DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME

FOR

CONSTRUCTION OF A NEW 600 MMØ RAW WATER PIPELINE FROM MEULSPRUIT DAM TO FICKSBURG WATER TREATMENT PLANT

PREPARED FOR

FLAGG CONSULTING ENGINEERS (Pty) Ltd

ON BEHALF OF

SETSOTO LOCAL MUNICIPALITY

PREPARED BY

NSVT CONSULTANTS

MARCH 2016

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1. INTRODUCTION

FLAGG Consulting Engineers (Pty)Ltd appointed *NSVT Consultants* as independent environmental assessment practitioners to undertake an Environmental Impact Assessment process and to complete the draft Environmental Management Plan (EMPR) for the proposed construction of a new 600mm raw water pipeline from Meulspruit dam to Ficksburg water treatment plant. as per requirements of Department of Economic, Small Business Development, Tourism and Environmental Affairs (*DESTEA)*.

2. DETAILS OF ENVIRONMENTAL ASSESSMENT PRACTITIONER

The curriculum vitae of the EAP is attached hereto as **Appendix A**.

EAP	NSVT Consultants		
CONTACT PERSON	Lorato Tigedi *Pr. Sci. Nat.*		
POSTAL ADDRESS	P. O. Box 42452, Heuwelsig, 9332		
TELEPHONE	(051) 430 1041/2	**FACSIMILE**	086 239 9133
E-MAIL	lorato@nsvt.co.za	**CELL**	082 784 8259
QUALIFICATIONS	B. Sc (Natural Science) B. Sc Hons (Wildlife)	**EXPERIENCE**	12 years working in the environmental management field as an EAP. She has completed environmental impact assessment, basic assessment, drafting of EMPRs and environmental compliance monitoring for various development within the Free State., North West, Northern Cape and Eastern Cape Provinces.
EXPERTISE/ TRAINING	Resources & Sustainability, Physical & Biological Environment and Informatics, 2006 Project Management for Environmental Management, 2006 Social & Economic Sustainability, 2006 Use of Matrices in EIA, 2008 Public Participation Training, 2010		

	Introduction to Social Impact Assessment, 2011 Integrating HIV/Aids and Gender related issues into EIA Process, 2013 Integrated Water Resources Management, Water Use Authorisation and Water Use License Application, 2013 One Environmental System-2015	**PROFESSIONAL AFFILIATE**	SACNASP Professional Natural Scientist-4000161/09 Member of International Association for Public Participation Southern Africa Affiliate-2010/ZA/FS/0001) Member of international Association for Impact Assessment SA-2191

3. PROJECT DESCRIPTION

3.1. BACKGROUND INFORMATION

Setsoto Local Municipality obtains raw water from two sources, i.e. the Caledon river and from the Meulspruit Dam and neither the sources are currently able to sustainably supply the total water demand of Ficksburg/Meqheleng on a continual basis. There is an existing raw water pipeline from Meulspruit Dam to the water treatment plant in Ficksburg, which currently works by pumping raw water from pumpstation to a balancing tank which is situated on the nearby mountain; from there it is conveyed to the water treatment plant via a 315mm uPVC pipeline. However, the pipeline has insufficient capacity to cater for the current and future water demand of Ficksburg/Meqheleng. Therefore the local municipality proposes to construct a new 600mmØ steel Raw Water Pipeline from the dam to the water Treatment Plant. The pipeline runs from the western side to the eastern side of Ficksburg along an existing gravel road then crosses the R26 towards Ficksburg through the residential area. It will be designed to supply the future 24 hours daily Peak demand in an 18 hour period allowing 6 hours per day for down time and maintenance of the pumps and also augment the water flow between the Meulspruit Dam and Ficksburg Water Treatment Plant. The pipeline will be designed to supply 32Ml/day less the existing capacity of the 315mm u-PVC pipeline. The total supply capacity of the new pipeline will be 27.1Ml/day. The raw water pumps at the dam pump station supplying the proposed pipeline with raw water will be upgraded and the required air and scour valve chambers provided along the route of the pipeline as topography dictates.

3.2 SENSITIVITY OF THE PROPOSED ROUTE

The proposed route is along an existing gravel road used to access Meulspruit Dam and in the vicinity, an existing pipeline, railway line gulley erosions (donga) and then it crosses over the R26 under the overhead powerline then along the sidewalks of numerous streets, which are already transformed areas in town until it ends at the water treatment plant. From the findings of the Palaeontologist, the absence of potentially fossilferous gulleys and appropriate exposure suggest that fossils are absent from the route, however, it is possible that due to earthmoving activities they could be present on the outskirts of the town along the R26 and at the Meulspruit Dam. From the Archaeologist, there is Anna Maria mill site structural remains and a large circular brick-built structure, which should be avoided during construction although

it is not within the proposed route, however, no aboveground evidence was found of intact Quaternary palaeontological or Stone Age archaeological exposures or significant structures older than 60 years. Therefore the proposed route is considered to be of low archaeological significance.

Some sections on the outskirts of the area have natural vegetation but other sections have been impacted by vegetation transformation and degradation by existing land uses, e.g. gravel road, R26, wood collection and livestock grazing with the main transformation being on the eastern side within the urban edge. From field survey undertaken by the specialist, neither protected species nor species of conservational concern were noted although one species of conservational concern was observed. The lack of remaining natural habitat means that the expected faunal biodiversity will be relatively low as stated by the specialist. However, small mammals, avifauna, reptiles, amphibians and invertebrates are expected to occur in the area.

