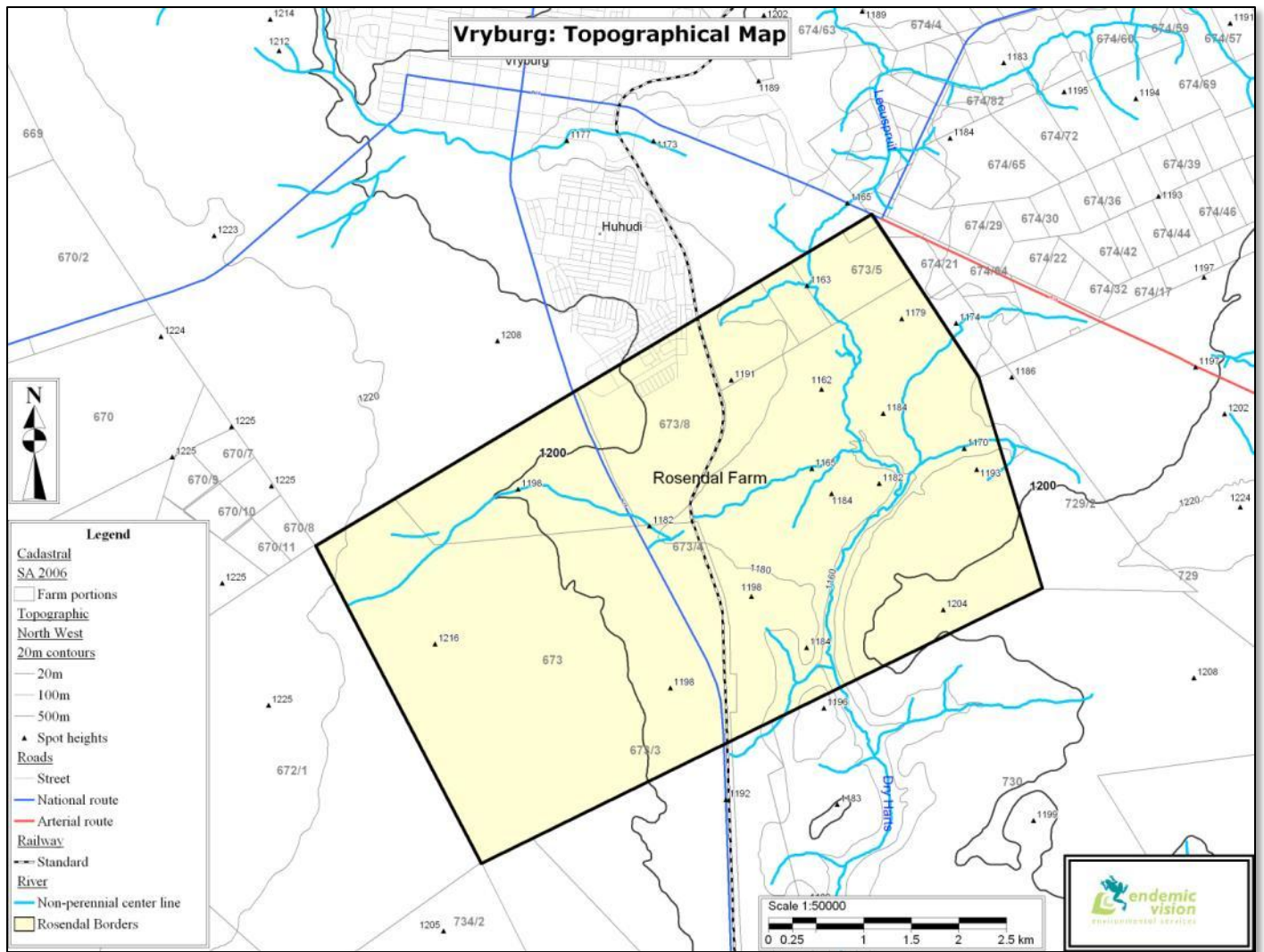
(Source: [http://www.windfinder.com/windstats/windstatistic\\_vryburg\\_airfield.htm&fspot=vryburg](http://www.windfinder.com/windstats/windstatistic_vryburg_airfield.htm&fspot=vryburg))

#### 4.1.3 TOPOGRAPHY

This prominent escarpment, averaging c. 100 m in relief and 1150 to 1200 m in elevation, extends some 280 km from 27.7°S near Vryburg to 29.7°S near Douglas, trending from northeast to southwest. The cliffed escarpment (40-70°) and the generally flat plateau (less than 0.5°) are formed of gently warped, Precambrian dolomites of the Transvaal System. The scarp rim is angular, the foot slope more often smooth concave, averaging 25° as it descends onto a rock-cut plain descending to the valley margins of the Vaal and Harts rivers. Drainage lines have incised short, V-shaped gorges along the edge of the escarpment. In some of these gorges, water flowing over the surface of the tufa is still today adding to the tufa mass. The escarpment is well developed south of Ulco, where relief attains 90 - 120 m (Butzer, 1974).

The topography of the three sites is similar in nature. It is sloping moderately, becoming flat towards the river that is situated east of the site. Regional drainage occurs to the South. The figure below show a topographical map of Vryburg.





**FIGURE 14: TOPOLOGICAL MAP OF VRYBURG**

#### 4.1.4 SOIL

The northern and western parts of the area are completely covered by Aeolian sand of the Kalahari Group which overlies the undifferentiated granite gneiss of Swazian age. The oldest rocks or the basement complex comprise mainly low grade metamorphic rocks which also form part of the Kraaipan Group (Keyser & Du Plessis, 1993). Granite and gneiss cover a substantial part of the area. It is, however, rarely exposed due to a thick cover of Kalahari sand (Gordonia Formation) in the western and north western part of the area and a thick soil cover. The basement granite-gneiss comprises migmatite, gneiss, granite, amphibolite and schist.

#### 4.1.5 LAND USE

The current land use zoning is agricultural with cattle grazing taking place.

#### 4.1.6 HYDROGEOLOGY

Volcanic basement rocks of the study area have generally been subjected to multiple tectonic events under varying stress conditions which resulted in complex brittle fracture. The presence of dykes of variable age throughout the study area suggests that the basement rocks sustained significant fracture and loss of cohesion. From groundwater exploration point of view, this process has important implication and characterization of the water bearing properties of these rocks is highly important (Golder Associates Africa (Pty) Ltd, 2013).

The Department of Water Affairs (DWA) compiled groundwater aquifer types map of Vryburg at a scale of 1:500,000. The map broadly shows number of aquifer-types which were subdivided as intergranular,

fractured, karst, both intergranular and fractured. Figure 7 shows simplified aquifer types in the study area which is derived from interpretation of the geological map of the area in terms of their physical properties relevant to groundwater flow and storage. The Vryburg area is underlain by basic extrusive rocks consisting of andesitic and basaltic lava flows of the Ventersdorp Supergroup. These rocks are categorized as fractured and inter-granular where the intergranular refer to thick regolith, i.e. weathered overburden which is usually the main groundwater storage compartment; although significant amount of water may be supplied from the underlying fractured hard rocks (Golder Associates Africa (Pty) Ltd, 2013).

The borehole yield corresponding to these rocks varies from 0.1 l/s to 0.5 l/s, but locally they supply significant amount of water (>5 l/s). The Vryburg Formation consisting of meta-argillaceous rocks (slate, siltstone and dolomite) as well as metaarenaceous (quartzite) is characterized by moderate-to-high borehole yield (2.0 – 4.0 l/s). The cover rocks consisting of windblown Kalahari sand are characterized by variable borehole yield throughout the study area (Golder Associates Africa (Pty) Ltd, 2013).

#### 4.1.7 SURFACE WATER

In this instance surface water refer to catchments, river streams, inflows to river streams, flood lines and surface hydrology of infrastructure (pipeline, plant and roads).

As mentioned, the proposed project site for the Vryburg WWTW is on the western bank of the Dry Harts River located in quaternary catchment C32A. This catchment occurs in the Dry Harts River tertiary drainage area C32 within the greater Harts Management Sub Area as part of the Lower Vaal Water Management Area (WMA) (Golder Associates Africa (Pty) Ltd, 2013).

The Bles Spruit flows from the North West through the town of Vryburg, past the existing WWTW upstream of the proposed site. The Bles Spruit then confluences with the Leeuspruit that flows from the north east across the N14 to form the Dry harts river, which then passes the proposed site approximately 3 km downstream of the confluence. The Dry Harts River (C32) is drained by the Harts River just downstream of Rooiwal and Mokgareng. This is approximately 65 km from the project site (Golder Associates Africa (Pty) Ltd, 2013).

The Blespruit has normal catchment inflow along the length of the stream with one specific area considered a shallow depression of relatively more concentrated inflow.

The Lower Vaal WMA consists of the C3, C9 and D41 secondary drainage regions. The WMA (excluding the D4 drainage region) covers approximately 51 539 km<sup>2</sup> including parts of Northern Cape, Free State and North West Provinces. The main rivers in the secondary drainage regions are listed in Table 12. There are four (4) large dams in the WMA: Bloemhof Dam, Taung Dam, Vaalharts Dam and Spitskop Dam (Golder Associates Africa (Pty) Ltd, 2013).

The specialist report has been attached as Appendix D.

**TABLE 12: MAJOR CATCHMENTS AND RIVERS**

Primary Catchment	Sub-catchment area	Quaternary catchments	Average gross area (km <sup>2</sup> )	Mean Annual Precipitation (mm)	Mean Annual Run off (mm)
C	Harts	C31A-F	11 023	530	5.9
	Dry Harts	C32A-D	10 205	444	4.5
	Vaal D/S of Bloemhof	C91A-B; C92A-E	20 468	425* and 348**	2.1* and 2.5**
	Vaalharts	C33A-C	9 843	414	3.8

\*MAP and MAR for C91

\*\*MAP and MAR for C92

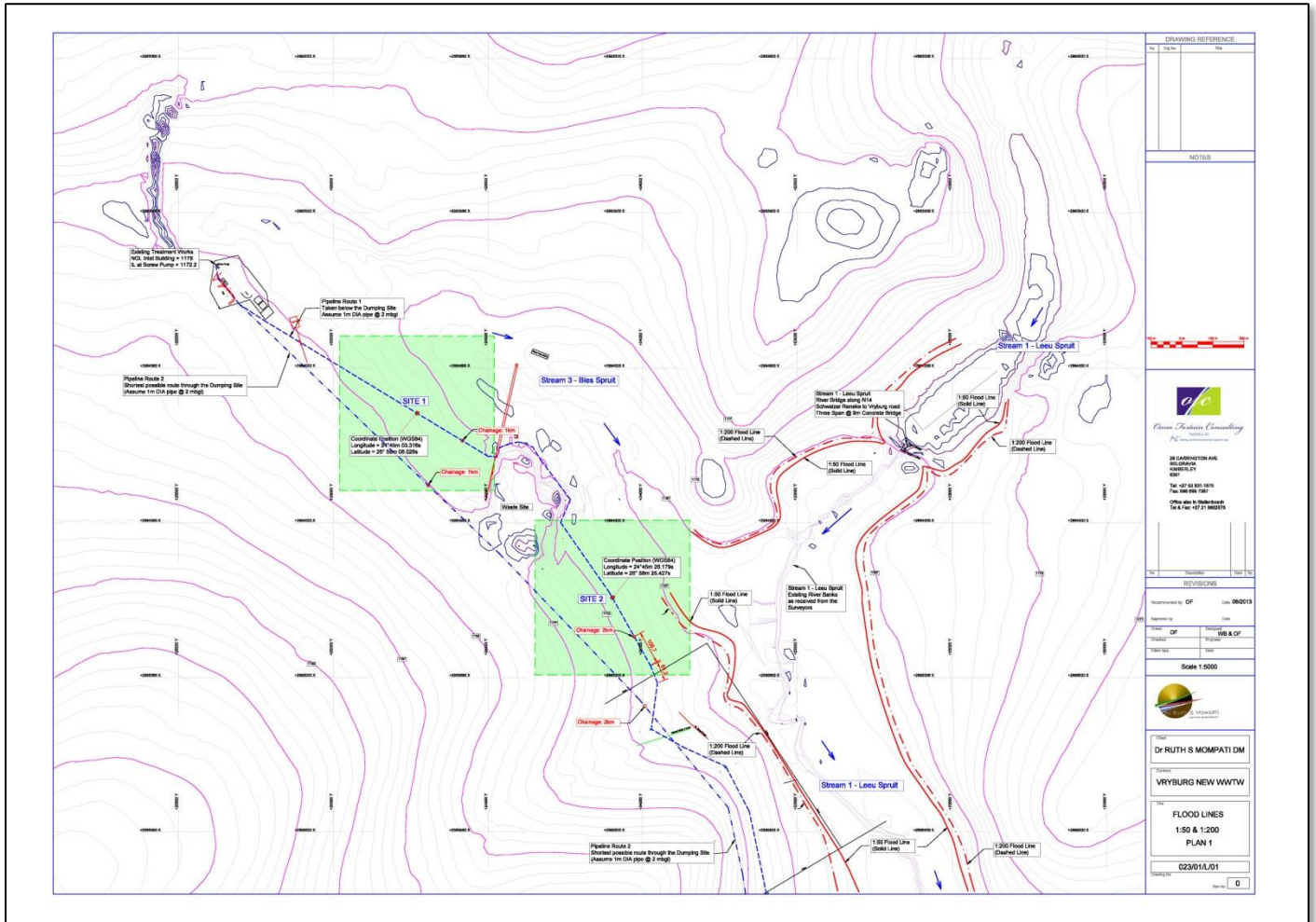
# FLOOD LINE DETERMINATION

A 1:50 year flood line mapping is required for this development. In this case provision is made to accommodate 1:200 year flood lines as well and have a conservative design.

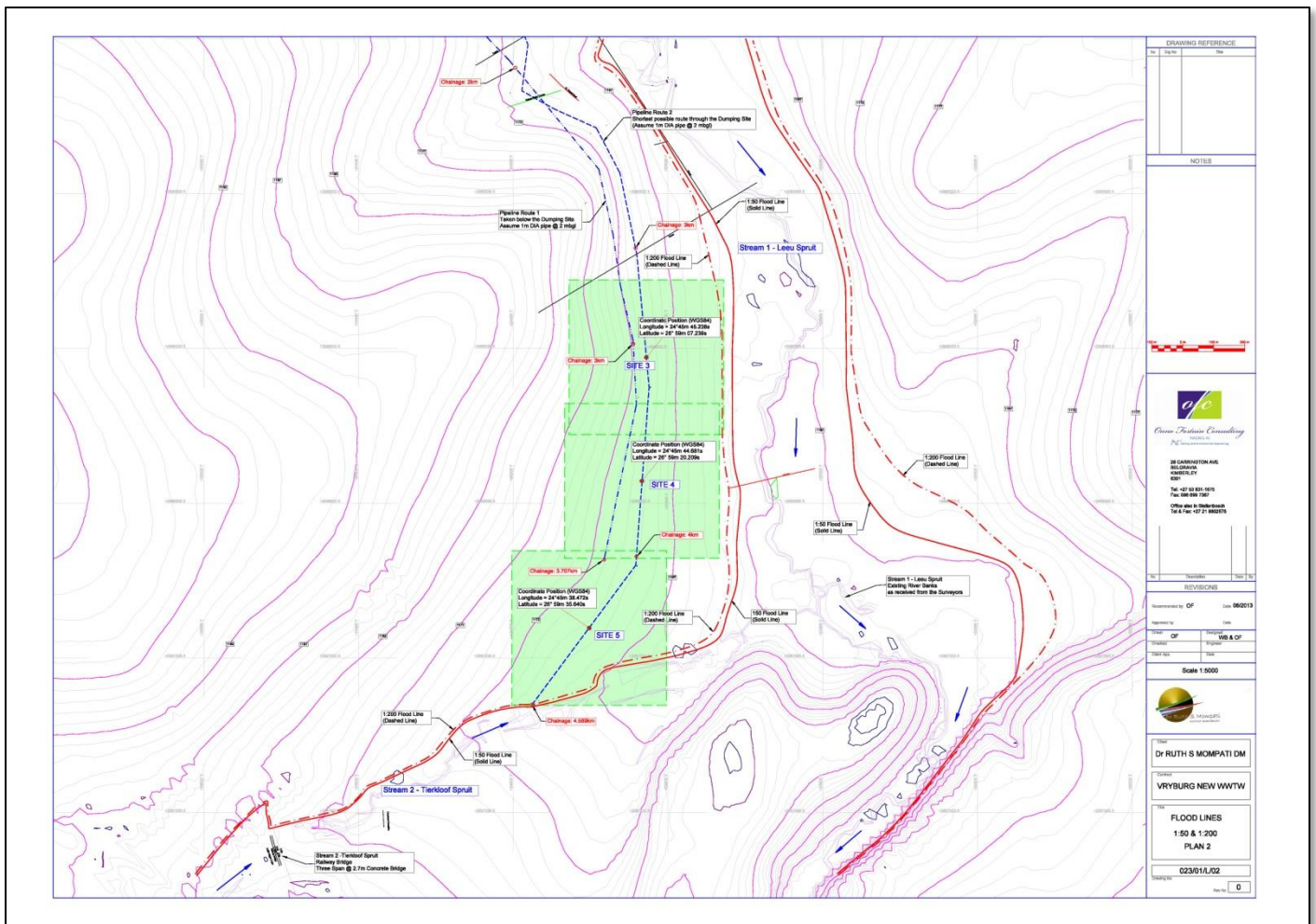
Rivers and tributaries were ground surveyed in detail and the industry accepted Hec-ras program used to calculate flood lines. Aerial mapping, aerial photos and DTM mapping compiled at high level of accuracy and resolution were used to incorporate contours and site design.

Flood lines are calculated at 1:50 as well as 1:200 flood lines. The construction design is set at having a buffer above the 1:200 meter flood lines.

A flood line plan was generated depicting two pipeline routes and the selection of WWTW sites. (1:50 year flood – solid line on map & 1:200 year flood – dashed line on map).



**FIGURE 15: FLOOD LINE MAP 1 – UPPER REACHES**



**FIGURE 16: FLOOD LINE MAP 2 – LOWER REACHES**

#### 4.1.8 NOISE

The new WWTW will be situated approximately 1 km from the closest neighbourhood thus it will not have a significant impact on the noise in the area.

### 4.2 ECOLOGICAL FEATURES AND CHARACTERISTICS

A detailed ecological study has been attached as Appendix D.

#### 4.2.1 VEGETATION

According to the national vegetation map (Mucina & Rutherford, 2006), the entire site falls within the Ghaap Plateau Vaalbosveld vegetation type. Ghaap Plateau Vaalbosveld is a relatively widespread vegetation type which occupies 15424 km<sup>2</sup> of the high elevation (1100-1500 m) plateau. This vegetation type occurs in the Northern and North West provinces from around Campbell in the south, east of Danielskuil through Reivilo to around Vryburg in the north. In terms of structure and broad composition, this vegetation type occupies the flat plateau with a well-developed shrub layer with *Tarchonanthus camphoratus*, and *Acacia karoo*. The open tree layer has *Olea europea subsp africana*, *Acacia tortilis*, *Zizyphus mucronata*, and *Rhus lancea*. *Olea* is reportedly more important in the southern part of the range while *Acacia tortilis*, *Acacia hebeclada* and *Acacia mellifera* are more important in the north and north west of the unit. This vegetation type is usually associated with surface limestone of Tertiary to Recent age with dolomite and chert of the Campbell Group supporting shallow soils of the Mispah and Hutton forms. The dominant land type is Fc with some Ae and Ag.

Ghaap Plateau Vaalbosveld is not a threatened vegetation type and the conservation status of this vegetation type is classified as Least Threatened. Less than 2% has been transformed by intensive

agriculture and mining activity (Mucina & Rutherford, 2006). The vegetation type is however very poorly protected and does not fall within any formal protected areas. Only one endemic species, *Rennera stellata* is known from the vegetation type and is unlikely to occur at the site.

## 4.3 CULTURAL CHARACTERISTICS

### 4.3.1 SITES OF ARCHAEOLOGICAL AND CULTURAL INTEREST

A detailed heritage and archaeological study has been attached as Appendix D.

### 4.3.2 VISUAL ASPECTS

The proposed site might have a visual impact due to the fact that the topography is relatively flat. However the lack of receptors in the area, the height of the vegetation and the distance from the nearest neighbourhood should provide an adequate screen to reduce the visual impact considerably. The sensitive receptors will include Huhudi residence at a distance greater than 500 meters and neighbouring landowners at a distance of  $\pm 755$  meters (from the farm house) from Portion 6 of Rosendal 673 and  $\pm 1100$  meters (from the farm house) from Portion 2 of Rosendal 673 etc)

## 4.4 SOCIO-ECONOMIC ENVIRONMENT OF THE MUNICIPAL AREA

### 4.4.1 NORTH WEST PROVINCE

The North West Province has four District Municipalities (DMs) comprising Bojanala Platinum, Ngaka Modiri Molema, Dr Ruth Semogotsi Mompoti, and Dr Kenneth Kaunda. The executive authority of the North West lies with the Premier and this authority is executed in conjunction with other members of the Executive Council. The Province is governed by the following Departments:

- 🌿 North West Agriculture, Conservation, Environment and Rural Development
- 🌿 North West Economic Development, Conservation, Environment and Tourism
- 🌿 North West Education and Training
- 🌿 North West Finance
- 🌿 North West Health
- 🌿 North West Human Settlements, Public Safety and Liaison
- 🌿 North West Local Government and Traditional Affairs
- 🌿 North West Office of the Premier
- 🌿 North West Provincial Government
- 🌿 North West Provincial Legislature
- 🌿 North West Public Safety
- 🌿 North West Public Works, Roads and Transport
- 🌿 North West Social Development, Women, Children and Persons with Disabilities
- 🌿 North West Sport, Arts and Culture

The department which will play a significant role in the Project is the Department of Economic Development, Environment, Conservation and Tourism which is the provincial arm of the National Department of Environmental Affairs. The National Department of Environmental Affairs will be the Commenting Authority on the project.

