APPENDIX G

Environmental Management Programme (EMPr)

ENVIRONMENTAL MANAGEMENT PROGRAMME

The Proposed Construction of a Pipeline Senekal Bulk Water Supply Setsoto Local Municipality

Proponent: Setsoto Local Municipality
MDA Ref No: 40714
Date: May 2019

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Town & Regional Planners,
Environmental & Development
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1. INTRODUCTION

1.1 Project and associated construction activities

The proposed project entails the construction of a 500mm diameter pipeline. The pipeline will be constructed within 32m of a watercourse at certain section. In addition, the pipeline will also cross the watercourse. The construction of an 11 000kℓ reservoir will also be undertaken as part of the project. Note that, due to the volume of the proposed reservoir, activities associated with the construction of the reservoir is not listed as per GN 324, 325 or 327. The project will form part of the bulk water supply of Senekal, Setsoto Local Municipality.

Please refer to the map in Appendix A of the Basic Assessment Report for an indication on the locality of the proposed activities.

1.2 Objectives of the EMPr

The EMPr aims to fulfil the requirements in terms of the National Environmental Management Act (Act 107 of 1998), with the following objectives:

- To identify, predict and evaluate actual and potential impacts on the environment, socio-economic conditions and cultural heritage, the risks and consequences and alternatives and options for mitigation of activities, with a view to minimizing negative impacts, maximizing benefits and promoting compliance with the principles of environmental management;
- To identify and employ the modes of environmental management best suited to ensuring that the activity is pursued in accordance with best environmental management practices;
- To be able to respond to unforeseen events; and
- To provide feedback on compliance.

1.3 Implementation of the EMPr

The proponent, namely Mangaung Metropolitan Municipality is responsible for the implementation of the EMPr. All contractors should be supplied with a copy of the EMPr and should ensure that construction staff adheres to the mitigation measures.

2. PREPARATION OF THE EMPR

2.1 Person(s) who prepared the EMPr

i) Mr Neil Devenish
ii) Me Hanlie Stander

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2.2 Expertise of the person(s) who prepared the EMPr

i) Mr Neil Devenish

Key qualifications:
- Key competencies and experience include development control applications (applications and appeals pertaining to rezoning, consolidations, subdivisions etc.) township establishment applications, environmental management and control applications.

Education:
- B. A. (Sociology, Geography) University of the Free State, SA, 1994
- Master of Town and Regional Planning, University of the Free State, SA, 1996
- Managing the Environmental Impact Assessment Process, Environmental Management Unit, PU for CHE, 2000
- Environmental Management Consulting, South African Institute of Ecologists & Environmental Scientists, 2001
- Water Law of South Africa, The South African Institution of Civil Engineers (SAICE), 2006

ii) Me Hanlie Stander

Key qualifications:
- Key competencies and experience include environmental management and research in zoology and environmental management.

Education:
- B.Sc. (Zoology), University of the Free State, South Africa, 2005

- B.Sc. Honors (Zoology), University of the Free State, South Africa, 2006
- M.Sc. (Zoology), University of the Free State, South Africa, 2012

3. RECOMMENDED MANAGEMENT AND MITIGATION MEASURES

ECO - Environmental Control Officer / IECO - Independent Environmental Control Officer

Compliance and Monitoring					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
Record keeping of compliance and monitoring reports	1. The applicant will ensure that the contractors adhere to the recommendations of the EMPr and conditions of the Environmental Authorisation during construction.	Applicant / Contractor	Contractor / ECO / Applicant	On-going	During planning, construction and rehabilitation phase
	2. An Environmental Control Officer (ECO) will be appointed to monitor the construction phase. Note that the ECO may be appointed separately or can be part of the contractor's team.	ECO / Contractor	IECO	On-going	During construction and rehabilitation phase
	3. Regular monitoring and / or spot inspections at least every fortnight during the construction phase is recommended.	ECO / Contractor	ECO/ IECO	On-going	During construction and rehabilitation phase
	4. Inspections should be documented and any shortcomings addressed immediately.	ECO / Contractor	ECO/ IECO	On-going	At all phases

Compliance and Monitoring					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
	5. A report will be provided by the independent ECO to the contractor upon completion thereof. The findings thereof should be made available to the competent authority (for example DESTEA, DWS), should it be requested.	IECO / Contractor	ECO/ DESTEA / DWS	On-going	At all phases
	6. Any emergency or unforeseen impact will be reported to the relevant environmental department / DWS within 24 hours after identification for telephonic approval and will be confirmed in writing.	ECO / Contractor	ECO/ IECO / DWS / DESTEA	On-going	At all phases
	7. During the operational phase the pipeline and associated infrastructure must be routinely audited and maintenance schedule adjusted accordingly in order to prevent leakage.	Applicant	DWS / DESTEA	On-going	During operational phase
	8. Material Safety Data Sheets (MSDS) should be available on site. Where possible and available, MSDS should include information on ecological impacts and measures to minimize negative environmental impacts during accidental releases or escapes.	ECO / Contractor	ECO/ IECO / DWS / DESTEA	On-going	During construction and rehabilitation phase
	9. Procedures in the MSDS should be implemented in case of an emergency	ECO / Contractor	ECO/ IECO / DWS / DESTEA	On-going	During construction and rehabilitation

Compliance and Monitoring					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
					phase
	10. The following documents should be available on site, and made available to the competent authority on request (if applicable): - Complaints Register - Environmental Incident Register - Disposal Certificates of waste generated - during the construction / operational phase - Disposal Certificates of waste generated as a result of the construction activities. - Environmental Monitoring (Audit) Reports - Written Corrective Action Instructions - Environmental Authorisation - DWS Permit / License - Blasting Permit - EMPr	ECO / Contractor	ECO/ IECO / DWS / DESTEA	On-going	During construction and rehabilitation phase