From the aquatic specialists, sensitive features identified along the route are 2 wetlands, riparian zones and a stream. There encroachment of exotic vegetation and evidence of erosion of the water courses. The wetland habitat would be unavoidable be impacted upon and construction within the riparian zones will be required.

A sensitivity map will be compiled after inputs from relevant stakeholders have been received after the reviewing of the draft basic assessment report.

4 CHECKLIST FOR THE PROPOSED PROJECT

1. Give a detailed description of the development:

Construction of a new 600mmØ Raw Water Pipeline from Meulspruit dam to Ficksburg Water Treatment Plant, crossing the R26, wetlands, riparian zones and a stream at some sections.

2. Give a brief description of the surrounding area:

In the vicinity of the pipeline route, there is Meulspruit, railway line, gravel access road, Anna Maria mill site structural remains, livestock enclosures, riparian zones, gulley formations, and it runs parallel the existing pipeline. The pipeline route transverse riparian zones, wetlands, R26 and a stream and at some section it will cross under the bridge and overhead powerline.

3. Is the project significantly different from the surrounding land use?

No, it is runs parallel to an existing pipeline.

4. Are any of the following located on the site chosen for the development?

i. River, stream, dam, wetland – yes, wetlands and a stream

ii. Open space area – no

iii. Residential (formal or informal settlement) – Yes within the urban edge

iv. Area of cultural importance, yes

5. Are there any protected areas close to the proposed site?

No but the Anna Maria Mill site should be avoided.

6. Will the project be considered a noisy intrusion to the neighbours?

Yes, but the increased noise levels will be during construction.

7. Would it be necessary to construct roads to access the proposed route?

No, the existing access road branches from R26 towards Meulspruit dam then to numerous streets within the urban edge would be used.

5 ENVIRONMENTAL MANAGEMENT PROGRAMME

5.1. INTRODUCTION

The EMPR has been divided into four different phases associated with the proposed development namely the pre-construction planning phase, the construction phase and operational phase. This draft EMPR will be considered a Final EMPR if approved by DESTEA. It should be read in conjunction with the contract documentation to ensure the contractor works in an environmentally sensitive manner, thus ensuring the impacts on the environment and neighbouring community are kept to a minimum. Should there be any conflict between the EMPR and project specifications, then terms herein shall be secondary.

5.2 OBJECTIVES OF THE EMPR`

The aim of the EMPR is to ensure that impact on the environment due to the proposed development is limited. To achieve this, the EMPR has the following objectives:

- To identify possible impacts of the proposed route on the environment and mitigation thereof.
- To provide information on construction activities associated with the identified environmental issues.
- To provide guidelines for the management of the identified environmental issues.
- To provide guidelines to the responsible person to follow appropriate contingency plans in the case of various possible impacts.

5.3 RESPONSIBLE PERSON (S)

The implementation of this EMPR requires the involvement of various role players, each with specific responsibilities to ensure that the development is completed in an environmentally sensitive manner.

The Developer: Setsoto Local Municipality

Responsibility: To implement the final EMPr after approval by DESTEA before commencement of the construction phase and ensure the proposed development comply with the NEMA requirements and the Environmental Authorisation.

The Project Consultants*: FLAGG Consulting Engineers (Pty) Ltd*

Responsibility: To undertake the detailed design for the proposed development and to ensure that necessary permit has been obtained. To ensure the contractor sign the EMPr before commencement of construction.

The Environmental Control Officer:

Responsibility:

- To ensure that the contractor implement the EMPr for the duration of the project from pre-construction to post-construction (decommissioning).
- To review the method statements with the resident engineer.
- To maintain direct open line between the project consultant, contractor and PSC.
- To audit the implementation of the EMPr and compliance to the environmental authorisation once a month until project completion.

The Contractor:

Responsibility:

- To implement the EMPr and keep a copy on-site for the duration of the construction phase because obligations imposed by the document are legally binding to environmental legislation.
- To comply with the Environmental Authorisation and undertake his construction activities in an environmentally sensitive manner and rehabilitation of the site.
- To undertake good housekeeping practices during duration of the project.
- To ensure that adequate environmental awareness training takes place in the language of the Employees.

Designated Environmental Officer:

Responsibility:

- To implement the environmental management programme.
- To maintain records of environmental queries for duration of the construction.
- To resolve environmental issues during the construction phase of the project.

The Project Steering Committee: A committee that comprises of representatives of the Project Consultants, Engineers, Councillor of the affected wards, Ward Committee, Local Community, Beneficiaries, Contractor and other stakeholders.

Responsibility:

- To monitor the implementation of the EMPr.
- To assist in sourcing general workers from the local community.
- To ensure participation of local contractors during construction.
- To assist in resolving social issues that may arise during construction.

5.4 METHOD STATEMENT

A method statement outlines construction activities to be undertaken with mitigation measures. The contractor should give a written statement to the resident engineer at least two weeks before the activity so that any irregularities can be handled before construction commences and also communicated to the Employees. The format of the method statement should clearly indicate the following:

1. Construction and Operational Procedures
2. Materials and Equipment used
3. How and where materials will be stored
4. When actions will be undertaken

Based on the EMPr specifications, the following method statements are required as a minimum:

- Crossing of the stream
- Crossing of wetlands and riparian zone
- Site clearing
- Site layout and establishment
- Storage of hazardous substances and accidental spillages of hazardous substances
- Cement mixing
- Waste management procedures
- Wastewater management procedures
- Traffic accommodation
- Erosion remediation
- Fire control and emergency procedures
- Crossing of the stream
- Crossing of wetlands and riparian zone

5.5 ENVIRONMENTAL AWARENESS TRAINING

The contractor and his Employees involved with the work on the construction phase are to be briefed on their obligation towards environmental protection and methodologies in terms of the EMPr prior to work commencing. The briefing should be done by the designated Environmental Officer prior to construction in the form of an on site talk (toolbox talks). After the toolbox talks, the attendees should sign an attendance register for record keeping in the environmental file.