### 4.4.2 DR RUTH SEMOGOTSI MOMPATI DISTRICT MUNICIPALITY

The Dr RSM DM comprises six local municipalities namely, Naledi Local Municipality (in which the proposed sites for the WWTW are located), Greater Taung Local Municipality, Lekwa-Teemane Local Municipality, Schweizer-Reneke Local Municipality, and the Kagisano/Molopo Local Municipality. This district municipality was one of the few municipalities whose municipal boundaries are not affected by the District Management Areas (DMA). The executive authority of the Dr RSM DM rests with the Executive Mayor.

The regional centre of the Dr RSM District Municipality is Vryburg. Strategic development within the Dr. RSM District Municipality is aligned with the District Growth and Development Strategy and other national development initiatives. Although 2011 Census statistics show that the Dr. RSM District Municipality has come a long way in terms of service and infrastructure delivery, some communities still experience a lack of basic services. For example, 27.7% of households still do not have access to electricity, 67.9% of households have no access to formal refuse removal, 41.2% do not have access to reasonable levels of sanitation, and 44% still do not have acceptable levels of access to piped water. Even though the municipality struggles to provide the necessary basic services to the community, its 2007-2011 IDP concentrates heavily on the provision of infrastructure and basic services and have started the process of identifying spatial areas with development potential.

The North West Local Economic Development (LED) Strategy recognized fifteen driving forces crucial for the renewal of the Dr. RSM District's economy which was identified in an opportunity analysis:

- 🌿 SMME Sector
- 🌿 New employment opportunities
- 🌿 Youth entrepreneurship
- 🌿 Women entrepreneurship
- 🌿 Community projects and Co-operatives
- 🌿 Employment generating community infrastructure projects, i.e. Hawker Settlements
- 🌿 BEE
- 🌿 Research and development Support to existing businesses.
- 🌿 Creation of Industrial Clusters
- 🌿 Investment promotion
- 🌿 Agro-Processing Sector, i.e. Food Extrusion Project
- 🌿 Manufacturing Sector
- 🌿 Mining Sector
- 🌿 Growth and development of the Tourism Sector
- 🌿 Exports

#### 4.4.3 NALEDI LOCAL MUNICIPALITY

Naledi Local Municipality (LM) is situated within the central part of Dr. Ruth Segomotsi Mompati District Municipality within the North West Province. The total area covered by Naledi LM is 4 250 077 km<sup>2</sup>. The main urban areas of Naledi LM are Vryburg and Stella.

The authority of the District Municipality lies with (30) elected councilors inclusive of five (5) tribal authority leaders (dikgosi) as the district is + 60% rural. A total of 10 councilors are elected in terms of a system of proportional representation (directly elected), and 15 represent local municipalities. Only the mayor/speaker is full-time employees. These councilors represent local government in the various towns and work closely with local government departments. The role of the councilors is to monitor and maintain existing service delivery such as water, sanitation and refuse removal and to initiate new projects within the communities. Councilors work closely with the Community Development Workers (CDWs). These are local people employed by the Department of Housing and Local Government. The role of these CDWs is to represent their communities at the local and district government level and to identify potential development opportunities and needs.

The role of the LM is to monitor and manage service delivery to settlements within its jurisdiction, implement plans and policies of the Dr. RSM District Municipality and to carry out the development objectives outlined within the LED.

The strategic objectives of the LM are to:

- 🌿 provide sustainable services to the inhabitants and to maintain existing resources;
- 🌿 develop the LM as an institution through transformation and capacity building;

- promote local economic development through poverty alleviation, job creation, empowerment of the previous disadvantaged people with capacity building in business skills and establish a climate for investment; and promote sound financial management and viability

Key priorities for the LM between 2012 and 2017 include:

- Basic Service Delivery and Infrastructure Investment;
- Municipal Transformation and Institutional Development;
- Financial Viability and Financial Management;
- Good Governance and Community Participation and
- Local Economic Development

#### 4.4.4 POLITICAL ADMINISTRATION

The ANC has the majority vote in the municipality, occupying six places in the municipal council and the DA and COPE each taking only one seat each.

#### 4.4.5 POPULATION STATISTICS

##### DR RUTH S. MOMPATI DISTRICT MUNICIPALITY

Dr RSM District Municipality is the largest out of the four District municipalities in the North West Province, but it has the smallest population out of the four districts in the province. On the basis of the most recent statistics contained in the Community Survey report of 2007, the population of Dr RSM has decreased from 432 069 in 2001 to 354 554 in 2007. Taking into account the population figure indicated in the 2001 population census (i.e. 432 069), the District has lost a large number of people to the neighboring provinces and districts.

This decline in population takes into cognizance the boundary changes made to Kagisano in 2006 (constituting approximately 7000 demarcated people) and echoes the NSDP statements made about migration from Dr Ruth S. Mompoti District Municipality to the bigger cities and metropolitan areas.

The Global Insight Data however estimate the 2001 population figures at 483 643 and an annual increase of 1.1% resulting in 504 053 in 2005. The Demarcation Board echo this data with an estimate of 509 703 in 2006. These figures do not take into effect the boundary changes to Kagisano in 2006 and do not estimate a decrease, but allow an increase of 1.1%. The amount of households are also estimated at approximately 100 000 (Dr Ruth S Mompoti District Municipality, 2012).

Taking into account the large geographical size of the District and the smaller population out of the four Districts within the province, Dr RSM has the lowest density of people per square km, which makes the provision of municipality services in some parts of the District costly and almost impossible in certain cases.

The estimated average population growth rate for the Dr Ruth S Mompoti District Municipal Area was 0.4% for the year 1996 to 2009, the lowest in the North West Province. Overall, there has been an increase and decrease of population within Dr RSM DM which can be attributed to various factors such as lack of employment in the area and eviction of farm workers moving into the area from different farms.

##### NALEDI LOCAL MUNICIPALITY

The local municipality of Naledi consists of 66 468 people (2012) which translates to 17 020 households with an average household size of 3.8 people per household. Population growth is calculated to be 1.0% (Maxim Planning Solutions (Pty) Ltd, 2012).

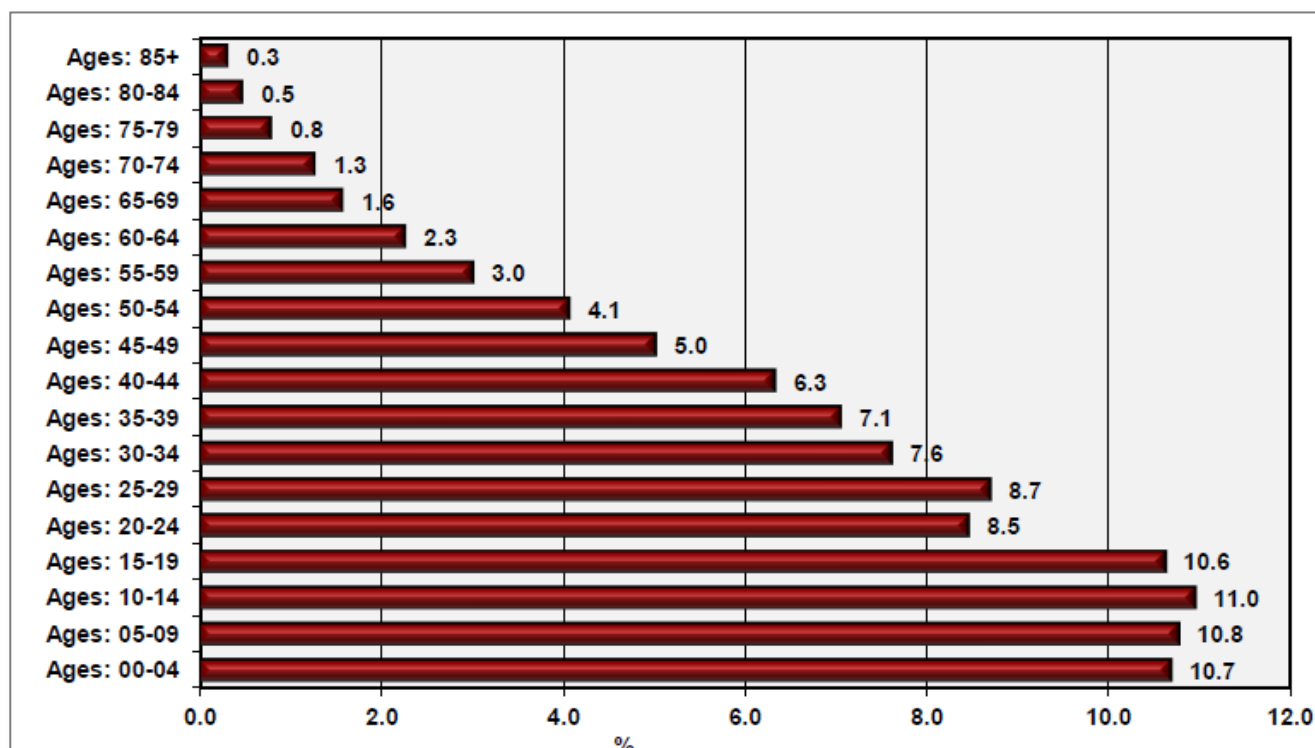
#### 4.4.6 AGE

According to Global Insight survey 2009, Dr RSM DM has quite a number of youth throughout. The population group between 00-04 is at (10%) of the district, ages 05-09 provide (12%) of the population. There is further increase on the category of 10-14 which is (11%) of the population. Children between 15-19 are at (10%) of the district population. The total of the above is at 212 066 of the population. Therefore the entire population of the ages 00-19 is at 43% of the entire population of the district (Dr Ruth S Mompoti District Municipality, 2012).

The population group between 35-39 is at (6%) of the district, ages 40-44 provide (5%) of the population. There is further or similar number on the category of 45-49 which is (5%) of the population. Individuals who fall on the economic active population between 50-54 are at (5%) of the district population. The total of the above is at 103 637 of the population. Therefore the entire population of the ages 35-54 is at 21% of the entire population of the district (Dr Ruth S Mompoti District Municipality, 2012).

We can regard the above to be regarded as the economic active population within the district though it the report does not exclude population 20-34 which we assume form part of this category (Dr Ruth S Mompoti District Municipality, 2012).

11.0% of the population is between 10 – 14 years old and the Naledi Local municipality is characterized by a younger population, mostly between 0 and 19 years. The figure below shows the age profile for the Naledi Local Municipality (Maxim Planning Solutions (Pty) Ltd, 2012).

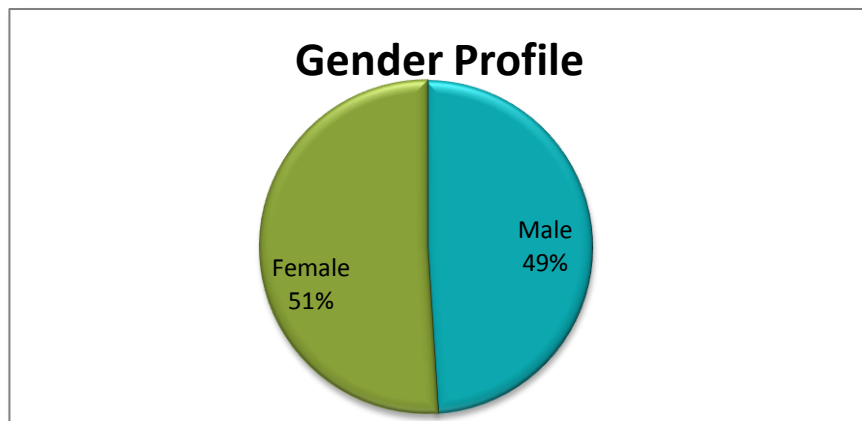


**FIGURE 17: AGE DISTRIBUTION IN NALEDI LOCAL MUNICIPALITY**

#### 4.4.7 GENDER

According to the Local Municipality's figures, 51% of the population is female and 49% are male (Maxim Planning Solutions (Pty) Ltd, 2012). The figure below gives a visual representation of the female to male ration in the Local Municipality.

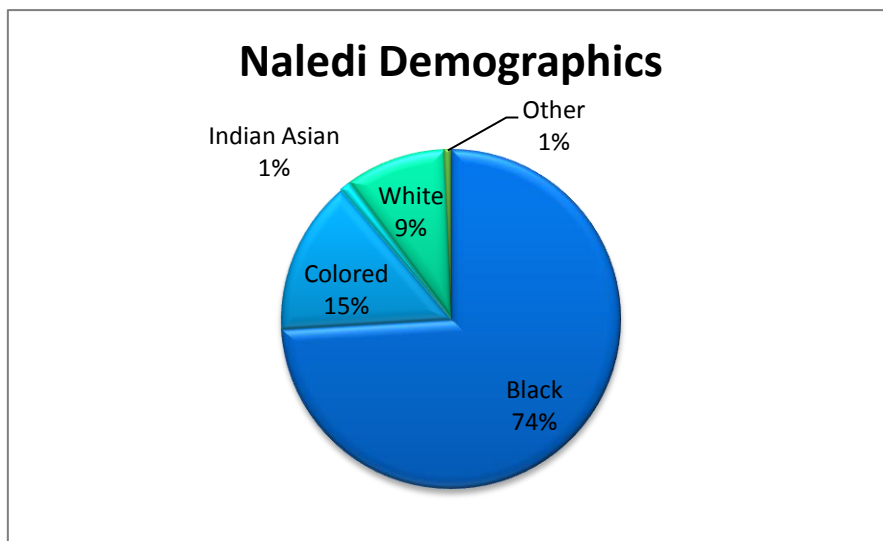




**FIGURE 18: GENDER STATISTICS OF NALEDI MUNICIPALITY**

#### 4.4.8 ETHNICITY AND LANGUAGE

It was found that the largest ethnic group living in the Naledi Local Municipality area was Africans, making up approximately 74% of the population group. The second largest ethnic group in Naledi is mixed race with 13.4%. The smallest ethnic group making part of the population within the local municipality area is Indian Asians with only 1.1% (Maxim Planning Solutions (Pty) Ltd, 2012).



**FIGURE 19: RACE DISTRIBUTION IN THE NALEDI LOCAL MUNICIPALITY**

#### 4.4.9 EDUCATION

The information provided indicated educational facilities (primary, secondary, intermediate and combined schools) throughout Naledi Local Municipality. This information indicated that educational facilities are mostly located in Naledi and Huhudi. However, most of the settlements have access to educational facilities. Education facilities in the municipality consist of the following:

- 🌿 Sixteen (16) Primary Schools
- 🌿 One (1) Combined School
- 🌿 One (1) Intermediate School
- 🌿 Fourteen (14) Secondary Schools

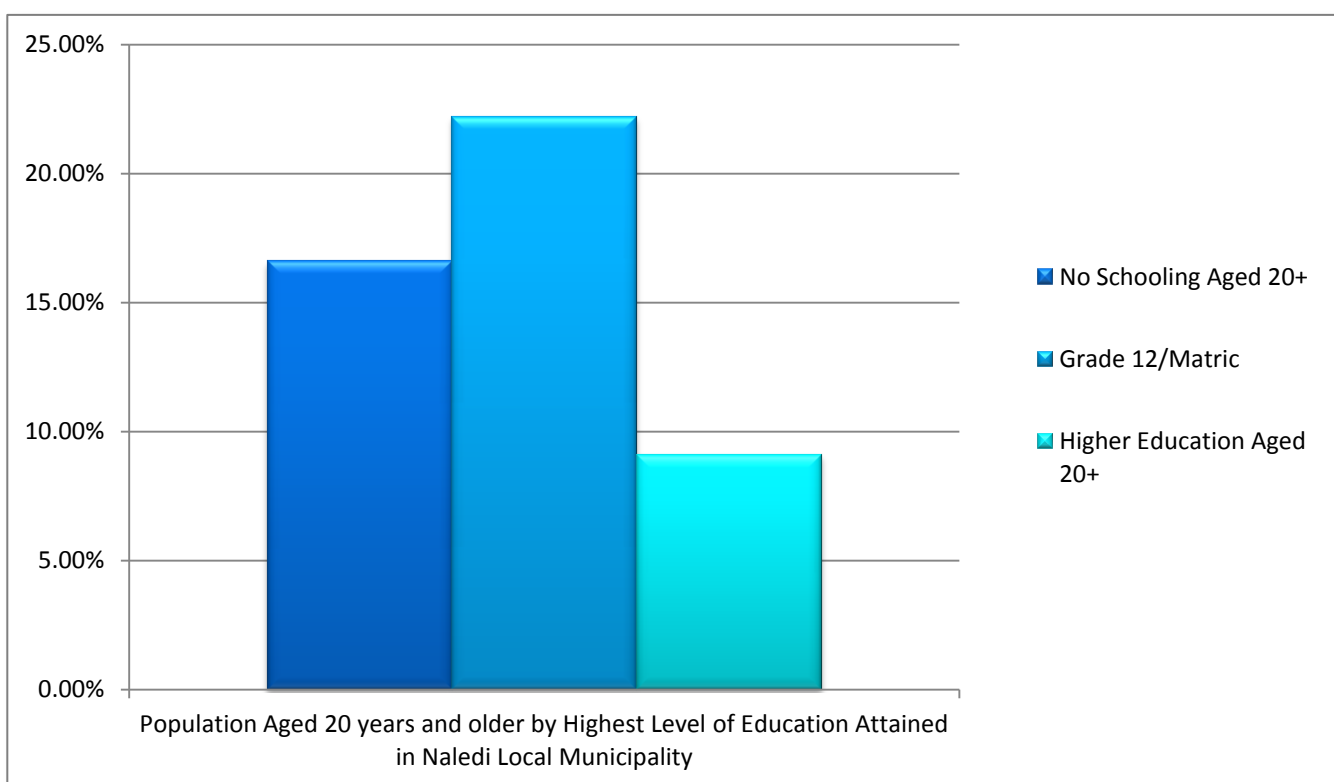
A large section of the population is composed of present and former farm laborers hence the low levels of education especially among those from the age of +45 years. Illiteracy creates a significant problem and impact on the local economic development. 16.60% of the population has no schooling followed by

22.2% with Grade 12/Matric education and only 9.10% have attained higher education. This reflects a moderate education level (Statistics South Africa, 2012).

There is a significant proportion of the population, especially in the farms and townships areas where the population only has a primary level of education. In addition, the majority of the population of the local area (approximately 25% - 45%) did complete their secondary education. The highest level of households with tertiary education qualifications is concentrated within the three main towns. However, due to limited job opportunities in the local area few of those with tertiary education qualifications remain in the Municipality (Maxim Planning Solutions (Pty) Ltd, 2012).

Several other factors influence the level of skills and education within the municipality, the:

- Out migration of skilled workers in search of jobs outside the Municipality / Province
- Out migration of students to universities who do not return to the area once their degrees are attained.
- Increasing death rate as a consequence of the spread of HIV/AIDS.
- Declining employment opportunities resulting in unskilled and semi-skilled to move to larger urban centers outside the Municipality/and or Province.



**FIGURE 20: POPULATION AGED 20 YEARS AND OLDER BY HIGHEST LEVEL OF EDUCATION WITHIN THE NALEDI LOCAL MUNICIPAL AREA**

#### 4.4.10 HEALTH

The provincial headquarters department of health is in Mmabatho North West Province and the regional office is based in Vryburg and one sub region in Taung. The provision of health services is the function of the provincial government (Dr Ruth S Mompoti District Municipality, 2012).

The information provides indication on health facilities (hospital, clinic and community health centers) throughout Naledi Local Municipality. This information indicates that health care facilities are mostly located at Vryburg and Huhudi, whilst most of the settlements have access to health facilities (Maxim Planning Solutions (Pty) Ltd, 2012).

Health facilities in the municipality consist of the following:

- 🦋 Two hospitals
- 🦋 Three Clinics
- 🦋 One Community Health Centers
- 🦋 Three mobile services

#### COMMUNICABLE DISEASES (HIV/AIDS, TB)

According to the 2008 South African national HIV prevalence, incidence, behavior and communication survey (HSRC survey) reports that HIV prevalence in people aged 2+ years in North West is 11.3% (95% CI: 9.1, 14.0). In people aged 15-49 years, the estimate of HIV prevalence rises to 17.7% (95% CI: 13.9, 22.3). This estimate is comparable to those obtained in 2005 (18.0%, 95% CI: 13.7, 23.2) (Johnson, Kincaid, Laurence, Chikwava, Delate, & Mahlasela, 2009).

Although research indicates that the North West Province had the highest rate of intergenerational sex when compared to other provinces, which increases individuals' chances to be infected, statistics from 2008 indicated that the HIV prevalence was the lowest within the Dr RSM DM (28.1%) (Johnson, Kincaid, Laurence, Chikwava, Delate, & Mahlasela, 2009). The proportion of ANC clients tested for HIV increased to 94% in 2007/08. The nevirapine uptake in HIV+ve ANC clients increased slightly in 2007/08 (Monticelli).

Within the Dr RSM DM the TB cure rate was marginally higher in 2006 (67.4%) than it was in 2003 (66.5%), while the smear conversion rate decreased consistently from 59.1% in 2004 to 44.3% in 2007. Urgent managerial attention is required to improve the TB control programme in this district, particularly since annual TB incidence is fairly high at 356 new smear positive cases per 100 000 members of the population (Monticelli).