Planning and Design phase					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
Planning and design NOTE: Should the following aspects not be taken into consideration during the Planning and Design Phase, the environmental impacts associated with the construction and operation phase will be of high significance as the environment	1. No environmental mitigation measures are required during the planning phase on the proposed site, as no mitigation measures are to be implemented on site during the planning phase.	Applicant / Engineers / Environmental Consultant / Contractor	Applicant	On-going	During planning and design phase
	2. The design and layout of the proposed project will take the possibility of flooding, erosion and pollution into consideration	Applicant / Engineers / Environmental Consultant / Contractor	Applicant	On-going	During planning and design phase
	3. The applicant, engineers, environmental consultants and specialists should take the following steps during the planning phase: - Permits will be obtained for the removal / transplantation of protected species (if any) that are located within the construction area where no alternatives are possible. - A monitoring system should be implemented to determine the occurrence (if any) of any fuel / oil spillages during the construction phase.	Applicant / Engineers / Environmental Consultant / Contractor	Applicant	On-going	During planning and design phase

Planning and Design phase					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
will be negatively affected.	- The necessary Environmental Authorisation will be obtained before any activities listed in the Regulations are undertaken. - In addition, the necessary DWS registrations will be obtained, before any construction activities near watercourses are undertaken. - The necessary precautions with regard to road safety will be implemented for construction work to be undertaken within road crossings (if any). - Proper sanitation, potable water and waste facilities will be in place before construction activities are undertaken. - A blasting permit will be obtained before blasting activities is undertaken (if any).				

Construction phase					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
General measures to consider	1. Any construction is disruptive and the environment must be given consideration with every activity undertaken	Contractor	ECO / IECO	On-going	During construction phase
	2. All relevant standards relating to legislation should be adhered to (including waste emissions, waste disposal, noise regulations, etc.)	Contractor	ECO / IECO	On-going	During construction phase
	3. According to Section 28 of the NEMA Act 107, every person who cause, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring and if it can't be avoided or stopped, to minimize and rectify such pollution or degradation of the environment.	Contractor	ECO / IECO	On-going	During construction phase
	4. The pollution control provision in Section 19(1) of the National Water Act (Act 36 of 1998) should be adhered to at all times.	Contractor	ECO / IECO	On-going	During construction phase

Construction phase					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
	5. ECO should be provided with a layout of the site, indicating the position of the following prior to the site establishment, for acceptance: - Ablution Facilities - Storage Areas - Ready-mix Areas - Stockpile Areas - Waste Disposal Facilities - Hazardous Substances Storage Area - Etc.	Contractor / ECO	ECO / IECO	On-going	During construction phase
	6. Designate the boundaries of the active construction start-up site, by erecting fencing / danger tape (where applicable)	Contractor	ECO / IECO	On-going	During construction phase
	7. Fence off operational footprint area (if possible) to ensure all operational activities are contained within the designate area.	Contractor	ECO / IECO	On-going	During construction phase
	8. All construction and operational activities must be contained within the demarcated servitude determined in consultation with the ECO.	Contractor / ECO	ECO / IECO	On-going	During construction phase
	9. Care will be taken to prevent unnecessary damage to vegetation near to construction activities.	Contractor	ECO / IECO	On-going	During construction phase

Construction phase					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
	10. The necessary precautions with regard to road safety will be implemented for construction work within road crossings (if any).	Contractor	ECO / IECO	On-going	During construction phase
	11. Proper sanitation, water and waste facilities will be in place for construction workers throughout the construction phase.	Contractor	ECO / IECO	On-going	During construction phase
	12. Chemical toilets will be cleaned and serviced regularly and proof thereof will be available on site.	Contractor	ECO / IECO	On-going	During construction phase
	13. Potable water will be made available daily to workers on site.	Contractor	ECO / IECO	On-going	During construction phase
	14. Fire-fighting equipment will be available on site, where applicable.	Contractor	ECO / IECO	On-going	During construction phase
	15. If artefacts or graves are uncovered during construction activities, work in the immediate vicinity will be stopped until the project Archaeologist and SAHRA has been consulted.	Contractor	ECO / IECO	On-going	During construction phase
	16. Adjacent landowners will be notified of proposed blasting, 24 hours prior to blasting activities.	Contractor	ECO / IECO	On-going	During construction phase

Construction phase					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
Site access	1. Necessary drawings for the upgrading of intersections (if any) are to be submitted to the relevant authority (SANRAL / Provincial Department of Roads / Municipality's Department of Roads) for approval, and the upgrades are to be implemented	Applicant / Contractor	ECO / IECO	On-going	During construction phase
	2. The current access road should be improved, when required	Contractor	ECO / IECO	On-going	During construction phase
	3. Proper storm water measures are to be implemented to avoid run-off of water and washing of sand / soil onto the road	Contractor	ECO / IECO	On-going	During construction phase
	4. Erosion measures will be implemented	Contractor	ECO / IECO	On-going	During construction phase
	5. Removal of vegetation will be kept to the required area	Contractor	ECO / IECO	On-going	During construction phase
	6. No animals will be hunted / captured on site (only to be undertaken by a relevant specialist)	Contractor / ECO	ECO / IECO	On-going	During construction phase
Employee conduct on site	1. No animals may be harmed / captured / trapped and / or hunted. This must be strictly enforced.	Contractor / ECO	ECO / IECO	On-going	During construction phase