The basic rules of conduct, which should be considered for the duration of the project, are tabulated below.

Table 1: Basic Conduct Rules during Construction

Do	Do Not
Use of toilet facilities provided and report dirty or full facilities	Make open fires for cooking, dedicated areas should be provided.
Clear your work areas of litter and building rubbish at the end of each day	Allow any cement bags or litter to be blown around
Use the waste bins provided and ensure that litter will not blow away	Access the neighbouring properties without the owners' consent
Report all leakages and/or spillages and remediate the surface immediately	Collect fire wood in neighbouring areas
Confine work and storage of equipment and comply with all safety procedures	Dispose of cigarettes and burning matches randomly
Provide fire extinguisher in good working condition and easily accessible	Do not leave food lying around
Use areas designated for food preparation	Enter any fenced off neighbouring areas
Only emergency repairs of construction vehicles is allowed on the construction site	Dump any waste substance into the donga
Use all safety equipment and comply with all safety procedures	Avoid disturbance of the Anna Maria mill site structural remains
Prevent excessive generation of dust and noise	No storage of equipment or material on the wetland and riparian zones including its buffer zone

5.6 RECORD KEEPING

There should be an up to date filing system at the site office for the duration of the project whereby method statements, environmental incidents report, training records, audit reports and public complaints register are kept. It is advised that photographs of the site should be taken pre-, during and post-construction as a visual reference. These records should be kept for a minimum of 2 years after completion of the project.

5.7 PENALTIES

In cases of transgressions and non-compliance to the EMPr by the contractor, he should be liable to a penalty fine. Transgressions should be recorded in a dedicated register, and be kept at the site office for the duration of the project. The resident engineer will issue the penalties in terms of the severity on the environment; however, *Table 2* below may be used as a guideline.

Table 2: Penalties for Transgressions

TRANSGRESSION	PENALTY
Littering and bush-toileting	R1000
Concrete mixing on the ground	R2000
Spillages	R1000-R10 000 depending on the magnitude)
Soil erosion	R2000
Veld fires	R5000

The Draft Environmental Management Programme is outlined in *Table 3* below. Adherence to this plan during construction will ensure that the environmental impacts associated with the proposed development will be mitigated to a greater extent thus promoting sustainable development. The commitment and co-operation of the identified responsible person (s) will ensure effective implementation of the EMPr pre-construction and post-construction; therefore it is imperative that there is file dedicated for Environmental Documentation.

Table 3: Draft Environmental Management Programme

ASPECT	POSSIBLE IMPACT	MITIGATION PLAN	RESPONSIBLE PERSON (S)	OBJECTIVES	FREQUENCY
1. PRE-CONSTRUCTION PHASE					
Project Contract and Programme	Adherence to the EMPR	◊ The EMPr must be included in the tender documentation and a copy of should be available on-site for the duration of the project. ◊ The environmental responsibilities should be formalized and environmental awareness should be introduced to the labourers in their language as toolbox talks.	**CONTRACTOR & ENGINEERS**	Ensure that EMPr is adhere to	Frequency Once off for signing of the tender document and awareness for the duration of the project
Environmen-tal Authorisation and Permits	Adherence to the applicable environmental legislation	◊ Obtain a wayleave from the Department of Roads prior to crossing of R26. ◊ Obtain a wayleave from Eskom prior to commencement of the construction within their servitude. ◊ Obtain a water use license prior to crossing of the wetlands and stream	**ENGINEERS & CONTRACTOR**	Ensure adherence to environmental legislation	Frequency Once-off
Location of Camp and Depot	Environmental damage	◊ The camp depot should be located in ecologically sensitive areas, i.e. wetland and riparian zones. ◊ The contractor should provide the project consultant/ engineer with the layout plan of the camp depot for approval before commencement with the construction phase. The plan should include site offices, temporary fencing boundary, sanitation facilities, waste and petroleum products storage facilities, stockpiling	**CONTRACTOR & RESIDENT ENGINEERS**	Prevent environmental damage and disturbance of neighbouring land users	Frequency Once off

		areas, etc. The parking of vehicles, storage of equipment and materials must strictly be confined to designated areas. ◊ If located on the "virgin" ground, the area should be rehabilitated once the project is completed.			
MANAGEMENT ACTION		A camp depot must be approved by the RE and the ECO			
Water Supply	Source of water during the construction phase.	◊ Potable water must be available at the camp depot, office site and construction site. It should be obtained from the local municipality. ◊ No boreholes can be established without DWS approval. ◊ No water should be abstracted from Meulspruit without approval. ◊ Water from the stream should not be used because it is contaminated.	**CONTRACTOR, ENGINEERS & MUNICIPALITY**	Prevent borehole establishment without DWS approval and unauthorized water abstraction from Meulspruit.	Frequency Once off
MANAGEMENT ACTION		A written agreement between the contractor and the municipality for water supply.			
Access Control	Theft of construction materials	◊ Fence or suitably secure main site office and material storage area. ◊ Unauthorized entry should be prohibited.	**CONTRACTOR AND ENGINEER**	Keep the site secure from trespassing.	Frequency Once off
	Hazards to animals			Livestock should be kept from the camp depot or material storage area.	
MANAGEMENT ACTION		Site access register and complaints book should be in place. Regular maintenance of the fence.			
Access route	Erosion and dilapidation of the access route	◊ Proper maintenance should be done to ensure the quality of the access road.	**CONTRACTOR, DEO, ECO & ENGINEERS**	Prevention of dilapidation of access route	Frequency Weekly
MANAGEMENT ACTION		Audit checklist, photographs			

