

APPENDIX F: IMPACT ASSESSMENT

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ACRONYMS AND ABBREVIATIONS

Acronym / Abbreviation	Definition
CBA	Critical Biodiversity Area
CO	Carbon Monoxide
CO ₂	Carbon Dioxide
ECO	Environmental Control Officer
EMPr	Environmental Management Programme
ESA	Ecosystem Support Area
HCAC	Heritage Contracts and Archaeological Consulting CC
IBA	Important Bird Area
NFEPA	National Freshwater Ecosystem Priority Area
NGO	Non-Governmental Organisation
NOX	Nitrogen Oxides
OHS	Occupational Health and Safety
SABAP2	South African Bird Atlas Project, Version 2
SAHRA	South African Heritage Resources Agency
SCC	Species of Conservation Concern
SKEP	Succulent Karoo Ecosystem Programme
VOC	Volatile Organic Compounds
WTP	Water Treatment Plant

1 ASSESSMENT OF POTENTIAL IMPACTS

Potential environmental and socio-economic impacts were identified by SLR and other stakeholders. Environmental and socio-economic impacts that will be assessed in this section include the following:

- Dust and other air emissions (Section 3.1);
- Noise (Section 3.2);
- Heritage and Archaeology (Section 3.3);
- Aquatic Biodiversity (Sections 3.4 and 3.5);
- Terrestrial Biodiversity (Section 3.6 and 3.7)
- Traffic (Section 3.8); and
- Socio-economic (Section 3.9).

Specialist input was obtained for the assessment of the following impacts:

- Ecology; and
- Archaeological and Heritage Resources.

The impact assessment methodology used for the rating of impacts is included in Section 2.

Mitigation measures that are identified as part of this Impact Assessment are included in the Environmental Management Programme (EMPr) in Appendix G.

2 IMPACT ASSESSMENT METHODOLOGY

The method used for the assessment of impacts is set out in [Table 2-1](#). This assessment methodology enables the assessment of environmental impacts including: cumulative impacts, the intensity of impacts (including the nature of impacts and the degree to which impacts may cause irreplaceable loss of resources), the extent of the impacts, the duration and reversibility of impacts, the probability of the impact occurring, and the degree to which the impacts can be mitigated.

Table 2-1: SLR EIA Methodology

PART A: DEFINITIONS AND CRITERIA*		
Definition of SIGNIFICANCE	Significance = consequence x probability	
Definition of CONSEQUENCE	Consequence is a function of intensity, spatial extent and duration	
Criteria for ranking of the INTENSITY of environmental impacts	VH	Severe change, disturbance or degradation. Associated with severe consequences. May result in severe illness, injury or death. Targets, limits and thresholds of concern continually exceeded. Substantial intervention will be required. Vigorous/widespread community mobilization against project can be expected. May result in legal action if impact occurs.
	H	Prominent change, disturbance or degradation. Associated with real and substantial consequences. May result in illness or injury. Targets, limits and thresholds of concern regularly exceeded. Will definitely require intervention. Threats of community action. Regular complaints can be expected when the impact takes place.
	M	Moderate change, disturbance or discomfort. Associated with real but not substantial consequences. Targets, limits and thresholds of concern may occasionally be exceeded. Likely to require some intervention. Occasional complaints can be expected.
	L	Minor (Slight) change, disturbance or nuisance. Associated with minor consequences or deterioration. Targets, limits and thresholds of concern rarely exceeded. Require only minor interventions or clean-up actions. Sporadic complaints could be expected.
	VL	Negligible change, disturbance or nuisance. Associated with very minor consequences or deterioration. Targets, limits and thresholds of concern never exceeded. No interventions or clean-up actions required. No complaints anticipated.
	VL+	Negligible change or improvement. Almost no benefits. Change not measurable/will remain in the current range.
	L+	Minor change or improvement. Minor benefits. Change not measurable/will remain in the current range. Few people will experience benefits.
	M+	Moderate change or improvement. Real but not substantial benefits. Will be within or marginally better than the current conditions. Small number of people will experience benefits.
	H+	Prominent change or improvement. Real and substantial benefits. Will be better than current conditions. Many people will experience benefits. General community support.
	VH+	Substantial, large-scale change or improvement. Considerable and widespread benefit. Will be much better than the current conditions. Favourable publicity and/or widespread support expected.
Criteria for ranking the DURATION of impacts	VL	Very short, always less than a year. Quickly reversible
	L	Short-term, occurs for more than 1 but less than 5 years. Reversible over time.
	M	Medium-term, 5 to 10 years.
	H	Long term, between 10 and 20 years. (Likely to cease at the end of the operational life of the activity)
	VH	Very long, permanent, +20 years (Irreversible. Beyond closure)
Criteria for ranking the EXTENT of impacts	VL	A part of the site/property.
	L	Whole site.
	M	Beyond the site boundary, affecting immediate neighbours
	H	Local area, extending far beyond site boundary.
	VH	Regional/National