Construction phase					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
	2. Animals found at the construction site will be removed and relocated to an appropriate area, by a suitable, qualified person	Contractor / ECO	ECO / IECO	On-going	During construction phase
	3. No open fires allowed. Provision will be made that no accidental fires are started.	Contractor / ECO	ECO / IECO	On-going	During construction phase
	4. No firewood will be collected on site or in surrounding areas, without written approval from the landowner.	Contractor / ECO	ECO / IECO	On-going	During construction phase
	5. No smoking or open fires will be allowed near storage facilities	Contractor / ECO	ECO / IECO	On-going	During construction phase
	6. No waste may be dumped on site	Contractor / ECO	ECO / IECO	On-going	During construction phase
	7. Employees should make use of the ablution facilities provided	Contractor / ECO	ECO / IECO	On-going	During construction phase
Soil, erosion and vegetation management	1. Construction activities will be limited to designated construction areas to prevent peripheral impacts on surrounding natural habitats. Construction vehicles will also keep to constructed roads where possible, so that natural vegetation is not destroyed unnecessarily.	Contractor / ECO	ECO / IECO	On-going	During construction phase

Construction phase					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
	2. Access roads or temporary crossings must be non-erosive, structurally stable and not induce flooding / safety hazard.	Contractor / ECO	ECO / IECO	On-going	During construction phase
	3. If any access road or temporary crossing is impaired, it will be repaired immediately to prevent any future / further damage.	Contractor / ECO	ECO / IECO	On-going	During construction phase
	4. All human movement and activities will be contained within designated construction areas in order to prevent peripheral impacts on surrounding natural habitat.	Contractor / ECO	ECO / IECO	On-going	During construction phase
	5. Erosion management is important. Rehabilitation measures must be monitored to ensure that no erosion has occurred and the disturbed areas have been adequately re-vegetated.	Contractor / ECO	ECO / IECO	On-going	During construction phase
	6. Concurrent rehabilitation of disturbed areas will be undertaken to help the recovery of the vegetation.	Contractor / ECO	ECO / IECO	On-going	During construction phase
	7. Stockpiled soil will be stockpiled in an area where it will not be disturbed by vehicles.	Contractor / ECO	ECO / IECO	On-going	During construction phase

Construction phase					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
	8. Stockpiled soil will be protected from washing away during rainstorms. For example: - One layer of bricks or stones can be placed around the stockpiled topsoil. - Bricks may be placed around the stockpiles, to limit the loss thereof due to rainy events. - Stockpiles should not be higher than 1.5 m. - The gradient of stockpiles should not be greater than 1:1.5.	Contractor / ECO	ECO / IECO	On-going	During construction phase
	9. Stockpiles should be located away from drainage lines, watercourses and areas of temporary flood	Contractor / ECO	ECO / IECO	On-going	During construction phase
	10. All soil excavated is to be separated into top- and subsoil. Subsoil must be used for backfilling and topsoil for landscaping and rehabilitation of disturbed areas	Contractor / ECO	ECO / IECO	On-going	During construction phase
	11. Stockpiled material will be placed on the cleared areas once construction is completed. Re-spreading of topsoil is preferably to be done to the natural level.	Contractor / ECO	ECO / IECO	On-going	During construction phase

Construction phase					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
	12. Fertilisers should be used where topsoil and subsoil was mixed or where the topsoil is not up to original standard	Contractor / ECO	ECO / IECO	On-going	During construction phase
	13. Indigenous tree species in the vicinity of the operational site (if any) should be marked with danger tape. Disturbance to such species should be avoided, where possible.	Contractor / ECO	ECO / IECO	On-going	During construction phase
	14. A permit for the removal of protected plant species will be obtained before the removal of these species (if any).	Applicant / Contractor	ECO / IECO	On-going	During construction phase
	15. An alien control and monitoring programme will be developed starting during the construction phase and will be carried over into the operational phase.	Contractor / ECO	ECO / IECO	On-going	During construction phase
	16. Any proclaimed weed or alien species that germinates during the contract period will be cleared by hand / approved chemicals before flowering thereof.	Contractor / ECO	ECO / IECO	On-going	During construction phase
	17. Imported fill material will be monitored during and after construction for the presence of any alien species. Any such species will be removed immediately.	Contractor / ECO	ECO / IECO	On-going	During construction phase

Construction phase					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
	18. Fire fighting equipment will be available on site.	Contractor / ECO	ECO / IECO	On-going	During construction phase
	19. Species, especially grasses, trees and shrubs occurring in the region will be used to rehabilitate disturbed areas.	Contractor / ECO	ECO / IECO	On-going	During construction phase
	20. Compacted soils (such as dirt tracks not to be utilised during the operational phase) must be ripped to ensure the establishment of natural occurring vegetation.	Contractor / ECO	ECO / IECO	On-going	During construction phase
	21. Should natural re-growth not be sufficient, the area should be hydro-seeded.	Contractor / ECO	ECO / IECO	On-going	During construction phase
	22. Concurrent rehabilitation should be undertaken, where possible.	Contractor / ECO	ECO / IECO	On-going	During construction phase
	23. Vegetation clearance will be limited to the required area.	Contractor / ECO	ECO / IECO	On-going	During construction phase
	24. Speed limit will be enforced on the construction vehicles and these vehicles will only make use of designated roads / pathways.	Contractor / ECO	ECO / IECO	On-going	During construction phase