The stillbirth rates and peri-natal mortality rates were close to the national averages, at 22.8 and 33 per 1000 deliveries, respectively, in 2007/08 and have more than halved since 2000/01 (Monticelli).

#### 4.4.11 SOCIAL PROBLEMS AND VULNERABILITY

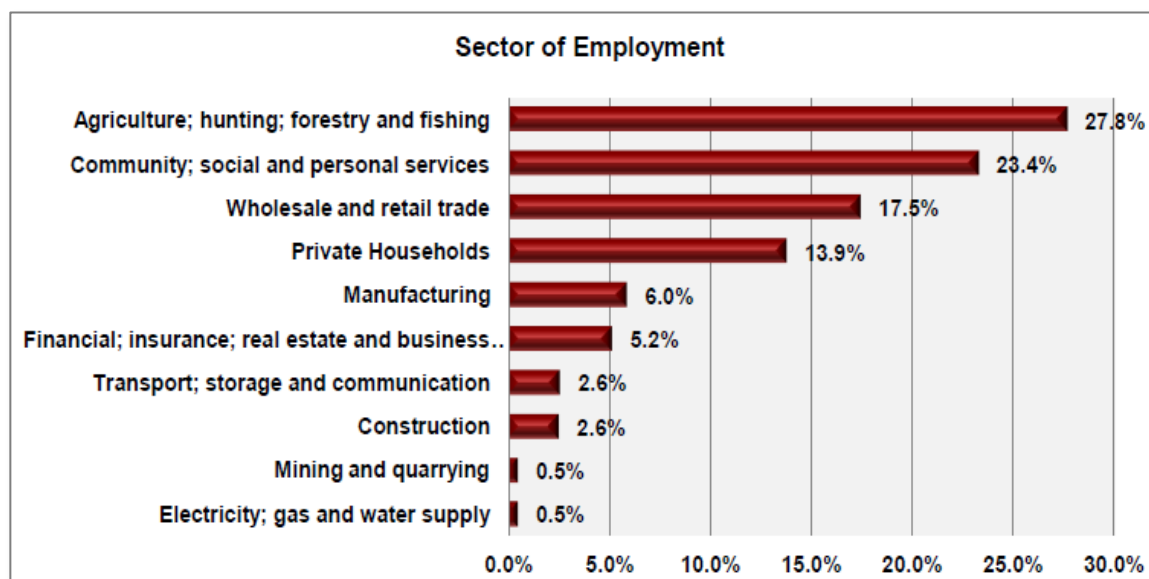
According to the Census 2011 Municipal Report the dependency ratio of groups considered vulnerable (Individuals 14 years of age and younger and individuals 65 years and older) has increased within the Naledi Local Municipal Area while only the dependency ratio of individuals 65 years and older has experienced an increase in the Dr RSM DM Area (Statistics South Africa, 2012).

There was an increase in Individuals 14 years of age and younger group from 18 184 to 20 683 from 2001 to 2011. The group of individuals 65 years and older within the area of Naledi Local Municipality increased from 2 552 in 2001 to 3 358 in 2011. The Dr RSM DM Area group of individuals 65 years and older increase from 24 189 in 2001 to 29 861 in 2011 (Statistics South Africa, 2012).

#### 4.4.12 MAJOR ECONOMIC ACTIVITIES AND SOURCES OF EMPLOYMENT

The economy of the Dr RSM DM is low- keyed, with the exception of the agricultural sector in the Naledi and Mamusa Local Municipal areas. The Naledi Local Municipal area dominates the economy in the majority of the economic sector and activities (Dr Ruth S Mompoti District Municipality, 2012).

The largest sources of employment within the Naledi LM are Agriculture followed by Community Services and Wholesale and retail Trade. The figure below illustrates the key sectors of employment.

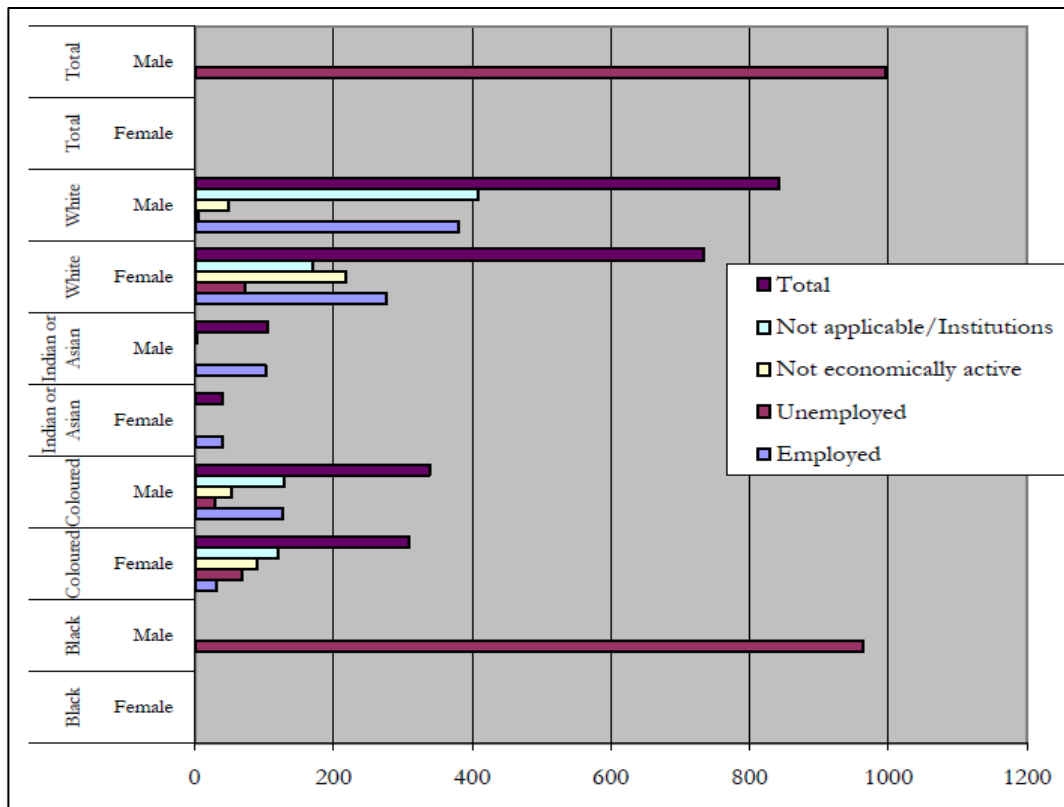


**FIGURE 21: SECTORS OF EMPLOYMENT IN THE NALEDI LOCAL MUNICIPALITY**

Based on Census 2001 data, only 19% of the population in the Dr RSM DM is employed of which most of them receive a monthly income of less than R1 600. A large portion of the population has either had no schooling or has just primary education. A small portion (18%) of the population has secondary education with even a smaller portion of the population (1%) has tertiary education (Dr Ruth S Mompoti District Municipality, 2012).

The unemployment rate in Naledi is estimated at 11.9% and the total of persons who are not economically active is estimated at 25.6%. From this analysis, it is the evident that this socio-economic plight experienced by the communities of Naledi people, has a negative effect on the overall financial sustainability of the municipality as more and more people are unable to pay for their municipal services and thus have to rely on subsidized municipal services (Naledi Local Municipality, 2010/2011).

According to Statistics South Africa's Community Survey: 2007, the unemployment rate in Naledi Local Municipality is as follows:



**FIGURE 22: UNEMPLOYMENT RATES AMONG THE DIFFERENT RACE GROUPS IN NALEDI LOCAL MUNICIPALITY**

From the above presentation, it is evident that black male constitute the highest proportion of employed people, followed by white male and white female. In general, females represents the lowest proportion of employed people in the municipality which will suggest that specific focus and attention should be paid towards developing ways and means to get more and more women employed and participating in the main stream economy (Naledi Local Municipality, 2010/2011).

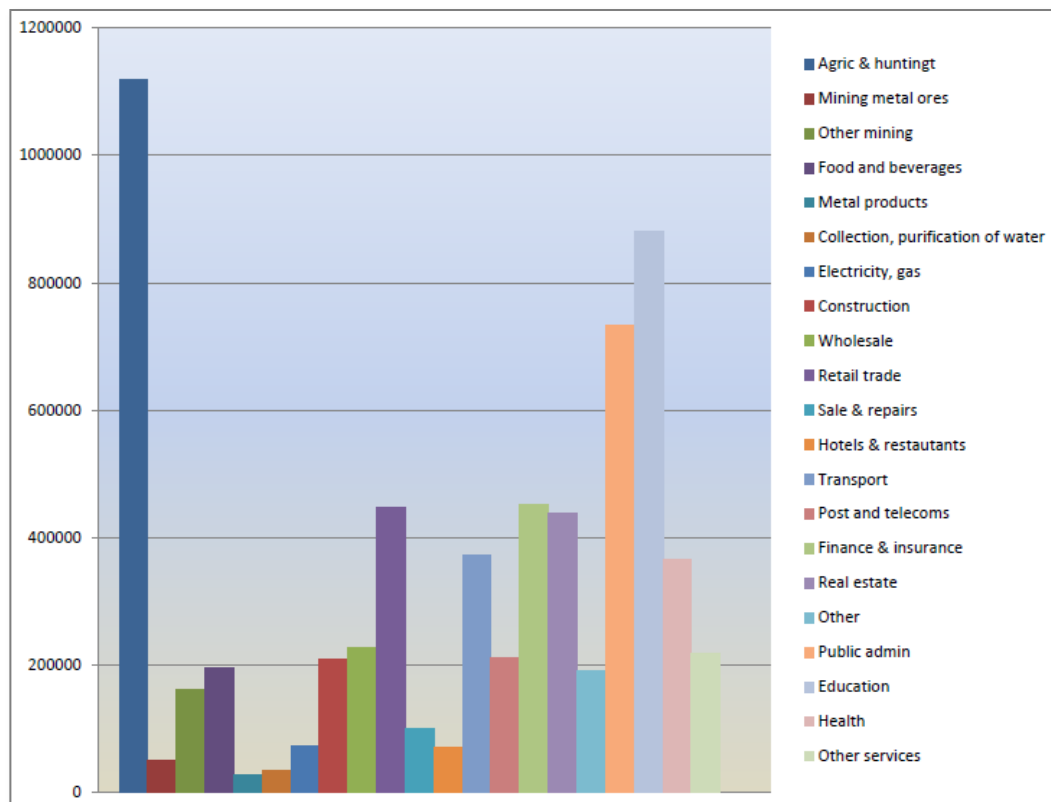
#### 4.4.13 KEY SECTORS OF DR RUTH S MOMPATI DISTRICT MUNICIPALITY

Taking the gross domestic products of Dr. RSM DM into consideration, it is depended highly on agriculture and hunting, mining and government sectors for growth purpose. The major economic activities in the Dr RSM DM are livestock farming, manufacturing, retail trade and financial institutions (Dr Ruth S Mompoti District Municipality, 2012).

Even within the global economic slowdown, the district economy has shown a growth level of 1.7% of the GDP between 1996-2009. Contribution to the total economic growth was within the following sectors: agriculture (-0.1%), mining (0.0%), manufacturing (0.1%), electricity (0.0%), construction (0.1%), trade (0.0%), transport (0.2%), finance (0.5%), community services (0.6%) and the total industries contributed 1.5% of the total GDP (Dr Ruth S Mompoti District Municipality, 2012).

#### 4.4.14 OTHER SECTORS

The figure below shows the main sectors of Dr. RSM DM. The sectors which are significant contributors are agriculture and fishing, education, public administration, retail, finance, transport and the least is metal products, collection, purification and distribution of water, hotels and restaurants (Dr Ruth S Mompoti District Municipality, 2012).



**FIGURE 23: THE MAIN SECTORS IN THE DR. RUTH S. MOMPATI DISTRICT MUNICIPALITY**

#### 4.4.15 HOUSEHOLDS INCOMES

The low functional literacy levels and low employment figures in the informal sector and the high levels of unemployment amongst African and colored race group means that income levels are low in Dr. RSM DM. The table below illustrates the number of households by income category for the Dr. RSM DM (Dr Ruth S Mompoti District Municipality, 2012).

**TABLE 13: NUMBER OF HOUSEHOLDS BY INCOME CATEGORY FOR DR. RSM DM**

Annual Income	Total	African	White	Coloureds	Asians
0-2400	435	418	0	17	0
2400-6000	1 269	1252	4	14	0
6000-12000	12 937	12393	13	521	2
12000-18000	15 368	14920	4	427	9
18000-30000	19 875	19594	9	237	20
30000-42000	16 911	16486	29	360	20
42000-54000	11 827	11463	43	297	19
54000-72000	9 636	9149	69	364	17
72000-96000	7 058	6371	350	290	19
96000-132000	5 432	4480	685	251	27
132000-192000	4 449	3325	883	197	29
192000-360000	5 071	3197	1630	166	13
360000-600000	2 330	1250	1003	49	4
600000-1200000	1 109	475	602	18	2
1200000-2400000	291	119	167	3	0
2400000+	59	27	31	0	0
<b>Total</b>	<b>114 059</b>	<b>104922</b>	<b>5522</b>	<b>3211</b>	<b>180</b>

The income distribution of individuals follows much the same pattern across the province, with the majority of people not earning a formal income at all, or falling within the lower income brackets. Accordingly, 7 % of people with income earning potential in Naledi earn no income, 10 % earned between R1 and R4 800 per month (Statistics South Africa, 2009). The table below illustrates the household incomes per month for the Naledi Local Municipal area.

**TABLE 14: HOUSEHOLD INCOME PER MONTH FOR NALEDI LOCAL MUNICIPALITY**

Naledi Local Municipality	Monthly Income Categories						Response not given
	None	R1 – 4800	R4801 – 9600	R9601 - 19200	R19 201– 38400	> R38401	
	714	798	970	2 200	1 895	1479	217
%	51.89	11.63	4.09	11.35	4.13	11.80	2.70

#### 4.4.16 BULK SERVICES AND INFRASTRUCTURE

##### DR RUTH S MOMPATI DISTRICT MUNICIPALITY

Transportation in the District Municipal area is insufficient. Though roads are part of the provincial responsibility, the municipality has a role to play in supporting the provincial government. Most of the roads are in a bad state and this has an impact in service delivery issues including economic development. There will always be delay in provision of service should roads deteriorate to unacceptable levels (Dr Ruth S Mompoti District Municipality, 2012).

According to current survey, 70 532 households (62%) of the households have access to formal refuse removal services. These households receive municipal refuse removal services weekly. 33 085 of these households receive municipal refuse removal services weekly. This number is above average suggesting that Dr. RSM DM is delivering on refuse removal. 3 531 households (3%) receive refuse removal less often than weekly by authority. 3 971 households (6%) use own dumping for refuse removal. 144 households receive services from community members for removal. 36 households (6%) receive no refuse removal services (Dr Ruth S Mompoti District Municipality, 2012).

##### NALEDI LOCAL MUNICIPALITY

The following service delivery backlogs for major categories of services as outlined hereunder, measured on the basis of number of households:

Ward	Service Delivery Backlog			Relative Weight	
	Housing	Water	Sanitation		
1	271	271	30		
2	727	727	382	Housing	40%
3	386	386	283	Water	20%
4	866	866	187	Sanitation	40%
<b>Total</b>	<b>2250</b>	<b>2250</b>	<b>2890</b>	<b>Total</b>	<b>100%</b>

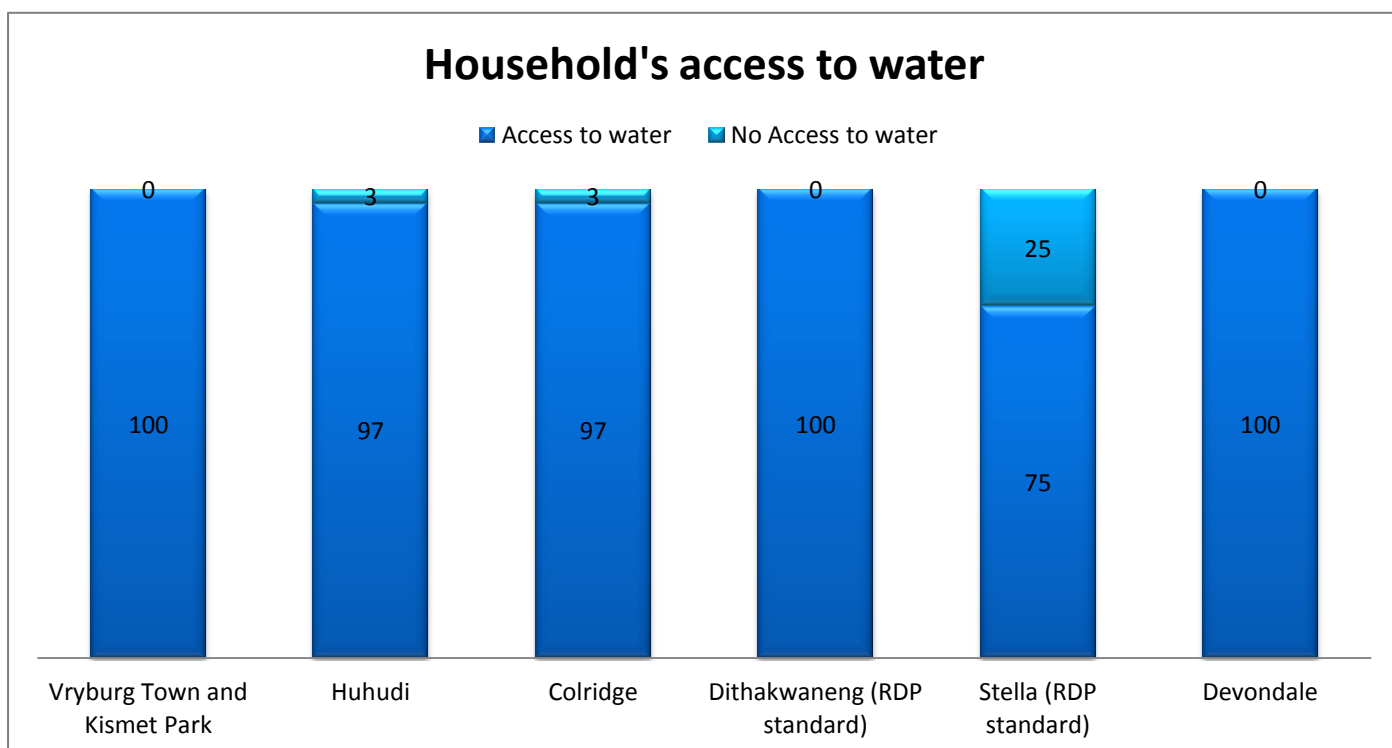
#### 4.4.17 WATER SUPPLY

Dr RSM DM is the Water Authority and Naledi Local Municipality is the Water Service Provider. According to the Taung/Naledi Bulk Water Supply Scheme, the only area in Naledi that is supplied with surface water is Vryburg town. Vryburg relies on groundwater for ±50% of its primary water demand while the rest is supplied from the Pudimoe Treatment Works via the newly upgraded Pudimoe-Vryburg

pipeline. The capacity of this pipe is sufficient to carry the total water demand for Vryburg. The Pudimoe Water Supply Scheme utilizes Vaal River water from the Vaalharts Irrigation Canal as water source (Maxim Planning Solutions (Pty) Ltd, 2012).

A total 90 366 households (90.3% of the households) in the Dr RSM DM Area have access to acceptable levels of water services. Estimated 20 916 households (20.9% of the households) use piped water inside the dwelling. 20 315 households (20.3% of the households) use water inside the yard. A total 49 136 households (or 49.1% households) use piped water from access point outside the yard. A total 9 708 households (9.7% households) don't have access to acceptable levels of water services.

According to Naledi Local Municipality's latest Spatial Development Framework the water capacity in the area is as follows:



**FIGURE 24: HOUSEHOLD'S IN NALEDI LOCAL MUNICIPALITY'S ACCESS TO WATER**

#### 4.4.18 SANITATION

A number of the households 33 325 households or 33.3% of the households in the Dr RSM DM Area have access to acceptable levels of sanitation services. A small number of the households, 66 749 or 66.7% of the households in the Dr RSM DM Area, however, are in need of acceptable levels of sanitation services. 31 323 households (31.3% of the households) use flushing toilets connected to sewerage (Dr Ruth S Mompoti District Municipality, 2012).

About 2002 households (2.0% households) use flush toilet (with septic tank), whilst 1 702 households (1.7% households) use dry toilet facility. An estimated 15 812 households (15.8% of the households) use chemical toilets. Total 30 923 households (30.9% households) use a pit latrine with ventilation (VIP). 100 households (0.1% households) use a pit latrine without ventilation. Lastly, 2002 households (2.0% households) use a bucket latrine. 6 205 households (16.2% of the households) are not provided with any sanitation (Dr Ruth S Mompoti District Municipality, 2012).