ASPECT	POSSIBLE IMPACT	MITIGATION PLAN	RESPONSIBLE PERSON (S)	OBJECTIVES	MONITORING ACTION AND FREQUENCY
Power Supply	Safety Impacts	◊ Limit the power supply cables & ensure the safety of the workers and neighbouring road users and residents. ◊ All health and safety laws and regulations should be adhered. ◊ A safety officer should be appointed to undertake safety audits.	**CONTRACTOR & ENGINEERS**	Implement safety measures	Frequency Monthly
MANAGEMENT ACTION		Safety Audits Report and Record keeping of all the reports			
Solid Waste	Littering/ Pollution of environment with waste materials	◊ Refuse receptacles with lids should be placed at the camp depot and on the construction sites. ◊ They should be easily accessible. ◊ System for regular waste removal must be set up. ◊ Refuse bins should be clearly marked to avoid mixing of hazardous and general waste. ◊ Letter or agreement between contractor and pollution control officers or companies dealing with hazardous waste should be in the environmental file.	**CONTRACTOR& ENGINEERS**	Prevent environmental pollution with waste materials and visual impact.	Frequency Duration of the Project
MANAGEMENT ACTION		Method Statement for storing, handling, and disposal of waste and Record keeping of all records			
Sewage	Pollution of environment with waste materials	◊ Adequate sanitation facilities e.g. chemical toilets must be provided at the camp depot and construction site. ◊ Bush toileting is prohibited. ◊ Uncontrolled emptying of chemical toilets is prohibited.	**CONTRACTOR & ENGINEERS**	Prevent environmental pollution	Frequency Duration of the project

		◊ Letter of consent from a registered waste facility to allow contractor to empty the toilet facility at their sewer system should be in the environmental document.			
MANAGEMENT ACTION		Record keeping copies of all permits and/or agreements.			
Social & Socio-Economic Aspects	Dissatisfaction	◊ A project steering committee (PSC), which comprises of the municipality, Engineers, contractors and community representatives must be convened and details of the project discussed. ◊ The PSC must meet regularly to address any concerns/ issues from the neighbouring land users and employing local labourers.	**CONTRACTOR, ENGINEERS, BENEFICIARIES, MUNICIPALITY & OTHER STAKEHOLDERS**	Ensure satisfaction of works and neighboring land users	Frequency Monthly
MANAGEMENT ACTION		Contravening of PSC meetings and Records of the Minutes			
Construction Material	Illegal removal of material from borrow pits/quarries	◊ Construction material should be obtained from commercial quarries. ◊ If not, then application for a Mining Permit should be lodged with the Free State Department of Mineral Resources.	**CONTRACTOR & ENGINEERS**	Prevent environmental degradation	Frequency Duration of the project
MANAGEMENT ACTION		Illegal mining should be prohibited.			
Health & Safety	Danger to the neighbouring road users, land users and residence	◊ The site should be clearly demarcated for safety reasons and non-employees, neighbouring community and passerby shouldn't be allowed on the construction site as a precautionary measure. ◊ The contractor should provide employees with suitable equipment to protect them from hazards being	**CONTRACTOR & ENGINEERS**	To avoid endangering of the neighbouring Boxwood community	Frequency Once off

		presented and that will allow them to work without risk to the health in a hazardous environment, e.g. hard hats, gloves, boots, etc. ◊ Safety signs complying with SABS and SANS standards should be placed on-site in a manner clearly visible to the public. ◊ Barricading of excavations/open trenches. ◊ Construction methods should adhere to the Occupational Health and Safety Act (Act 85 of 1993). ◊ A safety officer should arrange a safety awareness through the CLO.			
MANAGEMENT ACTION		Risk register should be in place			
2. CONSTRUCTION PHASE					
Flora	Loss of vegetation	◊ Vegetation clearance should be confined to the pipeline route and set out to avoid substantial vegetation disturbance. ◊ Topsoil must be reserved and used as a top layer on disturbed areas to enable plant succession. ◊ All excavations to be filled and rehabilitated before construction moves off sites. ◊ Rehabilitate denuded areas with appropriate species as per specifications. ◊ Management of exotic vegetation encroachment.	Contractor, Engineer, DEO and ECO	Minimize impacts on flora and prevent unnecessary loss of vegetation	<u>Frequency</u> weekly
MANAGEMENT ACTION		ECO audit check list, Photographs taken before the clearance of the pipeline route.			