PART B: DETERMINING CONSEQUENCE							
INTENSITY = VL							
DURATION	Very long	VH	Low	Low	Medium	Medium	High
	Long term	H	Low	Low	Low	Medium	Medium
	Medium term	M	Very Low	Low	Low	Low	Medium
	Short term	L	Very low	Very Low	Low	Low	Low
	Very short	VL	Very low	Very Low	Very Low	Low	Low
INTENSITY = L							
DURATION	Very long	VH	Medium	Medium	Medium	High	High
	Long term	H	Low	Medium	Medium	Medium	High
	Medium term	M	Low	Low	Medium	Medium	Medium
	Short term	L	Low	Low	Low	Medium	Medium
	Very short	VL	Very low	Low	Low	Low	Medium
INTENSITY = M							
DURATION	Very long	VH	Medium	High	High	High	Very High
	Long term	H	Medium	Medium	Medium	High	High
	Medium term	M	Medium	Medium	Medium	High	High
	Short term	L	Low	Medium	Medium	Medium	High
	Very short	VL	Low	Low	Low	Medium	Medium
INTENSITY = H							
DURATION	Very long	VH	High	High	High	Very High	Very High
	Long term	H	Medium	High	High	High	Very High
	Medium term	M	Medium	Medium	High	High	High
	Short term	L	Medium	Medium	Medium	High	High
	Very short	VL	Low	Medium	Medium	Medium	High
INTENSITY = VH							
DURATION	Very long	VH	High	High	Very High	Very High	Very High
	Long term	H	High	High	High	Very High	Very High
	Medium term	M	Medium	High	High	High	Very High
	Short term	L	Medium	Medium	High	High	High
	Very short	VL	Low	Medium	Medium	High	High

VL	L	M	H	VH
A part of the site/ property	Whole site	Beyond the site, affecting neighbours	Extending far beyond site but localised	Regional/ National
EXTENT				

PART C: DETERMINING SIGNIFICANCE							
PROBABILITY (of exposure to impacts)	Definite/ Continuous	VH	Very Low	Low	Medium	High	Very High
	Probable	H	Very Low	Low	Medium	High	Very High
	Possible/ frequent	M	Very Low	Very Low	Low	Medium	High
	Conceivable	L	Insignificant	Very Low	Low	Medium	High
	Unlikely/ improbable	VL	Insignificant	Insignificant	Very Low	Low	Medium
			VL	L	M	H	VH
CONSEQUENCE							

PART D: INTERPRETATION OF SIGNIFICANCE	
Significance	Decision guideline
Very High	Potential fatal flaw unless mitigated to lower significance.
High	It must have an influence on the decision. Substantial mitigation will be required.
Medium	It should have an influence on the decision. Mitigation will be required.
Low	Unlikely that it will have a real influence on the decision. Limited mitigation is likely required.
Very Low	It will not have an influence on the decision. Does not require any mitigation
Insignificant	Inconsequential, not requiring any consideration.

*VH = very high, H = high, M= medium, L= low and VL= very low and + denotes a positive impact.

3 IMPACT ASSESSMENT

3.1 IMPACT ON AMBIENT AIR QUALITY

3.1.1 Description of impact

During the construction phase the existing underground pipeline will be excavated and removed. No blasting will be required as base rock was removed during the initial construction for the existing underground pipeline. However, machinery for the excavation of the pipeline and digging of trenches will be required. This could have an impact on the surrounding air quality due to both the generation of dust as well as potential emissions from vehicles and machinery. No additional impacts are expected during the operational phase other than vehicle emissions from vehicles carrying out inspections and maintenance of the pipeline on an ad hoc basis.

3.1.2 Impact assessment

Construction Phase

Potential Impacts

The project area is characterised by sparse vegetation and exposed soil which is typical of a semi-arid region. During the construction phase dust generated from vegetation clearing, soil grubbing, material handling and the movement of vehicles on unsurfaced areas may contribute to elevated particulate matter levels in the air. In addition, wind erosion from exposed materials could also contribute to elevated particulate matter levels, particularly in the dry and windy summer and spring seasons. This could result in increased dustfall on a local scale and higher particulate matter loads.