Construction phase					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
	25. Dust control measures will be implemented if nuisance dust generation occurs during the construction period.	Contractor / ECO	ECO / IECO	On-going	During construction phase
	26. All archaeological findings (if any) should be recorded and reported to SAHRA. No construction activities in the area may proceed without the authorisation from SAHRA.	Contractor / ECO	ECO / IECO	On-going	During construction phase
	27. Storm water measures will be implemented in order to manage storm water and this will also prevent erosion.	Contractor / ECO	ECO / IECO	On-going	During construction phase
	28. Visual inspections for the occurrence of erosion should be undertaken on a weekly basis.	Contractor / ECO	ECO / IECO	On-going	During construction phase
	29. No animals may be captured / harmed / killed on site.	Contractor / ECO	ECO / IECO	On-going	During construction phase
	30. Any occurrences of harmed animals should be reported to the ECO and recorded as such.	Contractor / ECO	ECO / IECO	On-going	During construction phase
Minimise contamination and	1. Use of potentially polluting and hazardous substances should be strictly controlled	Contractor / ECO	ECO / IECO	On-going	During construction phase

Construction phase					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
sterilisation of soil	2. If soil is significantly contaminated by hazardous substances, then this soil is considered as hazardous and should be disposed of according to best practices	Contractor / ECO	ECO / IECO	On-going	During construction phase
	3. Minor vehicle repair / maintenance will be conducted on site, and impacts like oil spills should be appropriately mitigated. Spill response procedures must be clearly defined and well known by all staff.	Contractor / ECO	ECO / IECO	On-going	During construction phase
	4. All threatened or protected plant species as specified by the NEM: Biodiversity Act (2004) will be identified on site. Permits are required for the removal / transplantation of these plants.	Contractor / ECO	ECO / IECO	On-going	During construction phase
Trenching, placing of pipeline and covering of pipeline	1. Site will be kept neat and tidy.	Contractor / ECO	ECO / IECO	On-going	During construction phase
	2. Appropriate area will be identified as a stockpiling area.	Contractor / ECO	ECO / IECO	On-going	During construction phase
	3. Speed limit will be enforced on the construction vehicles and these vehicles will only make use of designated roads / pathways.	Contractor / ECO	ECO / IECO	On-going	During construction phase

Construction phase					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
	4. Dust control measures will be implemented if nuisance dust generation occurs during the construction period.	Contractor / ECO	ECO / IECO	On-going	During construction phase
	5. Stockpiled material will be stored in such a way to limit the loss thereof. For example: - Bricks may be placed around the stockpiles, to limit the loss thereof due to rainy events. - Stockpiles should not be higher than 1.5 m. - The gradient of stockpiles should not be greater than 1:1.5.	Contractor / ECO	ECO / IECO	On-going	During construction phase
	6. Noise control measures will be implemented.	Contractor	ECO / IECO	On-going	During construction phase
	7. All employees will be provided with the correct PPE.	Contractor	ECO / IECO	On-going	During construction phase
	8. Establishment of alien / invader vegetation will be monitored and these species will be removed by hand or by an approved chemical before gestation thereof.	Contractor / ECO	ECO / IECO	On-going	During construction phase

Construction phase					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
	9. All archaeological findings (if any) should be recorded and reported to SAHRA. No construction activities in the area may proceed without the authorisation from SAHRA.	Contractor / ECO	ECO / IECO	On-going	During construction phase
	10. Storm water measures will be implemented in order to manage storm water and this will also prevent erosion.	Contractor / ECO	ECO / IECO	On-going	During construction phase
	11. Visual inspections for the occurrence of erosion should be undertaken on a weekly basis.	Contractor / ECO	ECO / IECO	On-going	During construction phase
	12. No animals may be captured / harmed / killed on site.	Contractor	ECO / IECO	On-going	During construction phase
	13. Any occurrences of harmed animals should be reported to the ECO and recorded as such.	Contractor	ECO / IECO	On-going	During construction phase
Ablution Facilities	1. No open areas or the surrounding vegetation may be used as 'toilet facilities'.	Contractor	ECO / IECO	On-going	During construction phase
	2. Toilets should be available for all employees. Where waterborne sewerage is not available, the ECO must designate an area within the boundaries of the site for the erection of portable chemical toilets.	Contractor / ECO	ECO / IECO	On-going	During construction phase

Construction phase					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
	3. Toilet facilities shall occur at a minimum ration of 1 toilet per 15 employees.	Contractor / ECO	ECO / IECO	On-going	During construction phase
	4. Toilets shall be maintained in a hygienic state and serviced when required.	Contractor / ECO	ECO / IECO	On-going	During construction phase
	5. Temporary toilets should be serviced regularly and the contents be removed to a licensed disposal facility.	Contractor / ECO	ECO / IECO	On-going	During construction phase
Safeguard water resources	1. No activities will be undertaken within 32 m of a watercourse / within the 1:100 year floodline / 500m of a wetland, without the necessary authorisations (for example from DESTEA and DWS).	Contractor / ECO	IECO / DWS / DESTEA	On-going	During construction phase
	2. Caution will be taken to ensure that construction materials are not dumped or stored within storm water management systems.	Contractor / ECO	IECO / DWS / DESTEA	On-going	During construction phase
	3. Construction activities in the storm water infrastructure will be limited through proper demarcation and appropriate environmental awareness training.	Contractor / ECO	ECO / IECO	On-going	During construction phase
	4. The Contractor is responsible to inform all staff of the need to be vigilant against any practice that will have a harmful effect on waterways.	Contractor	ECO / IECO	On-going	During construction phase