ASPECT	POSSIBLE IMPACT	MITIGATION PLAN	RESPONSIBLE PERSON (S)	OBJECTIVES	MONITORING ACTION FREQUENCY
Fauna	Disturbance to fauna in the area	◊ Limit the construction footprint. ◊ No hunting, snaring, shooting, nest raiding or egg collection by the construction staff should be allowed. ◊ Toolbox talks should include handling of animals.	Contractor, Engineer, DEO and ECO	Prevent killings of animals and destruction of areas not included in the development footprint.	Frequency Duration of the contract
MANAGEMENT ACTION		ECO checklist, keeping to the construction footprint.			
Topsoil	Loss of Topsoil	◊ Exposure of bare ground will be minimized. Topsoil stripping should be limited and it should be stored separately from subsoil, i.e. no mixing of soils. ◊ In situ material should be removed to an average depth of 1000mm. ◊ Cleared and grubbed topsoil must be stockpiled as a top layer of at least 150mm thickness on the backfilled trenches for rehabilitation purposes. ◊ Soil conservation measures such as berms, gabions and mats should be used on-site to help reduce erosion. ◊ Topsoil stockpile should be weed free ◊ Litter should be removed from the stockpiled topsoil.	Contractor, Engineer, and ECO	Conserve and protect topsoil from erosion and deterioration	Frequency Weekly
MANAGEMENT ACTION		ECO audit check list, photographs			

ASPECT	POSSIBLE IMPACT	MITIGATION PLAN	RESPONSIBLE PERSON (S)	OBJECTIVES	MONITORING ACTION AND FREQUENCY
Topography	Disturbing the natural topography	◊ Trenches, soil dumps and other working areas should be rounded-off to ensure the disturbed area(s) blend in with the natural environment and the possibility of erosion is minimized. ◊ All the excavations should be backfilled to avoid being used as illegal dumping sites. ◊ Rehabilitation by covering the disturbed areas should hasten the succession process and minimize potential erosion.	Contractor, Engineer, DEO and ECO	Minimize the disturbance of topography	Frequency Duration of the project
MANAGEMENT ACTION		ECO audit check list			
Wetlands	Destruction of wetland and loss of wetland dependent biodiversity	◊ Limit the construction footprint as far as possible. ◊ No storage of equipment within the 32m protective buffer zone. ◊ Guidelines for trenching should be followed.	Contractor, Engineer, DEO and ECO	To minimize the loss of wetlands.	Frequency During construction on the identified wetlands
Surface Water	Siltation of the stream resulting in deterioration of water quality	◊ Clearing of vegetation should be kept to a minimum. ◊ No dumping of waste, unused soil/spoil in the stream should be allowed. ◊ Method statement for river crossing should be adhered, see Appendix B.	Contractor, Engineer, DEO and ECO	To minimize the loss of riparian vegetation and deterioration of water quality.	Frequency During construction on the identified wetlands
MANAGEMENT ACTION FOR		ECO Audit Report, Safety Audit report and Complaints Register			

NUISANCE POLLUTION					
Air Quality	Nuisance and reduction in visibility	◊ Occasional wetting of the access routes and construction site must be done by means of a water tanker pipe to keep the dust down and vehicles should drive at 40km/h speed.	Contractor, Engineer, DEO and ECO	To avoid dust from excavated materials and unnecessary visual impact caused by site operations	Frequency Twice a week
Noise	Nuisance	◊ Construction should be limited to normal working days and office hours from 07h30 to 17h00. ◊ Ensure that employees and staff conduct themselves in an acceptable manner while on site, both during work hours and after hours. ◊ Limit working hours of noisy equipment to daylight hours, ◊ Fit silencers to equipment.	Contractor, Engineer, DEO and ECO	To avoid excessive noise generation from site operations	Frequency Duration of Contract
Solid Waste	Littering/ Pollution	◊ All waste should be appropriately separated, contained and disposed be removed from the site to Ficksburg landfill site during the construction period. ◊ Reduction, reuse and recycling of waste should be introduced. ◊ Illegal dumping should be forbidden. ◊ Toolbox talks should include a component of waste management. ◊ Good housekeeping practices.	Contractor, Engineer, DEO and ECO	Provide facilities for appropriate collection and disposal of sewage	Frequency Weekly
Sewerage	Pollution of the receiving	◊ Adequate sanitation facilities i.e. 15 employees per facility should	Contractor, Engineer, DEO	Provide facilities for sanitation	Frequency Weekly

	environment.	be provided. ◊ The toilets should be located at least 50m from the construction site. ◊ They should be kept clean and hygienic regularly to ensure that they are usable. ◊ Effluent must not be discharged into natural environment and bush-toileting is prohibited.	and ECO		
Cement mixing	Pollution of soils, surface and groundwater	◊ Mixing of cement should be done at specifically selected areas on mortar boards or similar structures to contain surface run-off. ◊ Cleaning of cement mixing equipment should be done on proper cleaning trays. ◊ No cement or cement containers should be left lying around.	Contractor, Engineer, DEO and ECO	Avoid polluting soil and groundwater	<u>Frequency</u> Weekly
Water Supply	Source of potable water during the construction phase.	◊ Potable water must be available at the camp site and construction site in clearly marked containers.	Contractor, Engineer, DEO and ECO	Water supply must be available	<u>Frequency</u> Weekly
Energy Efficiency	Saving of fossil fuels	◊ Manual labour should be used as much as possible rather than machinery to conserve fossil fuels.	Contractor, Engineer, DEO and ECO	Saving of fossil fuels by using labour intensive.	<u>Frequency</u> Weekly
Stormwater	Contamination of stormwater	◊ Stormwater must be diverted from the construction works. ◊ Stormwater control works must be constructed, operated and	Contractor, Engineer, DEO and ECO	Avoid contamination of storm water	<u>Frequency</u> Weekly