The main receptors likely to be impacted by the reduced air quality include:

- The farmhouse which lies approximately 170m south of the proposed pipeline on the Farm Aroams 57; and
- Any potentially sensitive plant receptors within the vicinity of the road.

Emissions would also be generated by vehicles and other combustion-driven equipment (e.g. generators) that release nitrogen oxides (NO_x), carbon dioxide (CO₂), carbon monoxide (CO) and volatile organic compounds (VOC). Given that the construction phase is short term/temporary, the related significance is considered to be LOW without mitigation and VERY LOW with mitigation (

Table 3-1).

Mitigation

The following mitigation measures are recommended (see EMPr in Appendix G):

- Limit the disturbance of land to what is absolutely necessary;
- Construction related vehicles travelling on gravel roads should not exceed the indicated speed limits for the roads;
- Dust suppression on areas where there is significant vehicle movement and dust generating activities through chemical binding agents and/or water sprays;
- Any generators and vehicles/equipment will be operated and maintained according to supplier specification at maintenance workshops;
- Concurrent rehabilitation and re-vegetation of all areas to be undertaken as construction activities are completed; and
- Implementation of a grievance procedure whereby air quality issues can be raised / reported and transparently and timeously addressed.

Monitoring

The following monitoring is recommended (see EMPr in Appendix G):

- Visual inspections should be undertaken on a daily basis during the construction phase.

Table 3-1: Impact summary – Increased dust and other air emissions during construction and decommissioning

Issue: Increased dust and other air emissions		
Phases: Construction and Decommissioning Phases		
Criteria	Without Mitigation	With Mitigation
Intensity	Minor change or disturbance	Minor change or disturbance
Duration	Short-term	Short-term
Extent	Beyond the site boundary	A part of the site
Consequence	Low	Low
Probability	Probable	Possible
Significance	Low	Very Low
Nature of cumulative impacts		
	The Gamsberg Zinc Mine is a major dust generating activity in the general area as well as the generation of dust from general traffic including farmers and others using these dirt roads in the region. In addition some farming activities many result in additional dust. However, considering the temporary nature of the construction phase, the cumulative impact is assessed to be LOW.	
Degree to which impact can be reversed		
	The impact can be fully reversed once the construction period is completed and the full length of the pipeline has been rehabilitated.	
Degree to which impact may cause irreplaceable loss of resources		
	Very low as this area has been disturbed in the past by the construction of the existing underground pipeline.	
Residual impacts		
	The residual impact is considered to be VERY LOW with only minor impacts on surrounding receptors.	

Operational Phase

Potential Impacts

During operational phase, emissions and dust generation are expected to be INSIGNIFICANT prior to mitigation due to vehicle emissions and minor dust generation from ad hoc maintenance vehicles. As such, the impacts have not been further assessed.

Decommissioning Phase

Potential Impacts

Impacts related to the creation of dust during the decommissioning phase of the project will be similar to those described in the construction phase impacts section.

3.2 IMPACT ON AMBIENT NOISE

3.2.1 Description of impact

Two types of noise are distinguished: noise disturbance and noise nuisance. The former is noise that can be registered as a discernible reading on a sound level meter and the latter, although it may not register as a discernible reading on a sound level meter, may cause nuisance because of its tonal character (e.g. distant humming noises). This section considers the extent to which noise created during the construction and operational phases of the proposed project could impact on nearby sensitive receptors.

The pipeline and the associated infrastructure is largely located in a rural area that is sparsely populated, with limited sensitive receptors. Sensitive receptors that are located in the vicinity of the proposed areas to be developed include the following, as identified by ERM (2013):

- The Aggeneys township (approximately 15 km at the closest point);
- Pella township (approximately 1.2 km at the closest point);
- A local farmhouse on the Farm Aroams 57 approximately 170 m south of the proposed pipeline;
- The adjacent land owners (i.e. two farmers that own the land through which the existing servitude runs);
- The Sedibeng Water staff quarters (adjacent to the Water Treatment Plant (WTP));
- Local subsistence farmers (i.e. predominantly goat herders);
- A neighbouring resort which is a community development initiative along the Orange River;
- Sedibeng Water staff employed at the WTP;
- Local fauna;
- Recreational users (i.e. hikers and river users); and
- Road users (N14 and gravel access roads).

In terms of existing noise in the project area, there are currently low levels of ambient noise generated in the area owing its rural nature. This noise primarily emanates from the Pella and Aggeneys towns, farming operations, the Sedibeng Water treatment works and vehicles using the associated road network. The proposed upgrade will result in the generation of increased noise through various activities undertaken during the construction and operational phases of the project. The possible impacts of this increased noise are discussed in more detail below.