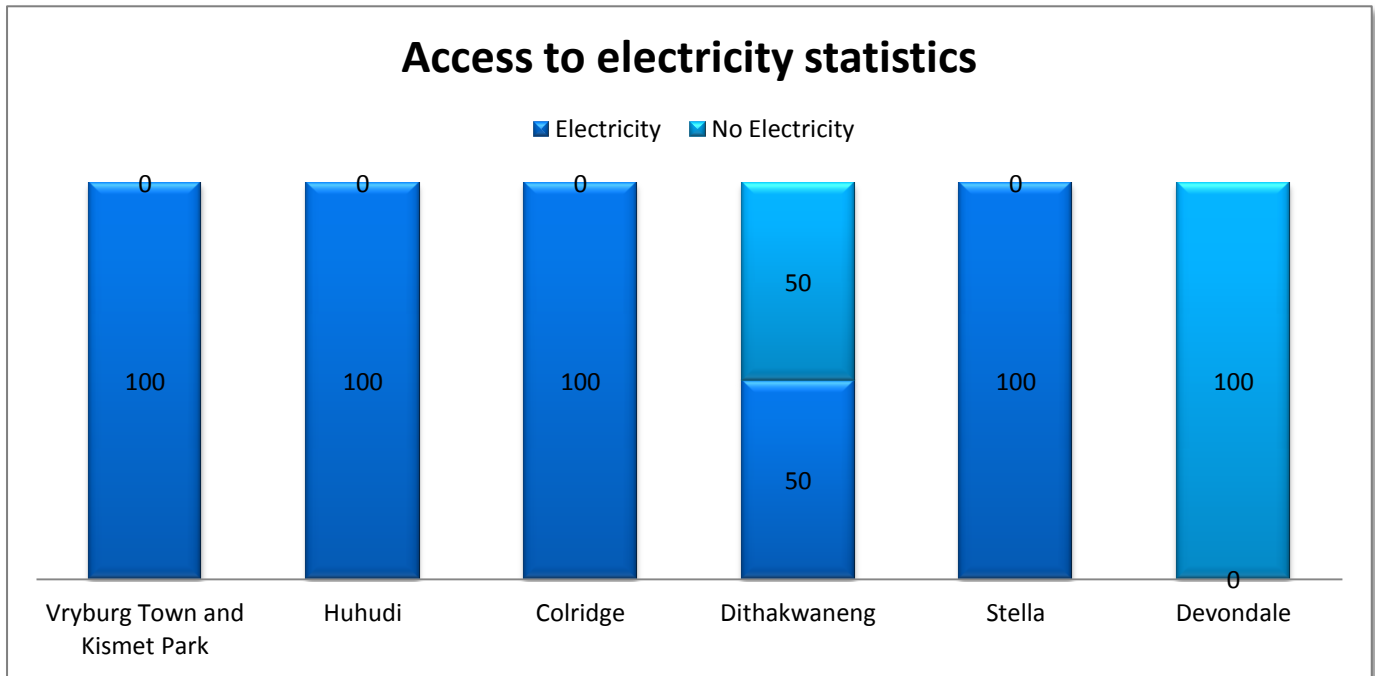


#### 4.4.19 POWER SUPPLY

A total 81 759 of households or 81.7% households in the Dr RSM DM Area use electricity for lighting. An estimated 100 households or 0.1% households in Dr RSM DM use gas for lighting. About 2001 households or 2.0% household use paraffin for lighting.

A number of the 15 811 households or 15.8% of the households use candles. About 100 households (0.1% households) in the Dr RSM DM Area use solar energy for lighting. About 200 households or 0.2% household uses other sources of energy such as wood, coal etc for lighting (Dr Ruth S Mompoti District Municipality, 2012).

The following areas according to percentages within Naledi Local Municipality’s jurisdiction have access to electricity:



**FIGURE 25: ACCESS TO ELECTRICITY TO THE INHABITANTS OF THE NALEDI LOCAL MUNICIPALITY**

#### 4.4.20 TRANSPORT, ROADS AND RAIL

There are two main roads in Naledi LM and that is N18 linking Mahikeng to Warrenton (passing through Stella, Vryburg, and Taung) and the N14 highway linking Gauteng to Upington (passing through Vryburg). Vryburg forms the centre of the ox-wheel in relation to the major roads. The most heavily trafficked routes include the N14 from Vryburg to Upington, and the N18 from Vryburg to Warrenton (Maxim Planning Solutions (Pty) Ltd, 2012).

The main railway line includes the Mahikeng to Warrington line which passes through Vryburg and Taung. No rail networks exist in the northern two thirds of the district, i.e. north-west of Vryburg. The rail network is utilized for both public and freight transport purposes. The public transport demand on this section of the railway line consists of exclusively long-distance passengers (Maxim Planning Solutions (Pty) Ltd, 2012).

#### 4.4.21 LAND TENURE AND REFORM

Land reform in South Africa encompasses three primary segments namely land restitution, tenure reform and land redistribution. The redistribution segment has different components which include:

- ✿ Agricultural Development: to make land available to people for agricultural purposes.
- ✿ Settlement: to provide people land for settlement purposes.
- ✿ Non-agricultural enterprises: to provide people land for non-agricultural enterprises, for example eco-tourism projects.

LRAD has two distinct parts. Firstly, LRAD deals with the transfer of agricultural land to specific individuals or groups. Secondly, LRAD deals with commonage projects, which aim to improve people with access to municipal and tribal land, primarily for grazing purposes.

The strategic objectives of the sub-programmes include:

- ✿ Contributing to the redistribution of 30% of the countries agricultural land over 15 years
- ✿ Improving nutrition and incomes of the rural poor who want to farm on any scale
- ✿ De-congesting over-crowded former homeland areas
- ✿ Expanding opportunities for women and young people who stay in rural areas

In order to align Land Reform Initiatives the Department of Rural Development and Land Reform embarked on a series of Area Based Plans (ABP) to align Land Reform Projects with the SDF and other sector plans. The agricultural sector in Naledi is dominated by private land where the focus is on the production of cattle. In order to expand farming enterprises, land is required.

Land reform projects should target prime agricultural land if the intention is to benefit a number of people. Land reform projects should form part of existing nodal development and be close to selected rural nodes in order to improve the accessibility of beneficiaries to higher order of social and economic infrastructure and facilities.

Therefore, the SDF for Naledi Local Municipality needs to advocate the increased availability of land. The SDF should identify opportunities for Land Reform especially in the agriculture and eco-tourism fields where possible. The lengthy land claims process constrains development in Naledi Local Municipality with land not being able to be developed until the claims has been settled and therefore Land Reform elements have to materialize in this regard (Maxim Planning Solutions (Pty) Ltd, 2012).

The Land Use Management Bill processed and enact in order for an effective Land Use Management System to be in place. The Naledi, Lekwa-Teemane, Greater Taung and Mamusa Local Municipalities have Town Planning Schemes which are outdated and do not address certain issues, i.e. rural land use management, and hence are deemed ineffective. The district plans is to have updated LUMS for all local municipalities during the third or fourth quarter of the 2012/2013 financial year (Maxim Planning Solutions (Pty) Ltd, 2012).

## 5. PREDICTED ENVIRONMENTAL IMPACTS

### 5.1 PROJECT ACTIVITIES

The following activities in below are associated with each of the key project phases within the project lifecycle:

**TABLE 15: ACTIVITES ASSOCIATED WITH THE PROJECT**

Phase	Activity	Description
<b>Construction</b>	1	Site Clearing: Removal of topsoil & vegetation
	2	Vehicular access and movement of construction activities
	3	Stockpiling, handling and storage of building material
<b>Operation</b>	4	Temporary storage of sewage sludge
	5	Storage and treatment of sewage effluent
<b>Decommissioning</b>	6	Decommissioning of the old plant
	7	Closure of the old plant

### 5.2 ASSESSMENT APPROACH

Standard evaluation methods are applied as defined below.

An impact can be defined as any change in the physical-chemical, biological, cultural and/or socio-economic environmental system that can be attributed to human activities related to alternatives under study for meeting a project need. Assessment of impacts will be based on DEAT's (1998) Guideline Document: EIA Regulations.

The significance of the aspects/impacts of the process will be rated by using a matrix derived from Plomp (2004) and adapted to some extent to fit this process. These matrixes use the consequence and the likelihood of the different aspects and associated impacts to determine the significance of the impacts.

The significance of the impacts will be determined through a synthesis of the criteria below:

**Probability: This describes the likelihood of the impact actually occurring.**

**Improbable:** The possibility of the impact occurring is very low, due to the circumstances, design or experience.

**Probable:** There is a probability that the impact will occur to the extent that provision must be made therefore.

**Highly Probable:** It is most likely that the impact will occur at some stage of the development.

**Definite:** The impact will take place regardless of any prevention plans, and there can only be relied on mediatory actions or contingency plans to contain the effect.

**Duration: The lifetime of the impact.**

**Short term:** The impact will either disappear with mitigation or will be mitigated through natural processes in a time span shorter than any of the phases.

**Medium term:** The impact will last up to the end of the phases, where after it will be negated.

**Long term:** The impact will last for the entire operational phase of the project but will be mitigated by direct human action or by natural processes thereafter.

**Permanent:** Impact that will be non-transitory. Mitigation either by man or natural processes will not occur in such a way or in such a time span that the impact can be considered transient.

**Scale: The physical and spatial size of the impact**

**Site:** The impacted area extends only as far as the activity, e.g. footprint

**Local:** The impact could affect the whole, or a measurable portion of the above mentioned properties and adjacent properties.

**Regional:** The impact could affect the area including the neighboring residential areas.

**Magnitude/ Severity: Does the impact destroy the environment, or alter its function.**

**Low:** The impact alters the affected environment in such a way that natural processes are not affected.

**Medium:** The affected environment is altered, but functions and processes continue in a modified way.

**High:** Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.

**Significance:** This is an indication of the **importance of the impact** in terms of both physical extent and time scale, and therefore indicates the level of mitigation required.

**Negligible:** The impact is non-existent or unsubstantial and is of no or little importance to any stakeholder and can be ignored.

**Low:** The impact is limited in extent, has low to medium intensity; whatever its probability of occurrence is, the impact will not have a material effect on the decision and is likely to require management intervention with increased costs.

**Moderate:** The impact is of importance to one or more stakeholders, and its intensity will be medium or high; therefore, the impact may materially affect the decision, and management intervention will be required.

**High:** The impact could render development options controversial or the project unacceptable if it cannot be reduced to acceptable levels; and/or the cost of management intervention will be a significant factor in mitigation.

## 5.3 ASSESSMENT OF POTENTIAL IMPACTS

This chapter identifies and evaluates the actual and potential environmental consequences associated with the development of the project. This assessment proposed potential for mitigation of negative impacts and enhancement of positive impacts (DEAT, 2003) to enable sustainable development principles are adhered to.

This report considers the extent of issues created during the construction and operational phases of the proposed project: “the new Vryburg Waste Water Treatment Works” (hereafter referred to as ‘WWTW’) and associated infrastructure. Decommissioning of the current plant will take place after the new plant is in operation.

The following impacts were identified as potentially significant and important to evaluate:

- 🌿 Ecology
- 🌿 Soils
- 🌿 Land Capability and Land Use
- 🌿 Surface water hydrology and storm water
- 🌿 Geotechnical capability
- 🌿 Ground water
- 🌿 Odor
- 🌿 Archaeology and Cultural History
- 🌿 Safety and Security
- 🌿 Socio-economic Environment
- 🌿 Traffic
- 🌿 Dust Emissions
- 🌿 Noise

General environmental, social and economical inputs from local experts were obtained for the completion of this assessment. The following in depth specialist studies were done and is included in the appendices of the Basic Assessment Report:

- 🌿 Appendix D1: Baseline surface and groundwater investigations at Vryburg Proposed New WWTW (Golder Associates Africa [Pty] Ltd)
- 🌿 Appendix D2: Heritage impact assessment (Dr Dave Morris – Head of Archaeology: McGregor Museum Kimberley)
- 🌿 Appendix D3: Ecological scan and wetland assessment (Simon Todd – Simon Todd Consulting)
- 🌿 Appendix D4: Surface Water Management Memo
- 🌿 Appendix D5: Geotechnical Investigation Memo

The following section is a summary of the most significant impacts for the proposed WWTW project.

### 5.3.1 ECOLOGY

#### **IMPACTS ON VEGETATION AND PROTECTED PLANT SPECIES**

Vegetation will only be impacted during the pre-construction and construction phase. During the operational phase no vegetation will be left on the site to be impacted. The current plant will be decommissioned but there is no vegetation to be impacted.

#### IMPACT CHARACTERISTICS: VEGETATION AND PROTECTED PLANT SPECIES

**TABLE 16: IMPACT CHARACTERISTICS: VEGETATION AND PROTECTED PLANT SPECIES**

Summary	Pre-Construction	Construction	Operational	Decommissioning
<b>Project Aspect/Activity</b>	Road access clearing Exploration	Road access clearing Exploration	<i>Not Applicable</i>	<i>Not Applicable</i>

	activities	activities		
<b>Impact Type</b>	Direct Negative	Direct Negative	<i>Not Applicable</i>	<i>Not Applicable</i>
<b>Stakeholders/ Receptors Affected</b>	Fauna & Flora	Fauna & Flora	<i>Not Applicable</i>	<i>Not Applicable</i>

#### IMPACT CHARACTERISTICS: PRE-CONSTRUCTION PHASE

**Nature:** Pre-construction activities will have a **direct negative** effect on the vegetation and protected plant species.

**Impact Magnitude: MEDIUM**

**Extent:** The extent of the impact is **local** as a large portion of vegetation will be impacted during this phase.

**Duration:** The duration will be **short term** as this impact will only last until the end of the construction phase.

**Intensity:** The intensity is likely to be **low** as vegetation is already disturbed.

**Likelihood:** There is a **probability** that there will be an impact.

**IMPACT SIGNIFICANCE (PRE-MITIGATION): LOW**

**IMPACT SIGNIFICANCE (POST-MITIGATION): NEGLIBIGLE**

#### IMPACT CHARACTERISTICS: CONSTRUCTION PHASE

**Nature:** Construction activities will have a **direct negative** effect on the vegetation and protected plant species.

**Impact Magnitude: MEDIUM**

**Extent:** The extent of the impact is **local** as a large portion of vegetation will be impacted during this phase.

**Duration:** The duration will be **long term** as this impact will only last until the end of the operational phase.

**Intensity:** The intensity is likely to be **medium** as flora will be impacted.

**Likelihood:** It is **highly probable** that there will be an impact.

**IMPACT SIGNIFICANCE (PRE-MITIGATION): MODERATE**

**IMPACT SIGNIFICANCE (POST-MITIGATION): MODERATE**

#### MITIGATION MEASURES: PRE-CONSTRUCTION PHASE

- 🌿 No unauthorised access to the site.
- 🌿 No unauthorised site clearing or disturbance at the site without an ECO present.
- 🌿 The final development area should be surveyed for species suitable for search and rescue, which should be translocated prior to the commencement of construction.
- 🌿 Areas where exploration work is permissible should be clearly demarcated.

#### MITIGATION MEASURES: CONSTRUCTION PHASE

- 🌿 Vegetation clearing to commence only after walk through has been conducted and necessary permits obtained.
- 🌿 Vegetation clearing to be kept to a minimum. No unnecessary vegetation to be cleared.

- All construction vehicles should adhere to clearly defined and demarcated roads. No off-road driving to be allowed.
- Temporary lay-down areas should be located within previously transformed areas or areas that have been identified as being of low sensitivity. These areas should be rehabilitated after use.

#### RESIDUAL IMPACT

If the above stipulated mitigation measures are implemented, the residual impact significance will be reduced to *Negligible* for the pre-construction but will remain the same for the construction impact, *Moderate*. Some loss of vegetation is inevitable and cannot be avoided.

**TABLE 17: RESIDUAL IMPACT: VEGETATION & PROTECTED PLANT SPECIES**

Aspect	Project Phase	Impact	Impact Magnitude	Significance (Pre-mitigation)	Residual Significance (Post-mitigation)
<b>Vegetation &amp; Protected Plant Species</b>	Pre- Construction Impact	Direct Negative	<b>MEDIUM</b>	<b>LOW</b>	<b>NEGLIGIBLE</b>
	Construction Impact	Direct Negative	<b>MEDIUM</b>	<b>MODERATE</b>	<b>MODERATE</b>
	Operational Impact	<i>Not Applicable</i>	<i>Not Applicable</i>	<i>Not Applicable</i>	<i>Not Applicable</i>
	Decommissioning Closure Impact	<i>Not Applicable</i>	<i>Not Applicable</i>	<i>Not Applicable</i>	<i>Not Applicable</i>

#### FAUNAL IMPACTS

##### IMPACT CHARACTERISTICS: FAUNAL SPECIES

**TABLE 18: IMPACT CHARACTERISTICS: FAUNAL SPECIES**

Summary	Pre-Construction	Construction	Operation	Decommissioning
<b>Project Aspect/Activity</b>	Human Presence Operation of heavy machinery on-site	Construction vehicles	Operation & presence of the facility	Abandoned or demolished building
<b>Impact Type</b>	Direct Negative	Direct Negative	Direct Negative	Indirect Positive
<b>Stakeholders/Receptors Affected</b>	Fauna & Flora	Fauna & Flora	Fauna & Flora	Fauna & Flora

##### IMPACT CHARACTERISTICS: PRE-CONSTRUCTION

**Nature:** Pre-construction activities will have a **direct negative** effect on faunal species.

**Impact Magnitude: MEDIUM**

**Extent:** The extent of the impact is **local** as a large portion of fauna might be impacted during this phase.

**Duration:** The duration will be **short term** as this impact will only last until the end this phase.

**Intensity:** The intensity is likely to be **low** as impacts have the ability to be reversed.

**Likelihood:** There is a **probability** that there will be an impact.

**IMPACT SIGNIFICANCE (PRE-MITIGATION): LOW**

**IMPACT SIGNIFICANCE (POST-MITIGATION): NEGLIBIGLE**

IMPACT CHARACTERISTICS: CONSTRUCTION

**Nature:** Construction activities will have a **direct negative** effect on faunal species.

**Impact Magnitude: MEDIUM**

**Extent:** The extent of the impact is **local** as a large portion of fauna might be impacted during this phase.

**Duration:** The duration will be **short term** as this impact will only last until the end this phase.

**Intensity:** The intensity is likely to be **low** as impacts have the ability to be reversed.

**Likelihood:** It is **highly probable** that there will be an impact.

**IMPACT SIGNIFICANCE (PRE-MITIGATION): MODERATE**

**IMPACT SIGNIFICANCE (POST-MITIGATION): MODERATE**

IMPACT CHARACTERISTICS: OPERATION

**Nature:** Construction activities will have a **direct negative** effect on faunal species.

**Impact Magnitude: MEDIUM**

**Extent:** The extent of the impact is **local** as a large portion of fauna might be impacted during this phase.

**Duration:** The duration will be **long term** as this impact will last for the entire duration of the operational phase (20 years and beyond).

**Intensity:** The intensity is likely to be **low** as impacts have the ability to be reversed.

**Likelihood:** There is a **probability** that there will be an impact.

**IMPACT SIGNIFICANCE (PRE-MITIGATION): LOW**

**IMPACT SIGNIFICANCE (POST-MITIGATION): LOW**

IMPACT CHARACTERISTICS: DECOMMISSIONING

**Nature:** Construction activities will have a **indirect positive** effect on faunal species.

**Impact Magnitude: LOW (+)**

**Extent:** The extent of the impact is **site** as the impact will be limited to the current sewage works.

**Duration:** The duration will be **medium term** as this impact will last until the building is used again (human presence) or a new development is built.

**Intensity:** The intensity is likely to be **low**.

**Likelihood:** There is a **probability** that there will be animals coming back to the site.

**IMPACT SIGNIFICANCE (PRE-MITIGATION): LOW**

**IMPACT SIGNIFICANCE (POST-MITIGATION): NEGLIGBLE (+)**

MITIGATION MEASURES: PRE-CONSTRUCTION PHASE



- Site access to be controlled and no unauthorized persons should be allowed onto the site.
- The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden.
- No open excavations, holes or pits should be left at the site as fauna can fall in and become trapped.

#### MITIGATION MEASURES: CONSTRUCTION PHASE

- Site access should be controlled and no unauthorized persons should be allowed onto the site.
- Any fauna directly threatened by the construction activities should be removed to a safe location by the ECO or other suitably qualified person.
- The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. Personnel should not be allowed to wander off the demarcated construction site.
- Fires should not be allowed on site.
- No fuel wood collection should be allowed on-site.
- No dogs should be allowed on site.
- If the site must be lit at night for security purposes, this should be done with low-UV type lights (such as most LEDs), which do not attract insects.
- All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.
- All construction vehicles should adhere to a low speed limit to avoid collisions with susceptible species such as snakes and tortoises.
- Faunal sweeps within habitats such as bush clumps should take place before clearing and any fauna located should form part of a search and rescue and relocated to safety.

#### MITIGATION MEASURES: OPERATIONAL PHASE

- No unauthorized persons should be allowed onto the site.
- Any potentially dangerous fauna such snakes or fauna threatened by the maintenance and operational activities should be removed to a safe location.
- The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden.
- If the site must be lit at night for security purposes, this should be done with low-UV type lights (such as most LEDs), which do not attract insects.
- All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.
- All vehicles accessing the site should adhere to a low speed limit (30km/h max) to avoid collisions with susceptible species such as snakes and tortoises.
- If the facility is to be fenced, then no electrified strands should be placed within 30cm of the ground as some species such as tortoises and pangolins are susceptible to electrocution from electric fences as they do not move away when electrocuted but rather adopt defensive behaviour and are killed by repeated shocks.

#### RESIDUAL IMPACT

If the above stipulated mitigation measures are implemented, the residual impact significance will be reduced to *Negligible* for the pre-construction phase while it will stay the same for the construction phase, *Negligible*. The impacts will stay the same for the operational phase as well, *Low*. Some habitat loss for fauna is an inevitable consequence of the development and cannot be fully mitigated. Noise and disturbance are typical of construction activities and cannot be avoided to a significant degree. The impact is however transient and confined to the construction period.