		maintained in a sustainable manner throughout the project. ◊ Construct and operate the necessary collection facilities and storm water management systems such as diversion berms, ditches, drains, oil separation sumps, gross water ways etc. to prevent contamination of any water. ◊ Stormwater leaving the construction site must in no way be contaminated by any substance produced, stored, dumped or spilled on site. ◊ Washing areas should be designated and contaminated water channeled through an existing system. ◊ No contaminated water should be allowed to run freely into the drainage channels.			
Soil erosion	Erosion	◊ Exposure of bare ground should be minimized and topsoil stripping limited to the development footprint. ◊ Construct within low-flow (dry) period ◊ Ensure correct drainage of areas. ◊ No stockpiling should be allowed within the protective buffer zone of wetlands and riparian zones. ◊ Avoid steep-cut banks of watercourses or drainage lines ◊ All the areas disturbed during construction work needs to be landscaped to a standard similar	Contractor, Engineer, DEO and ECO	Prevent soil erosion	<u>Frequency</u> Weekly

		or better than before on completion of the works before replacement of topsoil. ◊ Correct site reinstatement and landscaping following any disturbances will abate channel and gulley formation. ◊ Make use of geotextiles within disturbed areas of steeper topography to avoid erosion through the surface water runoff.			
Traffic Impact	Safety/ Traffic Impacts	◊ The vehicle construction should limit speed to 40km/h and also be considerate of the surrounding land users. ◊ Only drivers with valid licenses should be allowed to drive the construction vehicles. ◊ Wayleave from Department of Police, Roads and Transport should be obtained.	Contractor, Engineer, DEO, ECO and Traffic Officer	Minimize the disruption of road users	Frequency Weekly
Fire Hazard	Risk of veld fires	◊ No open fires are permitted in the construction site. ◊ The contractors and labourers should be informed and advised on the associated risks, dangers and damage of property caused by accidental fires and how to prevent them. ◊ Fire extinguishers should be made available at the construction site, and the labourers should be informed of their location and shown how to use them.	Contractor, Engineer, DEO and ECO	Prevent veld fires.	Frequency Weekly

		◊ Restrict smoking activities to demarcated smoking activities.			
Vehicle Servicing Areas	Pollution	◊ Vehicle servicing should be done at the identified camp depot on impermeable surfaces to minimize the likelihood of petrochemical spills on soil. In the case of accidents polluted soil should be appropriately treated or taken away to an appropriate site. ◊ Used spares must be collected and disposed of in the correct manner. Oils must be drained into a suitable container, transferred to a larger storage container, and then supplied to oil recycling companies such as Oilkol or the Rose Foundation. ◊ Oil may under no circumstances be disposed off into the sewer lines, storm water system, stream, or the ground. ◊ All construction equipment and vehicles will be cleaned before entering the site to reduce chances of spreading weeds and non-native species.	Contractor, Engineer, DEO and ECO	Prevent soil Erosion	<u>Frequency</u> Weekly
Areas of Palaeontological, Cultural and/or Historical Importance	Disturbance of important scientific artefacts	◊ A circular brick build structure at the historical Anna Maria Mill site should be strictly avoided during construction phase. ◊ Should fossil material be discovered later, it must be	Contractor, Engineer, DEO and ECO	Prevent disturbance of scientific artefacts.	<u>Frequency</u> Duration of the Contract

		appropriately protected and the discovery reported to a palaeontologist for the removal thereof as per SAHRA legislation. ◊ Should any human skeletal remains be found during excavations, work must stop in the area. The findings should be reported immediately to SAHRA.			

ASPECT	POSSIBLE IMPACT	MITIGATION PLAN	RESPONSIBLE PERSON	OBJECTIVES	MONITORING ACTIONS AND FREQUENCY
3. POST CONSTRUCTION PHASE					
Aesthetic view of the area	Aesthetic pollution	◊ The site must be clear of litter and all waste and builders' rubble must be removed and disposed to Ficksburg landfill site. ◊ All stockpiles must be removed to spoil or handled as directed by the engineers. ◊ Spoil heaps should be flattened to the similar adjacent ground, to prevent soil erosion, thus encouraging natural revegetation. ◊ All excavations should be backfilled, leveled and compacted. ◊ All surfaces hardened due to construction must be ripped and material imported thereon be removed. ◊ The original site topography should be restored where as much as possible. ◊ All disturbed areas should be revegetated with indigenous grass to ensure progressive plant succession. Topsoil should be applied at cleared area and where material was	Contractor, Engineer, DEO and ECO	Prevent pollution	Frequency Once off

		stockpiled for this purpose. ◊ A final audit must be completed before the contractor may leave the site to ensure that all requirements were adhered to. ◊ A meeting must be held between the stakeholders to ensure that the site has been restored to a satisfactory condition. ◊ The contractor should rehabilitate the site when construction is completed, thus a detailed rehabilitation plan should be provided by the contractor.			

ASPECT	POSSIBLE IMPACT	MITIGATION PLAN	RESPONSIBLE PERSON	OBJECTIVES	FREQUENCY
4. OPERATION PHASE					
Soil erosion	Increased soil erosion due to lack of vegetation cover.	◊ Monitoring of the wetland and stream crossing for 12 months after rehabilitation should be in place.	**MUNICIPALITY**	Prevent pollution	Frequency 12 months after rehabilitation (once a month)
Water loss	Destruction of the biodiversity	◊ Regular maintenance of the pipeline should be in place.	**MUNICIPALITY**	Minimise loss of water	Frequency Regularly

6 AUDIT AND MONITORING

Compliance monitoring provides useful information for determining environmental performance for the duration of the project. Information gained can also be used to determine how effective mitigation plans might be in achieving objectives of the EMPr, the corrective actions undertaken are adequate and whether any modifications are required. The resident engineer (project manager) should monitor overall aspects of the project, e.g. labour issues and complaints raised by the community, so they can be addressed thoroughly involving the Project Steering Committee. A designated Environmental officer should be on site for the duration of the project to ensure that the conditions of the EA and EMPr are adhered to. The ECO should monitor construction activities at least once a month and the monthly reports should be compiled and presented to the PSC for discussion if need be. It is highlighted that regular meetings between the resident engineer, site manager and ECO should be held to ensure that anticipated environmental impacts are within predicted levels, e.g. noise generation and the implementation of the EMPr is effective.

