Appendix J2.1:

Environmental impacts and risk assessment/Impact Risk Matrix – WWTP Ponds Upgrade

A.	Impact Rating: Site Establishment & Construction	Construction: WWTP Ponds															
				WITHOUT MITIGATION						WITH MITIGATION						
No.	ASPECT	IMPACT	Objective	Probability	Extent	Duration	Magnitude	Receiving Environment	Without Mitigation Score (Baseline)	Probability	Extent	Duration	Magnitude	Receiving Environment	With Mitigation Score (Impact assessment)	Short Description of Mitigation Measures
1	Soils															
1.1	Soil Erosion	Clearing of vegetation during earthworks might make the site susceptible to soil erosion in case of rains	1.1.1 Limit the risk of soil erosion	-4	-2	-4	-2	-1	-2,6	-1	-1	-1	-1	-1	-1	Earth works and site preparation to take place during the drier winter season; Storm water to be channelled away from the exposed area for the duration of construction; soil stockpiles (if any) not to be placed in drainage lines and must be protected from erosion as stated in the EMPr; erosion should be remediated if erosion does take place as per the EMPr.
			1.2.1 Prevent infiltration of incoming raw sewage into soil diverting the incoming sewage from the primary facultative pond to one of the completed dams to undertake construction on the primary facultative pond	-16	-2	-4	-8	-2	-6,4	-2	-1	-2	-2	-1	-1,6	Construction and lining of the secondary and tertiary ponds must take place first (the ponds that does not fall within the existing footprint), so that the incoming sewage which is currently held in the primary facultative pond can be safely transferred/ diverted to these ponds when construction work commences on the primary facultative pond; No pit toilets on site, workers to be provided with temporary chemical toilets; toilets not to be placed within the drainage lines on site; workers not to use the veld for sanitary purposes; suitable washing facilitates must be proved for the workers and should be established in a suitable manner that environment is not polluted any soil contamination on site must be remediated and disposed of in a responsible manner

1.2	Soil contamination	Possible soil contamination from construction activities	1.2.2 Prevent spillage of water potentially contaminated by cement/ chemicals/ fuel & oil from construction vehicles/ machines	-8	-2	-4	-2	-1	-3,4	-2	-2	-1	-1	-1	-1,4	The Contractor must prevent the discharge of any pollutants, such as cement, concrete, lime, chemicals, fuel, oil, waste water, etc; Inspects all construction vehicles/ machinery daily for early detection of deterioration or leaks; The Contractor should ensure drip trays are placed under stationary vehicles/ machines; All spills should be reported to the ECO so that he/ she can investigate the incident and recommend the appropriate mitigation; Any significant spills must be reported to the Department of Water and Sanitation who may conduct a site visit to recommend appropriate mitigation; Spill kits must be available on site & workers should be trained how to use spill kits to rectify a spill immediately; Records of spills should be kept on site; Mixing of cement not to take place on impermeable surfaces; Potentially contaminated water may not be allowed to flow into drainage lines or infiltrate into the soil.
2	**Water**														
2.1	Water quality (groundwater and surface water)	Possible leakage or spillage of sewage when diverting the incoming sewage from the primary facultative pond to one of the completed dams to undertake construction on the primary facultative pond	2.1.1. Prevention spillage of sewage	-16	-2	-4	-8	-1	-6,2	-2	-2	-2	-2	-2	-2	Construction and lining of the secondary and tertiary ponds must take place first (the ponds that does not fall within the existing footprint), so that the incoming sewage which is currently held in the primary facultative pond can be safely transferred/ diverted to these ponds when construction work commences on the primary facultative pond; No pit toilets on site, workers to be provided with temporary chemical toilets; toilets not to be placed within the drainage lines on site; workers not to use the veld for sanitary purposes; suitable washing facilitates must be proved for the workers and should be established in a suitable manner that environment is not polluted; any soil contamination on site must be remediated and disposed of in a responsible manner; All spills should be reported to the ECO so that he/ she can investigate the incident and recommend the appropriate mitigation; Any significant spills must be reported to the Department of Water and Sanitation who may conduct a site visit to recommend appropriate mitigation; Appropriate measures must be implemented to prevent a recurrence of a spillage event.

		Possible leakage or spillage of sewage from portable toilets during construction, or contamination of water by runoff containing construction-related substances such as cement/ paint/ oil/ fuel	2.1.2 Prevent spillage of water potentially contaminated by cement, paint, oil, fuel, etc	-4	-2	-4	-2	-2	-2,8	-2	-1	-1	-1	-1	-1,2	The Contractor must prevent the discharge of any pollutants, such as cement, concrete, lime, chemicals, fuel, oil, waste water, etc; Inspects all construction vehicles/ machinery daily for early detection of deterioration or leaks; The Contractor should ensure drip trays are placed under stationary vehicles/ machines; All spills should be reported to the ECO so that he/ she can investigate the incident and recommend the appropriate mitigation; Any significant spills must be reported to the Department of Water and Sanitation who may conduct a site visit to recommend appropriate mitigation; Spill kits must be available on site & workers should be trained how to use spill kits to rectify a spill immediately; Records of spills should be kept on site; Mixing of cement not to take place on impermeable surfaces; Potentially contaminated water may not be allowed to flow into drainage lines or infiltrate into the soil.
2.2	Storm water	Storm water may cause soil erosion on cleared construction site	2.2.1 Minimize water-related soil erosion	-4	-2	-4	-2	-2	-2,8	-2	-2	-1	-1	-1	-1,4	Construction should ideally take place in dry winter months; stormwater should be channelled away from the exposed area. Implementation of proposed storm water management plan.
3	**Flora & Fauna**														
3.1	Fauna	Possible killing of fauna e.g. killing of snakes/ spiders out of fear	3.1.1. Prevent killing of fauna	-4	-2	-2	-1	-1	-2	-2	-1	-1	-1	-1	-1,2	Environmental Awareness training to be conducted with all labourers, educating the importance of not simply killing fauna that is perceived as dangerous; Keep contact details in the site office for someone who can be called if catching and relocation of fauna is required, no hunting/ snaring allowed on site.

3.2	Flora	Temporary impact and/or potential loss of disturbed Prince Albert Succulent Karoo Vegetation	3.2.1. Prevent unnecessary loss of vegetation	-16	-2	-4	-4	-2	-5,6	-2	-1	-2	-1	-1	-1,4	Temporary impact on disturbed Prince Albert Succulent Karoo Vegetation. : A suitably qualified ECO must be appointed to monitor the construction of phase in terms of the EMPr and any other conditions pertaining to specialist studies; Environmental Awareness training to be conducted with all workers; Before any work is done, the development footprint and access routes must be clearly demarcated and approved by the ECO. Demarcation must include the total footprint necessary to execute the work, but must aim at minimum disturbance; Lay-down areas or construction sites must be located within already disturbed areas or areas of low ecological value and must be pre-approved by the ECO; Indiscriminate clearing of any area outside of construction footprint must be avoided; Access roads should be limited to a single circular route in and out. Ensure construction vehicles stay on existing roads.
		Loss of Critical Biodiversity Areas	3.2.2. Prevent the unnecessary loss of CBAs	-8	-2	-4	-4	-2	-4	-2	-2	-1	-1	-1	-1,4	A suitably qualified ECO must be appointed to monitor the construction of phase in terms of the EMPr and any other conditions pertaining to specialist studies; Environmental Awareness training to be conducted with all workers; Before any work is done, the development footprint and access routes must be clearly demarcated and approved by the ECO. Demarcation must include the total footprint necessary to execute the work, but must aim at minimum disturbance; Lay-down areas or construction sites must be located within already disturbed areas or areas of low ecological value and must be pre-approved by the ECO; Indiscriminate clearing of any area outside of construction footprint must be avoided; Access roads should be limited to a single circular route in and out. Ensure construction vehicles stay on existing roads
4	**Heritage Resources**															
4.1	Heritage Resources	Potential loss of Heritage Resources	4.1.1. Prevent the unnecessary loss of heritage resources	-2	-2	-4	-1	-1	-2	-1	-1	-1	-1	-1	-1	It is recommended that the HWC Fossil Finds Procedure be implemented throughout the development phase; In the case of any significant new fossil finds exposed during construction, these should be safeguarded - preferably in situ - and reported by the ECO as soon as possible to Heritage Western Cape.
5	**Air quality**															

5.1	Air quality	Possible air pollution in form of emissions from construction vehicles and equipment	5.1.1 Limit air pollution	-8	-4	-4	-2	-1	-3,8	-4	-2	-2	-1	-1	-2	All vehicles and machinery on the construction site must be in good working condition to prevent unnecessary emissions; Vehicles should not be allowed to idle for unnecessary long periods of time
		Potentially high dust levels during earthworks and site establishment	5.1.2 Limit levels of airborne dust	-8	-2	-4	-2	-1	-3,4	-2	-1	-1	-1	-1	-1,2	If necessary, exposed soil must be watered down at regular intervals to reduce levels of airborne dust; The Contractor must take all reasonable measures to minimise the generation of dust resulting from construction activities; Where possible stockpiles should be located in areas where they are not exposed to the erosive effects of the wind.
6	**Waste Management**															
6.1	Solid waste management	Incorrect dispoal of general solid waste generated during construction	6.1.1. Safety dispose of all solid waste.	-8	-4	-4	-4	-3	-4,6	-2	-1	-2	-2	-1	-1,6	All solid waste to be disposed of at a licensed landfill/ waste disposal site; No dumping or burning on near the site; any soil contaminated during construction (e.g. by cement) to be disposed off at a suitable disposal site; If hazardous waste is generated, this must be contained and disposed of by suitably licensed hazardous waste contractors at a suitable site; Sufficient refuse bins are to be provided on site for disposal of general waste; refuse bins to be emptied regularly; Conduct environmental awareness training with all staff and discourage littering.
7	**Visual Impacts**															
7.1	Visual Impacts of construction site	Untidy construction site	7.1.1. The construction site must be kept as neat and tidy as possible	-4	-2	-4	-2	-1	-2,6	-2	-1	-1	-1	-1	-1,2	Conduct environmental awareness training with all staff and discourage littering; Sufficient waste bins must be provided on site and must be emptied regularly; Litter picked up where necessary; Building rubble not allowed to accumulate on site, but must be removed at regular intervals and disposed of at a licensed disposal site; Stockpiles of soil or excavated material should be used for backfilling, rehabilitation or landscaping.
8	**Noise**															
8.1	Noise caused by construction activities on site	Construction related noise is expected to relate mostly to construction vehicles and machinery involved in earthworks and delivery of materials	8.1.1 Minimise disturbance to neighbours	-4	-2	-4	-2	-1	-2,6	-2	-1	-1	-1	-1	-1,2	Construction activities should be limited to daylight hours; a complaints register should be maintained in which any complaints about noise is noted.

B.	Impact Rating: Operations	Operations: WWTP Ponds															
				WITHOUT MITIGATION						WITH MITIGATION						
No.	ASPECT	IMPACT	OBJECTIVE	Probability	Extent	Duration	Magnitude	Receiving Environment	Without Mitigation Score (Baseline)	Probability	Extent	Duration	Magnitude	Receiving Environment	With Mitigation Score (Impact assessment)	Short Description of Mitigation Measures
1	Water															
1	Water quality	1.1 Potential leakage or spillage of waste water from works into drainage lines & ground water	Maintain a closed system to prevent leakage or spillage	-16	-4	-8	-8	-2	-7,6	-2	-2	-4	-1	-1	-2	Ponds to be lined to prevent infiltration; Daily visual inspection of plant for signs of leakage or particular greening of grass in certain areas which may be indicative of leakage. Berms of ponds must be high enough remain freeboard. Implement Stormwater Management Plan. Implement Operations Manual.
		1.2 Possible overflow of sewage, polluting drainage lines/ river/ ground water	Accommodate peak flow to prevent overflow/ remain freeboard	-16	-4	-8	-8	-2	-7,6	-2	-2	-4	-1	-1	-2	Daily visual inspections of the plant to determine whether ponds are nearing full capacity and whether there is an overflow, remain freeboard; Keep sludge and waste water out of drainage lines and the river; Remove sludge periodically and dispose of properly; Harvest reeds annually and remove harvested reeds; A water monitoring programme must be in place to detect any contamination linked to the plant; Immediately institute appropriate mitigation measures if contamination is discovered; A groundwater quality monitoring programme must be in place to detect any contamination that may be linked with the plant. Implement Stormwater Management Plan. Implement Operations Manual
		1.3 Contamination of surface waster from irrigation from inadequately treated wastewater	Treated effluent used for irrigation must comply with the standards set by DWS.	-16	-4	-8	-4	-2	-6,8	-2	-2	-2	-1	-1	-1,6	Treatment of waste water must take place strictly according to engineers' prescriptions in order to meet wastewater quality standards as set out by DWS; Treated water to be monitored on a regular basis to verify water quality. Treated water should be chlorinated to ensure that any remaining pathogens are eliminated before effluent is released; Hand screens & grid channels must be cleaned regularly and waste disposed of at in a suitable manner. Implement Stormwater Management Plan. Implement Operational Management Plan
2	Soils															

2.1	Soil contamination	Leakage or spillage of sewage may result in pollution of surrounding soil	Maintain a closed system to prevent leakage or spillage	-16	-4	-8	-4	-2	-6,8	-2	-2	-2	-2	-1	-1,8	Ponds to be lined to prevent infiltration; Daily visual inspection of plant for signs of leakage or particular greening of grass in certain areas which may be indicative of leakage. Daily visual inspections of the plant to determine whether ponds are nearing full capacity and whether there is an overflow, remain freeboard; Remove sludge periodically and dispose of properly; Harvest reeds annually and remove harvested reeds; A water monitoring programme must be in place to detect any contamination linked to the plant; Immediately institute appropriate mitigation measures if contamination is discovered; Implement Stormwater Management Plan; Implement Operations Manual
2.2	Soil erosion	Soil erosion	Prevent soil erosion	-8	-2	-4	-2	-2	-3,6	-2	-1	-1	-1	-1	-1,2	It must be ensured that storm water does not reach excessive speeds, as that would increase the potential for soil erosion; storm water runoff must not be concentrated in any one place or channel where it flows over unpaved (erodible) surfaces; Should any signs of erosion be found, remedial action such as backfilling, compaction and re-vegetation should be taken immediately to avoid exacerbation of the erosion; Monthly monitoring for erosion should take place, especially after heavy rainfall,
3	**Air Quality**															
3	Air Quality	Release of unpleasant odours associated with raw sewage and sludge cause by methane and hydrogen sulphide	Reduce unpleasant odours.	-8	-4	-2	-2	-2	-3,6	-4	-2	-1	-1	-1	-1,8	Ensure that all components of the treatment plant are in good working order at all times. If the plant is functioning properly, the generation of odours should be minimised, Implement Operations Manual.
4	**Noise**															
4	Noise	Potential Noise Impact	Reduce noise impact from operations	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	No noise expected during operations
5	**Visual**															
5	Visual	Potential visual Impact	Potential visual impact from operations	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	No visual impact expected during operations as the site was previously used as a WWTP

C.	Impact Rating: Decommissioning	Decommissioning: WWTP Ponds															
				WITHOUT MITIGATION						WITH MITIGATION							
No.	ASPECT	IMPACT	Objective	Probability	Extent	Duration	Magnitude	Receiving Environment	Without Mitigation Score (Baseline)	Probability	Extent	Duration	Magnitude	Receiving Environment	With Mitigation Score (Impact assessment)	Short Description of Mitigation Measures	
1	Soils																
1.1	Soil Erosion	If structures are to be demolished and cleared, the site susceptible to soil erosion in case of rains	1.1.1 Limit the risk of soil erosion	-8	-4	-4	-2	-1	-3,8	-2	-1	-2	-1	-1	-1,4	If structures are to be demolished and cleared, this is to take place during the drier winter season; Storm water to be channelled away from the exposed area for the duration of construction; soil stockpiles (if any) not to be placed in drainage lines and must be protected from erosion as stated in the EMPr; erosion should be remediated if erosion does take place as per the EMPr. Refer to decommissioning section in the EMPr. Implement Stormwater Management Plan.	
1.2	Soil contamination	Possible soil contamination from construction/ decommissioning activities	1.2.1 Prevent spillage/ infiltration of raw sewage or semi-treated sewage or waste water to soil	-8	-4	-4	-2	-1	-3,8	-2	-4	-2	-1	-1	-2	All waste water contained in the system must be treated and discharged before dismantling of the system commences; If the system is no longer fully functional, the waste water still in the system must be revomed to an appropriate licensed treatment facility for treatment before work commences on the site. No pit toilets on site, workers to be provided with temporary chemical toilets; toilets not to be placed within the drainage lines on site; workers not to use the veld for sanitary purposes; suitable washing facilitates must be proved for the workers and should be established in a suitable manner that environment is not polluted any soil contamination on site must be remediated and disposed of in a responsible manner; In case of a spillage spills should be reported to the ECO so that he/ she can investigate the incident and recommend the appropriate mitigation; Any significant spills must be reported to the Department of Water and Sanitation who may conduct a site visit to recommend appropriate mitigation.	