3.2.2 Impact assessment

Construction Phase

Potential Impacts

An increase in noise would be expected from a number of construction related activities including:

- Operation of heavy machinery and equipment for excavation, moving and stockpiling of soil, laying of pipelines, filling trenches etc.;
- Transport of the pipeline and related equipment and construction vehicles and personnel;

- Increased traffic in the area; and
- Blasting activities where required (including potential drilling) in the trench to deepen the base in the bed rock.

Noise sensitive receptors that would likely be impacted by noise from construction activities include the affected landowners, local subsistence farmers, local fauna, road users, recreational users (i.e. river users and hikers) and inhabitants of Aggeneys and Pella towns. Although an increase in noise is expected this noise will be localised and temporary and would largely only impact those receptors located in close proximity to the source (i.e. within 500 metres from a significant noise source). The severity of the impact is likely to be low due to the low numbers of receptors located in close proximity to the proposed construction phase activities as well as the short term basis over which the activities will be undertaken.

Given that the construction phase is short term/temporary, and the limited number of sensitive receptors in close proximity to the construction site, the related significance is considered to be LOW without mitigation and VERY LOW with mitigation ([Table 3-2](#)).

Mitigation

The following mitigation measures are recommended (see EMPr in Appendix G):

- The noise generating construction activities should be restricted to normal working hours, between 07h00 and 18h00;
- Adjacent landowners should be notified of commencement of construction activities and expected timeframes for activities that would result in significant noise generation;
- Construction site yards, concrete batching plants, construction worker camps and other noisy fixed facilities should be located well away from noise sensitive areas;
- Ensure that municipal regulations relating to noise generation are observed;
- Truck traffic will be confined to existing roads;
- All vehicles and equipment will be maintained according to suppliers' specifications to limit noise emissions;
- Implementation of a grievance procedure whereby noise related issues can be raised and transparently and timeously addressed; and
- It must be ensured that employees' and Business Partners' working conditions comply with the requirements of the Occupational Health and Safety Act (OHS Act), (Act No 85 of 1993). Where necessary, workers must be required to wear ear protection equipment.

Monitoring

The following monitoring is recommended (see EMPr in Appendix G):

- Daily inspections during the construction phase.

Table 3-2: Impact summary – Increased noise during construction and decommissioning

Issue: Increased noise emissions		
Phases: Construction and Decommissioning Phases		
Criteria	Without Mitigation	With Mitigation
Intensity	Minor change or disturbance	Minor change or disturbance
Duration	Short-term	Short-term
Extent	Beyond the site boundary	A part of the site
Consequence	Low	Low
Probability	Probable	Possible
Significance	Low	Very Low
Nature of cumulative impacts		
	There are very few noise generating sources in the area and as such, due to the temporary nature of the construction phase, cumulative impacts are likely to be VERY LOW.	
Degree to which impact can be reversed		
	The impact can be fully reversed once the construction period is completed.	
Degree to which impact may cause irreplaceable loss of resources		
	N/A	
Residual impacts		
	The residual impact is considered to be VERY LOW with only minor impacts on surrounding receptors.	

Operational Phase

Potential Impacts

Noise levels during the operational phase would be limited to the additional low lift pumping capacity at the abstraction tower, the booster pump station, ad hoc maintenance vehicles and maintenance activities. However, the remote nature of these noise generating activities/ infrastructure means that there is an absence of sensitive receptors in close proximity to the sites.

The noise generated by pipe line inspection and maintenance vehicles is expected to be less frequent than it currently is as the new pipeline would have fewer integrity issues than the existing underground pipeline which requires significant maintenance due to the aging infrastructure.

Given the remoteness of the noise generating activities during the operational phase the related significance is considered to be LOW without mitigation and VERY LOW with mitigation (**Table 3-3**).

Mitigation

The following mitigation measures are recommended (see EMPr in Appendix G):

- The new abstraction pumps and booster pumps are to incorporate all the necessary noise control measures required in order that the overall noise level from the new installations comply with SANS 10103 and any relevant noise control regulations;
- Any particularly noisy plant and equipment should be properly insulated;

- Noisy maintenance works should only be carried out during the day;
- Safety signage must be placed in prominent areas at the entrance to designated noise zones (i.e. pump houses);
- All employees' and Business Partners' working conditions should comply with the requirements of the OHS Act (Act No 85 of 1993). Where necessary, workers will be required to wear ear protection equipment; and
- Implement a grievance procedure whereby noise issues can be raised / reported and transparently and timeously addressed.