Construction phase					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
	5. Infilling, excavation, drainage and hardening of surfaces will not occur unnecessarily in storm water infrastructure.	Contractor	ECO / IECO	On-going	During construction phase
	6. Emergency plans will be in place in case of fuel spillages (to limit the occurrence of soil as well as groundwater pollution).	Contractor	ECO / IECO	On-going	During construction phase
	7. A monitoring system should be implemented to determine the occurrence (if any) of any fuel / oil spillages during the construction phase.	Contractor	ECO / IECO	On-going	During construction phase
	8. The necessary mitigation measures should be implemented immediately, should any leakages / spills be detected.	Contractor	ECO / IECO	On-going	During construction phase
	9. Weather forecasts from the South African Weather Bureau of up to three days in advance will be monitored on a daily basis to avoid exposing soil or construction works or materials during a storm event and appropriate action will be taken in advance to protect construction works should a storm event be forecasted.	Contractor	ECO / IECO	On-going	During construction phase
	10. All no-go areas will be demarcated under guidance of the Environmental Control Officer (ECO).	Contractor / ECO	ECO / IECO	On-going	During construction phase

Construction phase					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
	11. The design of drainage systems will ensure that there is no contamination or eutrophication. Drainage systems will be maintained regularly in order to minimize the runoff of harmful chemical substances into the waterway(s).	Contractor	ECO / IECO	On-going	During construction phase
	12. It will be ensured that the construction activities have minimal effects on the flow of water through the storm water infrastructure.	Contractor	ECO / IECO	On-going	During construction phase
	13. No erosion or siltation may occur due to any construction or operational activities.	Contractor	ECO / IECO	On-going	During construction phase
	14. Construction and operational activities should take the wetland boundaries and associated buffer zones into consideration (if any).	Contractor	ECO / IECO	On-going	During construction phase
	15. Occurrence of erosion will be monitored. Reparations will be undertaken as soon as possible.	Contractor	ECO / IECO	On-going	During construction phase
Workings within / near to	1. Storm water measures will be implemented in order to manage storm water and this will also prevent erosion.	Contractor	ECO / IECO	On-going	During construction phase

Construction phase					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
watercourses	2. Construction activities in waterways should be undertaken in such a manner that no containment of water is required, where possible. 2/3 of the waterways may be diverted at a time, where required.	Contractor	ECO / IECO	On-going	During construction phase
	3. The necessary authorisations should be obtained from DWS, should the containment of water be required.	Contractor	ECO / IECO / DWS	On-going	During construction phase
	4. All scour outlets will be provided with stone pitched or gabion mattress lined channels.	Contractor	ECO / IECO	On-going	During construction phase
	5. Visual inspections for the occurrence of erosion should be undertaken on a weekly basis.	Contractor / ECO	ECO / IECO	On-going	During construction phase
Handling of waste / Waste Management (Note that waste refers to all construction debris and domestic waste	1. The contractor is responsible for the removal of construction waste.	Contractor	ECO / IECO	On-going	During construction phase
	2. Suitable containers (weather and vermin proof) will be placed on site to collect all solid waste. These will be emptied regularly.	Contractor	ECO / IECO	On-going	
	3. No littering is permitted. During the construction and operational phase the site will be maintained in a neat and tidy condition.	Contractor	ECO / IECO	On-going	During construction phase

Construction phase					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
generated due to construction activities.)	4. All solid waste produced will be disposed of at an authorized landfill site. Recyclable waste may also be sold to recycling contractors.	Contractor	ECO / IECO	On-going	During construction phase
	5. No dumping, burning or burying of waste will be undertaken on site.	Contractor	ECO / IECO	On-going	During construction phase
	6. All hazardous waste will be disposed of at an authorized hazardous landfill site. Recyclable hazardous waste may be re-used or sold to recycling contractors, where possible.	Contractor	ECO / IECO	On-going	During construction phase
	7. A waste management plan will be compiled and designed to ensure that adequate waste management activities are undertaken.	Contractor	ECO / IECO	On-going	During construction phase
	8. Areas used for waste storage and loading of materials should be lined and bund walls have to be erected to contain any spills that might occur.	Contractor	ECO / IECO	On-going	During construction phase
	9. Waybills providing evidence of correct disposal procedure must be provided for the ECO's inspection.	Contractor	ECO / IECO	On-going	During construction phase
	10. Waste classification should be undertaken.	Contractor	ECO / IECO	On-going	During construction phase

Construction phase					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
	11. Visual inspections for the occurrence of pollution should be undertaken daily.	Contractor	ECO / IECO	On-going	During construction phase
	12. Spills should be cleaned up immediately according to best practices	Contractor	ECO / IECO	On-going	During construction phase
	13. DWS should be notified of any spillage / pollution of water sources (groundwater and / or surface water) within 24 hours of occurrence	Contractor	ECO / IECO / DWS	On-going	During construction phase
	14. Record should be kept on site to indicate date of visual inspection, any spillages observed, and manner in which spill was treated.	Contractor / ECO	ECO / IECO / DWS	On-going	During construction phase
Health, safety and security	1. Site should be fenced / marked with danger tape, where possible.	Contractor	ECO / IECO	On-going	During construction phase
	2. The contractors will comply with the Occupational Health and Safety Act, National Building Regulations and any other national, regional or local regulations with regard to safety on site.	Contractor	ECO / IECO	On-going	During construction phase
	3. Construction contracts will include safety and security measures for staff.	Contractor	ECO / IECO	On-going	During construction phase