			1.2.2 Safely dispose of contaminated waste	-8	-4	-2	-1	-1	-3,2	-2	-1	-1	-1	-1	-1,2	Waste water or any parts of the system which were in direct contact with the sewage must be disposed of at a registered landfill as agreed upon between the competent authority and the ECO.
2	**Water**															
2.1	Water quality	Possible leakage or spillage of sewage and portable toilets during construction/ decomissioning, or contamination of water by runoff containing construction-related substances such as cement/ paint/ oil/ fuel	2.1.2 Prevent spillage of water potentially contaminated by sewage, cement, paint, oil, fuel, etc	-16	-8	-8	-4	-2	-7,6	-2	-2	-4	-2	-1	-2,2	All waste water contained in the system must be treated and discharged before dismantling of the system commences. if the system is no longer fully functional , the waste water still in the system must be revomed to an appropriate licensed treatment facility for treatment before work commences on the siteThe Contractor must prevent the discharge of any pollutants, such as cement, concrete, lime, chemicals, fuel, oil, waste water, etc; Inspects all construction vehicles/ machinery daily for early detection of deterioration or leaks; The Contractor should ensure drip trays are placed under stationary vehicles/ machines; All spills should be reported to the ECO so that he/ she can investigate the incident and recommend the appropriate mitigation; Any significant spills must be reported to the Department of Water and Sanitation who may conduct a site visit to recommend appropriate mitigation; Spill kits must be available on site & workers should be trained how to use spill kits to rectify a spill immediately; Records of spills should be kept on site; Mixing of cement not to take place on impermeable surfaces; Potentially contaminated water may not be allowed to flow into drainage lines or infiltrate into the soil/ water.
2.2	Storm water	Storm water may cause soil erosion on cleared site	2.2.1 Minimize water-related soil erosion	-8	-4	-4	-4	-1	-4,2	-1	-1	-1	-1	-1	-1	Construction/ demolition should ideally take place in dry winter months; stormwater should be channelled away from the exposed area. Implement Stormwater Management Plan.
3	**Flora & Fauna**															

3.2	Flora	No rehabilitation of the site	3.1.1. Rehabilitation of the site to a state approximating the pre-development state or a condition similar to undeveloped areas nearby.	-8	-4	-8	-2	-1	-4,6	-4	-2	-4	-1	-1	-2,4	Prepare soil for re-vegetation, e.g. by removing potentially contaminated soil (for disposal at a suitable site), ripping compacted soil and adding organic material; Re-establish locally indigenous vegetation under the guidance of an ecologist.
		Colonisation of alien invasive species	3.2.2. Prevent colonisation by alien invasive species	-8	-2	-8	-1	-1	-4	-2	-1	-2	-1	-1	-1,4	No alien plan species may be established on site during rehabilitation; Any alien vegetation on site must be eradicated before seeding/ planting of indigenous vegetation; Monitor the site for re-growth of vegetation.
4	**Waste Management**																
4.1	Solid waste management	Waste generated at site not disposed of at a suitably licensed disposal site	4.1.1. Remove general solid waste to a landfill site	-8	-4	-4	-2	-1	-3,8	-2	-2	-1	-1	-1	-1,4	General solid waste must be disposed of at a general landfill site or another licensed waste disposal site; General rubble from demolition can be used as fill at nearby construction sites (if any) or disposed of at a licensed landfill site. The ECO will have to be consulted regarding the disposal of linings and other components of the system which where directly in contact with untreated sewage. Waste not to be dumped on or near the site.
			4.1.2 Dispose of hazardous waste at suitable disposal site	-8	-4	-8	-2	-1	-4,6	-2	-2	-1	-1	-1	-1,4	Any parts of the system which were in direct contact with the sewage must be disposed of by a suitably licensed waste contractor at a suitable, registered waste disposal site as agreed upon between the local authority's waste division and the ECO.
5	**Visual Impacts**																
5.1	Visual Impacts of demolition on site	Untidy construction/ demolition site	5.1.1. The construction site must be kept as neat and tidy as possible	-4	-1	-2	-1	-1	-1,8	-2	-1	-1	-1	-1	-1,2	Conduct environmental awareness training with all staff and discourage littering; Sufficient waste bins must be provided on site and must be emptied regularly; Litter picked up where necessary; Building rubble not allowed to accumulate on site, but must be removed at regular intervals and disposed of at a licensed disposal site.
6	**Noise**																

6.1	Noise caused by construction activities on site	Construction related noise is expected to relate mostly to construction vehicles and machinery involved in earthworks and delivery of materials	6.1.1 Minimise disturbance to neighbours	-4	1	-2	-1	-1	-1.4	-2	-1	-1	-1	-1	-1.2	Construction/ demolition activities should be limited to daylight hours; a complaints register should be maintained in which any complaints about noise is noted.

Appendix J2.2:

Environmental impacts and risk assessment/Impact Risk Matrix – Pipeline Route Alt 1 (Not Preferred)

A.	Impact Rating: Site Establishment & Construction	Construction: Pipeline Route_Alternative A (Not - Preferred)															
				WITHOUT MITIGATION						WITH MITIGATION							
No.	ASPECT	IMPACT	Objective	Probability	Extent	Duration	Magnitude	Receiving Environment	Without Mitigation Score (Baseline)	Probability	Extent	Duration	Magnitude	Receiving Environment	With Mitigation Score (Impact assessment)	Short Description of Mitigation Measures
1	**Soils**															
1.1	Soil Erosion	Clearing of vegetation during earthworks might make the site susceptible to soil erosion in case of rains	1.1.1 Limit the risk of soil erosion	-8	-4	-4	-2	-1	-3,8	-2	-1	-2	-1	-1	-1,4	Earth works and site preparation to take place during the drier winter season; Storm water to be channelled away from the exposed area for the duration of construction; soil stockpiles (if any) not to be placed in drainage lines and must be protected from erosion as stated in the EMPr; erosion should be remediated if erosion does take place as per the EMPr.Implement Stormwater Management Plan.
1.2	Soil contamination	Soil contamination from construction activities	1.2.1 Prevent spillage of water potentially contaminated by cement/ chemicals/ fuel & oil from construction vehicles/ machines	-8	-4	-4	-2	-1	-3,8	-2	-4	-2	-1	-1	-2	The Contractor must prevent the discharge of any pollutants, such as cement, concrete, lime, chemicals, fuel, oil, waste water, etc; Inspects all construction vehicles/ machinery daily for early detection of deterioration or leaks; The Contractor should ensure drip trays are placed under stationary vehicles/ machines; All spills should be reported to the ECO so that he/ she can investigate the incident and recommend the appropriate mitigation; Any significant spills must be reported to the Department of Water and Sanitation who may conduct a site visit to recommend appropriate mitigation; Spill kits must be available on site & workers should be trained how to use spill kits to rectify a spill immediately; Records of spills should be kept on site; Mixing of cement not to take place on impermeable surfaces; Potentially contaminated water may not be allowed to flow into drainage lines or infiltrate into the soil.
2	**Water**															

2.1	Water Quality (Surface and ground water)	Possible contamination of water by runoff containing construction-related substances such as cement/ paint/ oil/ fuel	2.1.1 Prevent spillage of water potentially contaminated by cement, paint, oil, fuel, etc	-4	-4	-4	-2	-2	-3,2	-2	-1	-1	-1	-1	-1,2	The Contractor must prevent the discharge of any pollutants, such as cement, concrete, lime, chemicals, fuel, oil, waste water, etc; Inspects all construction vehicles/ machinery daily for early detection of deterioration or leaks; The Contractor should ensure drip trays are placed under stationary vehicles/ machines; All spills should be reported to the ECO so that he/ she can investigate the incident and recommend the appropriate mitigation; Any significant spills must be reported to the Department of Water and Sanitation who may conduct a site visit to recommend appropriate mitigation; Spill kits must be available on site & workers should be trained how to use spill kits to rectify a spill immediately; Records of spills should be kept on site; Mixing of cement not to take place on impermeable surfaces; Potentially contaminated water may not be allowed to flow into drainage lines or infiltrate into the soil.
2.2	Storm water	Storm water may cause soil erosion on cleared construction site	2.2.1 Minimize water-related soil erosion	-4	-4	-4	-2	-2	-3,2	-1	-2	-1	-1	-1	-1,2	Construction should ideally take place in dry winter months; stormwater should be channelled away from the exposed area. Implement Storm Water Management Plan
3	**Flora & Fauna**															
3.1	Fauna	Possible killing of fauna e.g. killing of snakes/ spiders out of fear	3.1.1. Prevent killing of fauna	-4	-4	-4	-2	-2	-3,2	-2	-1	-1	-1	-1	-1,2	Environmental Awareness training to be conducted with all labourers, educating the importance of not simply killing fauna that is perceived as dangerous; Keep contact details in the site office for someone who can be called if catching and relocation of fauna is required, no hunting/ snaring allowed on site.

3.2	Flora	Temporary impact and/or potential loss of disturbed Prince Albert Succulent Karoo Vegetation	3.2.1. Prevent unnecessary loss of vegetation	-8	-4	-4	-2	-1	-3,8	-1	-1	-1	-1	-1	-1	Temporary impact on disturbed Prince Albert Succulent Karoo Vegetation. : A suitably qualified ECO must be appointed to monitor the construction of phase in terms of the EMPr and any other conditions pertaining to specialist studies; Environmental Awareness training to be conducted with all workers; Before any work is done, the development footprint and access routes must be clearly demarcated and approved by the ECO. Demarcation must include the total footprint necessary to execute the work, but must aim at minimum disturbance; Lay-down areas or construction sites must be located within already disturbed areas or areas of low ecological value and must be pre-approved by the ECO; Indiscriminate clearing of any area outside of construction footprint must be avoided; Access roads should be limited to a single circular route in and out. Ensure construction vehicles stay on existing roads.
		Loss of Critical Biodiversity Areas	3.2.2. Prevent the unnecessary loss of CBAs	-8	-4	-4	-2	-1	-3,8	-2	-1	-1	-1	-1	-1,2	A suitably qualified ECO must be appointed to monitor the construction of phase in terms of the EMPr and any other conditions pertaining to specialist studies; Environmental Awareness training to be conducted with all workers; Before any work is done, the development footprint and access routes must be clearly demarcated and approved by the ECO. Demarcation must include the total footprint necessary to execute the work, but must aim at minimum disturbance; Lay-down areas or construction sites must be located within already disturbed areas or areas of low ecological value and must be pre-approved by the ECO; Indiscriminate clearing of any area outside of construction footprint must be avoided; Access roads should be limited to a single circular route in and out. Ensure construction vehicles stay on existing roads
4	**Heritage Resources**														
4.1	Heritage Resources	Potential loss of Heritage Resources	4.1.1. Prevent the unnecessary loss of heritage resources	-2	-1	-1	-1	-1	-1,2	-1	-1	-1	-1	-1	-1	It is recommended that the HWC Fossil Finds Procedure be implemented throughout the development phase; In the case of any significant new fossil finds exposed during construction, these should be safeguarded - preferably in situ - and reported by the ECO as soon as possible to Heritage Western Cape.
5	**Air quality**														

5.1	Air quality	Possible air pollution in form of emissions from construction vehicles and equipment	5.1.1 Limit air pollution	-4	-4	-4	-2	-1	-3	-1	-1	-1	-1	-1	-1	All vehicles and machinery on the construction site must be in good working condition to prevent unnecessary emissions; Vehicles should not be allowed to idle for unnecessary long periods of time
		Potentially high dust levels during earthworks and site establishment	5.1.2 Limit levels of airborne dust	-4	-2	-2	-1	-1	-2	-2	-1	-1	-1	-1	-1,2	If necessary, exposed soil must be watered down at regular intervals to reduce levels of airborne dust; The Contractor must take all reasonable measures to minimise the generation of dust resulting from construction activities; Where possible stockpiles should be located in areas where they are not exposed to the erosive effects of the wind.
6	**Waste Management**															
6.1	Solid waste management	Incorrect dispoal of general solid waste generated during construction	6.1.1. Safety dispose of all solid waste.	-8	-4	-4	-2	-1	-3,8	-2	-4	-1	-1	-1	-1,8	All solid waste to be disposed of at a licensed landfill/ waste disposal site; No dumping or burning on near the site; any soil contaminated during construction (e.g. by cement) to be disposed off at a suitable disposal site; If hazardous waste is generated, this must be contained and disposed of by suitably licensed hazardous waste contractors at a suitable site; Sufficient refuse bins are to be provided on site for disposal of general waste; refuse bins to be emptied regularly; Conduct environmental awareness training with all staff and discourage littering.
7	**Visual Impacts**															
7.1	Visual Impacts of construction site	Untidy construction site	7.1.1. The construction site must be kept as neat and tidy as possible	-4	-1	-1	-1	-1	-1,6	-2	-1	-1	-1	-1	-1,2	Conduct environmental awareness training with all staff and discourage littering; Sufficient waste binds must be provided on site and must be emptied regularly; Litter picked up where necessary; Building rubble not allowed to accumulate on site, but must be removed at regular intervals and disposed of at a licensed disposal site; Stockpiles of soil or excavated material should be used for backfilling, rehabilitation or landscaping.
8	**Noise**															
8.1	Noise caused by construction activities on site	Construction related noise is expected to relate mostly to construction vehicles and machinery involved in earthworks and delivery of materials	8.1.1 Minimise disturbance to neighbours	-4	-1	-1	-1	-1	-1,6	-2	-1	-1	-1	-1	-1,2	Construction activities should be limited to daylight hours; a complaints register should be maintained in which any complaints about noise is noted.

9	**Traffic**															
9.1	Impedance of normal traffic flow	Impedance of normal traffic flow due to pipeline crossing the N12 through culvert	9.1.1. Minimise impedence of traffic	-8	-4	-4	-2	-1	-3.8	-4	-2	-2	-1	-1	-2	Traffic management plan in place. Comply with legislative requirements. If necessary, use traffic controllers.