Monitoring

The following monitoring is recommended (see EMP in Appendix G):

- Weekly inspections during the operational phase.

Table 3-3: Impact summary – Increased noise during operational phases

Issue: Increased noise emissions		
Phases: Operational Phase		
Criteria	Without Mitigation	With Mitigation
Intensity	Minor change or disturbance	Minor change or disturbance
Duration	Very long, more than 20 years	Very long, more than 20 years
Extent	A part of the site/ property	A part of the site/ property
Consequence	Medium	Medium
Probability	Conceivable	Unlikely
Significance	Low	Very Low
Nature of cumulative impacts	There are very few noise generating sources in the area and as such, due to the temporary nature of the construction phase, cumulative impacts are likely to be VERY LOW.	
Degree to which impact can be reversed	The impact can be fully reversed once the construction period is completed.	
Degree to which impact may cause irreplaceable loss of resources	N/A	
Residual impacts	The residual impact is considered to be VERY LOW with only minor impacts on surrounding receptors.	

Decommissioning Phase

Potential Impacts

Impacts related to the generation of noise during the decommissioning phase of the project will be similar to those described in the construction phase impacts section.

3.3 IMPACT ON HERITAGE

3.3.1 Description of impact

Excavations in general could have an impact on potential archaeological and palaeontological resources. However, due to the disturbed nature of the area and the fact that there is an existing underground pipeline that is being replaced, the sensitivity of the site from an archaeological and palaeontological perspective is low.

3.3.2 Impact assessment

Construction Phase

Potential Impacts

Given the disturbed nature of the area affected by the proposed construction activities, a letter was submitted to the South African Heritage Resources Agency (SAHRA) requesting exemption from specialist input. A letter of Recommendation for Exemption of a Heritage Impact Assessment was compiled by Jaco van der Walt from Heritage Contracts and Archaeological Consulting CC (HCAC), dated 18 February 2020 (refer to Appendix D). In this correspondence the area in which the pipeline is located is described as “of low heritage sensitivity....that has previously been impacted on by pipeline and powerline construction”. The recorded sites by Webley & Halkett (2017) are all located outside of the current servitude and no heritage features of high significance are expected to be impacted by this project.

In addition, Van der Walt (2020) discusses that the study area “is indicated as of insignificant to low palaeontological significance on the SAHRA paleontological map”.

Due to the existing disturbance of the site the potential impact on heritage, archaeological and palaeontological resources prior to mitigation is considered VERY LOW and with the implementation of mitigation measures would be INSIGNIFICANT.

Mitigation

The following mitigation measures are recommended (see EMPr in Appendix G):

- If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA Archaeology, Palaeontology and Meteorites Unit (Natasha Higgitt/Phillip Hine 021 462 5402) must be alerted as per section 35(3) of the NHRA.
- If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves Unit (Thingahangwi Tshivhase/Mimi Seetelo 012 320 8490), must be alerted immediately as per section 36(6) of the NHRA.
- If heritage resources are uncovered during the course of the development, a professional archaeologist or palaeontologist, depending on the nature of the finds, must be contracted as soon as possible to inspect the heritage resource. If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA.

- If any discoveries are made the Chance Find Procedure must be implemented. This Procedure applies to the developer’s permanent employees, its subsidiaries, contractors and subcontractors, and service providers. Construction crews must be properly inducted to ensure they are fully aware of the procedures regarding chance finds as discussed below:
 - If during the pre-construction phase, construction, operational or closure phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of potential cultural significance or fossil material, this person must cease work at the site of the find and report this find to their immediate supervisor, and through their supervisor to the senior on-site manager;
 - It is the responsibility of the senior on-site manager to make an initial assessment of the extent of the find and confirm the extent of the work stoppage in that area; and
 - The senior on-site manager will inform the Environmental Control Officer (ECO) of the find and its immediate impact on operations. The ECO will then contact a professional archaeologist or palaeontologist for an assessment of the finds who will notify the SAHRA.

Monitoring

The following monitoring is recommended (see EMPr in Appendix G):

- Visual inspections should be undertaken on a daily basis during the construction phase.