**TABLE 19: RESIDUAL IMPACT: FAUNA**

Aspect	Project Phase	Impact	Impact	Significance	Residual
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			Magnitude	(Pre-mitigation)	Significance (Post-mitigation)
<b>Fauna</b>	Pre- Construction Impact	Direct Negative	<b>MEDIUM</b>	<b>LOW</b>	<b>NEGLIGIBLE</b>
	Construction Impact	Direct Negative	<b>MEDIUM</b>	<b>MODERATE</b>	<b>MODERATE</b>
	Operational Impact	Direct Negative	<b>MEDIUM</b>	<b>LOW</b>	<b>LOW</b>
	Decommissioning Closure Impact	Direct Positive	<b>LOW (+)</b>	<b>LOW</b>	<b>NEGLIGIBLE (+)</b>

### INCREASED ALIEN PLANT INVASION

Alien plants are likely to invade the site as a result of disturbance created during construction. Only the operational phase is applicable as impacts would not occur during the other phases.

IMPACT CHARACTERISTICS: INCREASED ALIEN PLANT INVASION

**TABLE 20: IMPACT CHARACTERISTICS: INCREASED ALIEN PLANT INVASION**

Summary	Construction	Operation	Decommissioning
<b>Project Aspect/ Activity</b>	<i>Not Applicable</i>	Operation & presence of the facility	<i>Not Applicable</i>
<b>Impact Type</b>	<i>Not Applicable</i>	Direct Negative	<i>Not Applicable</i>
<b>Stakeholders/Receptors Affected</b>	<i>Not Applicable</i>	Flora	<i>Not Applicable</i>

IMPACT CHARACTERISTICS: OPERATIONAL PHASE

<p><b>Nature:</b> Pre-construction activities will have a <b>direct negative</b> effect on the environment.</p> <p><b>Impact Magnitude: MEDIUM</b></p> <p><b>Extent:</b> The extent of the impact is <b>local</b> as a large portion of land might be impacted during this phase.</p> <p><b>Duration:</b> The duration will be <b>long term</b> as this impact will for an indefinite period of time.</p> <p><b>Intensity:</b> The intensity is likely to be <b>medium</b> as impacts might not have the ability to be reversed if it is not mitigated.</p> <p><b>Likelihood:</b> It is <b>highly probable</b> that there will be an impact.</p> <p><b>IMPACT SIGNIFICANCE (PRE-MITIGATION): MODERATE</b></p> <p><b>IMPACT SIGNIFICANCE (POST-MITIGATION): LOW</b></p>
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MITIGATION MEASURES

- Regular monitoring for alien plants within the development footprint.
- Regular alien clearing should be conducted using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible.

RESIDUAL IMPACT

If the above stipulated mitigation measures are implemented, the residual impact significance will be reduced to *Low* for the operational phase. If alien species at the site are controlled, then there will be very little residual impact.

**TABLE 21: RESIDUAL IMPACT: ALIEN PLANT INVASION**

Aspect	Project Phase	Impact	Impact Magnitude	Significance (Pre-mitigation)	Residual Significance (Post-mitigation)
<b>Alien Plant Invasion</b>	Pre- Construction Impact	<i>Not Applicable</i>	<i>Not Applicable</i>	<i>Not Applicable</i>	<i>Not Applicable</i>
	Construction Impact	<i>Not Applicable</i>	<i>Not Applicable</i>	<i>Not Applicable</i>	<i>Not Applicable</i>
	Operational Impact	Direct Negative	<b>MEDIUM</b>	<b>MODERATE</b>	<b>LOW</b>
	Decommissioning Closure Impact	<i>Not Applicable</i>	<i>Not Applicable</i>	<i>Not Applicable</i>	<i>Not Applicable</i>

**AVIFAUNAL IMPACTS DUE TO OVERHEAD POWER LINES**

The operation and presence of the facility may lead to negative impacts on avifauna as a result of electrocution or collisions with the associated power transmission infrastructure.

IMPACT CHARACTERISTICS: AVIFAUNA – POWER LINES

**TABLE 22: IMPACT CHARACTERISTICS: AVIFAUNA – POWER LINES**

Summary	Construction	Operation	Decommissioning
<b>Project Aspect/ Activity</b>	<i>Not Applicable</i>	Operation & presence of the facility	<i>Not Applicable</i>
<b>Impact Type</b>	<i>Not Applicable</i>	Direct Negative	<i>Not Applicable</i>
<b>Stakeholders/Receptors Affected</b>	<i>Not Applicable</i>	Avifauna	<i>Not Applicable</i>

IMPACT CHARACTERISTICS: OPERATIONAL PHASE

**Nature:** Pre-construction activities will have a **direct negative** effect on the environment.

**Impact Magnitude: LOW**

**Extent:** The extent of the impact is **local** as a large avifaunal community might be impacted during this phase.

**Duration:** The duration will be **long term** as this impact will for an indefinite period of time.

**Intensity:** The intensity is likely to be **low** as impacts might have the ability to be reversed.

**Likelihood:** There is a **probability** that there will be an impact.

**IMPACT SIGNIFICANCE (PRE-MITIGATION): LOW**

**IMPACT SIGNIFICANCE (POST-MITIGATION): NEGLIGIBLE**

MITIGATION MEASURES

- 🦋 Ensure that all new lines are marked with bird flight diverters along their entire length, but particularly in areas where larger birds are likely to pass such as near drainage lines, dams or pans and hills.
- 🦋 All new power line infrastructure should be bird-friendly in configuration and adequately insulated.
- 🦋 Any electrocution and collision events that occur should be recorded, including the species affected and the date. If repeated collisions occur within the same area, then further mitigation and avoidance measures may need to be implemented.

**RESIDUAL IMPACT**

If the above stipulated mitigation measures are implemented, the residual impact significance will be reduced to *Negligible* for the operational phase. Bird flight diverters are not always effective and some impact is likely to remain regardless of mitigation.

**TABLE 23: RESIDUAL IMPACT: AVIFAUNA - POWER LINES**

Aspect	Project Phase	Impact	Impact Magnitude	Significance (Pre-mitigation)	Residual Significance (Post-mitigation)
<b>Avifauna: Power lines</b>	Pre- Construction Impact	<i>Not Applicable</i>	<i>Not Applicable</i>	<i>Not Applicable</i>	<i>Not Applicable</i>
	Construction Impact	<i>Not Applicable</i>	<i>Not Applicable</i>	<i>Not Applicable</i>	<i>Not Applicable</i>
	Operational Impact	Direct Negative	<b>LOW</b>	<b>LOW</b>	<b>NEGLIGIBLE</b>
	Decommissioning Closure Impact	<i>Not Applicable</i>	<i>Not Applicable</i>	<i>Not Applicable</i>	<i>Not Applicable</i>

**AVIFAUNAL IMPACTS DUE TO OPERATION/PRESENCE OF THE FACILITY**

The operation and presence of the facility may lead to negative impacts on avifauna as a result of mortality related to foraging on the settling ponds or being poached while in the facility.

**IMPACT CHARACTERISTICS: AVIFAUNA – OPERATION / PRESENCE OF THE FACILITY**

**TABLE 24: IMPACT CHARACTERISTICS: AVIFAUNA - OPERATION / PRESENCE OF THE FACILITY**

Summary	Construction	Operation	Decommissioning
<b>Project Aspect/ Activity</b>	<i>Not Applicable</i>	Operation & presence of the facility	<i>Not Applicable</i>
<b>Impact Type</b>	<i>Not Applicable</i>	Direct Negative	<i>Not Applicable</i>
<b>Stakeholders/Receptors Affected</b>	<i>Not Applicable</i>	Avifauna	<i>Not Applicable</i>

**IMPACT CHARACTERISTICS: OPERATIONAL PHASE**

<p><b>Nature:</b> Pre-construction activities will have a <b>direct negative</b> effect on the environment.</p> <p><b>Impact Magnitude: LOW</b></p> <p><b>Extent:</b> The extent of the impact is <b>local</b> as a large avifaunal community might be impacted during this phase.</p> <p><b>Duration:</b> The duration will be <b>long term</b> as this impact will for a long period of time.</p> <p><b>Intensity:</b> The intensity is likely to be <b>low</b> as impacts have the ability to be reversed.</p> <p><b>Likelihood:</b> There is a <b>probability</b> that there will be an impact.</p> <p><b>IMPACT SIGNIFICANCE (PRE-MITIGATION): LOW</b></p> <p><b>IMPACT SIGNIFICANCE (POST-MITIGATION): NEGLIGIBLE</b></p>
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## MITIGATION MEASURES

- ✦ If the facility includes settling ponds or artificial wetlands that attract birds, then it is important that access to the facility is controlled at all times and that no dogs or unauthorised persons be allowed onto the site.
- ✦ If waterfowl and waders are attracted to the facility then it would be important to monitor any significant mortality events that occur, so that the possible causes can be examined.

## RESIDUAL IMPACT

If the above stipulated mitigation measures are implemented, the residual impact significance will be reduced to *Negligible* for the operational phase. Some habitat loss for avifauna is an inevitable consequence of the development and cannot be fully mitigated.

**TABLE 25: RESIDUAL IMPACT: AVIFAUNA - POWER LINES**

Aspect	Project Phase	Impact	Impact Magnitude	Significance (Pre-mitigation)	Residual Significance (Post-mitigation)
<b>Avifauna: Power lines</b>	Pre- Construction Impact	<i>Not Applicable</i>	<i>Not Applicable</i>	<i>Not Applicable</i>	<i>Not Applicable</i>
	Construction Impact	<i>Not Applicable</i>	<i>Not Applicable</i>	<i>Not Applicable</i>	<i>Not Applicable</i>
	Operational Impact	Direct Negative	<b>LOW</b>	<b>LOW</b>	<b>NEGLIGIBLE</b>
	Decommissioning Closure Impact	<i>Not Applicable</i>	<i>Not Applicable</i>	<i>Not Applicable</i>	<i>Not Applicable</i>

## IMPACT ON CRITICAL BIODIVERSITY AREAS AND DISRUPTION OF BROAD-SCALE ECOLOGICAL PROCESSES

Transformation within CBAs would potentially disrupt the functioning of the CBA or result in biodiversity loss.

## CUMULATIVE IMPACTS

**TABLE 26: IMPACT CHARACTERISTICS: CBA & DISRUPTION OF BROAD-SCALE ECOLOGICAL PROCESSES**

Summary	Impacts
<b>Project Aspect/Activity</b>	The construction and operation of the new WWTW.
<b>Impact Type</b>	Direct Negative
<b>Stakeholders/Receptors Affected</b>	Biodiversity & Ecological Processes

## IMPACT CHARACTERISTICS: OVERALL

**Nature:** Pre-construction activities will have a **direct negative** effect on the environment and receptors.

**Impact Magnitude: MEDIUM**

**Extent:** The extent of the impact is **regional** as a large part of the receiving environment will be impacted.

**Duration:** The duration will be **long term** as this impact will for a long period of time.

**Intensity:** The intensity is likely to be **low** as impacts have the ability to be reversed.

**Likelihood:** There is a **probability** that there will be an impact.

**IMPACT SIGNIFICANCE (PRE-MITIGATION): MEDIUM**

**IMPACT SIGNIFICANCE (POST-MITIGATION): MEDIUM**

#### MITIGATION MEASURES

- ✿ The development footprint should be kept to a minimum and natural vegetation should be encouraged to return to disturbed areas.
- ✿ An open space management plan should be developed for the site, which should include management of biodiversity within the fenced area, as well as that in the adjacent rangeland.
- ✿ No unauthorised access to the site.

#### RESIDUAL IMPACT

If the above stipulated mitigation measures are implemented, the residual impact significance will be reduced but will stay *Medium*. The loss of intact vegetation and the majority of impact on the CBA would persist for at least the lifetime of the facility and probably longer.

**TABLE 27: RESIDUAL IMPACT: CBAS & ECOLOGICAL PROCESSES**

Aspect	Project Phase	Impact	Impact Magnitude	Significance (Pre-mitigation)	Residual Significance (Post-mitigation)
<b>CBAs &amp; Ecological Processes</b>	Overall	Direct Negative	<b>MEDIUM</b>	<b>MEDIUM</b>	<b>MEDIUM</b>

### 5.3.2 SOILS

#### IMPACT CHARACTERISTICS: SOIL

**TABLE 28: IMPACT CHARACTERISTICS: SOIL**

Summary	Construction	Operation	Decommissioning
<b>Project Aspect/Activity</b>	Excavation Road construction	Daily operation of WWTW	Preparation of soil Replacement of soil
<b>Impact Type</b>	Direct negative	Direct negative	Indirect positive
<b>Stakeholders/Receptors Affected</b>	Fauna & Flora Soils	Fauna & Flora Soils	Fauna & Flora Soils

#### IMPACT ASSESSMENT: CONSTRUCTION PHASE

Vehicular movements during the construction phase will result in increased compaction on roads, leading to water runoff and erosion of soils. However, the impact is expected to be of minimal nature given the fact that soils are already disturbed due to cattle grazing.

**Nature:** Construction activities will have a **direct negative** impact on the soil in the area.

**Impact Magnitude: LOW**

**Extent:** The extent of the impact is limited to the **site** as the potential impact extends only as far as the activity.

**Duration:** The duration will be **medium term** as the impact will last up to the end of this phase, where after it will be negated.

**Intensity:** The intensity is likely to be **low**.

**Likelihood:** There is a **high probability** that the impact will occur at some stage of the development.

**IMPACT SIGNIFICANCE (PRE-MITIGATION): LOW**

**IMPACT SIGNIFICANCE (POST-MITIGATION): NEGLIGIBLE**

#### IMPACT ASSESSMENT: OPERATIONAL PHASE

The soil will be contaminated if there are leaks in the pipes or damage to the infrastructure. Through the operation of the new plant it will allow for the decommissioning of the old plant. This process will allow for the removal and/or rehabilitation of contaminated soil which will have a neutralising (rectification of negative impacts) impact in the overall ecological integrity of the site.

**Nature:** Operational activities will have a **direct negative** impact on the soil in the area.

**Impact Magnitude: LOW**

**Extent:** The extent of the impact is limited to the **site** as the potential impact extends only as far as the activity.

**Duration:** The duration will be **long term** as the impact will last up to the end of this phase, where after it will be negated.

**Intensity:** The intensity is likely to be **low**.

**Likelihood:** There is a **high probability** that the impact will occur at some stage of the development.

**IMPACT SIGNIFICANCE (PRE-MITIGATION): LOW**

**IMPACT SIGNIFICANCE (POST-MITIGATION): NEGLIGIBLE**

#### IMPACT ASSESSMENT: DECOMMISSIONING PHASE

The soil on which the current plant is built, will have to be rehabilitated in order to make it useful for other future activities. Soils will be landscaped and remediated. Good quality soils will have to be placed on impacted areas.

**Nature:** Decommissioning will have an **indirect positive** impact on the soil in the area.

**Impact Magnitude: MINOR (+)**

**Extent:** The extent of the impact is limited to the **site** as the potential impact extends only as far as the activity.

**Duration:** The duration will be **long term** as the impact will last up to where a new activity takes place on this piece of land.

**Intensity:** The intensity is likely to be **low**.

**Likelihood:** There is a **high probability** that the impact will occur at some stage of the development.

**IMPACT SIGNIFICANCE (PRE-MITIGATION): LOW**

**IMPACT SIGNIFICANCE (POST-MITIGATION): NEGLIGIBLE (+)**

#### MITIGATION MEASURES

- ✿ Use dust abatement techniques on unpaved, unvegetated surfaces to minimize windblown erosion.
- ✿ Provide temporary stabilization of disturbed areas that are not actively under construction.

- Apply erosion controls (e.g., jute netting, silt fences, and check dams) to prevent/minimize soil erosion from vehicular traffic and during construction activities.
- Maintain vegetative cover within road rights-of-way (ROWs) to prevent erosion and periodically monitor ROWs to assess erosion.
- During all phases of the project, keep equipment and vehicles within the limits of the initially disturbed areas.
- Conduct routine site inspections to assess the effectiveness of and the maintenance requirements for erosion and sediment control systems.
- If tractors are used for clearing, they should be small size and equipped with brush rake in place of earth moving blade, in order to minimize soil disturbance and compaction. The brush rake should be moved above the ground surface without touching the ground to prevent any soil disturbance and forming of rill erosion.

#### RESIDUAL IMPACT

If the above stipulated mitigation measures are implemented, the residual impact significance will be reduced to *Negligible* for all of the phases.

**TABLE 29: RESIDUAL IMPACT: SOIL**

Aspect	Project Phase	Impact	Impact Magnitude	Significance (Pre-mitigation)	Residual Significance (Post-mitigation)
Soil	Construction Impact	Direct Negative	LOW	LOW	NEGLIGIBLE
	Operational Impact	Direct Negative	LOW	LOW	NEGLIGIBLE
	Decommissioning Closure Impact	Indirect Positive	MINOR (+)	LOW	NEGLIGIBLE (+)

### 5.3.3 LAND CAPABILITY AND LAND USE

#### IMPACT CHARACTERISTICS: LAND CAPABILITY AND LAND USE

**TABLE 30: IMPACT CHARACTERISTICS: LAND CAPABILITY AND LAND USE**

Summary	Construction	Operation	Decommissioning
Project Aspect/Activity	Land capability alteration through earth moving	Change in land use from agriculture to industrial	Positive change of land use from contaminated decommissioned plant to alternative land use
Impact Type	Direct negative for ecological functioning	Direct positive for economic value and service delivery provided to community	Direct positive
Stakeholders/Receptors Affected	Landowner & Neighbouring owners Fauna & Flora	Vryburg Municipality and Community	Landowner and direct neighbours, Vryburg Community

#### IMPACT ASSESSMENT: CONSTRUCTION PHASE

The existing land use of the farm is agricultural with cattle grazing. Rezoning will have to take place and the cattle will have to be moved.



**Nature:** Construction activities will have an **indirect negative** effect on the land use as it will have to be rezoned and the environment altered.

**Impact Magnitude: MINOR**

**Extent:** The extent of the impact is **local** because a larger portion of land will be bought for the development.

**Duration:** The duration will be **long term** as it will last for the construction phase and beyond.

**Intensity:** The intensity is likely to be **low** as this land is not suitable to plant crops for grazing or harvesting.

**Likelihood:** There is a **definite** likelihood that there will be an impact.

**IMPACT SIGNIFICANCE (PRE-MITIGATION): LOW**

**IMPACT SIGNIFICANCE (POST-MITIGATION): NEGLIBIGLE**

IMPACT ASSESSMENT: OPERATIONAL PHASE

The cattle that currently graze on this land will have to be moved when the plant starts operating.

**Nature:** Operational activities will have a **direct negative** effect on the land use as it will have to be rezoned and the environment altered although there is a **direct positive** impact on service delivery to the community of Vryburg. The positive outweigh the negative.

**Impact Magnitude: HIGH (+)**

**Extent:** The extent of the impact is **regional** because a larger portion of land will be bought for the development.

**Duration:** The duration will be **permanent** as it will last for the construction phase and beyond.

**Intensity:** The intensity is likely to be **high** as this land will now service the whole of Vryburg in terms of sewage treatment as an industrial site providing jobs as well.

**Likelihood:** There is a **definite** likelihood that there will be an impact.

**IMPACT SIGNIFICANCE (PRE-MITIGATION): MAJOR (+)**

**IMPACT SIGNIFICANCE (POST-MITIGATION): MAJOR (+)**

IMPACT ASSESSMENT: DECOMMISSIONING PHASE

The current plant will be available for other use. This means that for the time being, municipal land is gained. It should be noted that if it is not decommissioned properly a contaminated site and degradation of infrastructure with possible ingress of squatters or continued vandalism.

The final land uses have not been selected.

**Nature:** Decommissioning will have a **direct positive** effect on the land use as it will be available for an alternative use.

**Impact Magnitude: MODERATE (+)**

**Extent:** The extent of the impact is **site** because only the part where the current sewage works are will be impacted.

**Duration:** The duration will be **long term** as it will last up until the land is used for other developments.

**Intensity:** The intensity is likely to be **low** as this decommissioning will not alter the environment in a negative way.

**Likelihood:** It is **highly probable** that there will be an impact.

**IMPACT SIGNIFICANCE (PRE-MITIGATION): LOW**

**IMPACT SIGNIFICANCE (POST-MITIGATION): MODERATE (+)**

#### MITIGATION MEASURES

The mitigation measures for the existing plant are aligned towards decommissioning, demolishing, closure and rehabilitation of the site. Where an alternative land use can be secured, this should be planned properly with its own set of mitigation measures that can only be determined once the final land use has been selected.

Ensure a proper mitigation plan is in place that facilitates:

##### Transfer of plants

- process to allow complete transfer of flow to new plant;
- transfer of equipment and staff

##### Decommissioning of the plant

- Clean out of pollution of existing plant to new plant as far as possible;

##### Demolishing of the plant

- Identification of salvageable, re-usable, recyclable materials
- Stripping and selling of all salvageable materials
- Breaking down materials without salvage value
- Use stabilisation techniques of residue contaminated materials (mechanical, chemical, time delays) Use bulkheads/bracing/retaining walls to support excavation
- Use deep piles to withstand shrink/swell movement
- Backfilling of building rubble into excavations /dams as far as possible
- Ensure permitted disposal of all waste material that cannot be backfilled
- Ensure proper compaction of backfilled material to a standard where alternative land uses can be practiced in the long term. (e.g. housing developments)

##### Rehabilitation of the plant

- Minimise area of exposed soil and time of exposure
- Divert drainage around the excavation
- Intercept groundwater seepage into excavation/dewatering of site
- Consider alternative foundation arrangement use sub-soil drains to intercept and remove seepage.
- Remove problem soils and backfill with compacted selected materials
- Establish vegetation cover and vegetation support (irrigation, fertilising) with the assistance of a professional environmentalist or landscape planner.

- Where an alternative land-use is proposed by the municipality besides decommissioning and rehabilitation, a proper action plan and budget should accompany the plan.

#### RESIDUAL IMPACT

If the above stipulated mitigation measures are implemented, the residual impact significance will be reduced to *Negligible* for all of the phases.