B.	Impact Rating: Operations	Operations: Pipeline Route Aternative A (Not Preferred)															
				WITHOUT MITIGATION						WITH MITIGATION							
No.	ASPECT	IMPACT	OBJECTIVE	Probability	Extent	Duration	Magnitude	Receiving Environment	Without Mitigation Score (Baseline)	Probability	Extent	Duration	Magnitude	Receiving Environment	With Mitigation Score (Impact assessment)	Short Description of Mitigation Measures
1	Water															
1	Water quality	1.1 Potential leakage or spillage of waste water from pipelines	Maintain a closed system to prevent leakage or spillage/ Monitor pipeline for signes of leakage	-8	-4	-4	-4	-2	-4,4	-2	-2	-2	-2	-1	-1,8	Visual inspection of the pipeline route for signs of leakage or particular greening of grass in certain areas which may be indicative of leakage; perhaps streamline leakage detection through mobilising the community to report any leakages along the pipeline route. A water monitoring programme must be in place to detect any contamination linked to the plant; Immediately institute appropriate mitigation measures if contamination is discovered;
		1.2 Contamination of surface waster from irrigation from inadequately treated wastewater	Treated effluent used for irrigation must comply with the standards set by DWS.	-16	-4	-4	-8	-2	-6,8	-2	-2	-2	-2	-1	-1,8	Treatment of waste water must take place strictly according to engineers' prescriptions in order to meet wastewater quality standards as set out by DWS; Treated water to be monitored on a regular basis to verify water quality. Treated water should be chlorinated to ensure that any remaining pathogens are eliminated before effluent is released; Hand screens & grid channels must be cleaned regularly and waste disposed of at in a suitable manner. A water monitoring programme must be in place to detect any contamination linked to the plant; Immediately institute appropriate mitigation measures if contamination is discovered;
2	Soils															

2.1	Soil contamination	Leakage of semi-treated sewage may result in pollution of surrounding soil	Maintain a closed system to prevent leakage or spillage/ Monitor pipeline for signes of leakage	-8	-4	-4	-4	-1	-4.2	-2	-2	-2	-2	-1	-1.8	Visual inspection of the pipeline route for signs of leakage or particular greening of grass in certain areas which may be indicative of leakage; perhaps streamline leakage detection through mobilising the community to report any leakages along the pipeline route; A water monitoring programme must be in place to detect any contamination linked to the plant; Immediately institute appropriate mitigation measures if contamination is discovered;
2.2	Soil erosion	Soil erosion causing exposure of the pipeline	Prevent soil erosion	-8	-4	-4	-2	-1	-3.8	-2	-1	-1	-1	-1	-1.2	It must be ensured that storm water does not reach excessive speeds, as that would increase the potential for soil erosion; storm water runoff must not be concentrated in any one place or channel where it flows over unpaved (erodible) surfaces; Should any signs of erosion be found, remedial action such as backfilling, compaction and re-vegetation should be taken immediately to avoid exacerbation of the erosion; Monthly monitoring for erosion should take place, especially after heavy rainfall,
3	**Air Quality**															
3	Air Quality	Release of unpleasant odours associated with raw sewage and sludge cause by methane and hydrogen sulphide	Reduce unpleasant odours.	-8	-4	-4	-2	-1	-3.8	-4	-2	-1	-1	-1	-1.8	Ensure that all components of the treatment plant & pipeline are in good working order at all times. If the plant is functioning properly, the generation of odours should be minimised,
4	**Noise**															
4	Noise	Potential Noise Impact	Reduce noise impact from operations	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	No noise expected during operations
5	**Visual**															
5	Visual	Potential visual Impact	Potential visual impact from operations	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	No visual impact expected during operations as the site was previously used as a WWTP

C.	Impact Rating: Decommissioning	Decommissioning: Pipeline Route Alternative A (Not- Preferred)															
				WITHOUT MITIGATION						WITH MITIGATION							
No.	ASPECT	IMPACT	Objective	Probability	Extent	Duration	Magnitude	Receiving Environment	Without Mitigation Score (Baseline)	Probability	Extent	Duration	Magnitude	Receiving Environment	With Mitigation Score (Impact assessment)	Short Description of Mitigation Measures	
1	Soils																
1.1	Soil Erosion	If structures are to be demolished and cleared, the site susceptible to soil erosion in case of rains	1.1.1 Limit the risk of soil erosion	-8	-2	-4	-2	-1	-3,4	-2	-1	-2	-1	-1	-1,4	If structures are to be demolished and cleared, this is to take place during the drier winter season; Storm water to be channelled away from the exposed area for the duration of construction; soil stockpiles (if any) not to be placed in drainage lines and must be protected from erosion as stated in the EMPr; erosion should be remediated if erosion does take place as per the EMPr. Refer to decommissioning section in the EMPr.	
1.2	Soil contamination	Possible soil contamination from construction/ demolition activities	1.2.1 Prevent spillage/ infiltration of raw sewage or semi-treated sewage or waste water to soil	-8	-4	-4	-2	-1	-3,8	-2	-4	-2	-1	-1	-2	All waste water contained in the system must be treated and discharged before dismantling of the system commences. if the system is no longer fully functional , the waste water still in the system must be removed to an appropriate licensed treatment facility for treatment before work commences on the site. No pit toilets on site, workers to be provided with temporary chemical toilets; toilets not to be placed within the drainage lines on site; workers not to use the veld for sanitary purposes; suitable washing facilitates must be proved for the workers and should be established in a suitable manner that environment is not polluted any soil contamination on site must be remediated and disposed of in a responsible manner; In case of a spillage spills should be reported to the ECO so that he/ she can investigate the incident and recommend the appropriate mitigation; Any significant spills must be reported to the Department of Water and Sanitation who may conduct a site visit to recommend appropriate mitigation.	

			1.2.2 Safely dispose of contaminated waste	-8	-2	-2	-1	-1	-2,8	-2	-1	-1	-1	-1	-1,2	Waste water or any parts of the system which were in direct contact with the sewage must be disposed of by a suitably licensed waste contractor at a suitable, registered waste disposal site as agreed upon between the local authority's waste division and the ECO.
2	**Water**															
2.1	Water quality	Possible leakage or spillage of semi-treated sewage, or contamination of water by runoff containing construction-related substances such as cement/ paint/ oil/ fuel	2.1.2 Prevent spillage of water potentially contaminated by waste water/ sewage, cement, paint, oil, fuel, etc	-8	-4	-4	-2	-2	-4	-2	-1	-2	-1	-1	-1,4	All waste water contained in the system must be treated and discharged before dismantling of the system commences. if the system is no longer fully functional , the waste water still in the system must be removed to an appropriate licensed treatment facility for treatment before work commences on the site The Contractor must prevent the discharge of any pollutants, such as cement, concrete, lime, chemicals, fuel, oil, waste water, etc; Inspects all construction vehicles/ machinery daily for early detection of deterioration or leaks; The Contractor should ensure drip trays are placed under stationary vehicles/ machines; All spills should be reported to the ECO so that he/ she can investigate the incident and recommend the appropriate mitigation; Any significant spills must be reported to the Department of Water and Sanitation who may conduct a site visit to recommend appropriate mitigation; Spill kits must be available on site & workers should be trained how to use spill kits to rectify a spill immediately; Records of spills should be kept on site; Mixing of cement not to take place on impermeable surfaces; Potentially contaminated water may not be allowed to flow into drainage lines or infiltrate into the soil/ water.
2.2	Storm water	Storm water may cause soil erosion on cleared construction site	2.2.1 Minimize water-related soil erosion	-2	-2	-1	-1	-1	-1,4	-1	-1	-1	-1	-1	-1	Decommissioning should ideally take place in dry winter months; stormwater should be channelled away from the exposed area. Implement Storm Water Management Plan.
3	**Flora & Fauna**															
3.2	Flora	No rehabilitation of the site	3.1.1. Rehabilitation of the site to a state approximating the pre-development state or a condition similar to undeveloped areas nearby.	-8	-4	-4	-2	-1	-3,8	-2	-1	-2	-1	-1	-1,4	Prepare soil for re-vegetation, e.g. by removing [potentially contaminated soil (for disposal at a suitable site), ripping compacted soil and adding organic material; Re-establish locally indigenous vegetation under the guidance of an ecologist.

		Colonisation of alien invasive species	3.2.2. Prevent colonisation by alien invasive species	-8	-2	-4	-2	-1	-3,4	-2	-1	-2	-1	-1	-1,4	No alien plan species may be established on site during rehabilitation; Any alien vegetation on site must be eradicated before seeding/ planting of indigenous vegetation; Monitor the site for re-growth of vegetation.
4	**Waste Management**															
4.1	Solid waste management	Waste generated at site not disposed of at a suitably licensed disposal site	4.1.1. Remove general solid waste to a landfill site	-8	-4	-4	-2	-1	-3,8	-2	-2	-1	-1	-1	-1,4	General solid waste must be disposed of at a general landfill site or another licensed waste disposal site; General rubble from demolition can be used as fill at nearby construction sites (if any) or disposed of at a licensed landfill site. The ECO will have to be consulted regarding the disposal of linings and other components of the system which where directly in contact with untreated sewage. Water not to be dumped on or near the site.
			4.1.2 Dispose of hazardous waste at suitable disposal site	-8	-4	-4	-4	-1	-4,2	-2	-2	-2	-2	-1	-1,8	Any parts of the system which were in direct contact with the sewage must be disposed of by a suitably licensed waste contractor at a suitable, registered waste disposal site as agreed upon between the local authority's waste division and the ECO.
7	**Visual Impacts**															
7.1	Visual Impacts of demolition on site	Untidy construction/ demolition site	7.1.1. The construction site must be kept as neat and tidy as possible	-4	-1	-2	-1	-1	-1,8	-2	-1	-1	-1	-1	-1,2	Conduct environmental awareness training with all staff and discourage littering; Sufficient waste bins must be provided on site and must be emptied regularly; Litter picked up where necessary; Building rubble not allowed to accumulate on site, but must be removed at regular intervals and disposed of at a licensed disposal site.
8	**Noise**															
8.1	Noise caused by construction activities on site	Construction related noise is expected to relate mostly to construction vehicles and machinery involved in earthworks and delivery of materials	8.1.1 Minimise disturbance to neighbours	-4	1	-2	-1	-1	-1,4	-2	-1	-1	-1	-1	-1,2	Construction/ demolition activities should be limited to daylight hours; a complaints register should be maintained in which any complaints about noise is noted.

C.	Impact Rating: Decommissioning	Decommisioning: Pipeline Route Alternative B_Not preferred															
				WITHOUT MITIGATION						WITH MITIGATION							
No.	ASPECT	IMPACT	Objective	Probability	Extent	Duration	Magnitude	Receiving Environment	Without Mitigation Score (Baseline)	Probability	Extent	Duration	Magnitude	Receiving Environment	With Mitigation Score (Impact assessment)	Short Description of Mitigation Measures
1	**Soils**															
1.1	Soil Erosion	If structures are to be demolished and cleared, the site susceptible to soil erosion in case of rains	1.1.1 Limit the risk of soil erosion	-8	-2	-4	-2	-1	-3,4	-2	-1	-2	-1	-1	-1,4	If structures are to be demolished and cleared, this is to take place during the drier winter season; Storm water to be channelled away from the exposed area for the duration of construction; soil stockpiles (if any) not to be placed in drainage lines and must be protected from erosion as stated in the EMPr; erosion should be remediated if erosion does take place as per the EMPr. Refer to decommissioning section in the EMPr.
1.2	Soil contamination	Possible soil contamination from construction/ demolition activities	1.2.1 Prevent spillage/ infiltration of raw sewage or semi-treated sewage or waste water to soil	-8	-4	-4	-2	-1	-3,8	-2	-4	-2	-1	-1	-2	All waste water contained in the system must be treated and discharged before dismantling of the system commences. if the system is no longer fully functional , the waste water still in the system must be reomed to an appropriate licensed treatment facility for treatment before work commences on the site. No pit toilets on site, workers to be provided with temporary chemical toilets; toilets not to be placed within the drainage lines on site; workers not to use the veld for sanitary purposes; suitable washing facilitates must be proved for the workers and should be established in a suitable manner that environment is not polluted any soil contamination on site must be remediated and disposed of in a responsible manner; In case of a spillage spills should be reported to the ECO so that he/ she can investigate the incident and recommend the appropriate mitigation; Any significant spills must be reported to the Department of Water and Sanitation who may conduct a site visit to recommend appropriate mitigation.

			1.2.2 Safely dispose of contaminated waste	-8	-2	-2	-1	-1	-2,8	-2	-1	-1	-1	-1	-1,2	Waste water or any parts of the system which were in direct contact with the sewage must be disposed of by a suitably licensed waste contractor at a suitable, registered waste disposal site as agreed upon between the local authority's waste division and the ECO.
2	**Water**														
2.1	Water quality	Possible leakage or spillage of semi-treated sewage from pipelines and portable toilets during construction, or contamination of water by runoff containing construction-related substances such as cement/ paint/ oil/ fuel	2.1.2 Prevent spillage of water potentially contaminated by cement, paint, oil, fuel, etc	-8	-4	-4	-2	-2	-4	-2	-1	-2	-1	-1	-1,4	All waste water contained in the system must be treated and discharged before dismantling of the system commences. if the system is no longer fully functional , the waste water still in the system must be removed to an appropriate licensed treatment facility for treatment before work commences on the site. The Contractor must prevent the discharge of any pollutants, such as cement, concrete, lime, chemicals, fuel, oil, waste water, etc; Inspects all construction vehicles/ machinery daily for early detection of deterioration or leaks; The Contractor should ensure drip trays are placed under stationary vehicles/ machines; All spills should be reported to the ECO so that he/ she can investigate the incident and recommend the appropriate mitigation; Any significant spills must be reported to the Department of Water and Sanitation who may conduct a site visit to recommend appropriate mitigation; Spill kits must be available on site & workers should be trained how to use spill kits to rectify a spill immediately; Records of spills should be kept on site; Mixing of cement not to take place on impermeable surfaces; Potentially contaminated water may not be allowed to flow into drainage lines or infiltrate into the soil/ water.
2.2	Storm water	Storm water may cause soil erosion on cleared construction site	2.2.1 Minimize water-related soil erosion	-2	-2	-1	-1	-1	-1,4	-1	-1	-1	-1	-1	-1	Construction should ideally take place in dry winter months; stormwater should be channelled away from the exposed area.
3	**Flora & Fauna**														
3.2	Flora	No rehabilitationof the site	3.1.1. Rehabilitation of the site to a state approximating the pre-development state or a condition similar to undeveloped areas nearby.	-8	-4	-4	-2	-1	-3,8	-2	-1	-2	-1	-1	-1,4	Prepare soil for re-vegetation, e.g. by removing [potentially contaminated soil (for disposal at a suitable site), ripping compacted soil and adding organic material; Re-establish locally indigenous vegetation under the guidance of an ecologist.

		Colonisation of alien invasive species	3.2.2. Prevent colonisation by alien invasive species	-8	-2	-4	-2	-1	-3,4	-2	-1	-2	-1	-1	-1,4	No alien plan species may be established on site during rehabilitation; Any alien vegetation on site must be eradicated before seeding/ planting of indigenous vegetation; Monitor the site for re-growth of vegetation.
4	**Waste Management**															
4.1	Solid waste management	Waste generated at site not disposed of at a suitably licensed disposal site	4.1.1. Remove general solid waste to a landfill site	-8	-4	-4	-2	-1	-3,8	-2	-2	-1	-1	-1	-1,4	General solid waste must be disposed of at a general landfill site or another licensed waste disposal site; General rubble from demolition can be used as fill at nearby construction sites (if any) or disposed of at a licensed landfill site. The ECO will have to be consulted regarding the disposal of linings and other components of the system which where directly in contact with untreated sewage. Water not to be dumped on or near the site.
			4.1.2 Dispose of hazardous waste at suitable disposal site	-8	-4	-4	-4	-1	-4,2	-2	-2	-2	-2	-1	-1,8	Any parts of the system which were in direct contact with the sewage must be disposed of by a suitably licensed waste contractor at a suitable, registered waste disposal site as agreed upon between the local authority's waste division and the ECO.
7	**Visual Impacts**															
7.1	Visual Impacts of demolition on site	Untidy construction/ demolition site	7.1.1. The construction site must be kept as neat and tidy as possible	-4	-1	-2	-1	-1	-1,8	-2	-1	-1	-1	-1	-1,2	Conduct environmental awareness training with all staff and discourage littering; Sufficient waste bins must be provided on site and must be emptied regularly; Litter picked up where necessary; Building rubble not allowed to accumulate on site, but must be removed at regular intervals and disposed of at a licensed disposal site.
8	**Noise**															
8.1	Noise caused by construction activities on site	Construction related noise is expected to relate mostly to construction vehicles and machinery involved in earthworks and delivery of materials	8.1.1 Minimise disturbance to neighbours	-4	-1	-2	-1	-1	-1,8	-2	-1	-1	-1	-1	-1,2	Construction/ demolition activities should be limited to daylight hours; a complaints register should be maintained in which any complaints about noise is noted.