Table 3-4: Impact summary – Heritage, Archaeology and Palaeontology during construction

Issue: Impact on heritage resources during construction		
Phases: Construction Phase		
Criteria	Without Mitigation	With Mitigation
Intensity	Minor change, disturbance or degradation	Minor change, disturbance or degradation
Duration	Short-term	Short-term
Extent	A part of the site/ property	A part of the site/ property
Consequence	Low	Low
Probability	Conceivable	Unlikely
Significance	Very low	Insignificant
Nature of cumulative impacts		
	Potential cumulative impacts are considered to be very low.	
Degree to which impact can be reversed		
	Should there be a find and it is not properly documented and the correct procedures followed, the potential to reverse the impact is very low.	
Degree to which impact may cause irreplaceable loss of resources		
	Although the sensitivity of the site is low and the chance of a heritage related find small, should there be a find there is a high potential for the resource to be lost.	
Residual impacts		
	The residual impact to the project area is considered to be INSIGNIFICANT.	

Operational Phase

Potential Impacts

No additional impacts are expected during the operational phase and no further assessment has been undertaken.

Decommissioning Phase

Potential Impacts

No additional impacts are expected during the decommissioning phase and no further assessment has been undertaken.

3.4 IMPACT ON AQUATIC HABITAT

3.4.1 Description of impact

The proposed Pella bulk water pipeline is aligned for the majority of the route with the existing dirt road and existing pipeline servitudes and thus falls within previously impacted areas. The construction phase will entail the clearing of areas and digging of trenches, laying of the pipeline and attachment of the pipeline to the existing crossing structures thus increasing the potential for erosion and sedimentation of downstream habitats due to surface runoff during rainfall events. Another expected risk with underground pipeline projects would normally be a temporary channel diversion which, in this case, is unlikely provided that the construction is completed in the dry season. It is, however, important to note that the ephemeral nature of the watercourses is not reason to ignore appropriate protocols and mitigations as there is established habitat which become niches for aquatic macroinvertebrates and associated aquatic life when flow begins. The identified watercourses that could be affected by the proposed pipeline construction are included in [Figure 1](#).

Figure 1 Locality map with identified watercourses and river crossings

INSERT PDF

3.4.2 Impact assessment

Construction Phase

Potential Impacts

Earthworks and removal of vegetation in the riparian zones as well as in stream beds of the identified ephemeral watercourses (**Figure 1**) could lead to changes in drainage patterns thus increasing the potential for erosion and the consequent downstream sedimentation which could change or destroy downstream niche habitats.

Due to the disturbance from existing infrastructure, including the road and the existing above- and underground pipelines, as well as the irregular occurrence of rainfall and consequent flow events the potential impact on downstream habitats prior to mitigation is considered LOW and with the implementation of mitigation measures would be VERY LOW (**Table 3-5**).

Mitigation

The following mitigation measures are recommended (see EMPr in Appendix G):

- Water pipeline installation specific mitigation measures:
 - The footprint area of the pipeline must be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas;
 - The footprint area must be aligned with the existing pipeline or existing road reserves wherever possible. Disturbed areas should be sought as the preferred alignment area;
 - Due to the flat gradient of these watercourses, it is imperative that after burial the gradient is restored to the natural levels and not above or below this as it will produce artificial flow directions; and
 - Pipelines buried underground should be buried at a sufficient depth below ground level such that the pipelines do not interfere with surface water movement or create obstructions, where flows can cause erosion.
- The following general mitigation measures are provided:
 - The construction vehicles and machinery must make use of existing access routes as far as possible, before adjacent areas are considered for access. No uncontrolled access through the river to be allowed;
 - Laydown yards and storage areas must be situated outside of the delineated watercourse extent and buffer zones. Where possible, the construction of the pipeline and crossings must take place from the existing road servitudes and not from within the aquatic systems;
 - It is preferable that construction within the watercourses takes place during the dry season to reduce the erosion potential of the exposed surfaces; as well as guarantee dry watercourses. Should there be significant rainfall additional measures must be implemented and should be supervised by an aquatic ecologist;
 - Where the pipeline route crosses or follows a portion of a water course, stockpiling of soil and other material should take place a minimum of 100 m outside of the watercourse. All stockpiles must be protected from erosion and stored on flat areas where run-off will be minimised;
 - Erosion and sedimentation into drainage channels must be minimised through the effective stabilisation if required (gabions and Reno mattresses) and the re-vegetation of any disturbed banks and