**TABLE 31: RESIDUAL IMPACT: LAND CAPABILITY AND LAND USE**

Aspect	Project Phase	Impact	Impact Magnitude	Significance (Pre-mitigation)	Residual Significance (Post-mitigation)
Land Capability and Land Use	Construction Phase	Direct Negative	MINOR	LOW	NEGLIGIBLE
	Operational Phase	Direct Positive	MAJOR (+)	MAJOR (+)	NEGLIGIBLE
	Decommissioning Phase	Direct Positive	MODERATE (+)	LOW	MODERATE (+)

#### 5.3.4 SURFACE WATER

Storm water affect the development positively as the natural drainage channel of the Bles Spruit is used as the gradient along which the pipeline can gravitate from Vryburg to the new WWTW.

Storm water affect the development negatively as potential flooding of pipelines and infrastructure can take place. The pipeline is designed outside the flood line and no flooding will occur. A small drift is crossed (noted as natural water course at chainage - 2 km along pipeline)

Storm water may be affected by the development. In this case impacts will be greatest during construction of the WWTW and pipeline. The development will not affect the natural surface water after construction, as the pipeline will be submerged, the platform will be beyond the 1:200 year flood line and diversion berms will prevent surface water interaction with the infrastructure (platform and inflow infrastructure).

Furthermore, the greatest impact will be at the shallow inlet crossing. The drift crossing is seen as a low point and not a defined river. The pipeline will go through the drift.

Three design alternatives are considered and will be finalized at detail design:

- Drift will be filled up. The whole area will be elevated to allow drainage over the pipeline.
- The alternative is to have diversion berms above the crossing;
- Or following natural drainage patterns with a culvert underneath the pipeline.

#### IMPACT CHARACTERISTICS: SURFACE WATER

Summary	Construction	Operation	Decommissioning
<b>Project Aspect/Activity</b>	Excavation Vegetation Clearance	Effluent of waste water Daily operation of WWTW	None
<b>Impact Type</b>	Direct negative	Direct negative	Direct positive
<b>Stakeholders/Receptors Affected</b>	Landowner Neighbouring landowners	Landowner Neighbouring landowners Borehole users of the aquifer close to the WWTW Downstream users	Landowner Neighbouring landowners Borehole users of the aquifer close to the WWTW Downstream users

		Fauna & Flora	Fauna & Flora
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IMPACT CHARACTERISTICS: CONSTRUCTION PHASE

**Nature:** Construction activities will have a **direct negative** effect on the land use as no substantial amount of water will be used from the nearby river.

**Impact Magnitude: MINOR**

**Extent:** The extent of the impact is **site** as surface water would not really be impacted during this phase.

**Duration:** The duration will be **short term** as this impact will only last until the end of the construction phase.

**Intensity:** The intensity is likely to be **low** as surface water would not really be impacted during this phase.

**Likelihood:** There is a **probability** that there will be an impact.

**IMPACT SIGNIFICANCE (PRE-MITIGATION): LOW**

**IMPACT SIGNIFICANCE (POST-MITIGATION): NEGLIBIGLE**

IMPACT CHARACTERISTICS: OPERATIONAL PHASE

**Nature:** Construction activities will have a **direct negative** effect on the land use as effluent will be discharged into the river

**Impact Magnitude: MEDIUM**

**Extent:** The extent of the impact is **local** as polluted surface water could have a detrimental effect on downstream users.

**Duration:** The duration will be **long term** as this impact will last for the entire lifetime of the operational phase.

**Intensity:** The intensity is likely to be **high** as effluent will be constantly flowing to the watercourse.

**Likelihood:** It is **highly probable** that there will be an impact which must be mitigated.

**IMPACT SIGNIFICANCE (PRE-MITIGATION): HIGH**

**IMPACT SIGNIFICANCE (POST-MITIGATION): MODERATE**

IMPACT CHARACTERISTICS: DECOMMISSIONING PHASE

**Nature:** Decommissioning will have a **direct positive** effect on the water in the Bles Spruit as no more polluted effluent will be discharged into the river.

**Impact Magnitude: LOW (+)**

**Extent:** The extent of the impact is **local** as no more polluted surface water will come from this facility.

**Duration:** The duration will be **long term** as this impact will last up until there is development on this land that make use of the river.

**Intensity:** The intensity is likely to be **low** as no effluent will be flowing to the watercourse.

**Likelihood:** It is **highly probable** that there will be a positive impact.

**IMPACT SIGNIFICANCE (PRE-MITIGATION): LOW**

**IMPACT SIGNIFICANCE (POST-MITIGATION): NEGLIGIBLE (+)**

#### MITIGATION MEASURES

- ✿ Wastewater generated from foundation construction and related activities should be collected and discharged into storm drains after removal of silt and sand in a sedimentation facility;
- ✿ The quality of the discharged effluent in terms of suspended solids, pH, and other contaminated as specified in the discharge licence should be monitored to check for compliance with the licence's requirements;
- ✿ Reuse of the treated effluent for vehicle washing, dust suppression and cleaning is recommended;
- ✿ Suitable pH adjustment facilities would be required to lower than pH value of wastewater to an acceptable range;
- ✿ Building construction involves a large variety of construction activities. Wastewater would be generated from concreting, plastering, cleaning and polishing, internal decoration and similar activities. Direct discharge of wastewater into storm drains would pollute the water quality of the receiving water body. A suitably designed wastewater collection system should be provided on site to divert all the wastewater to the sedimentation facility. If necessary, pH adjustment should be undertaken to neutralise the wastewater;
- ✿ Emergency plans should be developed to deal with accidental spillage of chemicals. Leakage and spillage should be contained and cleaned up immediately to minimise the pollution to water quality. If chemical wastes are generated from the construction activities, the chemical waste disposal should comply with the applicable legislation;
- ✿ The design parameters are moved from being outside the 1:50 year flood line to being outside the 1:200 year flood line with adequate buffers.
- ✿ WWTW will not be constructed on the ground, but at raised platform.
- ✿ Diversion berms will be built around the WWTW to prevent surface water interaction.
- ✿ The pipeline will be 2 meter underground to prevent surface water interaction.
- ✿ After construction the aim will be to have level ground to allow for natural drainage.

#### RESIDUAL IMPACT

If the above stipulated mitigation measures are implemented, the residual impact significance will be reduced to *Negligible* for the construction and decommissioning phase and *Moderate* for the operational phases.

Aspect	Project Phase	Impact	Impact Magnitude	Significance (Pre-mitigation)	Residual Significance (Post-mitigation)
Surface Water	Construction Impact	Direct Negative	MINOR	LOW	NEGLIGIBLE
	Operational Impact	Direct Negative	MEDIUM	HIGH	MODERATE
	Decommissioning Closure Impact	Direct Positive	LOW (+)	LOW	NEGLIGIBLE (+)

### 5.3.5 GROUNDWATER

The Vryburg existing and proposed waste water treatment facilities pose a risk of contamination of the study area aquifers, as observed by water quality results whereby point source activities have on the nitrate load. The use of the existing and proposed Vryburg WWTF can probably have the following impact on groundwater:

- The impact on the quality of the groundwater.

A detailed specialist report will be attached in Appendix D of this document

#### IMPACT CHARACTERISTICS: GROUNDWATER

**TABLE 32: IMPACT CHARACTERISTICS: GROUNDWATER**

Summary	Construction	Operation	Decommissioning
<b>Project Aspect/Activity</b>	Excavation Vegetation Clearance	Effluent of waste water Daily operation of WWTW	None
<b>Impact Type</b>	Direct negative	Direct negative	Indirect negative
<b>Stakeholders/Receptors Affected</b>	Landowner Neighbouring landowners	Landowner Neighbouring landowners Borehole users of the aquifer close to the WWTW Fauna & Flora	Landowner Neighbouring landowners Borehole users of the aquifer close to the WWTW Fauna & Flora

#### IMPACT ASSESSMENT: CONSTRUCTION & OPERATIONAL PHASE

**Nature:** Construction & operational activities will have a **direct negative** effect on groundwater as it may be polluted at some stage.

**Impact Magnitude: LOW**

**Extent:** The extent of the impact is **local** because it could affect the whole, or a measurable portion of the property and adjacent properties.

**Duration:** The duration of the impact is **medium term** as the impact will last up to the end of the phases, where after it will be negated.

**Intensity:** Groundwater vulnerability at the existing and proposed WWTW site is shown on the national groundwater vulnerability map as **very low**.

**Likelihood:** There is a **probability** that the impact will occur to the extent that provision must be made therefore.

**IMPACT SIGNIFICANCE – CONSTRUCTION (PRE-MITIGATION): LOW**

**IMPACT SIGNIFICANCE – CONSTRUCTION (POST-MITIGATION): NEGLIGIBLE**

**IMPACT SIGNIFICANCE – OPERATIONAL (PRE-MITIGATION): MEDIUM**

**IMPACT SIGNIFICANCE – OPERATIONAL (PORST-MITIGATION): LOW**

## IMPACT ASSESSMENT: DECOMMISSIONING PHASE

**Nature:** Decommissioning will have an **indirect positive** effect as no more polluted water will have the chance to affect groundwater downstream.

**Impact Magnitude: LOW (+)**

**Extent:** The extent of the impact is **local** because it could positively affect the whole, or a measurable portion of the property and adjacent properties.

**Duration:** The duration of the impact is **long term** as the impact will last up to when a new development is made in the current sewage plant's place.

**Intensity:** Groundwater vulnerability at the existing and proposed WWTW site is shown on the national groundwater vulnerability map as **very low**.

**Likelihood:** There is a **probability** that the impact will occur.

**IMPACT SIGNIFICANCE (PRE-MITIGATION): LOW**

**IMPACT SIGNIFICANCE (POST-MITIGATION): NEGLIGIBLE (+)**

### MITIGATION MEASURES

- ✿ Lining and sealing of proposed new waste water treatment facility as per the engineering design.
- ✿ Minimising disturbance and controlling run-off from construction areas.
- ✿ Ensuring good maintenance of vehicles.
- ✿ Identifying strategies to remove or reduce risks associated with acid sulphate soils.
- ✿ Ensuring appropriate design of storage areas and temporary drainage systems.
- ✿ Requirements for operational basins and treatment trains to meet stated water quality objectives.
- ✿ Response plans to deal with any spillages or accidents that occur at refuelling sites and machinery compounds.
- ✿ Groundwater quality and groundwater level monitoring in order to assess the performance of the proposed mitigation measures.

### RESIDUAL IMPACT

If the above stipulated mitigation measures are implemented, the residual impact significance will be reduced to *Negligible* for the construction and decommissioning phase and *Low* for the operational phases.

**TABLE 33: RESIDUAL IMPACT: GROUNDWATER**

Aspect	Project Phase	Impact	Impact Magnitude	Significance (Pre-mitigation)	Residual Significance (Post-mitigation)
Groundwater	Construction Impact	Direct Negative	LOW	LOW	NEGLIGIBLE
	Operational Impact	Direct Negative	LOW	MODERATE	LOW
	Decommissioning Closure Impact	Indirect Positive	LOW (+)	LOW	NEGLIGIBLE (+)

### 5.3.6 AIR EMISSIONS

This section considers the extent to which carbon and other emissions will be created during the construction, operational and decommissioning phases of the proposed project. The main areas of interest are:

- ✿ Emissions generated during construction by earthmoving machines and construction vehicles
- ✿ Emissions generation by general traffic of vehicles travelling along the roads.

No other emissions besides carbon emissions are expected during the project.

Construction vehicles (i.e. transport vehicles, trucks, as well as employees and contractors vehicles) and other construction equipment and machinery will generate exhaust emissions. Owing to the scale of this development, it is anticipated that a certain volumes of exhaust emissions will be generated during the construction and operational phase of the project.

#### IMPACT CHARACTERISTICS: AIR EMISSIONS

**TABLE 34: IMPACT CHARACTERISTICS: AIR EMISSIONS**

Summary	Construction	Operation	Decommissioning
<b>Project Aspect/Activity</b>	Excavation and earth moving machinery Construction vehicles	Daily operations of the WWTW (smell) Maintenance vehicles	None
<b>Impact Type</b>	Indirect negative	Direct negative	Direct positive
<b>Stakeholders/Receptors Affected</b>	Landowner	Landowner Neighbouring landowners Inhabitants in the vicinity	Landowner Neighbouring landowners Inhabitants in the vicinity

#### IMPACT ASSESSMENT: CONSTRUCTION PHASE

**Nature:** Construction activities will have an **indirect negative** effect on receptors affected.

**Impact Magnitude: MINOR**

**Extent:** The extent of the impact is limited to the **site** as only site clearance and construction vehicles will access the site.

**Duration:** The duration of the impact is **short term** as the impact will last only until the end of construction.

**Intensity:** The intensity of the construction phase will be **low**.

**Likelihood:** There is a **probability** that the impact will occur to the extent that provision must be made therefore.

**IMPACT SIGNIFICANCE (PRE-MITIGATION): LOW**

**IMPACT SIGNIFICANCE (POST-MITIGATION): NEGLIGIBLE**

#### IMPACT ASSESSMENT: OPERATIONAL PHASE

**Nature:** Operational activities will have a **direct negative** effect on receptors affected.

**Impact Magnitude: LOW**

**Extent:** The extent of the impact is limited to the **local** as there might be bad smells at some times.

**Duration:** The duration of the impact is **long term** as the WWTW is planned to last for more than 20 years.



**Intensity:** The intensity of the operational phase will be **low**.

**Likelihood:** There is a **definite** probability that the impact will occur to the extent that provision must be made therefore.

**IMPACT SIGNIFICANCE (PRE-MITIGATION): MEDIUM**

**IMPACT SIGNIFICANCE (POST-MITIGATION): LOW**

IMPACT ASSESSMENT: DECOMMISSIONING PHASE

**Nature:** Decommissioning activities will have a **direct positive** effect on receptors affected.

**Impact Magnitude: LOW (+)**

**Extent:** The extent of the impact is limited to **local** as the bad smells will disappear if the current plant is decommissioned.

**Duration:** The duration of the impact is **long term** as it will take time for new developments to take place on this piece of land.

**Intensity:** The intensity of the decommissioning phase will be **low**.

**Likelihood:** There is a **definite** probability that the impact will occur and have a positive effect on receptors.

**IMPACT SIGNIFICANCE (PRE-MITIGATION): LOW**

**IMPACT SIGNIFICANCE (POST-MITIGATION): NEGLIGIBLE (+)**

MITIGATION MEASURES

- 🔧 Vehicles are to be kept in good working order and serviced regularly to minimize emissions.
- 🔧 Fuel efficient machinery should be considered where possible.
- 🔧 Ensure that the WWTW operates properly and waste is treated in sufficiently.
- 🔧 Internal reporting during construction of smoking / malfunctioning vehicles and immediate fixing.

RESIDUAL IMPACT

If the above stipulated mitigation measures are implemented, the residual impact significance will be reduced to *Negligible* for the construction and decommissioning phase and *Low* for the operational phases.

**TABLE 35: RESIDUAL IMPACT: AIR EMISSIONS**

Aspect	Project Phase	Impact	Impact Magnitude	Significance (Pre-mitigation)	Residual Significance (Post-mitigation)
Air Emissions	Construction Impact	Indirect Negative	MINOR	LOW	NEGLIGIBLE
	Operational Impact	Direct Negative	LOW	MODERATE	LOW
	Decommissioning Closure Impact	Direct Positive	LOW (+)	LOW	NEGLIGIBLE (+)

### 5.3.7 ODOUR

#### IMPACT CHARACTERISTICS: ODOUR

**TABLE 36: IMPACT CHARACTERISTICS: ODOURS**

Summary	Construction	Operation	Decommissioning
<b>Project Aspect/Activity</b>	<i>Not Applicable</i>	Activities of the sewage plant	None
<b>Impact Type</b>	<i>Not Applicable</i>	Direct negative	Direct positive
<b>Stakeholders/Receptors Affected</b>	<i>Not Applicable</i>	Fauna & Flora Construction personnel Landowner Neighbouring landowners	Fauna & Flora Construction personnel Landowner Neighbouring landowners

#### IMPACT ASSESSMENT: CONSTRUCTION PHASE

No odour impacts are envisaged during the construction phase except for the existing smell from the current plant in operation.

#### IMPACT ASSESSMENT: OPERATIONAL PHASE

When the new plant becomes operational, it will allow for the decommissioning of the old plant.

**Nature:** Operational activities will have a **direct negative** effect on affected receptors.

**Impact Magnitude: MEDIUM**

**Extent:** The extent of the impact is **regional** as the odour may extend far beyond the borders of Vryburg.

**Duration:** The duration of the impact is **long term** because the impact will last until the end of this phase.

**Intensity:** The intensity of the operational phase will be **low**.

**Likelihood:** It is **highly probable** that the impact will occur if not managed correctly.

**IMPACT SIGNIFICANCE (PRE-MITIGATION): MODERATE**

**IMPACT SIGNIFICANCE (POST-MITIGATION): LOW**

#### IMPACT ASSESSMENT: DECOMMISSIONING PHASE

**Nature:** Decommissioning activities will have a **direct positive** effect on affected receptors.

**Impact Magnitude: LOW (+)**

**Extent:** The extent of the impact is **regional** as no more odours from the decommissioned plant will occur.

**Duration:** The duration of the impact is **long term** because the impact will last until a new development may cause odours.

**Intensity:** The intensity of the construction phase will be **low**.

**Likelihood:** It is **highly probable** that no odours will be present after decommissioning.

**IMPACT SIGNIFICANCE (PRE-MITIGATION): NEGLIGIBLE (+)**

**IMPACT SIGNIFICANCE (POST-MITIGATION): NEGLIGIBLE (+)**

## MITIGATION MEASURES

- ✿ Dosing of chemicals, like calcium nitrate, ferric chloride, and other deodorising agents, and injection of oxygen into sewage to control the generation of odour;
- ✿ Covering up of channels, chambers and tanks which are likely to emit odour; and
- ✿ Installing deodorisation units like activated carbon system, chemical scrubbers and bio filters at appropriate locations to clean up the collected foul gases from odour sources in the plants.

## RESIDUAL IMPACT

**TABLE 37: RESIDUAL IMPACT: ODOURS**

Aspect	Project Phase	Impact	Impact Magnitude	Significance (Pre-mitigation)	Residual Significance (Post-mitigation)
Odours	Construction Impact	<i>Not Applicable</i>	<i>Not Applicable</i>	<i>Not Applicable</i>	<i>Not Applicable</i>
	Operational Impact	Direct Negative	<b>MEDIUM</b>	<b>MODERATE</b>	<b>LOW</b>
	Decommissioning Closure Impact	Indirect Negative	<b>LOW (+)</b>	<b>NEGLIGIBLE</b>	<b>NEGLIGIBLE (+)</b>

### 5.3.8 DUST EMISSIONS

#### IMPACT CHARACTERISTICS: DUST EMISSIONS

**TABLE 38: IMPACT CHARACTERISTICS: DUST EMISSIONS**

Summary	Construction	Operation	Decommissioning
<b>Project Aspect/Activity</b>	Vegetation clearing machinery Construction vehicles	Maintenance vehicles	Construction vehicles
<b>Impact Type</b>	Indirect negative	Indirect negative	Indirect Negative
<b>Stakeholders/Receptors Affected</b>	Fauna & Flora Construction personnel Landowner Neighbouring landowners	Landowner	Fauna & Flora Construction personnel Landowner Neighbouring landowners

#### IMPACT ASSESSMENT: CONSTRUCTION PHASE

**Nature:** Construction activities will have an **indirect negative** effect on affected receptors.

**Impact Magnitude: MEDIUM**

**Extent:** The extent of the impact is limited to the **site** as the impact will not be prolonged.

**Duration:** The duration of the impact is **short term** because the impact will only last a short period of time.

**Intensity:** The intensity of the operational phase will be **medium**.

**Likelihood:** It is **highly probable** that the impact will occur to the extent that provision must be made therefore.

**IMPACT SIGNIFICANCE (PRE-MITIGATION): LOW**

## IMPACT SIGNIFICANCE (POST-MITIGATION): NEGLIGIBLE

### IMPACT ASSESSMENT: OPERATIONAL PHASE

**Nature:** Operational activities will have an **indirect negative** effect on affected receptors.

**Impact Magnitude: LOW**

**Extent:** The extent of the impact is limited to the **site** as the impact will be minimal.

**Duration:** The duration of the impact is **short term** because the impact will only last a short period of time.

**Intensity:** The intensity of the operational phase will be **low**.

**Likelihood:** It is **probable** that the impact will occur but it will be minimal.

**IMPACT SIGNIFICANCE (PRE-MITIGATION): LOW**

**IMPACT SIGNIFICANCE (POST-MITIGATION): NEGLIGIBLE**

### IMPACT ASSESSMENT: DECOMMISSIONING PHASE

**Nature:** Operational activities will have an **indirect negative** effect on receptors affected.

**Impact Magnitude: MINOR**

**Extent:** The extent of the impact is limited to the **site** as the impact will be minimal.

**Duration:** Initially there will be intensive periods of high dust levels but it will only last for a short period. The duration of the impact is **long term** because the impact will last until further development occur on the premises.