Construction phase					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
	4. Precautions to ensure that construction staff and sites are visible and proper PPE will be provided to all employees.	Contractor	ECO / IECO	On-going	During construction phase
	5. Suitable warning and information signage should be available at the storage facilities. In addition, telephone numbers of emergency services (including local firefighting services) must be posted conspicuously on site.	Contractor	ECO / IECO	On-going	During construction phase
	6. Employees should be made aware of the health risks associated with any hazardous substances / dangerous goods used or stored on site. This includes soil that was contaminated with oil or diesel, etc.	Contractor	ECO / IECO	On-going	During construction phase
	7. Employees should receive relevant safety training in handling of hazardous substances / dangerous goods associated with the proposed project.	Contractor	ECO / IECO	On-going	During construction phase
	8. Construction work within road reserves will accommodate road users as far as possible. This includes the following: - Roads will be crossed in half widths at a time to minimise the impact on vehicular traffic, where possible. - Construction along and across existing roads will be executed in such a manner	Contractor	ECO / IECO	On-going	During construction phase

Construction phase					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
	that both pedestrian and vehicular traffic is accommodated at all times. - The contractor will be required to maintain adequate access to all public and private property at all times. - Contractor will supply, erect and maintain road signs for all work areas conforming to the prescribed layout and requirement of the South African Road Traffic Signs Manual and other relevant notices.				
	9. Fire extinguishers will be available on site and in the construction camp (if any).	Contractor	ECO / IECO	On-going	During construction phase
	10. The contractor will be required to maintain adequate access to all public and private property at all times.	Contractor	ECO / IECO	On-going	During construction phase
	11. Speed limits of 20km/h will be enforced.	Contractor	ECO / IECO	On-going	During construction phase
	12. All relevant IAPs will be notified prior to any blasting activities	Contractor	ECO / IECO	On-going	During construction phase

Construction phase					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
	13. All relevant IAPs will be notified 24 hours prior to any known potential risks associated with the site and the activities to be undertaken on site (for example, possible downstream flooding as a result of removal of upstream diversion).	Contractor	ECO / IECO	On-going	During construction phase
	14. The necessary precautions with regard to road safety will be implemented for construction work within road crossings.	Contractor	ECO / IECO	On-going	During construction phase
	15. All injuries should be recorded.	Contractor	ECO / IECO	On-going	During construction phase
Heritage	1. In the case of the discovery of any heritage, archaeological or palaeontological significance, the work in the area will be stopped and reported to the archaeologist and SAHRA. Any construction activities in the nearby vicinity may only commence after approval is obtained from SAHRA as well as the ECO.	Contractor	ECO / IECO / SAHRA	On-going	During construction phase
	2. Known heritage resources (if any) must be avoided as far as possible.	Contractor	ECO / IECO / SAHRA	On-going	During construction phase

Construction phase					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
	3. Employees should be encouraged and informed of the need to be on the look-out for potential fossils / buried archaeological material.	Contractor	ECO / IECO / SAHRA	On-going	During construction phase
	4. In the case of the discovery of any stone tools or other archaeological or palaentological material, the work in the immediate vicinity should temporarily cease and reported to the archaeologist and SAHRA. Should any human remains be exposed, the archaeologist as well as the local SAPS should be notified.	Applicant / Contractor	ECO / IECO / SAHRA	On-going	During construction phase
	5. If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (Tel: 021 462 5402) must be alerted. If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Tel: 012 320 8490), must be alerted immediately. A professional archaeologist or palaeontologist,	Applicant / Contractor	ECO / IECO / SAHRA	On-going	During construction phase

Construction phase					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
	depending on the nature of the finds, must be contracted as soon as possible to inspect the findings. If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA.				
	6. Appropriate measures should be undertaken by the ECO until the archaeologist / SAPS visits the site. This should include the following: - Site should be fenced with 'danger tape' - Position of finding should be recorded - Depth of finding should be recorded - Digital image of the finding should be taken - No information on the findings may be made public without the consent of the archaeologist / SAPS.	Applicant / Contractor	ECO / IECO / SAHRA	On-going	During construction phase
	7. Construction activities in the area may only continue after approval from the archaeologist and SAHRA.	Applicant / Contractor / ECO	ECO / IECO / SAHRA	On-going	During construction phase
Noise and dust control	1. Construction activities will be limited to normal daytime hours, where possible	Contractor	ECO / IECO	On-going	During construction phase

Construction phase					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
	2. Noise levels will be kept as low as possible during the construction phase in order not to disturb adjacent landowners	Contractor	ECO / IECO	On-going	
	3. Proper mitigation measures will be implemented to limit noise (e.g. the installation of silencers, where required).	Contractor	ECO / IECO	On-going	During construction phase
	4. Proper mitigation measures will be implemented to limit the formation of dust (e.g. wetting of construction area, when required).	Contractor	ECO / IECO	On-going	During construction phase
	5. The speed of the construction vehicles will be limited to avoid dangerous conditions, the formation of dust and the excessive deterioration of roads being used.	Contractor	ECO / IECO	On-going	During construction phase
Handling and Storage of materials	1. All chemicals used during the development, including fuel, will be stored in a proper storeroom or protected area to prevent pollution.	Contractor	ECO / IECO	On-going	During construction phase
	2. Vehicles will be serviced at designated areas. No oil, diesel or other chemicals may be spilled or discharged anywhere.	Contractor	ECO / IECO	On-going	During construction phase