- An alien invasive plant management plan needs to be compiled and implemented post construction to control current invaded areas and prevent the growth of invasives on cleared areas and should include reporting to the Department of Agriculture, Land Reform and Rural Development.
- The following should also be implemented:
 - A soil management strategy must be compiled and implemented for the excavation and back-filling of trenches. Topsoil (to a depth of approximately 50mm) should be excavated first and stockpiled separately to subsoil. Backfill subsoil first with topsoil after to facilitate rehabilitation.
 - A rehabilitation plan must be compiled and implemented for areas that are stripped of vegetation cover. These areas must be rehabilitated promptly by planting suitable vegetation (vigorous indigenous grasses) to protect the exposed soil. Large portions of the natural area is bare soil and should be kept as such. The rehabilitation plan should also include:
 - Drainage line areas prone to erosion, especially around pipeline infrastructure, should involve bank reprofiling where the bank material allows for this. This would involve a gentler gradient (ideally 35 degrees) which would assist in reducing flow energy and erosiveness, while allowing indigenous vegetation to establish in these areas; and
 - Large rocks sourced from the project area can be strategically placed in key areas to prevent erosion. Placement of these rocks needs to be planned as flows in major drainage lines can remove these if not properly placed.
 - An Environmental Control Officer (ECO) must oversee the construction phase of the project.
 - Any erosion caused by any activity during the construction period must be reported to the Department of Agriculture, Land Reform and Rural Development.

Monitoring

The following monitoring is recommended (see EMPr in Appendix G):

- Visual inspections should be undertaken on a daily basis during the construction phase; and
- Additional inspections should be undertaken immediately after any rainfall events to assess erosion and need for diverting water back into the watercourse, .

Table 3-5: Impact summary – Destruction of aquatic habitat during construction

Issue: Destruction of aquatic habitat during construction		
Phases: Construction Phase		
Criteria	Without Mitigation	With Mitigation
Intensity	Moderate change, disturbance or degradation	Minor change, disturbance or degradation
Duration	Short-term	Short-term
Extent	The whole site	A part of the site/property
Consequence	Medium	Low
Probability	Possible	Possible
Significance	Low	Very Low
Nature of cumulative impacts		
	No other construction activities are foreseen along the pipeline alignment, so additional cumulative impacts are unlikely.	
Degree to which impact can be reversed		
	High, with implementation of mitigation measures and concurrent rehabilitation as sections are completed the impact could largely be reversed.	
Degree to which impact may cause irreplaceable loss of resources		
	Unlikely, with mitigation.	
Residual impacts		
	The residual impact to the habitat integrity in the watercourses is considered to be VERY LOW.	

Operational Phase

Potential Impacts

Provided the site is rehabilitated post the construction phase the potential for erosion and the resultant impacts on downstream habitats can largely be prevented. However, artificial surfaces associated with the river crossings could influence infiltration of water and result in runoff which can modify natural flow patterns and cause erosion. In addition, alien vegetation can establish due to disturbance of natural systems which can have an effect on riparian and in stream habitat.

During the operational phase, due to the small area of impact and the rare occurrence of rainfall these impacts on aquatic habitat are expected to be LOW without mitigation and VERY LOW with mitigation ([Table 3-6](#)).

Mitigation

The following mitigation measures are recommended (see EMPr in Appendix G):

- Prevent uncontrolled access of vehicles through the rivers that can cause future significant adverse impact on the hydrology and alluvial soil structure of these areas during maintenance activities; and
- An alien invasive plant management plan must be implemented and removals done on a monthly basis for a minimum of three years, but it is recommended that the ECO on site monitor monthly for the construction period at least, and then implement the plan accordingly.

Monitoring

The following monitoring is recommended (see EMPr in Appendix G):

- Visual inspections should be undertaken on a monthly basis during the operational phase to identify any alien invasive plant species and implement actions for their removal and address any erosion along the pipeline alignment; and
- Additional inspections should be undertaken immediately after major rainfall events to assess erosion.

Table 3-6: Impact summary – Destruction of aquatic habitat during the operational phase

Issue: Destruction of aquatic habitat during operations		
Phases: Operational Phase		
Criteria	Without Mitigation	With Mitigation
Intensity	Minor change, disturbance or degradation	Negligible change, disturbance or degradation
Duration	Very long, 20 years or more	Very long, 20 years or more
Extent	Beyond the boundary, affecting immediate neighbours	A part of the site/ property
Consequence	Medium	Low
Probability	Possible	Conceivable
Significance	Low	Very Low
Nature of cumulative impacts		
	No other construction activities are foreseen along the pipeline alignment, so additional cumulative impacts are unlikely.	
Degree to which impact can be reversed		
	High, with implementation of mitigation measures the impact could largely be reversed.	
Degree to which impact may cause irreplaceable loss of resources		
	Unlikely, with mitigation.	
Residual impacts		
	The residual impact to the habitat integrity in the watercourses is considered to be VERY LOW.	

Decommissioning Phase

Potential Impacts

Impacts related to the destruction of downstream aquatic habitat during the decommissioning phase of the project will be similar to those described in the construction phase impacts section.