Appendix J2.3:

Environmental impacts and risk assessment/Impact Risk Matrix – Pipeline Route Alt B (Not preferred)

A.	Impact Rating: Site Establishment & Construction	Construction: Pipeline Route Alternative B_Not preferred															
				WITHOUT MITIGATION						WITH MITIGATION							
No.	ASPECT	IMPACT	Objective	Probability	Extent	Duration	Magnitude	Receiving Environment	Without Mitigation Score (Baseline)	Probability	Extent	Duration	Magnitude	Receiving Environment	With Mitigation Score (Impact assessment)	Short Description of Mitigation Measures
1	Soils															
1.1	Soil Erosion	Clearing of vegetation during earthworks might make the site susceptible to soil erosion in case of rains	1.1.1 Limit the risk of soil erosion	-8	-4	-4	-2	-1	-3,8	-2	-2	-2	-1	-1	-1,6	Earth works and site preparation to take place during the drier winter season; Storm water to be channelled away from the exposed area for the duration of construction; soil stockpiles (if any) not to be placed in drainage lines and must be protected from erosion as stated in the EMPr; erosion should be remediated if erosion does take place as per the EMPr.
		Clearing of vegetation during earthworks may impact banks of Sand River	1.1.2 Limit risk of soil erosion on banks of the Sand River	-16	-4	-4	-4	-4	-6,4	-2	-2	-1	-1	-1	-1,4	Minimise construction footprint; Pipeline route Alternative C/D is preferred as it will not impact the banks of the river Pipeline RouteC/D preferred alternative as no impact or loss of aquatic habitat will occur; Pipeline route Alt D to remain within road reserve and attach to existing brige to cross the N12.
1.2	Soil Contamination	Soil contamination from construction activities	1.2.2 Prevent spillage of water potentially contaminated by cement/ chemicals/ fuel & oil from construction vehicles/ machines	-8	-4	-4	-2	-1	-3,8	-2	-4	-2	-1	-1	-2	The Contractor must prevent the discharge of any pollutants, such as cement, concrete, lime, chemicals, fuel, oil, waste water, etc; Inspects all construction vehicles/ machinery daily for early detection of deterioration or leaks; The Contractor should ensure drip trays are placed under stationary vehicles/ machines; All spills should be reported to the ECO so that he/ she can investigate the incident and recommend the appropriate mitigation; Any significant spills must be reported to the Department of Water and Sanitation who may conduct a site visit to recommend appropriate mitigation; Spill kits must be available on site & workers should be trained how to use spill kits to rectify a spill immediately; Records of spills should be kept on site; Mixing of cement not to take place on impermeable surfaces; Potentially contaminated water may not be allowed to flow into drainage lines or infiltrate into the soil.

2	**Water**															
2.1	Water Quality (Surface water and ground water)	Possible leakage or spillage of sewage from portable toilets during construction, or contamination of water by runoff containing construction-related substances such as cement/ paint/ oil/ fuel	2.1.1 Prevent spillage of water potentially contaminated by cement, paint, oil, fuel, etc	-4	4	-4	-2	-2	-1,6	-2	-1	-1	-1	-1	-1,2	The Contractor must prevent the discharge of any pollutants, such as cement, concrete, lime, chemicals, fuel, oil, waste water, etc; Inspects all construction vehicles/ machinery daily for early detection of deterioration or leaks; The Contractor should ensure drip trays are placed under stationary vehicles/ machines; All spills should be reported to the ECO so that he/ she can investigate the incident and recommend the appropriate mitigation; Any significant spills must be reported to the Department of Water and Sanitation who may conduct a site visit to recommend appropriate mitigation; Spill kits must be available on site & workers should be trained how to use spill kits to rectify a spill immediately; Records of spills should be kept on site; Mixing of cement not to take place on impermeable surfaces; Potentially contaminated water may not be allowed to flow into drainage lines or infiltrate into the soil.
2.2	Storm water	Storm water may cause soil erosion on cleared construction site	2.2.1 Minimize water-related soil erosion	-4	-4	-4	-2	-2	-3,2	-1	-2	-1	-1	-1	-1,2	Construction should ideally take place in dry winter months; stormwater should be channelled away from the exposed area. Implement Storm Water Management Plan
3	**Flora & Fauna**															
3.1	Fauna	Possible killing of fauna e.g. killing of snakes/ spiders out of fear	3.1.1. Prevent killing of fauna	-4	-4	-4	-2	-2	-3,2	-2	-1	-1	-1	-1	-1,2	Environmental Awareness training to be conducted with all labourers, educating the importance of not simply killing fauna that is perceived as dangerous; Keep contact details in the site office for someone who can be called if catching and relocation of fauna is required, no hunting/ snaring allowed on site.

3.2	Flora	Temporary impact and/or potential loss of disturbed Prince Albert Succulent Karoo Vegetation	3.2.1. Prevent unnecessary loss of vegetation	-16	-4	-4	-2	-1	-5,4	-8	-1	-1	-1	-1	-2,4	Temporary impact on disturbed Prince Albert Succulent Karoo Vegetation. A suitably qualified ECO must be appointed to monitor the construction of phase in terms of the EMPr and any other conditions pertaining to specialist studies; Environmental Awareness training to be conducted with all workers; Before any work is done, the development footprint and access routes must be clearly demarcated and approved by the ECO. Demarcation must include the total footprint necessary to execute the work, but must aim at minimum disturbance; Lay-down areas or construction sites must be located within already disturbed areas or areas of low ecological value and must be pre-approved by the ECO; Indiscriminate clearing of any area outside of construction footprint must be avoided; Access roads should be limited to a single circular route in and out. Ensure construction vehicles stay on existing roads. Pipeline RouteC/D preferred alternative as no impact or loss of habitat will occur; Pipeline route Alternative D to remain within the road reserve
		Temporary impact and/or potential loss of aquatic vegetation associates with the Sand/ Groot River	3.2.2 Prevent the unneccessary loss of aquatic vegetation	-16	-4	-4	-4	-4	-6,4	-1	-1	-1	-1	-1	-1	Pipeline RouteC/D preferred alternative as no impact or loss of aquatic habitat will occur; Minimise the construction footrpint; Pipeline route Alt D to remain within road reserve and attach to existing brige to cross the N12.
		Loss of Critical Biodiversity Areas	3.2.3. Prevent the unnecessary loss of CBAs	-16	-4	-4	-4	-4	-6,4	-1	-1	-1	-1	-1	-1	Pipeline Route Alternative C/D is the preferred alternative as no impact or loss of habitat will occur. A suitably qualified ECO must be appointed to monitor the construction of phase in terms of the EMPr and any other conditions pertaining to specialist studies; Environmental Awareness training to be conducted with all workers; Before any work is done, the development footprint and access routes must be clearly demarcated and approved by the ECO. Demarcation must include the total footprint necessary to execute the work, but must aim at minimum disturbance; Lay-down areas or construction sites must be located within already disturbed areas or areas of low ecological value and must be pre-approved by the ECO; Indiscriminate clearing of any area outside of construction footprint must be avoided; Access roads should be limited to a single circular route in and out. Ensure construction vehicles stay on existing roads

4	**Heritage Resources**															
4.1	Heritage Resources	Potential loss of Heritage Resources	4.1.1. Prevent the unnecessary loss of heritage resources	-2	-1	-1	-1	-1	-1.2	-1	-1	-1	-1	-1	-1	It is recommended that the HWC Fossil Finds Procedure be implemented throughout the development phase; In the case of any significant new fossil finds exposed during construction, these should be safeguarded - preferably in situ - and reported by the ECO as soon as possible to Heritage Western Cape.
5	**Air quality**															
5.1	Air quality	Possible air pollution in form of emissions from construction vehicles and equipment	5.1.1 Limit air pollution	-4	-4	-4	-2	-1	-3	-1	-1	-1	-1	-1	-1	All vehicles and machinery on the construction site must be in good working condition to prevent unnecessary emissions; Vehicles should not be allowed to idle for unnecessary long periods of time
		Potentially high dust levels during earthworks and site establishment	5.1.2 Limit levels of airborne dust	-4	-2	-2	-1	-1	-2	-2	-1	-1	-1	-1	-1,2	If necessary, exposed soil must be watered down at regular intervals to reduce levels of airborne dust; The Contractor must take all reasonable measures to minimise the generation of dust resulting from construction activities; Where possible stockpiles should be located in areas where they are not exposed to the erosive effects of the wind.
6	**Waste Management**															
6.1	Solid waste management	Incorrect dispoal of general solid waste generated during construction	6.1.1. Safety dispose of all solid waste.	-8	-4	-4	-2	-1	-3,8	-2	-4	-1	-1	-1	-1,8	All solid waste to be disposed of at a licensed landfill/ waste disposal site; No dumping or burning on near the site; any soil contaminated during construction (e.g. by cement) to be disposed off at a suitable disposal site; If hazardous waste is generated, this must be contained and disposed of by suitably licensed hazardous waste contractors at a suitable site; Sufficient refuse bins are to be provided on site for disposal of general waste; refuse bins to be emptied regularly; Conduct environmental awareness training with all staff and discourage littering.
7	**Visual Impacts**															

7.1	Visual Impacts of construction site	Untidy construction site	7.1.1. The construction site must be kept as neat and tidy as possible	-4	-1	-1	-1	-1	-1,6	-2	-1	-1	-1	-1	-1,2	Conduct environmental awareness training with all staff and discourage littering; Sufficient waste binds must be provided on site and must be emptied regularly; Litter picked up where necessary; Building rubble not allowed to accumulate on site, but must be removed at regular intervals and disposed of at a licensed disposal site; Stockpiles of soil or excavated material should be used for backfilling, rehabilitation or landscaping.
8	**Noise**															
8.1	Noise caused by construction activities on site	Construction related noise is expected to relate mostly to construction vehicles and machinery involved in earthworks and delivery of materials	8.1.1 Minimise disturbance to neighbours	-4	-1	-1	-1	-1	-1,6	-2	-1	-1	-1	-1	-1,2	Construction activities should be limited to daylight hours; a complaints register should be maintained in which any complaints about noise is noted.
9	**Traffic**															
9.1	Impedance of normal traffic flow	Impedance of normal traffic flow due to pipeline crossing the N12 ove the bridge	9.1.1. Minimise impedence of traffic	-4	-4	-4	-2	-1	-3	-2	-2	-2	-1	-1	-1,6	Traffic management plan in place. Comply with legislative requirements. If necessary, use traffic controllers.

B.	Impact Rating: Operations	Operations: Pipeline Route Alternative B_Not preferred															
				WITHOUT MITIGATION						WITH MITIGATION							
No.	ASPECT	IMPACT	OBJECTIVE	Probability	Extent	Duration	Magnitude	Receiving Environment	Without Mitigation Score (Baseline)	Probability	Extent	Duration	Magnitude	Receiving Environment	With Mitigation Score (Impact assessment)	Short Description of Mitigation Measures
1	Water															
1	Water quality	1.1 Potential leakage or spillage of waste water from pipelines into the river	Maintain a closed system to prevent leakage or spillage	-16	-4	-4	-4	-4	-6,4	-2	-2	-2	-1	-1	-1,6	Pipeline Route C/D is the preferred alternative. Visual inspection of the pipeline route for signs of leakage or particular greening of grass in certain areas which may be indicative of leakage; perhaps streamline leakage detection through mobilising the community to report any leakages along the pipeline route. A water monitoring programme must be in place to detect any contamination linked to the plant; Immediately institute appropriate mitigation measures if contamination is discovered;
		1.2 Contamination of surface waster from irrigation from inadequately treated wastewater	Treated effluent used for irrigation must comply with the standards set by DWS.	-16	-4	-4	-8	-2	-6,8	-2	-2	-2	-2	-1	-1,8	Treatment of waste water must take place strictly according to engineers' prescriptions in order to meet wastewater quality standards as set out by DWS; Treated water to be monitored on a regular basis to verify water quality. Treated water should be chlorinated to ensure that any remaining pathogens are eliminated before effluent is released; Hand screens & grid channels must be cleaned regularly and waste disposed of at in a suitable manner.
2	Soils															
2.1	Soil contamination	Leakage or spillage of semi-treated sewage may result in pollution of surrounding soil	Maintain a closed system to prevent leakage or spillage/ Monitor pipeline for signes of leakage	-8	-4	-4	-4	-1	-4,2	-2	-2	-2	-1	-1	-1,6	Visual inspection of the pipeline route for signs of leakage or particular greening of grass in certain areas which may be indicative of leakage; perhaps streamline leakage detection through mobilising the community to report any leakages along the pipeline route; A water monitoring programme must be in place to detect any contamination linked to the plant; Immediately institute appropriate mitigation measures if contamination is discovered;

2.2	Soil erosion	Soil erosion	Prevent soil erosion	-8	-4	-4	-2	-1	-3.8	-2	-1	-1	-1	-1	-1.2	It must be ensured that storm water does not reach excessive speeds, as that would increase the potential for soil erosion; storm water runoff must not be concentrated in any one place or channel where it flows over unpaved (erodible) surfaces; Should any signs of erosion be found, remedial action such as backfilling, compaction and re-vegetation should be taken immediately to avoid exacerbation of the erosion; Monthly monitoring for erosion should take place, especially after heavy rainfall,
3	**Air Quality**															
3	Air Quality	Release of unpleasant odours associated with raw sewage and sludge cause by methane and hydrogen sulphide	Reduce unpleasant odours.	-8	-4	-4	-2	-1	-3.8	-4	-2	-1	-1	-1	-1.8	Ensure that all components of the treatment plant are in good working order at all times. If the plant is functioning properly, the generation of odours should be minimised,
4	**Noise**															
4	Noise	Potential Noise Impact	Reduce noise impact from operations	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	No noise expected during operations
5	**Visual**															
5	Visual	Potential visual Impact	Potential visual impact from operations	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	No visual impact expected during operations as the site was previously used as a WWTP

C.	Impact Rating: Decommissioning	Decommisioning: Pipeline Route Alternative B_Not preferred															
				WITHOUT MITIGATION						WITH MITIGATION							
No.	ASPECT	IMPACT	Objective	Probability	Extent	Duration	Magnitude	Receiving Environment	Without Mitigation Score (Baseline)	Probability	Extent	Duration	Magnitude	Receiving Environment	With Mitigation Score (Impact assessment)	Short Description of Mitigation Measures
1	Soils															
1.1	Soil Erosion	If structures are to be demolished and cleared, the site susceptible to soil erosion in case of rains	1.1.1 Limit the risk of soil erosion	-8	-2	-4	-2	-1	-3.4	-2	-1	-2	-1	-1	-1.4	If structures are to be demolished and cleared, this is to take place during the drier winter season; Storm water to be channelled away from the exposed area for the duration of construction; soil stockpiles (if any) not to be placed in drainage lines and must be protected from erosion as stated in the EMPr; erosion should be remediated if erosion does take place as per the EMPr. Refer to decommissioning section in the EMPr.
1.2	Soil contamination	Possible soil contamination from construction/ demolition activities	1.2.1 Prevent spillage/ infiltration of raw sewage or semi-treated sewage or waste water to soil	-8	-4	-4	-2	-1	-3.8	-2	-4	-2	-1	-1	-2	All waste water contained in the system must be treated and discharged before dismantling of the system commences. If the system is no longer fully functional , the waste water still in the system must be reomed to an appropriate licensed treatment facility for treatment before work commences on the site. No pit toilets on site, workers to be provided with temporary chemical toilets; toilets not to be placed within the drainage lines on site; workers not to use the veld for sanitary purposes; suitable washing facilitates must be proved for the workers and should be established in a suitable manner that environment is not polluted any soil contamination on site must be remediated and disposed of in a responsible manner; In case of a spillage spills should be reported to the ECO so that he/ she can investigate the incident and recommend the appropriate mitigation; Any significant spills must be reported to the Department of Water and Sanitation who may conduct a site visit to recommend appropriate mitigation.

			1.2.2 Safely dispose of contaminated waste	-8	-2	-2	-1	-1	-2,8	-2	-1	-1	-1	-1	-1,2	Waste water or any parts of the system which were in direct contact with the sewage must be disposed of by a suitably licensed waste contractor at a suitable, registered waste disposal site as agreed upon between the local authority's waste division and the ECO.
2	**Water**																
2.1	Water quality	Possible leakage or spillage of semi-treated sewage from pipelines and portable toilets during construction, or contamination of water by runoff containing construction-related substances such as cement/ paint/ oil/ fuel	2.1.2 Prevent spillage of water potentially contaminated by cement, paint, oil, fuel, etc	-8	-4	-4	-2	-2	-4	-2	-1	-2	-1	-1	-1,4	All waste water contained in the system must be treated and discharged before dismantling of the system commences. if the system is no longer fully functional , the waste water still in the system must be removed to an appropriate licensed treatment facility for treatment before work commences on the site. The Contractor must prevent the discharge of any pollutants, such as cement, concrete, lime, chemicals, fuel, oil, waste water, etc; Inspects all construction vehicles/ machinery daily for early detection of deterioration or leaks; The Contractor should ensure drip trays are placed under stationary vehicles/ machines; All spills should be reported to the ECO so that he/ she can investigate the incident and recommend the appropriate mitigation; Any significant spills must be reported to the Department of Water and Sanitation who may conduct a site visit to recommend appropriate mitigation; Spill kits must be available on site & workers should be trained how to use spill kits to rectify a spill immediately; Records of spills should be kept on site; Mixing of cement not to take place on impermeable surfaces; Potentially contaminated water may not be allowed to flow into drainage lines or infiltrate into the soil/ water.
2.2	Storm water	Storm water may cause soil erosion on cleared construction site	2.2.1 Minimize water-related soil erosion	-2	-2	-1	-1	-1	-1,4	-1	-1	-1	-1	-1	-1	Construction should ideally take place in dry winter months; stormwater should be channelled away from the exposed area.
3	**Flora & Fauna**																
3.2	Flora	No rehabilitationof the site	3.1.1. Rehabilitation of the site to a state approximating the pre-development state or a condition similar to undeveloped areas nearby.	-8	-4	-4	-2	-1	-3,8	-2	-1	-2	-1	-1	-1,4	Prepare soil for re-vegetation, e.g. by removing [potentially contaminated soil (for disposal at a suitable site), ripping compacted soil and adding organic material; Re-establish locally indigenous vegetation under the guidance of an ecologist.