Construction phase					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
	3. Where applicable, the contractors will ensure that all relevant national, regional and local legislation regarding storage, transport, use and disposal of petroleum, chemical, harmful or hazardous substances and materials are adhered to, where necessary.	Contractor	ECO / IECO	On-going	During construction phase
	4. Cement and concrete mixing, if applicable, will only take place within the construction site. No concrete will be mixed directly on the ground.	Contractor	ECO / IECO	On-going	During construction phase
	5. All environmental problems occurring on the site such as chemical spillage, wasteful water disposal, etc. will be reported to the ECO. The ECO should implement best practices to rectify the impacts thereof on the environment.	Contractor	ECO / IECO	On-going	During construction phase
	6. Spill response equipment must be available during the handling and loading of hazardous waste (if any).	Contractor	ECO / IECO	On-going	During construction phase
	7. Hazardous substances are to be stored in bunded areas.	Contractor	ECO / IECO	On-going	During construction phase
	8. Bund walls will have a capacity of at least 110% of the total capacity of the stored volume.	Contractor	ECO / IECO	On-going	During construction phase

Construction phase					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
	9. No oil, diesel or other chemicals may be spilled or discharged anywhere and contact with bare soil should be avoided at all cost.	Contractor	ECO / IECO	On-going	During construction phase
	10. Drip trays will be used during the servicing of vehicles as well as the transfer of chemicals / substances from transportation vehicles.	Contractor	ECO / IECO	On-going	During construction phase
	11. A monitoring system should be implemented to determine the occurrence (if any) of any fuel / oil spillages / untreated sewer.	Contractor	ECO / IECO	On-going	During construction phase
	12. The necessary mitigation measures should be implemented immediately, should any leakages / spills be detected.	Contractor	ECO / IECO	On-going	During construction phase
	13. Material stockpiles, such as bricks and pipes, must be stable and well secured to avoid collapse and possible injury	Contractor	ECO / IECO	On-going	During construction phase
	14. Material and Safety Data Sheets (MSDSs) should be readily available on site for all hazardous materials. MSDSs should additionally include information on ecological impacts and measures to minimise negative environmental impacts during accidental releases or escapes.	Contractor	ECO / IECO	On-going	During construction phase

Construction phase					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
	15. Storage areas should be kept clean and free from any accumulation of combustible matter (such as paper) and any possible source of ignition should be removed.	Contractor	ECO / IECO	On-going	During construction phase
Hazardous waste management	1. Hazardous wastes must be separated from general wastes, stored within secondary containment in appropriate containers.	Contractor	ECO / IECO	On-going	During construction phase
	2. Proper storage facilities for the storage of hazardous / dangerous goods must be provided to prevent the migration of spillage into the soil and or groundwater.	Contractor	ECO / IECO	On-going	During construction phase
	3. Certificates / waybills of hazardous waste disposals are to be available on request as well as auditing purposes. This includes the removal of soil contaminated with hydrocarbons.	Contractor	ECO / IECO	On-going	During construction phase
	4. Storage of hazardous substances and refuelling areas are to be bunded with an impermeable liner to protect groundwater quality and must comply with the relevant SANS codes.	Contractor	ECO / IECO	On-going	During construction phase
	5. Areas used for the storage of hazardous materials are to be clearly indicated as such.	Contractor	ECO / IECO	On-going	During construction phase

Construction phase					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
Hazardous and Flammable materials: Delivery	1. All deliveries (especially of hazardous nature) must be supervised.	Contractor	ECO / IECO	On-going	During construction phase
	2. Subcontractors and delivery companies should be informed of the delivery procedures and made aware of restrictions as to where materials may be stored.	Contractor	ECO / IECO	On-going	During construction phase
	3. Loads must be secured to prevent spillage during transportation thereof.	Contractor	ECO / IECO	On-going	During construction phase
	4. Hazardous substances are to be transported in sealed drums or bags	Contractor	ECO / IECO	On-going	During construction phase
Hazardous and Flammable materials: Cement and / or concrete mixing	1. Limit cement and concrete mixing to single sites, where possible.	Contractor	ECO / IECO	On-going	During construction phase
	2. No mixing allowed directly onto the ground.	Contractor	ECO / IECO	On-going	During construction phase
	3. All visible remains of excess material will be treated as hazardous waste.	Contractor	ECO / IECO	On-going	During construction phase

Construction phase					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
	4. Solid concrete waste may be treated as inert construction rubble. However, wet cement and liquid slurry and cement powder must be treated as hazardous waste	Contractor	ECO / IECO	On-going	During construction phase
Hazardous and Flammable materials: Gas Storage	1. All combustible materials are to be store at least 3 m from any gas storage areas. In case of any flammable or any other gas storage areas, open flames, welding and cutting operations, smoking, etc. shall be prohibited in or near the storage area.	Contractor / ECO	ECO / IECO	On-going	During construction phase
	2. No gas will be delivered until the site is registered with local Fire Safety.	Contractor / ECO	ECO / IECO	On-going	During construction phase
	3. Cylinders should always be stored in a well-ventilated area away from spark, flames or any source of heat or ignition.	Contractor / ECO	ECO / IECO	On-going	During construction phase
	4. Cylinders should always be handled, stored, used and transported in an upright position. It should not be dropped, dragged or rolled on their sides or allowed to skid. Cylinders that are too large to be carried shall be tilted and rolled on the rims of their foot rings or bases.	Contractor / ECO	ECO / IECO	On-going	During construction phase