APPENDIX A

CV OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

CURRICULUM VITAE (CV) FOR LORATO TIGEDI

1. **Name of Firm:** NSVT Consultants
2. **Present Position:** Director-NSVT Consultants
   Associate: Gudani Consulting
3. **Date of Birth:** 1980-09-25
4. **Nationality:** South African
5. **Contact Details:**
   Tel: +27 (0) 51 430 1041/2
   Fax: +27 (0) 86 239 9133
   Cell: +27 (0) 82 784 8259
   Email: lorato@nsvt.co.za
6. **Professional Standing: Professional Natural Scientist (400161/09)**

EDUCATIONAL QUALIFICATIONS:

- University of the Free State (Bloemfontein):
  - Bachelor of Science (Zoology and Grassland Science): 2002
  - Bachelor of Science (Hons): Wildlife: 2004

PROFESSIONAL ACCREDITATION AND ASSOCATIONS

- South African Council of Natural Scientific Professions (SACNASP)- 400161/09
- International Association of Public Participation South African Affiliate (IAP2)- 2010/ZA/FS0001
- International Association for Impact Assessment South Africa Affiliate (IAIAsa)- 2191

CONFERENCES ATTENDED:

- International Association of Impact Assessment South Africa Affiliate
  - 2015
  - 2013
  - 2011
  - 2010
  - 2008
  - 2005

CONTINUED PROFESSIONAL DEVELOPMENT:

- Resources & Sustainability, Physical & Biological Environment and Informatics-2006
- Project Management for Environmental Management (EMS)-2006
- Social & Economic Sustainability-2006
- Offered by DR. P.J. Aucamp "The use of Matrices in the EIA Process"-2008
- Planning for Effective Public Participation-2010
- Effective Communications-2010
- Techniques for Effective Public Participation-2010
- Introduction to Social Impact Assessment-2011
- IWRM, the NWA and the Water Use Authorisations focusing on Water Use License Applications, Procedures, IWMPs and Monitoring-2013
- One Environmental System-2015

RELEVANT EXPERIENCE:

Loreto Tigedi joined Geo Pollution Technologies (Free State) in 2003-04, and partnered with Cedric Nelson to set up Bokamoso Consultants as an environmental consultant, which later changed to NSVT Consultants. From 2004 after completion of BSc Hons (Wildlife), she enrolled for Masters Degree in Environmental Management in 2006 and the degree is still to be completed. In 2011, she set up NSVT Consultants CC as a sole member. She has approximately 12 years in environmental consulting and have completed basic assessment, environmental impact assessment and waste management license applications for Free State, Northern Cape, North West and Eastern Cape Provinces. She therefore has extensive knowledge regarding the competencies required to ensure implementation and alignment of environmental policy instruments such as EIA.

Her keen interest is public participation and conflict management, hence she has completed short courses in Planning for Effective Public Participation, Social Impact Assessment and Conflict Management. She has considerable public participation experience through her work in EIA and understand that an effective public participation process provides an opportunity for identifying problems during the EIA process and identifying opportunities that could be used in the decision making process.

LANGUAGES:

LANGUAGE:	SPEAKING	READING	WRITING
Setswana	Excellent	Excellent	Excellent
Sesotho	Good	Good	Good
English	Good	Excellent	Excellent
Afrikaans	Fair	Excellent	Fair

KEY PROJECTS:

A list of some of the projects that Loreto has undertaken are tabulated below.

NAME	DESCRIPTION	CLIENT	YEAR COMPLETED
Thaba Nchu Solid Waste Site	Application for rezoning and closure of the landfill site, included public participation.	Mangaung Local Municipality	2003
Botshabelo Solid Waste Site	Application for rezoning of the landfill site, included public participation.		2003
Ladybrand wastewater treatment works	Environmental Authorisation application, including public participation.	Kwezi V3 Consulting Engineers	2004
Ladybrand Reservoir	Environmental authorisation application for a new reservoir and pipeline.	Trubuild Consulting Engineers	2004
Dewetsdorp Wastewater Treatment Works	Environmental Authorisation for upgrading of the wastewater treatment works.	Ninham Shand Consulting Engineers	2006
Lower Majeakgoro Access Road	Application for Exemption from conducting Basic Assessment and Public Participation	Vela VkE	2006
Marquard wastewater treatment works	Application for exemption from conducting EIA process for upgrading of the treatment works.	ISA & Partners Consulting Engineers	2006