**Intensity:** The intensity of the decommissioning phase will be **low**.

**Likelihood:** It is **probable** that the impact will occur.

**IMPACT SIGNIFICANCE (PRE-MITIGATION): LOW**

**IMPACT SIGNIFICANCE (POST-MITIGATION): NEGLIGIBLE**

### MITIGATION MEASURES

- ✿ Vehicles travelling on gravel roads at the site and directly to and from the site (5 km radius) will not exceed a speed of 30 km/h.
- ✿ Overburden spoil of dusty materials will be covered by suitable shade cloth or netting to prevent escape of dust during loading and transfer from site.
- ✿ Any directly affected individuals including neighbouring landowners will be able to lodge grievances according to the grievance procedure. Complaints can be lodged with the Dr RSM district municipality using the complaints procedure of the municipality. The Contractor will take preventative measures to minimize complaints regarding dust nuisances by employing:
  - Covering stockpiles
  - Dust control by wetting with water and dust suppression chemicals
  - Timing dust generating work to have least impact on receptors (outside peak traffic periods and not after working hours)
  - Pre-notification of directly affected parties of the period of construction and construction hours.
  - Covering or sufficient wetting of materials stored over periods that construction will not take place (weekends).

- ✦ Additional appropriate dust suppression measures or temporary stabilizing mechanisms should be used when dust generation increase to levels affecting operation and traffic movement around the site by means of:
  - Being aware of prolonged periods of dry weather and/or high wind speeds and be prepared on site to increase dust management measures
  - Dampening with water and dust suppression chemicals
- ✦ It must be ensured that all temporary access roads and construction areas are regularly sprayed with water in order to curb dust generation. This is particularly necessary during the dry season when increased levels of dust generation can be expected. These areas should not be over-sprayed causing water run-off and subsequent sediment loss into waterways and wetland lines in the vicinity of the proposed linear development.

**RESIDUAL IMPACT**

If the above stipulated mitigation measures are implemented, the residual impact significance will be reduced to *Negligible* for the construction and operational phases.

**TABLE 39: RESIDUAL IMPACT: DUST EMISSIONS**

Aspect	Project Phase	Impact	Impact Magnitude	Significance (Pre-mitigation)	Residual Significance (Post-mitigation)
<b>Dust Emissions</b>	Construction Impact	Indirect Negative	<b>MEDIUM</b>	<b>LOW</b>	<b>NEGLIGIBLE</b>
	Operational Impact	Indirect Negative	<b>LOW</b>	<b>LOW</b>	<b>NEGLIGIBLE</b>
	Decommissioning Closure Impact	Indirect Negative	<b>MINOR</b>	<b>LOW</b>	<b>NEGLIGIBLE</b>

**5.3.9 ARCHAEOLOGY AND HISTORY**

**IMPACT CHARACTERISTICS: ARCHAEOLOGY AND HISTORY**

**TABLE 40: IMPACT CHARACTERISTICS: ARCHAEOLOGY AND HISTORY**

Summary	Construction	Operation	Decommissioning
<b>Project Aspect/Activity</b>	Clearing machinery Construction vehicles	Maintenance vehicles	Construction vehicles
<b>Impact Type</b>	Direct negative	Indirect negative	Direct Negative
<b>Stakeholders/Receptors Affected</b>	The WWTW development area itself as well as any access roads	Access roads	The existing WWTW area itself

**IMPACT ASSESSMENT: CONSTRUCTION PHASE**

**Nature:** Construction activities will have a **direct negative** effect on affected receptors.

**Impact Magnitude: LOW**

**Extent:** The extent of the impact is limited to the **site**, which would include the WWTW development area itself as well as any access road.

**Duration:** The duration of the impact is **short term** because the construction phase will only last a short period of time.

**Intensity:** The intensity of the construction phase will be **low**.

**Likelihood:** It is **highly improbable** that the impact will occur to the extent that provision must be made therefore.

**IMPACT SIGNIFICANCE (PRE-MITIGATION): LOW**

**IMPACT SIGNIFICANCE (POST-MITIGATION): NEGLIGIBLE**

#### MITIGATION MEASURES

It is recommended that, from an archaeological and cultural heritage perspective, the proposed development and construction of the Vryburg WWTW at the final selected site may proceed as planned, subject to the following provisos:

- ✎ That in the unlikely event of any site/feature being found (such as a grave or high density artifact occurrence) in the course of development of the WWTW, SAHRA should be contacted immediately (021-4624502: Dr Mariagrazia Galimberti), so that the find can be investigated and mitigation measures recommended.
- ✎ The Northern Cape PHRA (Ngwao Bošwa ya Kapa Bokone), to which a copy of this report is also being sent, will assume responsibility for archaeological resources in the province when it is accredited to deal with this aspect of heritage. In the interim Bošwa should be contacted in respect of the built environment.

#### IMPACT ASSESSMENT: OPERATIONAL PHASE

**Nature:** Operational activities will have an in **direct negative** effect on affected receptors.

**Impact Magnitude: LOW**

**Extent:** The extent of the impact is limited to the **site**, resulting from the movement of people or vehicles, which would include the WWTW development area itself as well as any access road.

**Duration:** The duration of the impact is **long term** because the operational phase will last for the entire lifespan of the plant.

**Intensity:** The intensity of the operational phase will be **low**.

**Likelihood:** It is **highly improbable** that the impact will occur to the extent that provision must be made therefore.

**IMPACT SIGNIFICANCE (PRE-MITIGATION): LOW**

**IMPACT SIGNIFICANCE (POST-MITIGATION): NEGLIGIBLE**

#### IMPACT ASSESSMENT: DECOMMISSIONING PHASE

**Nature:** Decommissioning activities will have an in **direct negative** effect on affected receptors.

**Impact Magnitude: LOW**

**Extent:** The extent of the impact is limited to the **site** of the existing WWTW, resulting from the movement of people, construction vehicles and clearing machines.

**Duration:** The duration of the impact is **short term** because the decommissioning phase will only last for a short period.

**Intensity:** The intensity of the decommissioning phase will be **low**.

**Likelihood:** It is **highly improbable** that the impact will occur to the extent that provision must be made therefore.

**IMPACT SIGNIFICANCE (PRE-MITIGATION): LOW**

**IMPACT SIGNIFICANCE (POST-MITIGATION): NEGLIGIBLE**

RESIDUAL IMPACT

If the above stipulated mitigation measures are implemented, the residual impact significance will be reduced to *Negligible* for the construction, operational and decommissioning phases.

**TABLE 41: RESIDUAL IMPACT: ARCHAEOLOGY AND HISTORY**

Aspect	Project Phase	Impact	Impact Magnitude	Significance (pre-mitigation)	Residual Significance (Post-mitigation)
Archaeology and History	Construction Phase	Direct Negative	LOW	LOW	NEGLIGIBLE
	Operational Phase	Indirect Negative	LOW	LOW	NEGLIGIBLE
	Decommissioning Phase	Direct Negative	LOW	LOW	NEGLIGIBLE

**5.3.10 SOCIO-ECONOMIC ENVIRONMENT**

The construction of the new Vryburg Waste Water Treatment Works is not expected to have a direct negative impact on the socio-economic receptors, due to its location and the nature of its construction. The major positive socio-economic impact associated with the project relates mainly to the sanitation services that will be provided to the whole of Vryburg. Moreover, the project’s construction phase will create benefits for the local economy such as creation of employment and procurement of local goods and services. In this context, local economy refers to the local district of Dr. Ruth S. Mompati District Municipality area.

BENEFITS TO THE LOCAL ECONOMY

The project is expected to contribute to the local economy through direct and indirect job creation and procurement of local goods and services. The impacts will, however, be limited as there will be minimum revenue generated at a local and regional level.

**TABLE 42: IMPACT CHARACTERISTICS: BENEFITS TO THE LOCAL ECONOMY**

Summary	Construction	Operational	Decommissioning
Project Aspect/activity	Employment (including training and development) and Procurement of Local contractors.	Employment and Procurement of Local contractors.	Short-term employment creation and Procurement of Local contractors. Positive change of land use from contaminated decommissioned plant to alternative land use.
Impact Type	Direct, indirect positive impact.	Direct, indirect and induced positive impact.	Direct Positive
Stakeholders/Receptors Affected	Local community and Local Municipality.	Local community, Local Municipality, and suppliers.	Landowner and direct neighbours , Vryburg Community

**DESIGN AND CONSTRUCTION PHASE IMPACTS**

EMPLOYMENT

The positive employment impacts of the proposed project will not be significant due to the limited employment opportunities that will be created for people living within the local area.

The design and construction phase of the Project is expected to create both direct and indirect employment opportunities for the local population. Estimated 5-15 permanent job opportunities will be created through the proposed project. The skills mix would include highly skilled personnel, semi-skilled and unskilled personnel. All the design (and engineering) jobs during the construction phase will be temporary in nature, as will all construction related jobs. It is the intention to employ mainly people from the Dr. Ruth S. Mompoti District areas and thereafter regionally, depending on their capabilities to complete the project.

Indirect employment will be created through employment in procurement of local goods and services.

#### TRAINING AND DEVELOPMENT

The construction work will create an opportunity for 'on-the-job' training, increasing general skills levels. Initial recruitment and training for local personnel will take place prior to and during the construction phase as the contractor may require. The opportunities for skills development and training will extend through from skilled to unskilled workforce.

#### PROCUREMENT OF LOCAL GOODS AND SERVICES

It is intended that the majority of the goods and services required for the Project will be procured locally and where possible, thereafter regionally. Local businesses are expected to benefit from the project primarily through civil and construction works, hospitality and services (such as catering, cleaning, amenities). The use of vehicles and machinery will result in a lesser extent in transport, vehicle servicing and security services. Due to the nature of the project and short-term construction period the procurement benefits will be limited.

#### SOCIAL FUND

All the contractors that form part of the technical team, which includes EndemicVision Environmental Services, Golder Associates and Onno Fortuin Consulting, have taken the initiative to establish a social fund that will create a lasting impact on the socio-economic environment of Vryburg. All the consultants have decided that they will commit to contributing 1% of all their earnings of the project to a fund that will assist the social environment of Vryburg in some manner.

The organization(s) that will benefit from this fund is yet to be established, but the District and Local municipalities are in favor of contributing the funds to the skills development of the new treatment plant operators.

Before the beneficiaries of the fund can be established, it has been decided that a committee will need to be established to help identifying problematic areas that will benefit the most out of this fund.

The current consultants on the project have committed to encouraging other contractors that will come on board during the construction phase to contribute to the social fund.

#### IMPACT ASSESSMENT

The construction phase of the Project will create approximately 5-15 jobs including direct and in-direct opportunities as related to the proposed project. An estimated 15 - 45 jobs will be indirectly created by the project (these include site security, health and safety, cleaners, and administration). A limited amount of permanent employment will take place after the construction phase has ceased. The only permanent employment that will result from the construction of the WWTW is the permanent plant operators.

The benefit to the local economy will be **direct** via employment and procurement of services and **indirect** benefits of expenditures in the local economy. Employment and procurement of service will be created at a **local** level, although this may not be Vryburg itself, as appointment depends on



accreditation, skills and capacity availability. Employment and procurement generated during the construction phase will take place over a few months and will therefore be **short-term**. The intensity will be **low** as there will be between jobs created with majority of goods and services procured locally and nationally during the construction phase. There is a **high** likelihood that this impact will occur.

#### IMPACT ASSESSMENT: BENEFITS FOR THE LOCAL ECONOMY

**Nature:** The benefit to the local economy will be **direct** via employment and procurement of services, skills transfer and training and **indirect** by means of improved land use, expenditures in the local economy due to increase in wages.

#### Impact Magnitude – Moderate (+)

**Extent:** Employment and procurement of service will be created at a **local** level depending on skills and capacity availability.

**Duration:** Employment and procurement generated during the construction phase will take place over the **short-term**.

**Intensity:** The intensity will be **low** as there will be a few jobs created with majority of goods and services procured locally during the construction phase.

**Likelihood** – There is a **high** likelihood that this impact will occur.

**IMPACT SIGNIFICANCE (PRE-MITIGATION) – MAJOR (+)**

**IMPACT SIGNIFICANCE (POST-MITIGATION): NEGLIGIBLE (+)**

#### OPERATIONAL PHASE IMPACTS

##### LOCAL ECONOMY BENEFITS

The major positive benefit that will stem from the operational phase of the new treatment works is the fact that the town of Vryburg will be able to expand since it will be able to provide all inhabitants access to better sanitation services.

The procurement of goods and services will be limited and localized during operations. Operational procurement is expected to include a possible increase in traffic nearing the chosen site, which might lead to a low scale increase in the use of local amenities and services.

##### IMPACT ASSESSMENT

The impact will be **direct positive** as it will allow Vryburg to expand. Furthermore, benefit to the local economy will be **direct** by way of employment and the acquirement of services and the local economy will benefit in an **indirect** manner through expenditures. Employment will be created at a **local** level, as the local municipality is in favor of skills being developed and sourced within the town of Vryburg or neighboring towns. This will be determined at a later stage via a screening process that will take place in selecting the most appropriate candidates for the position of plant operators. The second possibility that exists in terms of employment during the operational phase is to up skill the current plant operators by further education training. Employment and procurement generated during the operational phase will take place over a period of more than 10 years, and will therefore be **long-term**. The intensity will be **low** as there will be a limited amount of employment opportunities created during the operational phase. There is a **high** likelihood that this impact will occur.

#### IMPACT ASSESSMENT: BENEFITS FOR THE LOCAL ECONOMY

**Nature:** The benefit to the local economy will be **direct positive** due to the ability to expand Vryburg since all residents will have access to sanitation services as well as via employment, skills and experience training and procurement of services and **indirect** and induced benefits by means of expenditure in the local economy due to increase in wages; local supply chain etc.

**Impact Magnitude: Moderate (+)**

**Extent:** Employment will be created at a **local** level.

**Duration:** Expenditures will be **long-term**, generated for the indefinite duration of the operational phase.

**Intensity:** The intensity will be **low** as a limited amount of employment opportunities created during the operational phase.

**Likelihood** – It is a **high** likelihood that this impact will occur.

**IMPACT SIGNIFICANCE (PRE-MITIGATION): LOW (+)**

**IMPACT SIGNIFICANCE (POST-MITIGATION): NEGLIGIBLE (+)**

**DECOMMISSIONING - CLOSURE IMPACT**

LOCAL ECONOMY BENEFITS

Currently the following two options are being considered in terms if the decommissioning of the existing plant:

- ✎ Option 1: Demolish and rehabilitated the existing plant site;
- ✎ Option 2: keep the building that is located on site of the existing plant for an alternative socio-economic beneficial use.

The current planned option is to demolish and rehabilitate the existing plant, since with keeping the built structure on the site can result in various other social effects, such as vandalism and squatting, which will result in dilapidated social conditions. In order to predict the effects of option two, a proper evaluation needs to be conducted.

Moreover, if option two is selected, the local municipality will have to draw up a detailed plan that should stipulate the alternative use of the building, the maintenance procedure on the building, the maintenance costs as well as a detailed budget.

The Huhudi Township, towards the south and west, has expanded right up against the existing Treatment Works to the extent that residences are located within the required buffer from the WWTW affecting their lifestyle quality. This continued expansion severely limits the expansion and densification of the town of Vryburg. With the decommissioning of the existing Works, such developments can be in closer proximity to the central business district and improved town planning can result from it.

IMPACT ASSESSMENT

The benefit to the local economy will be **direct positive** by way of employment and the acquirement of services to decommission the existing plant as well as a the **positive** change in land use from contaminated decommissioned plant to alternative land use. The economy will benefit in an **indirect** way through increased spending in the local economy. Employment will be created at a **local** level, as the local municipality is in favor of skills being sourced from within the town of Vryburg or neighboring towns. The possibility exist that increased employment opportunities will be generated at a **local** level for residents in adjacent informal settlements will have ease of access to the central business district. The closure of the existing plant will extend over a few weeks or months a will therefore **short-term**. The impact of the existing plant’s decommissioning is expected to be **low**, since the employment opportunities generated from the decommissioning will possibly be temporary. There is a **high** likelihood that this impact will occur.

IMPACT ASSESSMENT: BENEFITS FOR THE LOCAL ECONOMY

**Nature:** The benefit to the local economy will be **direct** via employment and procurement of services and the **positive** change in land use. **Indirect** and induced benefits will stem from the decommissioning due to increased expenditure in the local economy on amenities.

**Impact Magnitude – Minor (+)**

**Extent:** Employment will be created at a **local** level.

**Duration:** Expenditures will be **short-term**, generated for the duration of the decommissioning phase.

**Intensity:** The intensity will be **low** as a limited amount of employment opportunities created during the closure phase.

**Likelihood** – It is a **high** likelihood that this impact will occur.

**IMPACT SIGNIFICANCE (PRE-ENHANCEMENT) – LOW (+)**

**IMPACT SIGNIFICANCE (POST-MITIGATION): NEGLIGIBLE**

## MITIGATION MEASURES

### **Mitigation objective**

The objective of enhancement is to optimize opportunities for employment and procurement of local labour and services, wherever possible, or alternatively that procurement at a regional or national level should take place.

### **Mitigation Measures**

- ✿ For this project a recruitment and procurement procedure will be followed which sets reasonable targets for the employment of local residents and South African, suppliers (originating from the local municipalities). Criteria will be set for prioritizing local (local municipalities) residents/suppliers over regional or national residents/suppliers.
- ✿ All contractors will be required to recruit and procure in terms of standard recruitment and procurement processes according to the Public Finance Management Act (No 1 of 1999) (PFMA).
- ✿ Ensure that the appointed project contractors and suppliers have access to Health, Safety, Environmental and Quality training as required by the Project. This will help to ensure that they have future opportunities to provide goods and services to the sector.
- ✿ Where materials can be salvaged or re-cycled, local and regional services should be selected to form part of the decommissioning process.
- ✿ If the selection of an alternative use for the land is chosen, then it will require a key socio-economic feasibility to be conducted and stakeholder engagement processes to make sure the alternative use is truly supported by the community and sustainable (economically and socially) in the long term.
- ✿ Lastly, the appointed project contractors and suppliers will be challenged to contribute to the social fund that has been established by Golder Associates, Onno Fortuin Consulting and EndemicVision Environmental Services. This will ensure that the effects of the project will not only influence the permanent employees of the new plant, but the broader community as well.

## RESIDUAL IMPACT: LOCAL ECONOMY

Considering the unemployment state and limited employment opportunities any change in the area is considered to have some residual benefit to the community at large. The implementation of the above measures would ensure that the construction impacts will increase the social benefit to the local community from moderate to a major positive impact due to the temporary job creation and ensure that the significance of the operational impact remains negligibly positive. The pre- and post-enhancement impacts are compared below.

**TABLE 43: RESIDUAL IMPACT: LOCAL ECONOMY**

Aspect	Project Phase	Impact	Impact Magnitude	Significance (pre-mitigation)	Residual Significance (Post-mitigation)
Local Economy	Construction Phase	Direct Positive	<b>MODERATE (+)</b>	<b>LOW (+)</b>	<b>NEGLIGIBLE (+)</b>
	Operational Phase	Direct & Indirect Positive	<b>MODERATE (+)</b>	<b>MAJOR (+)</b>	<b>NEGLIGIBLE (+)</b>
	Decommissioning Phase	Direct & Indirect Positive	<b>MINOR (+)</b>	<b>LOW (+)</b>	<b>NEGLIGIBLE</b>

**IMPACT ON DOWNSTREAM USERS**

The project is considered as part of the downstream users as the Bles Spruit borders the proximity of the project. There are no downstream users that will be negatively affected by the construction of the plant itself. Possible consideration could be given to downstream erosion and/or littering during construction phase.

**IMPACT ASSESSMENT**

The impact to downstream users will be **direct** as possible littering may occur during the construction phase downstream. The impact of the construction phase poses a threat of being permanent, if it is not mitigated. However, the impact will be **short-term**, (i.e. duration of the construction phase) if the mitigation measures are properly implemented. This is likely to have an impact to a **regional extent**. The intensity will be **low** considering the extent, duration of the project, waste management on site and number of staff brought on site. There is a **possible** likelihood that this impact will occur.

**CONSTRUCTION IMPACT ASSESSMENT: IMPACT ON DOWNSTREAM USERS**

**Nature:** The impact on downstream users will result in a **direct negative** impact due to possible littering.

**Impact Magnitude: MAJOR**

**Extent:** The impact of water quality will be **regional** in extent.

**Duration:** The duration is short lived, and will cease after the construction process- **Short Term**.

**Intensity:** The intensity will be **low** as the extent, duration of the project, waste management on site and number of staff brought on site.

**Likelihood** – This impact will **possibly** occur.

**IMPACT SIGNIFICANCE (PRE-ENHANCEMENT): LOW**

**IMPACT SIGNIFICANCE (POST-MITIGATION): NEGLIGIBLE**

## IMPACT ASSESSMENT

During the operational phase the impact to downstream users will be **direct negative**, if the operational performance does not comply with the sewage standards set by the Department of Water Affairs. This is extremely important, as the current treatment plant operations are not up to the compliance standards.

Moreover, the treated effluent that will be released into the Bles Spruit also poses a **direct negative** threat to the downstream users. Therefore, it is crucial that the treatment plant continually monitor their performance and have a good understanding of the mitigation measures, to ensure that the downstream users are not placed at risk by contaminating the surface and groundwater.

Furthermore, the effects of the operations will be **indirectly negative**, as erosion may occur due to the disposal of treated effluent. The duration of the operational phase is expected to be **long-term**, as the life of the plant extends more than 10 years and this will infected have a **local** impact on the water quality for downstream users. The intensity of the operational phase is expected to be **moderate** as the operations of the plant will affect the erosion patterns downstream. There is a **high probability** that this impact will occur.

### OPERATIONAL IMPACT ASSESSMENT: IMPACT ON DOWNSTREAM USERS

**Nature:** The impact on downstream users will result in a **direct negative** impact due to the treated effluent that will be released into the Bles Spruit as well as possible erosion that may occur along the banks of the Spruit. This will result in contaminated surface and groundwater and an increased sludge load further downstream.