		Colonisation of alien invasive species	3.2.2. Prevent colonisation by alien invasive species	-8	-2	-4	-2	-1	-3,4	-2	-1	-2	-1	-1	-1,4	No alien plan species may be established on site during rehabilitation; Any alien vegetation on site must be eradicated before seeding/ planting of indigenous vegetation; Monitor the site for re-growth of vegetation.
4	**Waste Management**																
4.1	Solid waste management	Waste generated at site not disposed of at a suitably licensed disposal site	4.1.1. Remove general solid waste to a landfill site	-8	-4	-4	-2	-1	-3,8	-2	-2	-1	-1	-1	-1,4	General solid waste must be disposed of at a general landfill site or another licensed waste disposal site; General rubble from demolition can be used as fill at nearby construction sites (if any) or disposed of at a licensed landfill site. The ECO will have to be consulted regarding the disposal of linings and other components of the system which where directly in contact with untreated sewage. Water not to be dumped on or near the site.
			4.1.2 Dispose of hazardous waste at suitable disposal site	-8	-4	-4	-4	-1	-4,2	-2	-2	-2	-2	-1	-1,8	Any parts of the system which were in direct contact with the sewage must be disposed of by a suitably licensed waste contractor at a suitable, registered waste disposal site as agreed upon between the local authority's waste division and the ECO.
7	**Visual Impacts**																
7.1	Visual Impacts of demolition on site	Untidy construction/ demolition site	7.1.1. The construction site must be kept as neat and tidy as possible	-4	-1	-2	-1	-1	-1,8	-2	-1	-1	-1	-1	-1,2	Conduct environmental awareness training with all staff and discourage littering; Sufficient waste bins must be provided on site and must be emptied regularly; Litter picked up where necessary; Building rubble not allowed to accumulate on site, but must be removed at regular intervals and disposed of at a licensed disposal site.
8	**Noise**																
8.1	Noise caused by construction activities on site	Construction related noise is expected to relate mostly to construction vehicles and machinery involved in earthworks and delivery of materials	8.1.1 Minimise disturbance to neighbours	-4	-1	-2	-1	-1	-1,8	-2	-1	-1	-1	-1	-1,2	Construction/ demolition activities should be limited to daylight hours; a complaints register should be maintained in which any complaints about noise is noted.

Appendix J2.4:

Environmental impacts and risk assessment/Impact Risk Matrix – Pipeline Route Alt C (Most Preferred)

A.	Impact Rating: Site Establishment & Construction	Construction: Pipeline Route_Alternative C (Most Preferred)															
				WITHOUT MITIGATION						WITH MITIGATION							
No.	ASPECT	IMPACT	Objective	Probability	Extent	Duration	Magnitude	Receiving Environment	Without Mitigation Score (Baseline)	Probability	Extent	Duration	Magnitude	Receiving Environment	With Mitigation Score (Impact assessment)	Short Description of Mitigation Measures
1	**Soils**															
1.1	Soil Erosion	Clearing of vegetation during earthworks might make the site susceptible to soil erosion in case of rains	1.1.1 Limit the risk of soil erosion	-8	-4	-4	-2	-1	-3,8	-2	-1	-2	-1	-1	-1,4	Earth works and site preparation to take place during the drier winter season; Storm water to be channelled away from the exposed area for the duration of construction; soil stockpiles (if any) not to be placed in drainage lines and must be protected from erosion as stated in the EMPr; erosion should be remediated if erosion does take place as per the EMPr.Implement Stormwater Management Plan.
1.2	Soil contamination	Soil contamination from construction activities	1.2.1 Prevent spillage of water potentially contaminated by cement/ chemicals/ fuel & oil from construction vehicles/ machines	-8	-4	-4	-2	-1	-3,8	-2	-4	-2	-1	-1	-2	The Contractor must prevent the discharge of any pollutants, such as cement, concrete, lime, chemicals, fuel, oil, waste water, etc; Inspects all construction vehicles/ machinery daily for early detection of deterioration or leaks; The Contractor should ensure drip trays are placed under stationary vehicles/ machines; All spills should be reported to the ECO so that he/ she can investigate the incident and recommend the appropriate mitigation; Any significant spills must be reported to the Department of Water and Sanitation who may conduct a site visit to recommend appropriate mitigation; Spill kits must be available on site & workers should be trained how to use spill kits to rectify a spill immediately; Records of spills should be kept on site; Mixing of cement not to take place on impermeable surfaces; Potentially contaminated water may not be allowed to flow into drainage lines or infiltrate into the soil.
2	**Water**															

2.1	Water Quality (Surface and ground water)	Possible contamination of water by runoff containing construction-related substances such as cement/ paint/ oil/ fuel	2.1.1 Prevent spillage of water potentially contaminated by cement, paint, oil, fuel, etc	-4	-4	-4	-2	-2	-3,2	-2	-1	-1	-1	-1	-1,2	The Contractor must prevent the discharge of any pollutants, such as cement, concrete, lime, chemicals, fuel, oil, waste water, etc; Inspects all construction vehicles/ machinery daily for early detection of deterioration or leaks; The Contractor should ensure drip trays are placed under stationary vehicles/ machines; All spills should be reported to the ECO so that he/ she can investigate the incident and recommend the appropriate mitigation; Any significant spills must be reported to the Department of Water and Sanitation who may conduct a site visit to recommend appropriate mitigation; Spill kits must be available on site & workers should be trained how to use spill kits to rectify a spill immediately; Records of spills should be kept on site; Mixing of cement not to take place on impermeable surfaces; Potentially contaminated water may not be allowed to flow into drainage lines or infiltrate into the soil.
2.2	Storm water	Storm water may cause soil erosion on cleared construction site	2.2.1 Minimize water-related soil erosion	-4	-4	-4	-2	-2	-3,2	-1	-2	-1	-1	-1	-1,2	Construction should ideally take place in dry winter months; stormwater should be channelled away from the exposed area. Implement Storm Water Management Plan
3	**Flora & Fauna**															
3.1	Fauna	Possible killing of fauna e.g. killing of snakes/ spiders out of fear	3.1.1. Prevent killing of fauna	-4	-4	-4	-2	-2	-3,2	-2	-1	-1	-1	-1	-1,2	Environmental Awareness training to be conducted with all labourers, educating the importance of not simply killing fauna that is perceived as dangerous; Keep contact details in the site office for someone who can be called if catching and relocation of fauna is required, no hunting/ snaring allowed on site.

3.2	Flora	Temporary impact and/or potential loss of disturbed Prince Albert Succulent Karoo Vegetation	3.2.1. Prevent unnecessary loss of vegetation	-8	-4	-4	-2	-1	-3,8	-1	-1	-1	-1	-1	-1	Temporary impact on disturbed Prince Albert Succulent Karoo Vegetation. : A suitably qualified ECO must be appointed to monitor the construction of phase in terms of the EMPr and any other conditions pertaining to specialist studies; Environmental Awareness training to be conducted with all workers; Before any work is done, the development footprint and access routes must be clearly demarcated and approved by the ECO. Demarcation must include the total footprint necessary to execute the work, but must aim at minimum disturbance; Lay-down areas or construction sites must be located within already disturbed areas or areas of low ecological value and must be pre-approved by the ECO; Indiscriminate clearing of any area outside of construction footprint must be avoided; Access roads should be limited to a single circular route in and out. Ensure construction vehicles stay on existing roads.
		Loss of Critical Biodiversity Areas	3.2.2. Prevent the unnecessary loss of CBAs	-8	-4	-4	-2	-1	-3,8	-2	-1	-1	-1	-1	-1,2	A suitably qualified ECO must be appointed to monitor the construction of phase in terms of the EMPr and any other conditions pertaining to specialist studies; Environmental Awareness training to be conducted with all workers; Before any work is done, the development footprint and access routes must be clearly demarcated and approved by the ECO. Demarcation must include the total footprint necessary to execute the work, but must aim at minimum disturbance; Lay-down areas or construction sites must be located within already disturbed areas or areas of low ecological value and must be pre-approved by the ECO; Indiscriminate clearing of any area outside of construction footprint must be avoided; Access roads should be limited to a single circular route in and out. Ensure construction vehicles stay on existing roads
4	**Heritage Resources**														
4.1	Heritage Resources	Potential loss of Heritage Resources	4.1.1. Prevent the unnecessary loss of heritage resources	-2	-1	-1	-1	-1	-1,2	-1	-1	-1	-1	-1	-1	It is recommended that the HWC Fossil Finds Procedure be implemented throughout the development phase; In the case of any significant new fossil finds exposed during construction, these should be safeguarded - preferably in situ - and reported by the ECO as soon as possible to Heritage Western Cape.
5	**Air quality**														

5.1	Air quality	Possible air pollution in form of emissions from construction vehicles and equipment	5.1.1 Limit air pollution	-4	-4	-4	-2	-1	-3	-1	-1	-1	-1	-1	-1	All vehicles and machinery on the construction site must be in good working condition to prevent unnecessary emissions; Vehicles should not be allowed to idle for unnecessary long periods of time
		Potentially high dust levels during earthworks and site establishment	5.1.2 Limit levels of airborne dust	-4	-2	-2	-1	-1	-2	-2	-1	-1	-1	-1	-1,2	If necessary, exposed soil must be watered down at regular intervals to reduce levels of airborne dust; The Contractor must take all reasonable measures to minimise the generation of dust resulting from construction activities; Where possible stockpiles should be located in areas where they are not exposed to the erosive effects of the wind.
6	**Waste Management**															
6.1	Solid waste management	Incorrect dispoal of general solid waste generated during construction	6.1.1. Safety dispose of all solid waste.	-8	-4	-4	-2	-1	-3,8	-2	-4	-1	-1	-1	-1,8	All solid waste to be disposed of at a licensed landfill/ waste disposal site; No dumping or burning on near the site; any soil contaminated during construction (e.g. by cement) to be disposed off at a suitable disposal site; If hazardous waste is generated, this must be contained and disposed of by suitably licensed hazardous waste contractors at a suitable site; Sufficient refuse bins are to be provided on site for disposal of general waste; refuse bins to be emptied regularly; Conduct environmental awareness training with all staff and discourage littering.
7	**Visual Impacts**															
7.1	Visual Impacts of construction site	Untidy construction site	7.1.1. The construction site must be kept as neat and tidy as possible	-4	-1	-1	-1	-1	-1,6	-2	-1	-1	-1	-1	-1,2	Conduct environmental awareness training with all staff and discourage littering; Sufficient waste binds must be provided on site and must be emptied regularly; Litter picked up where necessary; Building rubble not allowed to accumulate on site, but must be removed at regular intervals and disposed of at a licensed disposal site; Stockpiles of soil or excavated material should be used for backfilling, rehabilitation or landscaping.
8	**Noise**															
8.1	Noise caused by construction activities on site	Construction related noise is expected to relate mostly to construction vehicles and machinery involved in earthworks and delivery of materials	8.1.1 Minimise disturbance to neighbours	-4	-1	-1	-1	-1	-1,6	-2	-1	-1	-1	-1	-1,2	Construction activities should be limited to daylight hours; a complaints register should be maintained in which any complaints about noise is noted.

9	**Traffic**															
9.1	Impedance of normal traffic flow	Impedance of normal traffic flow due to pipeline crossing the N12	9.1.1. Minimise impedence of traffic	-8	-4	-4	-2	-1	-3.8	-4	-2	-2	-1	-1	-2	Road crossing via Horizontal Directional Drilling;Traffic management plan in place. Comply with legislative requirements. If necessary, use traffic controllers.

B.	Impact Rating: Operations	Operations: Pipeline Route Aternative C (Most Preferred)																
				WITHOUT MITIGATION						WITH MITIGATION								
No.	ASPECT	IMPACT	OBJECTIVE	Probability	Extent	Duration	Magnitude	Receiving Environment	Without Mitigation Score (Baseline)	Probability	Extent	Duration	Magnitude	Receiving Environment	With Mitigation Score (Impact assessment)	Short Description of Mitigation Measures
1	Water															
1	Water quality	1.1 Potential leakage or spillage of waste water from pipelines	Maintain a closed system to prevent leakage or spillage/ Monitor pipeline for signes of leakage	-8	-4	-4	-4	-2	-4,4	-2	-2	-2	-2	-1	-1,8	Visual inspection of the pipeline route for signs of leakage or particular greening of grass in certain areas which may be indicative of leakage; perhaps streamline leakage detection through mobilising the community to report any leakages along the pipeline route. A water monitoring programme must be in place to detect any contamination linked to the plant; Immediately institute appropriate mitigation measures if contamination is discovered;
		1.2 Contamination of surface waster from irrigation from inadequately treated wastewater	Treated effluent used for irrigation must comply with the standards set by DWS.	-16	-4	-4	-8	-2	-6,8	-2	-2	-2	-2	-1	-1,8	Treatment of waste water must take place strictly according to engineers' prescriptions in order to meet wastewater quality standards as set out by DWS; Treated water to be monitored on a regular basis to verify water quality. Treated water should be chlorinated to ensure that any remaining pathogens are eliminated before effluent is released; Hand screens & grid channels must be cleaned regularly and waste disposed of at in a suitable manner. A water monitoring programme must be in place to detect any contamination linked to the plant; Immediately institute appropriate mitigation measures if contamination is discovered;
2	Soils															

2.1	Soil contamination	Leakage of semi-treated sewage may result in pollution of surrounding soil	Maintain a closed system to prevent leakage or spillage/ Monitor pipeline for signes of leakage	-8	-4	-4	-4	-1	-4,2	-2	-2	-2	-2	-1	-1,8	Visual inspection of the pipeline route for signs of leakage or particular greening of grass in certain areas which may be indicative of leakage; perhaps streamline leakage detection through mobilising the community to report any leakages along the pipeline route; A water monitoring programme must be in place to detect any contamination linked to the plant; Immediately institute appropriate mitigation measures if contamination is discovered;
2.2	Soil erosion	Soil erosion causing exposure of the pipeline	Prevent soil erosion	-8	-4	-4	-2	-1	-3,8	-2	-1	-1	-1	-1	-1,2	It must be ensured that storm water does not reach excessive speeds, as that would increase the potential for soil erosion; storm water runoff must not be concentrated in any one place or channel where it flows over unpaved (erodible) surfaces; Should any signs of erosion be found, remedial action such as backfilling, compaction and re-vegetation should be taken immediately to avoid exacerbation of the erosion; Monthly monitoring for erosion should take place, especially after heavy rainfall,
3	**Air Quality**																
3	Air Quality	Release of unpleasant odours associated with raw sewage and sludge cause by methane and hydrogen sulphide	Reduce unpleasant odours.	-8	-4	-4	-2	-1	-3,8	-4	-2	-1	-1	-1	-1,8	Ensure that all components of the treatment plant & pipeline are in good working order at all times. If the plant is functioning properly, the generation of odours should be minimised,
4	**Noise**																
4	Noise	Potential Noise Impact	Reduce noise impact from operations	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	No noise expected during operations	
5	**Visual**																
5	Visual	Potential visual Impact	Potential visual impact from operations	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	No visual impact expected during operations as the site was previously used as a WWTP	

C.	Impact Rating: Decommissioning	Decommissioning: Pipeline Route Alternative C (Most Preferred)															
				WITHOUT MITIGATION						WITH MITIGATION							
No.	ASPECT	IMPACT	Objective	Probability	Extent	Duration	Magnitude	Receiving Environment	Without Mitigation Score (Baseline)	Probability	Extent	Duration	Magnitude	Receiving Environment	With Mitigation Score (Impact assessment)	Short Description of Mitigation Measures	
1	**Soils**																
1.1	Soil Erosion	If structures are to be demolished and cleared, the site susceptible to soil erosion in case of rains	1.1.1 Limit the risk of soil erosion	-8	-2	-4	-2	-1	-3,4	-2	-1	-2	-1	-1	-1,4	If structures are to be demolished and cleared, this is to take place during the drier winter season; Storm water to be channelled away from the exposed area for the duration of construction; soil stockpiles (if any) not to be placed in drainage lines and must be protected from erosion as stated in the EMPr; erosion should be remediated if erosion does take place as per the EMPr. Refer to decommissioning section in the EMPr.	
1.2	Soil contamination	Possible soil contamination from construction/ demolition activities	1.2.1 Prevent spillage/ infiltration of raw sewage or semi-treated sewage or waste water to soil	-8	-4	-4	-2	-1	-3,8	-2	-4	-2	-1	-1	-2	All waste water contained in the system must be treated and discharged before dismantling of the system commences. if the system is no longer fully functional , the waste water still in the system must be removed to an appropriate licensed treatment facility for treatment before work commences on the site. No pit toilets on site, workers to be provided with temporary chemical toilets; toilets not to be placed within the drainage lines on site; workers not to use the veld for sanitary purposes; suitable washing facilitates must be proved for the workers and should be established in a suitable manner that environment is not polluted any soil contamination on site must be remediated and disposed of in a responsible manner; In case of a spillage spills should be reported to the ECO so that he/ she can investigate the incident and recommend the appropriate mitigation; Any significant spills must be reported to the Department of Water and Sanitation who may conduct a site visit to recommend appropriate mitigation.	