NAME	DESCRIPTION	CLIENT	YEAR COMPLETED
Senekal wastewater treatment works	Application for exemption from conducting EIA process for upgrading of the treatment works.	ISA & Partners Consulting Engineers	2006
Mount Arthur Access Road	Environmental authorisation application for construction of a access road.	Thuso Development Consultants	2007
D313 Road	Upgrading of D313 road from Morokweng to Vorstershoop.	Babereki Consulting Engineers	2008
Jan Kempdorp wastewater treatment works	Environmental authorisation application for upgrading of the treatment plant.	Phokwane Local Municipality	2008
Jagersfontein wastewater treatment works	Environmental authorisation for the upgrading of the treatment works.	Phethogo Consulting Engineers	2009
Zamdela Residential Development	Environmental Authorisation application for development of new residential area including associated infrastructure.	YB Mashalaba & Associates Phethogo Consulting Engineers	2009
Wepener Residential Development			2010
Khuis Resettlement Planning	Community facilitation and public participation process for the resettlement planning and environmental authorisation application.	Regional Land Claims Commission Northern Cape	2010
Mantsopa Solid Waste Sites	Environmental authrohsation applicatios opr new landfill sites.	Bigen Africa	2011
N8 Interchange, Thaba Nchu	Environmental Authorisation application for a new interchange, overhead and pedestrian bridge.	UWP Consulting Engineers	2011
Marquard wastewater treatment works	Waste management license applications for development of new treatment plant.	ISA & Partners Consulting Engineers	2011
Vredefort wastewater treatment works	Application for rectification for upgrading the treatment works without obtaining an Environmental Authorisation.	SOBK Engineering	2011
Mauersnek Residential Development	Environmental Authorisation application for development of new residential area including associated infrastructure.	Phethogo Consulting Engineers	2012
Mooiplaats Residential Development	Environmental Authorisation application for development of new residential area including associated infrastructure.	YB Mashalaba & Associates	2012
Makholokoeng Photovoltaic Solar Power Plant	Environmental authorisation application for development of a solar power plant.	Ekhaya Solar Earth	2013

NAME	DESCRIPTION	CLIENT	YEAR COMPLETED
Kopanong Waste License Applications	Waste management license application for 5 landfill sites.	Department of Environmental Affairs	2013
Soverby Low water bridge and associated infrastructures, Northern Cape	Water use license application Mining permit applications for 3 borrow pits. Environmental Authorisation application for the low water bridge	BVI Consulting Engineers	2014
Botshabelo Pipeline	Application for the proposed pipeline in Section F Botshabelo.	Flagg Consulting Engineers	2014
Rouxville Bulk Water Supply Project	Application for the proposed pipeline with stream crossings in Rouxville.	ISA & Partners	2014
Mafube LM Residential Development	Application for Environmental Authorisation for the proposed residential development in Tweeling, Cornelia and Frankfort	Pula Strategic Resource Management	2014
Phumelela LM Residential Developments	Application for Environmental Authorisation for the proposed residential development in Vrede and Warden	Phethogo Consulting Engineers	2014
Matjhabeng LM Residential Development	Application for Environmental Authorisation for the proposed residential development in Homestead, Thabong in Welkom		2014
Upgrading of road D313 from Morokweng to Tsenge, North West	Mining permit applications for 5 borrow pits to be used to source material for the upgrading.	T-square Enginering	2014
Botshabelo Pipeline	Environmental Authorisation for the proposed pipeline from new reservoir to the Botshabelo water purification plant	Phethogo Consulting Engineers	2014
Klippoortjie Mine	Public Participation Process for the proposedcoal mine in Klippoortjie.	Gudani Consulting	2013
Weltevreden Residential Development, Qwa Qwa	Environental authorisation for development of a residential area.	YB Mashalaba & Associates Consultants	2014
Lotusville Residential Development, Harrismith			Current (90% completed)
Thaba Nchu Interchange Closure Application	Closure application for borrow pit used in the construction of bridges in Thaba Nchu.	UWP Consulting Engineers	2014
Phumelela Residential Development (Vrede and Warden)	Environmental authorisation for the proposed residential developmentsfor towns in Phumelela LM.	Phethogo Consulting Engineers	2014
Bultfontein Residential Development	Environmental Authorisation Application for the proposed residential development in Paul Roux, Freee State.	Phethogo Consulting Engineers	2014
Paul Roux Residential Development	Environmental Authorisation Application for the proposed residential development in Paul Roux, Freee State.		2015

NAME	DESCRIPTION	CLIENT	YEAR COMPLETED
Bloemwater Pipeline	Integrated public participation and social facilitation for new pipeline from Rustfontein dam to Lesaka reservoir.	Babereki HHO JV	Current
N8 Realignment from N8/R26 Intersection to Maseru Bridges	Public participation process for the proposed N8 realignment.	SMEC Consulting Engineers	Current (90% completed)
Colesberg Interchange Borrow Pit Closure application	Closure application for borrow pit used in the construction of interchange in Colesberg.	UWP Consulting Engineers	Current (95% complete)
Rapid Bucket Eradication	Social Facilitation for the implementation of the rapid bucket eradication programme in the Free State Province	Babereki Consulting Engineers	Current
Koffiefontein Solid Waste Site	Waste Management License Application for the existing Koffiefontein SWS	Bovicon Consulting Engineers	Current (90% completed)
Viva Filling Station	Environmental Compliance Monitoring for the construction of a filling station in Mahing.	Cronje Broers Boerdery Trust	Current
Ficksburg Pipeline	Environmental Authorisation and Water Use License Application for the proposed Ficksburg Pipeline from Meulspruit Dam to Ficksburg WWTW	Flagg Consutling Engineers	Current

REFERENCES

CONTACT NAME	ORGANISATION	TELEPHONE NUMBERS
Mamofolo Matebele	Babereki Consulting Engineers	051 522 4865
Solomon Munthali	TS Consulting ENgineers	071 875 8952
P. De Bie	Phethogo Consulting	051 448 6006

I confirm that the above CV is an accurate description of my qualifications and experience in environmental management, waste management license applications, which included basic assessment and environmental impact assessment processes, water use license and mining permit and rights applications, and environmental compliance monitoring.

Name: Lorato Tigedi *Pr. Sci. Nat.* **Signature** :_____ **Date**: 2015-11-06

APPENDIX B

METHOD STATEMENT FOR RIVER CROSSING