**Impact Magnitude: LOW**

**Extent:** The impact of water quality will be **regional** in extent.

**Duration:** The effects will be **long-term** and continue for the life of the plant.

**Intensity:** The intensity will be **moderate** and should be addressed in the Environmental Management Plan.

**Likelihood** – It is a **high** likelihood that this impact will occur.

**IMPACT SIGNIFICANCE (PRE-ENHANCEMENT): MODERATE**

**IMPACT SIGNIFICANCE (POST-MITIGATION): NEGLIGIBLE**

## IMPACT ASSESSMENT

The decommissioning of the existing plant is expected to have a **direct positive** effect on the downstream users, as the effluent quality being disposed of at the existing plant has been recorded to be below regulatory requirements on more than one occasion over an extended period of time (more than past 5 years). Hence, the water quality is expected to improve for downstream users with the decommissioning of the current plant. The extent of the decommissioning will be affecting the **regional** context in terms of its water standards and this will extend over the long-term. The intensity will be **low** as this will only be for the duration of the decommissioning.

### DECOMMISSIONING IMPACT ASSESSMENT: IMPACT ON DOWNSTREAM USERS

**Nature:** The impact on downstream users will result in a **direct positive** effect due to increased water quality.

**Impact Magnitude: Minor (+)**

**Extent:** The impact of water quality will be **local** in extent.

**Duration:** The effects will be **long-term** and continue for the life of the plant.

**Intensity:** The intensity will be **low** as this will only be for the duration of the closure phase.

**Likelihood:** This impact will **possibly** occur.

**IMPACT SIGNIFICANCE (PRE-ENHANCEMENT): LOW**

**IMPACT SIGNIFICANCE (POST-MITIGATION): NEGLIGIBLE (+)**

#### MITIGATION MEASURES

##### **Mitigation objective**

The objective of the mitigation measures will be to reduce the impact of operations and erosion and littering on downstream users.

##### **Mitigation Measures**

- ✿ All overburden material will be backfilled or removed from site.
- ✿ All loosened material will be stabilized as far as possible where it could result in direct erosion damage downstream.
- ✿ A proper waste sorting, removal and final disposal system must be put in place to ensure no littering takes place because of construction activities.
- ✿ Training in this regards should be given to all persons working on site.
- ✿ Response plans must be in place to deal with any spillages or accidents that occur at re-fuelling sites and machinery compounds.
- ✿ Requirements for operational basins and treatment trains to meet stated water quality objectives.
- ✿ Groundwater quality and groundwater level monitoring in order to assess the performance of the proposed mitigation measures.

#### CUMULATIVE EFFECTS

The proposed project will result in a possible increase in erosion. This is however only a possibility considering that the gradient of the Bles Spruit at this point is relatively shallow and dry and high speed water flow is not expected.

It should be noted that in order for the downstream users not to be placed at risk to contaminated surface and groundwater, it is of crucial importance that the new treatment plant follow compliance procedures by all means. This is extremely important as the town of Vryburg as well as neighboring towns rely heavily on their groundwater resources and the region is located in an arid to semi-arid area.

#### RESIDUAL IMPACT: IMPACT ON DOWNSTREAM USERS

**TABLE 44: RESIDUAL IMPACT: DOWNSTREAM USERS**

Aspect	Project Phase	Impact	Impact Magnitude	Significance (pre-mitigation)	Residual Significance (Post-mitigation)
Downstream Users	Construction Phase	Direct Negative	<b>MAJOR</b>	<b>LOW</b>	<b>NEGLIGIBLE</b>
	Operational Phase	Direct Negative	<b>LOW</b>	<b>MODERATE</b>	<b>NEGLIGIBLE</b>

	Decommissioning Phase	Direct Positive	<b>MINOR (+)</b>	<b>LOW</b>	<b>NEGLIGIBLE (+)</b>
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### 5.3.11 TRAFFIC

#### IMPACT CHARACTERISTICS: TRAFFIC

**TABLE 45: IMPACT CHARACTERISTICS: TRAFFIC**

Summary	Construction	Operation	Decommissioning
<b>Project Aspect/Activity</b>	Construction vehicles Construction personnel transport Vegetation clearance machinery	Maintenance vehicles WWTW personnel	Excavation vehicles Land rehabilitation vehicles/machinery
<b>Impact Type</b>	Indirect negative	Indirect negative	Direct positive
<b>Stakeholders/Receptors Affected</b>	Users of the road to the WWTW Landowner	Users of the road to the WWTW Landowner	Users of the road to the current WWTW

#### IMPACT ASSESSMENT: CONSTRUCTION PHASE

**Nature:** Operational activities will have an **indirect negative** effect on affected receptors.

**Impact Magnitude: LOW**

**Extent:** The extent of the impact is limited to the **local** as the road users might be impacted.

**Duration:** The duration of the impact is **short term** as the impact will only last as long as the construction phase is going on.

**Intensity:** The intensity of the operational phase will be **low**.

**Likelihood:** It is **probable** that the impact will occur to the extent that provision must be made therefore.

**IMPACT SIGNIFICANCE (PRE-MITIGATION): LOW**

**IMPACT SIGNIFICANCE (POST-MITIGATION): NEGLIGIBLE**

#### IMPACT ASSESSMENT: OPERATIONAL PHASE

**Nature:** Operational activities will have an **indirect negative** effect on affected receptors.

**Impact Magnitude: MINOR**

**Extent:** The extent of the impact is limited to the **site** as there will be minimal traffic when the WWTW is in operation.

**Duration:** The duration of the impact is **long term** because the impact will last as long as the WWTW is in operation.

**Intensity:** The intensity of the operational phase will be **low**.

**Likelihood:** It is **probable** that the impact will occur to the extent that provision must be made therefore.

**IMPACT SIGNIFICANCE (PRE-MITIGATION): LOW**

**IMPACT SIGNIFICANCE (POST-MITIGATION): NEGLIGIBLE**

## IMPACT ASSESSMENT: DECOMMISSIONING PHASE

**Nature:** Operational activities will have an **direct positive** effect on affected receptors.

**Impact Magnitude: MINOR**

**Extent:** The extent of the impact is limited to the **site** as there will be minimal traffic when the WWTW is decommissioned.

**Duration:** The duration of the impact is **long term** because the impact will last as long as it takes for a new development to emerge.

**Intensity:** The intensity of the operational phase will be **low**.

**Likelihood:** It is **definite** that the impact will occur.

**IMPACT SIGNIFICANCE (PRE-MITIGATION): LOW**

**IMPACT SIGNIFICANCE (POST-MITIGATION): NEGLIGIBLE**

## MITIGATION MEASURES

- ✿ Ensure that construction activities are staggered and vehicular activities are kept to a minimum, during daylight hours and as far as possible outside of peak traffic times.
- ✿ Adequate traffic signage and barricading guiding road users will be present at all times during construction.
- ✿ The transport of fuels on public roads is governed by the National Road Traffic Act and as such vehicles and drivers must meet stringent safety controls.
- ✿ A Traffic Management Plan should be developed to provide procedures and guidelines for the safe management of on-site traffic.
- ✿ It must be ensured that all hazardous storage containers and storage areas comply with the relevant SABS standards to prevent leakage.
- ✿ All vehicles must be regularly inspected for leaks.
- ✿ Re-fuelling must take place on a sealed surface area to prevent ingress of hydrocarbons into topsoil.

## RESIDUAL IMPACT

If the above stipulated mitigation measures are implemented, the residual impact significance will be reduced to *Negligible* for the construction and operational phases.

**TABLE 46: RESIDUAL IMPACT: TRAFFIC**

Aspect	Project Phase	Impact	Impact Magnitude	Significance (Pre-mitigation)	Residual Significance (Post-mitigation)
Traffic	Construction Impact	Indirect Negative	LOW	LOW	NEGLIGIBLE
	Operational Impact	Indirect Negative	MINOR	LOW	NEGLIGIBLE
	Decommissioning Closure Impact	Direct Positive	MINOR	LOW	NEGLIGIBLE



### 5.3.12 NOISE

#### IMPACT CHARACTERISTICS: NOISE

**TABLE 47: IMPACT CHARACTERISTICS: NOISE**

Summary	Construction	Operation	Decommissioning
<b>Project Aspect/Activity</b>	Excavation Machinery Construction Vehicles Construction of the WWTW	Maintenance Vehicles Operation of the WWTW	Construction Vehicles
<b>Impact Type</b>	Indirect negative	Indirect negative	Indirect Positive
<b>Stakeholders/Receptors Affected</b>	Fauna & Flora Landowner Neighbouring Landowners Travelling Pedestrians	Fauna & Flora Landowner Neighbouring Landowners	Fauna & Flora Landowner Neighbouring Landowners Travelling Pedestrians

#### IMPACT ASSESSMENT: CONSTRUCTION PHASE

**Nature:** Operational activities will have an **indirect negative** effect on affected receptors.

**Impact Magnitude: MEDIUM**

**Extent:** The extent of the impact is limited to the **local** as the impact may be disturbing to receptors.

**Duration:** The duration of the impact is **short term** because the impact will only last for the duration of construction.

**Intensity:** The intensity of the operational phase will be **medium**.

**Likelihood:** It is **definite** that the impact will occur to the extent that provision must be made therefore.

**IMPACT SIGNIFICANCE (PRE-MITIGATION): MEDIUM**

**IMPACT SIGNIFICANCE (POST-MITIGATION): LOW**

#### IMPACT ASSESSMENT: OPERATIONAL PHASE

**Nature:** Operational activities will have an **indirect negative** effect on affected receptors.

**Impact Magnitude: MINOR**

**Extent:** The extent of the impact is limited to the **site** as the impact may be disturbing to receptors but it will be minimal.

**Duration:** The duration of the impact is **long term** because the impact will last for the duration of the operational phase.

**Intensity:** The intensity of the operational phase will be **low**.

**Likelihood:** There is a **probability** that the impact will occur but it will be minimal.

**IMPACT SIGNIFICANCE (PRE-MITIGATION): LOW**

**IMPACT SIGNIFICANCE (POST-MITIGATION): NEGLIGIBLE**

## IMPACT ASSESSMENT: DECOMMISSIONING PHASE

**Nature:** Operational activities will have an **indirect positive** effect on affected receptors.

**Impact Magnitude: MINOR**

**Extent:** The extent of the impact is limited to the **site** as the impact may be disturbing to receptors but it will be minimal.

**Duration:** Initially there will be intensive periods of high dust levels but it will only last for a short period. The duration of the impact is **long term** because the impact will last until further development occur on the premises.

**Intensity:** The intensity of the decommissioning phase will be **low**.

**Likelihood:** There is a **probability** that the impact will occur but it will be minimal.

**IMPACT SIGNIFICANCE (PRE-MITIGATION): LOW**

**IMPACT SIGNIFICANCE (POST-MITIGATION): NEGLIGIBLE**

### MITIGATION MEASURES

- ✿ Working hours to be agreed upon with Project Manager, so as to minimize disturbance to landowners and community members. The noise generating construction phase activities shall be restricted to normal working hours, between 08h00 and 17h00.
- ✿ Adjacent landowners to the proposed activity will be notified of commencement of construction and expected timing for construction activities that would result in significant noise generation.
- ✿ Construction activities generating output levels of 85 dB or more will be confined to normal working hours.
- ✿ Construction site yards and other noisy fixed facilities should be located well away from noise sensitive areas (landowners).
- ✿ The responsible engineer should ensure that municipal regulations relating to noise generation are observed.
- ✿ Truck traffic will be confined to existing roads.
- ✿ It must be ensured that employees and contractors working conditions comply with the requirements of the Occupational Health and Safety Act (OHSA, Act No 85 of 1993). Where necessary, workers will be required to wear ear protection equipment.
- ✿ Noise / visual barriers in the form of vegetation (hedges) should be considered post construction. The noise barrier constructed /grown should be at least 1.2 meters high when fully grown and at least two rows of plants. The location and length of the hedges should be done in consultation with an independent practitioner.

### RESIDUAL IMPACT

If the above stipulated mitigation measures are implemented, the residual impact significance will be reduced to *Negligible* for the construction and operational phases.

**TABLE 48: RESIDUAL IMPACT: NOISE**

Aspect	Project Phase	Impact	Impact Magnitude	Significance (Pre-mitigation)	Residual Significance (Post-mitigation)
Noise	Construction Impact	Indirect Negative	<b>MEDIUM</b>	<b>LOW</b>	<b>NEGLIGIBLE</b>
	Operational Impact	Indirect Negative	<b>MINOR</b>	<b>LOW</b>	<b>NEGLIGIBLE</b>

	Decommissioning Closure Impact	Indirect Positive	<b>MINOR</b>	<b>LOW</b>	<b>NEGLIGIBLE</b>
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## 6. ENVIRONMENTAL MANAGEMENT PROGRAMME

The role of the EMP is to assist Dr RSM in achieving their environmental objectives and fulfilling their commitment to the environment.

The EMP describes methods and plans that can be used to reduce the negative environmental impacts and enhance the positive impacts. The EMP will be implemented throughout all phases of the project. In this regard, it is anticipated that monitoring will occur on a regular basis (variable depending on aspects to be monitored). The EMP serves a framework for implementing the mitigation measures during each phase of the project.

The EMP is appended as Annex B of this report.

## 7. CONCLUSION

The new proposed WWTW will effectively treat 16 MI/day of effluent in phase 1 and 24 MI/day in phase 2. The treated effluent will be discharged into the Bles Spruit.

No highly significant negative impacts were identified if all mitigation measures are implemented. The negative impacts identified either had a medium-low or low-negligible significance rating. The most significant negative impacts will be surface water, ground water and odours but it can be mitigated with the above mentioned measures. The new plant must not be managed like the current one, then more serious environmental impacts might occur. If managed correctly, it is expected that this project does not pose a major risk to the environment. The table below shows the ratings if no mitigation takes place. If the significant mitigation measure are not implemented, these ratings in the last column will most likely worsen. It is therefore of extreme importance that this new sewage plant is placed under an excellent management team to prevent what is happening at the current plant.

**TABLE 49: PRE-MITIGATION SIGNIFICANCE**

Aspect	Project Phase	Impact	Impact Magnitude	Significance (pre-mitigation)	Residual Significance (Post-mitigation)
Ecology: Vegetation & Protected Plant Species	Pre-construction Phase	Direct Negative	<b>MEDIUM</b>	<b>LOW</b>	<b>NEGLIGIBLE</b>
	Construction Phase	Direct Negative	<b>MEDIUM</b>	<b>MODERATE</b>	<b>MODERATE</b>
	Operational Phase	Not Applicable	Not Applicable	Not Applicable	Not Applicable
	Decommissioning Phase	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Ecology: Faunal Impacts	Pre-construction Phase	Direct Negative	<b>MEDIUM</b>	<b>LOW</b>	<b>NEGLIGIBLE</b>
	Construction Phase	Direct Negative	<b>MEDIUM</b>	<b>MODERATE</b>	<b>MODERATE</b>
	Operational Phase	Direct Negative	<b>MEDIUM</b>	<b>LOW</b>	<b>LOW</b>
	Decommissioning Phase	Direct Positive	<b>LOW (+)</b>	<b>LOW</b>	<b>NEGLIGIBLE (+)</b>
Ecology: Alien Plant Invasion	Pre-construction Phase	Not Applicable	Not Applicable	Not Applicable	Not Applicable
	Construction Phase	Not Applicable	Not Applicable	Not Applicable	Not Applicable
	Operational Phase	Direct Negative	<b>MEDIUM</b>	<b>MODERATE</b>	<b>LOW</b>
	Decommissioning Phase	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Ecology: Avifauna - Power lines	Pre-construction Phase	Not Applicable	Not Applicable	Not Applicable	Not Applicable
	Construction Phase	Not Applicable	Not Applicable	Not Applicable	Not Applicable
	Operational Phase	Direct Negative	<b>LOW</b>	<b>LOW</b>	<b>NEGLIGIBLE</b>
	Decommissioning Phase	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Ecology: Avifauna - Operation / Presence of the Facility	Pre-construction Phase	Not Applicable	Not Applicable	Not Applicable	Not Applicable
	Construction Phase	Not Applicable	Not Applicable	Not Applicable	Not Applicable
	Operational Phase	Direct Negative	<b>LOW</b>	<b>LOW</b>	<b>NEGLIGIBLE</b>
	Decommissioning Phase	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Ecology: CBAs & Ecological Processes	Overall	Direct Negative	<b>MEDIUM</b>	<b>MEDIUM</b>	<b>MEDIUM</b>
Soil	Construction Phase	Direct Negative	<b>LOW</b>	<b>LOW</b>	<b>NEGLIGIBLE</b>
	Operational Phase	Direct Negative	<b>LOW</b>	<b>LOW</b>	<b>NEGLIGIBLE</b>
	Decommissioning Phase	Indirect Positive	<b>MINOR (+)</b>	<b>LOW</b>	<b>NEGLIGIBLE (+)</b>
Land Capability and Land Use	Construction Phase	Direct Negative	<b>MINOR</b>	<b>LOW</b>	<b>NEGLIGIBLE</b>
	Operational Phase	Direct Positive	<b>MAJOR (+)</b>	<b>MAJOR (+)</b>	<b>NEGLIGIBLE</b>
	Decommissioning Phase	Direct Positive	<b>MODERATE (+)</b>	<b>LOW</b>	<b>MODERATE (+)</b>
Surface Water	Construction Impact	Direct Negative	<b>MINOR</b>	<b>LOW</b>	<b>NEGLIGIBLE</b>

	Operational Impact	Direct Negative	<b>MEDIUM</b>	<b>HIGH</b>	<b>MODERATE</b>
	Decommissioning Closure Impact	Direct Positive	<b>LOW (+)</b>	<b>LOW</b>	<b>NEGLIGIBLE (+)</b>
Groundwater	Construction Phase	Direct Negative	<b>LOW</b>	<b>LOW</b>	<b>NEGLIGIBLE</b>
	Operational Phase	Direct Negative	<b>LOW</b>	<b>MODERATE</b>	<b>LOW</b>
	Decommissioning Phase	Indirect Positive	<b>LOW (+)</b>	<b>LOW</b>	<b>NEGLIGIBLE (+)</b>
Air Emissions	Construction Phase	Indirect Negative	<b>MINOR</b>	<b>LOW</b>	<b>NEGLIGIBLE</b>
	Operational Phase	Direct Negative	<b>LOW</b>	<b>MODERATE</b>	<b>LOW</b>
	Decommissioning Phase	Direct Positive	<b>LOW (+)</b>	<b>LOW</b>	<b>NEGLIGIBLE (+)</b>
Odours	Construction Phase	Not Applicable	Not Applicable	Not Applicable	Not Applicable
	Operational Phase	Direct Negative	<b>MEDIUM</b>	<b>MODERATE</b>	<b>LOW</b>
	Decommissioning Phase	Direct Positive	<b>LOW (+)</b>	<b>NEGLIGIBLE</b>	<b>NEGLIGIBLE (+)</b>
Dust Emissions	Construction Phase	Indirect Negative	<b>MEDIUM</b>	<b>LOW</b>	<b>NEGLIGIBLE</b>
	Operational Phase	Indirect Negative	<b>LOW</b>	<b>LOW</b>	<b>NEGLIGIBLE</b>
	Decommissioning Phase	Indirect Negative	<b>MINOR</b>	<b>LOW</b>	<b>NEGLIGIBLE</b>
Archaeology and History	Construction Phase	Direct Negative	<b>LOW</b>	<b>LOW</b>	<b>NEGLIGIBLE</b>
	Operational Phase	Indirect Negative	<b>LOW</b>	<b>LOW</b>	<b>NEGLIGIBLE</b>
	Decommissioning Phase	Direct Negative	<b>LOW</b>	<b>LOW</b>	<b>NEGLIGIBLE</b>
Socio-economic Environment	Construction Phase	Direct Positive	<b>MODERATE (+)</b>	<b>LOW (+)</b>	<b>NEGLIGIBLE (+)</b>
	Operational Phase	Direct & Indirect Positive	<b>MODERATE (+)</b>	<b>MAJOR (+)</b>	<b>NEGLIGIBLE (+)</b>
	Decommissioning Phase	Direct & Indirect Positive	<b>MINOR (+)</b>	<b>LOW (+)</b>	<b>NEGLIGIBLE</b>
Traffic	Construction Phase	Indirect Negative	<b>LOW</b>	<b>LOW</b>	<b>NEGLIGIBLE</b>
	Operational Phase	Indirect Negative	<b>MINOR</b>	<b>LOW</b>	<b>NEGLIGIBLE</b>
	Decommissioning Phase	Direct Positive	<b>MINOR (+)</b>	<b>LOW</b>	<b>NEGLIGIBLE (+)</b>
Noise	Construction Phase	Indirect Negative	<b>MEDIUM</b>	<b>LOW</b>	<b>NEGLIGIBLE</b>
	Operational Phase	Indirect Negative	<b>MINOR</b>	<b>LOW</b>	<b>NEGLIGIBLE</b>
	Decommissioning Phase	Indirect Positive	<b>MINOR (+)</b>	<b>LOW</b>	<b>NEGLIGIBLE (+)</b>
Downstream Users	Construction Phase	Direct Negative	<b>MAJOR</b>	<b>LOW</b>	<b>NEGLIGIBLE</b>
	Operational Phase	Direct Negative	<b>LOW</b>	<b>MODERATE</b>	<b>NEGLIGIBLE</b>
	Decommissioning Phase	Direct Positive	<b>MINOR (+)</b>	<b>LOW</b>	<b>NEGLIGIBLE (+)</b>

Given the overload at the current sewage treatment plant, it is highly recommended that a new plant that can handle the current load, as well as the future load, is constructed. More importantly, that this plant be managed to the required standards ensuring the post mitigation measure impacts are applied.

EndemicVision Environmental Services is of the opinion that the project should definitely go ahead.

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