			1.2.2 Safely dispose of contaminated waste	-8	-2	-2	-1	-1	-2,8	-2	-1	-1	-1	-1	-1,2	Waste water or any parts of the system which were in direct contact with the sewage must be disposed of by a suitably licensed waste contractor at a suitable, registered waste disposal site as agreed upon between the local authority's waste division and the ECO.
2	**Water**															
2.1	Water quality	Possible leakage or spillage of semi-treated sewage, or contamination of water by runoff containing construction-related substances such as cement/ paint/ oil/ fuel	2.1.2 Prevent spillage of water potentially contaminated by waste water/ sewage, cement, paint, oil, fuel, etc	-8	-4	-4	-2	-2	-4	-2	-1	-2	-1	-1	-1,4	All waste water contained in the system must be treated and discharged before dismantling of the system commences. if the system is no longer fully functional , the waste water still in the system must be removed to an appropriate licensed treatment facility for treatment before work commences on the site The Contractor must prevent the discharge of any pollutants, such as cement, concrete, lime, chemicals, fuel, oil, waste water, etc; Inspects all construction vehicles/ machinery daily for early detection of deterioration or leaks; The Contractor should ensure drip trays are placed under stationary vehicles/ machines; All spills should be reported to the ECO so that he/ she can investigate the incident and recommend the appropriate mitigation; Any significant spills must be reported to the Department of Water and Sanitation who may conduct a site visit to recommend appropriate mitigation; Spill kits must be available on site & workers should be trained how to use spill kits to rectify a spill immediately; Records of spills should be kept on site; Mixing of cement not to take place on impermeable surfaces; Potentially contaminated water may not be allowed to flow into drainage lines or infiltrate into the soil/ water.
2.2	Storm water	Storm water may cause soil erosion on cleared construction site	2.2.1 Minimize water-related soil erosion	-2	-2	-1	-1	-1	-1,4	-1	-1	-1	-1	-1	-1	Decommissioning should ideally take place in dry winter months; stormwater should be channelled away from the exposed area. Implement Storm Water Management Plan.
3	**Flora & Fauna**															
3.2	Flora	No rehabilitation of the site	3.1.1. Rehabilitation of the site to a state approximating the pre-development state or a condition similar to undeveloped areas nearby.	-8	-4	-4	-2	-1	-3,8	-2	-1	-2	-1	-1	-1,4	Prepare soil for re-vegetation, e.g. by removing [potentially contaminated soil (for disposal at a suitable site), ripping compacted soil and adding organic material; Re-establish locally indigenous vegetation under the guidance of an ecologist.

		Colonisation of alien invasive species	3.2.2. Prevent colonisation by alien invasive species	-8	-2	-4	-2	-1	-3,4	-2	-1	-2	-1	-1	-1,4	No alien plan species may be established on site during rehabilitation; Any alien vegetation on site must be eradicated before seeding/ planting of indigenous vegetation; Monitor the site for re-growth of vegetation.
4	**Waste Management**																
4.1	Solid waste management	Waste generated at site not disposed of at a suitably licensed disposal site	4.1.1. Remove general solid waste to a landfill site	-8	-4	-4	-2	-1	-3,8	-2	-2	-1	-1	-1	-1,4	General solid waste must be disposed of at a general landfill site or another licensed waste disposal site; General rubble from demolition can be used as fill at nearby construction sites (if any) or disposed of at a licensed landfill site. The ECO will have to be consulted regarding the disposal of linings and other components of the system which where directly in contact with untreated sewage. Water not to be dumped on or near the site.
			4.1.2 Dispose of hazardous waste at suitable disposal site	-8	-4	-4	-4	-1	-4,2	-2	-2	-2	-2	-1	-1,8	Any parts of the system which were in direct contact with the sewage must be disposed of by a suitably licensed waste contractor at a suitable, registered waste disposal site as agreed upon between the local authority's waste division and the ECO.
7	**Visual Impacts**																
7.1	Visual Impacts of demolition on site	Untidy construction/ demolition site	7.1.1. The construction site must be kept as neat and tidy as possible	-4	-1	-2	-1	-1	-1,8	-2	-1	-1	-1	-1	-1,2	Conduct environmental awareness training with all staff and discourage littering; Sufficient waste bins must be provided on site and must be emptied regularly; Litter picked up where necessary; Building rubble not allowed to accumulate on site, but must be removed at regular intervals and disposed of at a licensed disposal site.
8	**Noise**																
8.1	Noise caused by construction activities on site	Construction related noise is expected to relate mostly to construction vehicles and machinery involved in earthworks and delivery of materials	8.1.1 Minimise disturbance to neighbours	-4	-1	-2	-1	-1	-1,8	-2	-1	-1	-1	-1	-1,2	Construction/ demolition activities should be limited to daylight hours; a complaints register should be maintained in which any complaints about noise is noted.

Appendix J2.5:

Environmental impacts and risk assessment/Impact Risk Matrix – Pipeline Route Alt D (Preferred)

A.	Impact Rating: Site Establishment & Construction	Construction: Pipeline Route Alternative D (Preferred)															
				WITHOUT MITIGATION						WITH MITIGATION							
No.	ASPECT	IMPACT	Objective	Probability	Extent	Duration	Magnitude	Receiving Environment	Without Mitigation Score (Baseline)	Probability	Extent	Duration	Magnitude	Receiving Environment	With Mitigation Score (Impact assessment)	Short Description of Mitigation Measures
1	Soils															
1.1	Soil Erosion	Clearing of vegetation during earthworks might make the site susceptible to soil erosion in case of rains	1.1.1 Limit the risk of soil erosion	-8	-4	-4	-2	-1	-3,8	-2	-2	-2	-1	-1	-1,6	Earth works and site preparation to take place during the drier winter season; Storm water to be channelled away from the exposed area for the duration of construction; soil stockpiles (if any) not to be placed in drainage lines and must be protected from erosion as stated in the EMPr; erosion should be remediated if erosion does take place as per the EMPr.
		Clearing of vegetation during earthworks may impact banks of Sand River	1.1.2 Limit risk of soil erosion on banks of the Sand River	-8	-4	-4	-4	-4	-4,8	-2	-2	-1	-1	-1	-1,4	Minimise construction footprint and remain out of the No-go area; Remain within road reserve and attach to existing brige to cross the N12.
1.2	Soil Contamination	Soil contamination from construction activities	1.2.2 Prevent spillage of water potentially contaminated by cement/ chemicals/ fuel & oil from construction vehicles/ machines	-8	-4	-4	-2	-1	-3,8	-2	-4	-2	-1	-1	-2	The Contractor must prevent the discharge of any pollutants, such as cement, concrete, lime, chemicals, fuel, oil, waste water, etc; Inspects all construction vehicles/ machinery daily for early detection of deterioration or leaks; The Contractor should ensure drip trays are placed under stationary vehicles/ machines; All spills should be reported to the ECO so that he/ she can investigate the incident and recommend the appropriate mitigation; Any significant spills must be reported to the Department of Water and Sanitation who may conduct a site visit to recommend appropriate mitigation; Spill kits must be available on site & workers should be trained how to use spill kits to rectify a spill immediately; Records of spills should be kept on site; Mixing of cement not to take place on impermeable surfaces; Potentially contaminated water may not be allowed to flow into drainage lines or infiltrate into the soil.

2	**Water**															
2.1	Water Quality (Surface water and ground water)	Possible leakage or spillage of sewage from portable toilets during construction, or contamination of water by runoff containing construction-related substances such as cement/ paint/ oil/ fuel	2.1.1 Prevent spillage of water potentially contaminated by cement, paint, oil, fuel, etc	-4	4	-4	-2	-2	-1,6	-2	-1	-1	-1	-1	-1,2	The Contractor must prevent the discharge of any pollutants, such as cement, concrete, lime, chemicals, fuel, oil, waste water, etc; Inspects all construction vehicles/ machinery daily for early detection of deterioration or leaks; The Contractor should ensure drip trays are placed under stationary vehicles/ machines; All spills should be reported to the ECO so that he/ she can investigate the incident and recommend the appropriate mitigation; Any significant spills must be reported to the Department of Water and Sanitation who may conduct a site visit to recommend appropriate mitigation; Spill kits must be available on site & workers should be trained how to use spill kits to rectify a spill immediately; Records of spills should be kept on site; Mixing of cement not to take place on impermeable surfaces; Potentially contaminated water may not be allowed to flow into drainage lines or infiltrate into the soil.
2.2	Storm water	Storm water may cause soil erosion on cleared construction site	2.2.1 Minimize water-related soil erosion	-4	-4	-4	-2	-2	-3,2	-1	-2	-1	-1	-1	-1,2	Construction should ideally take place in dry winter months; stormwater should be channelled away from the exposed area. Implement Storm Water Management Plan
3	**Flora & Fauna**															
3.1	Fauna	Possible killing of fauna e.g. killing of snakes/ spiders out of fear	3.1.1. Prevent killing of fauna	-4	-4	-4	-2	-2	-3,2	-2	-1	-1	-1	-1	-1,2	Environmental Awareness training to be conducted with all labourers, educating the importance of not simply killing fauna that is perceived as dangerous; Keep contact details in the site office for someone who can be called if catching and relocation of fauna is required, no hunting/ snaring allowed on site.

3.2	Flora	Temporary impact and/or potential loss of disturbed Prince Albert Succulent Karoo Vegetation	3.2.1. Prevent unnecessary loss of vegetation	-8	-4	-4	-2	-1	-3,8	-8	-1	-1	-1	-1	-2,4	Temporary impact on disturbed Prince Albert Succulent Karoo Vegetation. Remain within the road reserve and out of No-go areas. A suitably qualified ECO must be appointed to monitor the construction of phase in terms of the EMPr and any other conditions pertaining to specialist studies; Environmental Awareness training to be conducted with all workers; Before any work is done, the development footprint and access routes must be clearly demarcated and approved by the ECO. Demarcation must include the total footprint necessary to execute the work, but must aim at minimum disturbance; Lay-down areas or construction sites must be located within already disturbed areas or areas of low ecological value and must be pre-approved by the ECO; Indiscriminate clearing of any area outside of construction footprint must be avoided; Access roads should be limited to a single circular route in and out. Ensure construction vehicles stay on existing roads.
		Temporary impact and/or potential loss of aquatic vegetation associates with the Sand/ Groot River	3.2.2 Prevent the unneccessary loss of aquatic vegetation	-8	-4	-4	-4	-4	-4,8	-1	-1	-1	-1	-1	-1	Minimise the construction footprint and keep out of No-go areas. Remain within road reserve and attach to existing brige to cross the N12.
		Loss of Critical Biodiversity Areas	3.2.3. Prevent the unnecessary loss of CBAs	-8	-4	-4	-4	-4	-4,8	-1	-1	-1	-1	-1	-1	Remain wihtin the road reserve and out of No-go areas A suitably qualified ECO must be appointed to monitor the construction of phase in terms of the EMPr and any other conditions pertaining to specialist studies; Environmental Awareness training to be conducted with all workers; Before any work is done, the development footprint and access routes must be clearly demarcated and approved by the ECO. Demarcation must include the total footprint necessary to execute the work, but must aim at minimum disturbance; Lay-down areas or construction sites must be located within already disturbed areas or areas of low ecological value and must be pre-approved by the ECO; Indiscriminate clearing of any area outside of construction footprint must be avoided; Access roads should be limited to a single circular route in and out. Ensure construction vehicles stay on existing roads

4	**Heritage Resources**														
4.1	Heritage Resources	Potential loss of Heritage Resources	4.1.1. Prevent the unnecessary loss of heritage resources	-2	-1	-1	-1	-1	-1,2	-1	-1	-1	-1	-1	-1	It is recommended that the HWC Fossil Finds Procedure be implemented throughout the development phase; In the case of any significant new fossil finds exposed during construction, these should be safeguarded - preferably in situ - and reported by the ECO as soon as possible to Heritage Western Cape.
5	**Air quality**														
5.1	Air quality	Possible air pollution in form of emissions from construction vehicles and equipment	5.1.1 Limit air pollution	-4	-4	-4	-2	-1	-3	-1	-1	-1	-1	-1	-1	All vehicles and machinery on the construction site must be in good working condition to prevent unnecessary emissions; Vehicles should not be allowed to idle for unnecessary long periods of time
		Potentially high dust levels during earthworks and site establishment	5.1.2 Limit levels of airborne dust	-4	-2	-2	-1	-1	-2	-2	-1	-1	-1	-1	-1,2	If necessary, exposed soil must be watered down at regular intervals to reduce levels of airborne dust; The Contractor must take all reasonable measures to minimise the generation of dust resulting from construction activities; Where possible stockpiles should be located in areas where they are not exposed to the erosive effects of the wind.
6	**Waste Management**														
6.1	Solid waste management	Incorrect dispoal of general solid waste generated during construction	6.1.1. Safety dispose of all solid waste.	-8	-4	-4	-2	-1	-3,8	-2	-4	-1	-1	-1	-1,6	All solid waste to be disposed of at a licensed landfill/ waste disposal site; No dumping or burning on near the site; any soil contaminated during construction (e.g. by cement) to be disposed off at a suitable disposal site; If hazardous waste is generated, this must be contained and disposed of by suitably licensed hazardous waste contractors at a suitable site; Sufficient refuse bins are to be provided on site for disposal of general waste; refuse bins to be emptied regularly; Conduct environmental awareness training with all staff and discourage littering.
7	**Visual Impacts**														

7.1	Visual Impacts of construction site	Untidy construction site	7.1.1. The construction site must be kept as neat and tidy as possible	-4	-1	-1	-1	-1	-1,6	-2	-1	-1	-1	-1	-1,2	Conduct environmental awareness training with all staff and discourage littering; Sufficient waste binds must be provided on site and must be emptied regularly; Litter picked up where necessary; Building rubble not allowed to accumulate on site, but must be removed at regular intervals and disposed of at a licensed disposal site; Stockpiles of soil or excavated material should be used for backfilling, rehabilitation or landscaping.
8	**Noise**															
8.1	Noise caused by construction activities on site	Construction related noise is expected to relate mostly to construction vehicles and machinery involved in earthworks and delivery of materials	8.1.1 Minimise disturbance to neighbours	-4	-1	-1	-1	-1	-1,6	-2	-1	-1	-1	-1	-1,2	Construction activities should be limited to daylight hours; a complaints register should be maintained in which any complaints about noise is noted.
9	**Traffic**															
9.1	Impedance of normal traffic flow	Impedance of normal traffic flow due to pipeline crossing the N12 over the bridge	9.1.1. Minimise impedence of traffic	-4	-4	-4	-2	-1	-3	-2	-2	-2	-1	-1	-1,6	Traffic management plan in place. Comply with legislative requirements. If necessary, use traffic controllers.