Construction phase					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
	5. Valves should be kept properly closed.	Contractor / ECO	ECO / IECO	On-going	During construction phase
Hazardous and Flammable materials: Chemicals, Grease and Oil Storage	1. Storage areas must be bunded and hard surfaced in order to protect groundwater quality.	Contractor	ECO / IECO	On-going	During construction phase
	2. Compliance with SANS codes and hazardous substances bylaws should be adhered to.	Contractor	ECO / IECO	On-going	During construction phase
	3. All lids must be properly sealed / closed to prevent Volatile Organic Compounds (VOCs) and other potentially harmful gaseous compounds from escaping.	Contractor	ECO / IECO	On-going	During construction phase
Hazardous and Flammable materials: Hydrocarbon spillages	1. Spill kits are to be made permanently available at areas which have the potential to be subjected to spillage of hazardous substances and dangerous goods.	Contractor	ECO / IECO	On-going	During construction phase
	2. Remediation of spillages must be conducted immediately and closed out within 24 hours.	Contractor	ECO / IECO / DWS / DESTEA	On-going	During construction phase
	3. No waste water or waste will be disposed of into the surrounding environment at any time. Water collected in bunded areas must be collected in containers and disposed of as hazardous waste.	Contractor	ECO / IECO	On-going	During construction phase

Construction phase					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
	4. Machinery will be kept maintained in line with manufactures specifications to minimise the risk of hydrocarbon spillages.	Contractor	ECO / IECO	On-going	During construction phase
	5. An incident reporting system will be implemented in order to ensure incidents, where spillages has occurred, are closed out and appropriate measures are taken to prevent further incidents.	Contractor	ECO / IECO	On-going	During construction phase
	6. Incidents must be reported to DWS within 24 hours.	Contractor	ECO / IECO / DWS	On-going	During construction phase
	7. Contaminated soil must be disposed of in a hazardous materials skip and removed to a licensed hazardous landfill facility by a licensed contractor.	Contractor	ECO / IECO	On-going	During construction phase

Operational Phase					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
This phase consists of the use of the proposed pipeline. Maintenance and repair will be undertaken on the infrastructure when necessary.	1. Regular inspections of the pipeline are to be undertaken to identify leakages. These will be attended to immediately.	Applicant	DESTEA / DWS	On-going	During operational phase
	2. Maintenance and repair will be undertaken on the infrastructure when necessary.	Applicant	DESTEA / DWS	On-going	During operational phase
	3. Soil erosion occurrences will be attended to immediately.	Applicant	DESTEA / DWS	On-going	During operational phase
	4. Measures will be implemented to minimise the loss of water at any section.	Applicant	DESTEA / DWS	On-going	During operational phase
	5. Establishment of alien vegetation will be monitored and alien species will be removed by hand or by an approved chemical before gestation thereof.	Applicant	DESTEA / DWS	On-going	During operational phase
	6. Visual inspections should be undertaken at least every 6 months to investigate the occurrence of sedimentation and erosion.	Applicant	DESTEA / DWS	On-going	During operational phase
	7. Proper erosion mitigation measures should be implemented.	Applicant	DESTEA / DWS	On-going	During operational phase
	8. Stabilise the banks of the watercourses, where necessary.	Applicant	DESTEA / DWS	On-going	During operational phase

Decommissioning Phase					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
It is not anticipated that the proposed project will cease in the nearby future. However, if decommissioning is decided upon, a rehabilitation plan will be developed and submitted for approval. The end-use of the area will be kept in mind during the compilation of the rehabilitation plan. Activities	1. Temporary structures and office sites (if any) will be dismantled and removed after completion of the construction phase of the project.	Contractor	ECO / IECO	On-going	During construction phase
	2. All waste, equipment, materials, etc. used during construction will be cleared from the site. The contractors will ensure that the site is cleared and rehabilitated to the satisfaction of the ECO.	Contractor / ECO	ECO / IECO	On-going	During construction phase
	3. An alien plant control and monitoring programme will be implemented.	Contractor	ECO / IECO	On-going	During construction phase
	4. The establishment of natural occurring vegetation will be encouraged at disturbed areas.	Contractor	ECO / IECO	On-going	During construction phase
	5. Re-vegetation of disturbed areas will be undertaken with site indigenous species.	Contractor	ECO / IECO	On-going	During construction phase
	6. Hydro-seeding will be implemented if the establishment of natural occurring vegetation does not occur within reasonable time.	Contractor / ECO	ECO / IECO	On-going	During construction phase
	7. After completion of the construction phase, a waterway monitoring program will be initiated that ensure that all are	Contractor	ECO / IECO	On-going	During construction phase

Decommissioning Phase					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
associated with the decommissioning phase will be limited to the rehabilitation of areas disturbed during the construction phase. All disturbed areas will be rehabilitated according to best practices. A rehabilitation plan will be developed, if it is decided to remove the proposed pipeline and	adequately rehabilitated.				
	8. Temporary concrete surfaces (if any) will be removed and compacted areas ripped.	Contractor	ECO / IECO	On-going	During construction phase
	9. Establishment of extensive alien species will be monitored.	Contractor	ECO / IECO	On-going	During construction phase

Decommissioning Phase					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
associated infrastructure before the cessation of the operation aspects of the proposed project. The rehabilitation plan will include management and mitigation measures to be implemented during the decommissioning of the project					

No-Go Option					
Objective	**Mitigation Measure**	**Executing Party**	**Monitoring Party**	**Timeframe**	**Project Stage**
Keeping the status quo - Not construct the water pipeline.	1. The municipality will have to use trucks to transport potable water from adjacent towns. However, this option will largely depend on the accessibility of water from another source, availability of employees as well as suitable trucks. Note that the adjacent towns do not have enough potable water to provide their own areas as well as Senekal with their required volumes of water on a daily basis. Therefore, this option is not seen as a feasible option.	Applicant	DESTEA / DWS	On-going	N/A