B.	Impact Rating: Operations	Operations: Pipeline Route Alternative D (Preferred)															
				WITHOUT MITIGATION						WITH MITIGATION							
No.	ASPECT	IMPACT	OBJECTIVE	Probability	Extent	Duration	Magnitude	Receiving Environment	Without Mitigation Score (Baseline)	Probability	Extent	Duration	Magnitude	Receiving Environment	With Mitigation Score (Impact assessment)	Short Description of Mitigation Measures	
1	Water																
1	Water quality	1.1 Potential leakage or spillage of waste water from pipelines into the river	Maintain a closed system to prevent leakage or spillage	-16	-4	-4	-4	-4	-6,4	-2	-2	-2	-1	-1	-1,6	Pipeline Route C/D is the preferred alternative. Visual inspection of the pipeline route for signs of leakage or particular greening of grass in certain areas which may be indicative of leakage; perhaps streamline leakage detection through mobilising the community to report any leakages along the pipeline route. A water monitoring programme must be in place to detect any contamination linked to the plant; Immediately institute appropriate mitigation measures if contamination is discovered;	
		1.2 Contamination of surface waster from irrigation from inadequately treated wastewater	Treated effluent used for irrigation must comply with the standards set by DWS.	-16	-4	-4	-8	-2	-6,8	-2	-2	-2	-2	-1	-1,8	Treatment of waste water must take place strictly according to engineers' prescriptions in order to meet wastewater quality standards as set out by DWS; Treated water to be monitored on a regular basis to verify water quality. Treated water should be chlorinated to ensure that any remaining pathogens are eliminated before effluent is released; Hand screens & grid channels must be cleaned regularly and waste disposed of at in a suitable manner.	
2	Soils																
2.1	Soil contamination	Leakage or spillage of semi-treated sewage may result in pollution of surrounding soil	Maintain a closed system to prevent leakage or spillage/ Monitor pipeline for signes of leakage	-8	-4	-4	-4	-1	-4,2	-2	-2	-2	-1	-1	-1,6	Visual inspection of the pipeline route for signs of leakage or particular greening of grass in certain areas which may be indicative of leakage; perhaps streamline leakage detection through mobilising the community to report any leakages along the pipeline route; A water monitoring programme must be in place to detect any contamination linked to the plant; Immediately institute appropriate mitigation measures if contamination is discovered;	

2.2	Soil erosion	Soil erosion	Prevent soil erosion	-8	-4	-4	-2	-1	-3,8	-2	-1	-1	-1	-1	-1,2	It must be ensured that storm water does not reach excessive speeds, as that would increase the potential for soil erosion; storm water runoff must not be concentrated in any one place or channel where it flows over unpaved (erodible) surfaces; Should any signs of erosion be found, remedial action such as backfilling, compaction and re-vegetation should be taken immediately to avoid exacerbation of the erosion; Monthly monitoring for erosion should take place, especially after heavy rainfall,
3	**Air Quality**															
3	Air Quality	Release of unpleasant odours associated with raw sewage and sludge cause by methane and hydrogen sulphide	Reduce unpleasant odours.	-8	-4	-4	-2	-1	-3,8	-4	-2	-1	-1	-1	-1,8	Ensure that all components of the treatment plant are in good working order at all times. If the plant is functioning properly, the generation of odours should be minimised,
4	**Noise**															
4	Noise	Potential Noise Impact	Reduce noise impact from operations	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	No noise expected during operations
5	**Visual**															
5	Visual	Potential visual Impact	Potential visual impact from operations	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	No visual impact expected during operations as the site was previously used as a WWTP

C.	Impact Rating: Decommissioning	Decommisioning: Pipeline Route Alternative D (Preferred)														
				WITHOUT MITIGATION						WITH MITIGATION						
No.	ASPECT	IMPACT	Objective	Probability	Extent	Duration	Magnitude	Receiving Environment	Without Mitigation Score (Baseline)	Probability	Extent	Duration	Magnitude	Receiving Environment	With Mitigation Score (Impact assessment)	Short Description of Mitigation Measures
1	Soils															
1.1	Soil Erosion	If structures are to be demolished and cleared, the site susceptible to soil erosion in case of rains	1.1.1 Limit the risk of soil erosion	-8	-2	-4	-2	-1	-3,4	-2	-1	-2	-1	-1	-1,4	If structures are to be demolished and cleared, this is to take place during the drier winter season; Storm water to be channelled away from the exposed area for the duration of construction; soil stockpiles (if any) not to be placed in drainage lines and must be protected from erosion as stated in the EMPr; erosion should be remediated if erosion does take place as per the EMPr. Refer to decommissioning section in the EMPr.
1.2	Soil contamination	Possible soil contamination from construction/ demolition activities	1.2.1 Prevent spillage/ infiltration of raw sewage or semi-treated sewage or waste water to soil	-8	-4	-4	-2	-1	-3,8	-2	-4	-2	-1	-1	-2	All waste water contained in the system must be treated and discharged before dismantling of the system commences. if the system is no longer fully functional , the waste water still in the system must be reomed to an appropriate licensed treatment facility for treatment before work commences on the site. No pit toilets on site, workers to be provided with temporary chemical toilets; toilets not to be placed within the drainage lines on site; workers not to use the veld for sanitary purposes; suitable washing facilitates must be proved for the workers and should be established in a suitable manner that environment is not polluted any soil contamination on site must be remediated and disposed of in a responsible manner; In case of a spillage spills should be reported to the ECO so that he/ she can investigate the incident and recommend the appropriate mitigation; Any significant spills must be reported to the Department of Water and Sanitation who may conduct a site visit to recommend appropriate mitigation.

			1.2.2 Safely dispose of contaminated waste	-8	-2	-2	-1	-1	-2,8	-2	-1	-1	-1	-1	-1,2	Waste water or any parts of the system which were in direct contact with the sewage must be disposed of by a suitably licensed waste contractor at a suitable, registered waste disposal site as agreed upon between the local authority's waste division and the ECO.
2	**Water**															
2.1	Water quality	Possible leakage or spillage of semi-treated sewage from pipelines and portable toilets during construction, or contamination of water by runoff containing construction-related substances such as cement/ paint/ oil/ fuel	2.1.2 Prevent spillage of water potentially contaminated by cement, paint, oil, fuel, etc	-8	-4	-4	-2	-2	-4	-2	-1	-2	-1	-1	-1,4	All waste water contained in the system must be treated and discharged before dismantling of the system commences. if the system is no longer fully functional , the waste water still in the system must be removed to an appropriate licensed treatment facility for treatment before work commences on the site. The Contractor must prevent the discharge of any pollutants, such as cement, concrete, lime, chemicals, fuel, oil, waste water, etc; Inspects all construction vehicles/ machinery daily for early detection of deterioration or leaks; The Contractor should ensure drip trays are placed under stationary vehicles/ machines; All spills should be reported to the ECO so that he/ she can investigate the incident and recommend the appropriate mitigation; Any significant spills must be reported to the Department of Water and Sanitation who may conduct a site visit to recommend appropriate mitigation; Spill kits must be available on site & workers should be trained how to use spill kits to rectify a spill immediately; Records of spills should be kept on site; Mixing of cement not to take place on impermeable surfaces; Potentially contaminated water may not be allowed to flow into drainage lines or infiltrate into the soil/ water.
2.2	Storm water	Storm water may cause soil erosion on cleared construction site	2.2.1 Minimize water-related soil erosion	-2	-2	-1	-1	-1	-1,4	-1	-1	-1	-1	-1	-1	Construction should ideally take place in dry winter months; stormwater should be channelled away from the exposed area.
3	**Flora & Fauna**															
3.2	Flora	No rehabilitationof the site	3.1.1. Rehabilitation of the site to a state approximating the pre-development state or a condition similar to undeveloped areas nearby.	-8	-4	-4	-2	-1	-3,8	-2	-1	-2	-1	-1	-1,4	Prepare soil for re-vegetation, e.g. by removing [potentially contaminated soil (for disposal at a suitable site), ripping compacted soil and adding organic material; Re-establish locally indigenous vegetation under the guidance of an ecologist.

		Colonisation of alien invasive species	3.2.2. Prevent colonisation by alien invasive species	-8	-2	-4	-2	-1	-3,4	-2	-1	-2	-1	-1	-1,4	No alien plan species may be established on site during rehabilitation; Any alien vegetation on site must be eradicated before seeding/ planting of indigenous vegetation; Monitor the site for re-growth of vegetation.
4	**Waste Management**															
4.1	Solid waste management	Waste generated at site not disposed of at a suitably licensed disposal site	4.1.1. Remove general solid waste to a landfill site	-8	-4	-4	-2	-1	-3,8	-2	-2	-1	-1	-1	-1,4	General solid waste must be disposed of at a general landfill site or another licensed waste disposal site; General rubble from demolition can be used as fill at nearby construction sites (if any) or disposed of at a licensed landfill site. The ECO will have to be consulted regarding the disposal of linings and other components of the system which where directly in contact with untreated sewage. Water not to be dumped on or near the site.
			4.1.2 Dispose of hazardous waste at suitable disposal site	-8	-4	-4	-4	-1	-4,2	-2	-2	-2	-2	-1	-1,8	Any parts of the system which were in direct contact with the sewage must be disposed of by a suitably licensed waste contractor at a suitable, registered waste disposal site as agreed upon between the local authority's waste division and the ECO.
7	**Visual Impacts**															
7.1	Visual Impacts of demolition on site	Untidy construction/ demolition site	7.1.1. The construction site must be kept as neat and tidy as possible	-4	-1	-2	-1	-1	-1,8	-2	-1	-1	-1	-1	-1,2	Conduct environmental awareness training with all staff and discourage littering; Sufficient waste bins must be provided on site and must be emptied regularly; Litter picked up where necessary; Building rubble not allowed to accumulate on site, but must be removed at regular intervals and disposed of at a licensed disposal site.
8	**Noise**															
8.1	Noise caused by construction activities on site	Construction related noise is expected to relate mostly to construction vehicles and machinery involved in earthworks and delivery of materials	8.1.1 Minimise disturbance to neighbours	-4	-1	-2	-1	-1	-1,8	-2	-1	-1	-1	-1	-1,2	Construction/ demolition activities should be limited to daylight hours; a complaints register should be maintained in which any complaints about noise is noted.

A.	Impact Rating: Site Establishment & Construction	Construction: Disposal of existing sludge from decommissioning of existing ponds															
				WITHOUT MITIGATION						WITH MITIGATION							
No.	ASPECT	IMPACT	Objective	Probability	Extent	Duration	Receiving Environment	Toxicity	Without Mitigation Score (Baseline)	Probability	Extent	Duration	Receiving Environment	Toxicity	With Mitigation Score (Impact assessment)	Short Description of Mitigation Measures	
1	Soils																
1.1	Soil Erosion	Clearing of vegetation demolition of existing inlet works and septic tank might make the site susceptible to soil erosion in case of rains	1.1.1 Limit the risk of soil erosion	-8	-4	-4	-2	-1	-3,8	-2	-1	-1	-1	-1	-1,2	Earth works/ demolition and site preparation to take place during the drier winter season; Storm water to be channelled away from the exposed area for the duration of construction; soil stockpiles (if any) not to be placed in drainage lines and must be protected from erosion as stated in the EMPr; erosion should be remediated if erosion does take place as per the EMPr. Implementation of the Storm Water Management Plan .	
1.2	Soil contamination	Soil contamination from construction vehicles on site	1.2.1 Prevent spillage of oil and fuel from construction vehicles	-8	-4	-4	-2	-1	-3,8	-4	-2	-2	-2	-1	-2,2	The Contractor must prevent the discharge of any pollutants, such as cement, concrete, lime, chemicals, fuel, oil, waste water, etc; Inspects all construction vehicles/ machinery daily for early detection of deterioration or leaks; The Contractor should ensure drip trays are placed under stationary vehicles/ machines; All spills should be reported to the ECO so that he/ she can investigate the incident and recommend the appropriate mitigation; Any significant spills must be reported to the Department of Water and Sanitation who may conduct a site visit to recommend appropriate mitigation; Spill kits must be available on site & workers should be trained how to use spill kits to rectify a spill immediately; Records of spills should be kept on site; Mixing of cement to take place on impermeable surfaces; Potentially contaminated water may not be allowed to flow into drainage lines or infiltrate into the soil.	

		Soil contamination from decomissioning of exisitng inlet works & septic tank	1.2.2 Prevent spillage of water potentially contaminated by sewage	-16	-2	-8	-4	-1	-6,2	-2	-2	-1	-1	-1	-1,4	The Contractor must prevent the discharge of any pollutants, waste water, etc; All spills should be reported to the ECO so that he/ she can investigate the incident and recommend the appropriate mitigation; Any significant spills must be reported to the Department of Water and Sanitation who may conduct a site visit to recommend appropriate mitigation; Spill kits must be available on site & workers should be trained how to use spill kits to rectify a spill immediately; Records of spills should be kept on site;Ensure waste/ waste water from the septic tank/ inlet works is contained before demolition of the works. Waste/ waste water/ concrete from the decomissioning of the workd to be disposed of in designated approved area for disposal as per the Operations Manual.
2	**Water**															
	Water Quality (Surface/ ground water)	Possible contamination of water from construction vehicles on site	2.1.2 Prevent spillage of water potentially contaminated by , oil, fuel, etc	-4	-2	-2	-2	-1	-2,2	-1	-1	-1	-1	-1	-1	The Contractor must prevent the discharge of any pollutants, such as cement, concrete, lime, chemicals, fuel, oil, waste water, etc; Inspect all construction vehicles/ machinery daily for early detection of deterioration or leaks; The Contractor should ensure drip trays are placed under stationary vehicles/ machines; All spills should be reported to the ECO so that he/ she can investigate the incident and recommend the appropriate mitigation; Any significant spills must be reported to the Department of Water and Sanitation who may conduct a site visit to recommend appropriate mitigation; Spill kits must be available on site & workers should be trained how to use spill kits to rectify a spill immediately; Records of spills should be kept on site; Mixing of cement not to take place on impermeable surfaces; Potentially contaminated water may not be allowed to flow into drainage lines or infiltrate into the soil.

		Possible contamination of water with sewage from decomissioning of exisitng inlet works & septic tank &	2.2.2 Prevent spillage of water potentially contaminated by sewage	-16	-4	-8	-4	-1	-6,6	-2	-2	-2	-2	-1	-1,8	The Contractor must prevent the discharge of any pollutants, waste water, etc;All spills should be reported to the ECO so that he/ she can investigate the incident and recommend the appropriate mitigation; Any significant spills must be reported to the Department of Water and Sanitation who may conduct a site visit to recommend appropriate mitigation; Spill kits must be available on site & workers should be trained how to use spill kits to rectify a spill immediately; Records of spills should be kept on site; Ensure waste/ waste water from the septic tank/ inlet works is contained before demolition of the works. Waste/ waste water/ concrete from the decomissioning of the works to be disposed of in designated approved area for disposal as per the Operations Manual. Implement Storm Water Management Plan.
2.2	Storm water	Storm water may cause soil erosion on cleared construction site	2.2.1 Minimize water-related soil erosion	-4	-2	-1	-1	-1	-1,8	-1	-2	-1	-1	-1	-1,2	Construction should ideally take place in dry winter months; stormwater should be channelled away from the exposed area. Implement Storm Water Management Plan. Remain out of No-go areas.
3	**Flora & Fauna**															
3.1	Fauna	Possible killing of fauna e.g. killing of snakes/ spiders out of fear	3.1.1. Prevent killing of fauna	-2	-2	-1	-1	-1	-1,4	-1	-1	-1	-1	-1	-1	Environmental Awareness training to be conducted with all labourers, educating the importance of not simply killing fauna that is perceived as dangerous; Keep contact details in the site office for someone who can be called if catching and relocation of fauna is required, no hunting/ snaring allowed on site.

3.2	Flora	Temporary impact and/or potential loss of disturbed Prince Albert Succulent Karoo Vegetation	3.2.1. Prevent unnecessary loss of vegetation	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	The area considered for disposal is already disturbed with no natural vegetation remaining. A suitably qualified ECO must be appointed to monitor the construction of phase in terms of the EMPr and any other conditions pertaining to specialist studies; Environmental Awareness training to be conducted with all workers; Before any work is done, the development footprint and access routes must be clearly demarcated and approved by the ECO. Demarcation must include the total footprint necessary to execute the work, but must aim at minimum disturbance; Disposal site must be located within already disturbed areas or areas of low ecological value and must be pre-approved by the ECO; Indiscriminate clearing of any area outside of construction footprint must be avoided; Access roads should be limited to a single circular route in and out. Ensure construction vehicles stay on existing roads.
		Loss of Critical Biodiversity Areas	3.2.2. Prevent the unnecessary loss of CBAs	-4	-1	-2	-2	-1	-2	-2	-1	-1	-1	-1	-1,2	A suitably qualified ECO must be appointed to monitor the construction of phase in terms of the EMPr and any other conditions pertaining to specialist studies; Environmental Awareness training to be conducted with all workers; Before any work is done, the development footprint and access routes must be clearly demarcated and approved by the ECO. Demarcation must include the total footprint necessary to execute the work, but must aim at minimum disturbance; Lay-down areas or construction sites must be located within already disturbed areas or areas of low ecological value and must be pre-approved by the ECO; Indiscriminate clearing of any area outside of construction footprint must be avoided; Access roads should be limited to a single circular route in and out. Ensure construction vehicles stay on existing roads
4	**Heritage Resources**															
4.1	Heritage Resources	Potential loss of Heritage Resources	4.1.1. Prevent the unnecessary loss of heritage resources	-2	-1	-1	-1	-1	-1,2	-1	-1	-1	-1	-1	-1	No impact hertiage resources expected. It is recommended that the HWC Fossil Finds Procedure be implemented throughout the development phase; In the case of any significant new fossil finds exposed during construction, these should be safeguarded - preferably in situ - and reported by the ECO as soon as possible to Heritage Western Cape.

5	**Air quality**															
5.1	Air quality	Possible air pollution in form of emissions from construction vehicles and equipment	5.1.1 Limit air pollution	-2	-1	-1	-1	-1	-1.2	-1	-1	-1	-1	-1	-1	All vehicles and machinery on the construction site must be in good working condition to prevent unnecessary emissions; Vehicles should not be allowed to idle for unnecessary long periods of time
		Potentially high dust levels during earthworks and site establishment	5.1.2 Limit levels of airborne dust	-4	-1	-1	-1	-1	-1.6	-2	-1	-1	-1	-1	-1.2	If necessary, exposed soil must be watered down at regular intervals to reduce levels of airborne dust; The Contractor must take all reasonable measures to minimise the generation of dust resulting from construction activities; Where possible stockpiles should be located in areas where they are not exposed to the erosive effects of the wind.
6	**Visual Impacts**															
6.1	Visual Impacts of construction site	Untidy construction site	6.1.1. The construction site must be kept as neat and tidy as possible	-4	-1	-1	-1	-1	-1.6	-2	-1	-1	-1	-1	-1.2	Conduct environmental awareness training with all staff and discourage littering; Sufficient waste binds must be provided on site and must be emptied regularly; Litter picked up where necessary; Building rubble not allowed to accumulate on site, but must be removed at regular intervals and disposed of at a licensed disposal site; Stockpiles of soil or excavated material should be used for backfilling, rehabilitation or landscaping.
7	**Noise**															
7.1	Noise caused by demolision activities on site	Construction related noise is expected to relate mostly to construction vehicles and machinery involved in earthworks and delivery of materials	8.1.1 Minimise disturbance to neighbours	-4	-1	-1	-1	-1	-1.6	-2	-1	-1	-1	-1	-1.2	Construction activities should be limited to daylight hours; a complaints register should be maintained in which any complaints about noise is noted.

B.	Impact Rating: Operations & Decommissioning	Operations & Decommissioning: Disposal of existing sludge from decommissioning of existing ponds														
				WITHOUT MITIGATION						WITH MITIGATION						
No.	ASPECT	IMPACT	OBJECTIVE	Probability	Extent	Duration	Receiving Environment	Toxicity	Without Mitigation Score (Baseline)	Probability	Extent	Duration	Receiving Environment	Toxicity	With Mitigation Score (Impact assessment)	Short Description of Mitigation Measures
1	Water															
	Water Quality (surface water & ground water)	Contamination of surface water & ground water from disposal of existing sludge from decommissioning of existing facultative pond to earth	Prevent contamination of surface water	-16	-4	-4	-8	-1	-6,6	-2	-2	-2	-2	-1	-1,8	Implement the Operations Manual; Existing sludge from decommissioning the existing facultative pond only to be buried within the designated, approved area for disposal; sludge to be mixed with soil make it more stable and easier to handle; Sludge not allowed near any drainage lines or the river; Disposal area to be fenced off; Sludge to be covered with soil once disposed of. area to be leveled. No new sludge to be added to the disposal site. Borehole testing to be done to evaluate impact on ground water.
2	Soils															
2.1	Soil contamination	Contamination of surrounding soil from disposal of existing sludge from decommissioning of existing facultative pond to earth	Prevent contamination of surrounding soil	-16	-4	-4	-8	-2	-6,8	-2	-2	-2	-2	-1	-1,8	Implement the Operations Manual; Existing sludge from decommissioning the existing facultative pond only to be buried within the designated, approved area for disposal; sludge to be mixed with soil make it more stable and easier to handle; Sludge not allowed near any drainage lines or the river; Disposal area to be fenced off; Sludge to be covered with soil once disposed of. No new sludge to be added to the disposal site. Borehole testing to be done to evaluate impact on ground water.

2.2	Soil erosion	Soil erosion	Prevent soil erosion	-2	-2	-1	-1	-1	-1,4	-2	-1	-1	-1	-1	-1,2	It must be ensured that storm water does not reach excessive speeds, as that would increase the potential for soil erosion; storm water runoff must not be concentrated in any one place or channel where it flows over unpaved (erodible) surfaces; Should any signs of erosion be found, remedial action such as backfilling, compaction and re-vegetation should be taken immediately to avoid exacerbation of the erosion; Monthly monitoring for erosion should take place, especially after heavy rainfall, Implement the Operations Manual & Storm water Managment Plan
3	**Air Quality**																
3	Air Quality	Release of unpleasant odours associated with	Reduce unpleasant odours.	-8	-4	-4	-2	-1	-3,8	-4	-2	-1	-1	-1	-1,8	Sludge to be covered with soil once disposed of. Implement Operations Manual.
4	**Noise**																
4	Noise	Potential Noise Impact	Reduce noise impact from operations	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	No noise expected during operations. No mitigation proposed.
5	**Visual**																
5	Visual	Potential visual Impact	Potential visual impact from operations	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	Existing sludge from decommissioning the existing facultative pond only to be buried within the designated, approved area for disposal; sludge to be mixed with soil make it more stable and easier to handle; Sludge not allowed near any drainage lines or the river; Disposal area to be fenced off; Sludge to be covered with soil once disposed of. No new sludge to be added to the disposal site. Borehole testing to be done to evaluate impact on ground water. Implement the Operations Manual

Appendix J2.7:

Environmental impacts and risk assessment/Impact Risk Matrix – Sludge disposal from decommissioning of existing ponds

A.	Impact Rating: Site Establishment & Construction	Construction: No-go Alternative															
				WITHOUT MITIGATION						WITH MITIGATION							
No.	ASPECT	IMPACT	Objective	Probability	Extent	Duration	Magnitude	Receiving Environment	Without Mitigation Score (Baseline)	Probability	Extent	Duration	Magnitude	Receiving Environment	With Mitigation Score (Impact assessment)	Short Description of Mitigation Measures
1	**Soils**															
1.1	Soil Erosion	Clearing of vegetation during earthworks might make the site susceptible to soil erosion in case of rains	1.1.1 Limit the risk of soil erosion	-1	-1	-1	-1	-1	-1							The implementation of the no-go option would mean the status quo of the environment in term of soil erosion will remain the same.
1.2	Soil contamination form construction activities	Soil contamination form construction activities	1.2.2 Prevent spillage of water potentially contaminated by cement/ chemicals/ fuel & oil from	-1	-1	-1	-1	-1	-1							The implementation of the no-go option would mean that no construction will take place, the status quo of the environment would remain unchanged.
2	**Water**															
	Water quality (surface water & ground water)	Impact of water quality from constuction activities	2.1.1 Prevent spillage of water potentially contaminated by construction acitvities	-1	-1	-1	-1	-1	-1							The implementation of the no-go option would mean that no construction will take place, the status quo of the environment would remain unchanged.
2.2	Storm water	Storm water may cause soil erosion on cleared construction site	2.2.1 Minimize water-related soil erosion	-1	-1	-1	-1	-1	-1							The implementation of the no-go option would mean the status quo of the environment in terms of stormwater will remain unchanged.
3	**Flora & Fauna**															
3.1	Fauna	Possible killing of fauna e.g. killing of snakes/ spiders out of fear during construction	3.1.1. Prevent killing of fauna	-1	-1	-1	-1	-1	-1							The implementation of the no-go option would mean the status quo of the environment in terms of fauna and flora will remain unchanged.

3.2	Flora	Temporary impact and/or potential loss of disturbed Prince Albert Succulent Karoo Vegetation	3.2.1. Prevent unnecessary loss of vegetation	-1	-1	-1	-1	-1	-1							The implementation of the no-go option would mean the status quo of the environment in terms of fauna and flora will remain unchanged.
		Loss of Critical Biodiversity Areas	3.2.2. Prevent the unnecessary loss of CBAs	-1	-1	-1	-1	-1	-1							The implementation of the no-go option would mean the status quo of the environment in terms of fauna and flora will remain unchanged.
4	**Heritage Resources**															
4.1	Heritage Resources	Potential loss of Heritage Resources	4.1.1. Prevent the unnecessary loss of heritage resources	-1	-1	-1	-1	-1	-1						0	The implementation of the no-go option would mean the status quo of the environment in terms of heritage will remain unchanged.
5	**Air quality**															
5.1	Air quality	Possible air pollution in form of emissions from construction vehicles and equipment	5.1.1 Limit air pollution	-1	-1	-1	-1	-1	-1							The implementation of the no-go option would mean the status quo of the environment in terms of air quality will remain unchanged. No mitigation measures recommended.
		Potentially high dust levels during earthworks and site establishment	5.1.2 Limit levels of airborne dust	-1	-1	-1	-1	-1	-1							The implementation of the no-go option would mean the status quo of the environment in terms of air quality will remain unchanged. No mitigation measures recommended.
6	**Waste Management**															
6.1	Solid waste management	Incorrect dispoal of general solid waste generated during construction	6.1.1. Safety dispose of all solid waste.	-1	-1	-1	-1	-1	-1							The implementation of the no-go option would mean the status quo of the environment in terms of solid waste management will remain unchanged. No mitigation measures recommended.
7	**Visual Impacts**															

7.1	Visual Impacts of construction site	Untidy construction site	7.1.1. The construction site must be kept as neat and tidy as possible	-1	-1	-1	-1	-1	-1							The implementation of the no-go option would mean the status quo of the environment in terms of visual impact will remain unchanged. No mitigation measures recommended.
8	**Noise**															
8.1	Noise caused by construction activities on site	Construction related noise is expected to relate mostly to construction vehicles and machinery involved in earthworks and delivery of materials	8.1.1 Minimise disturbance to neighbours	-1	-1	-1	-1	-1	-1							The implementation of the no-go option would mean the status quo of the environment in terms of visual impact will remain unchanged. No mitigation measures recommended.

C.	Impact Rating: Decommissioning	Decommissioning: No-go Alternative															
				WITHOUT MITIGATION						WITH MITIGATION							
No.	ASPECT	IMPACT	Objective	Probability	Extent	Duration	Magnitude	Receiving Environment	Without Mitigation Score (Baseline)	Probability	Extent	Duration	Magnitude	Receiving Environment	With Mitigation Score (Impact assessment)	Short Description of Mitigation Measures
1	**Soils**															
1.1	Soil Erosion	If structures are to be demolished and cleared, the site susceptible to soil erosion in case of rains	1.1.1 Limit the risk of soil erosion	-1	-1	-1	-1	-1	-1							The implementation of the no-go option would mean no decommissioning to take place and the status quo of the environment will remain unchanged. This could have a negative impact on the environment as the existing Klaarstroom WWTP is both hydraulically (flow) and organically (chemical load) overloaded. Mitigation measures include the proposed upgrade of the Klaarstroom WWTP.
1.2	Soil contamination	Possible soil contamination from construction activities	1.2.1 Prevent spillage/ infiltration of raw sewage or semi-treated sewage or waste water to soil	-1	-1	-1	-1	-1	-1							The implementation of the no-go option would mean no decommissioning to take place and the status quo of the environment will remain unchanged. This could have a negative impact on the environment as the existing Klaarstroom WWTP is both hydraulically (flow) and organically (chemical load) overloaded. Mitigation measures include the proposed upgrade of the Klaarstroom WWTP.
			1.2.2 Safely dispose of contaminated waste	-1	-1	-1	-1	-1	-1							The implementation of the no-go option would mean no decommissioning to take place and the status quo of the environment will remain unchanged. This could have a negative impact on the environment as the existing Klaarstroom WWTP is both hydraulically (flow) and organically (chemical load) overloaded. Mitigation measures include the proposed upgrade of the Klaarstroom WWTP.
2	**Water**															

2.1	Water quality	Possible leakage or spillage of sewage and portable toilets during construction, or contamination of water by runoff containing construction-related substances such as cement/ paint/ oil/ fuel	2.1.2 Prevent spillage of water potentially contaminated by cement, paint, oil, fuel, etc	-1	-1	-1	-1	-1	-1							The implementation of the no-go option would mean no decommissioning to take place and the status quo of the environment will remain unchanged. This could have a negative impact on the environment as the existing Klaarstroom WWTP is both hydraulically (flow) and organically (chemical load) overloaded. Mitigation measures include the proposed upgrade of the Klaarstroom WWTP.
2.2	Storm water	Storm water may cause soil erosion on cleared construction site	2.2.1 Minimize water-related soil erosion	-1	-1	-1	-1	-1	-1							The implementation of the no-go option would mean no decommissioning to take place and the status quo of the environment will remain unchanged. This could have a negative impact on the environment as the existing Klaarstroom WWTP is both hydraulically (flow) and organically (chemical load) overloaded. Mitigation measures include the proposed upgrade of the Klaarstroom WWTP.
3	**Flora & Fauna**															
3.2	Flora	No rehabilitationof the site	3.1.1. Rehabilitation of the site to a state approximating the pre-development state or a condition similar to undeveloped areas	-16	-4	-8	-1	-1	-6							The implementation of the no-go option would mean no decommissioning to take place and the status quo of the environment will remain unchanged.
		Colonisation of alien invasive species	3.2.2. Prevent colonisation by alien invasive species	-16	-4	-8	-1	-1	-6							The implementation of the no-go option would mean no decommissioning to take place and the status quo of the environment will remain unchanged.This could have a negative impact on the environment as the existing Klaarstroom WWTP is both hydraulically (flow) and organically (chemical load) overloaded. Mitigation measures include the proposed upgrade of the Klaarstroom WWTP.
4	**Waste Management**															

4.1	Solid waste management	Waste generated at site not disposed of at a suitably licensed disposal site	4.1.1. Remove general solid waste to a landfill site	-1	-1	-1	-1	-1	-1							The implementation of the no-go option would mean no decommissioning to take place and the status quo of the environment will remain unchanged. This could have a negative impact on the environment as the existing Klaarstroom WWTP is both hydraulically (flow) and organically (chemical load) overloaded. Mitigation measures include the proposed upgrade of the Klaarstroom WWTP.
			4.1.2 Dispose of hazardous waste at suitable disposal site	-1	-1	-1	-1	-1	-1							The implementation of the no-go option would mean no decommissioning to take place and the status quo of the environment will remain unchanged. This could have a negative impact on the environment as the existing Klaarstroom WWTP is both hydraulically (flow) and organically (chemical load) overloaded. Mitigation measures include the proposed upgrade of the Klaarstroom WWTP
7	**Visual Impacts**															
7.1	Visual Impacts of demolition on site	Untidy construction/ demolition site	7.1.1. The construction site must be kept as neat and tidy as possible	-1	-1	-1	-1	-1	-1							The implementation of the no-go option would mean no decommissioning to take place and the status quo of the environment will remain unchanged. This could have a negative impact on the environment as the existing Klaarstroom WWTP is both hydraulically (flow) and organically (chemical load) overloaded. Mitigation measures include the proposed upgrade of the Klaarstroom WWTP
8	**Noise**															
8.1	Noise caused by construction activities on site	Construction related noise is expected to relate mostly to construction vehicles and machinery involved in earthworks and delivery of materials	8.1.1 Minimise disturbance to neighbours	-1	-1	-2	-1	-1	-1,2							The implementation of the no-go option would mean no decommissioning to take place and the status quo of the environment will remain unchanged. This could have a negative impact on the environment as the existing Klaarstroom WWTP is both hydraulically (flow) and organically (chemical load) overloaded. Mitigation measures include the proposed upgrade of the Klaarstroom WWTP

Appendix J2.8:

Environmental impacts and risk assessment/Impact Risk Matrix – No-Go Alternative