3.5 IMPACT ON DOWNSTREAM WATER QUALITY

3.5.1 Description of impact

Construction activities that include the use of vehicles and machinery in riparian areas, storage of chemicals, fuels and materials as well as the storage of domestic and industrial waste have the potential to result in contamination of the water resource. Soluble construction materials also have the potential to dissolve in runoff from the area. This can result in the increase of dissolved solids in downstream waterbodies during periods of rainfall and subsequent flow resulting in a water quality impact. All assessed watercourses are dry for large periods of the year allowing for long periods of time to address any spills before flow begins. This impact is likely to occur only during the construction phase with negligible impacts foreseen beyond the construction period.

3.5.2 Impact assessment

Construction Phase

Potential Impacts

The incorrect storage of chemicals, fuels and materials as well as domestic and industrial waste at the construction site has the potential for spills and/or leaks which could end up in downstream water bodies (or groundwater) during rainfall events. In addition, spills from vehicles or machinery that are being used for excavating in the riparian zones could cause a decrease in water quality downstream. However, due to the large time periods between rainfall should spills or leaks occur there is more than sufficient time for clean ups to be undertaken.

Prior to mitigation the impact is considered to be VERY LOW and with the implementation of mitigation measures would be INSIGNIFICANT ([Table 3-7](#)).

Mitigation

The following mitigation measures are recommended (see EMPr in Appendix G):

- The construction teams must have spill kits available to ensure that any fuel or oil spills are cleaned up and disposed of correctly;
- All chemicals to be used for the pipeline construction must be stored outside the channel system and in a bunded area;
- Material Safety Data Sheets for all applicable materials stored on site must be readily available to on site personnel;
- All machinery and equipment should be inspected regularly for faults and possible leaks. These should be serviced off-site;
- Adequate sanitary facilities and ablutions on the servitude must be provided for all personnel throughout the project area. Use of these facilities must be enforced. These facilities must be kept clean and serviced regularly so that they are a desired alternative to the surrounding vegetation;
- All waste generated on-site during construction must be adequately managed. Separation and recycling of different waste materials should be supported;
- Wastes produced from project activities on site would be transferred to designated temporary storage areas and where possible into secure containers
- Solid wastes including rubble and construction debris will be segregated to facilitate reuse and recycling of specific materials;
- All wastes that cannot be reused or recycled must be collected by approved waste contractors and stored at the Gamsberg Zinc Mine waste storage area before being transported to the Black Mountain Mine (BMM) waste site which is a registered landfill. Hazardous waste will follow the BMM hazardous waste procedure;
- Indigenous vegetative material to be kept on site and mulched to be spread over the disturbed areas to enhance rehabilitation of the natural vegetation;
- Effluent from the washing-down of concrete mixing and handling equipment to be contained within an appropriately sized bunded area and safely disposed of.

- All hazardous and liquid waste materials (e.g. fuel for generators, including any contaminated soils) to be stored in an appropriately sized bunded area and disposed of by a licensed Business Partner at the Vissershok hazardous waste facility. Proof to be obtained from each Business Partner as to the final disposal location and volume of domestic and hazardous wastes retained;
- Trucks and construction vehicles must be serviced off-site;
- Stormwater run-off should be discharged away from any identified drainage lines;
- Concrete mixing should be undertaken on an impermeable surface to prevent contamination of soils and run-off; and
- All refuse collected in the designated waste storage areas must be removed on a regular basis. Under no circumstances may domestic waste be burned on site.

Monitoring

The following monitoring is recommended (see EMPr in Appendix G):

- Visual inspections should be undertaken on a daily basis during the construction phase.

Table 3-7: Impact summary – Reduced downstream water quality during construction

Issue: Reduced downstream water quality during construction		
Phases: Construction Phase		
Criteria	Without Mitigation	With Mitigation
Intensity	Minor change, disturbance or degradation	Negligible change, disturbance or degradation
Duration	Short-term	Short-term
Extent	Beyond the boundary, affecting immediate neighbours	Beyond the boundary, affecting immediate neighbours
Consequence	Low	Very low
Probability	Conceivable	Unlikely
Significance	Very low	Insignificant
Nature of cumulative impacts		
	No other construction activities are foreseen along the pipeline alignment, so additional cumulative impacts are unlikely.	
Degree to which impact can be reversed	High, with implementation of mitigation measures the impact could largely be reversed.	
Degree to which impact may cause irreplaceable loss of resources	Unlikely, with mitigation.	
Residual impacts	The residual impact to the habitat integrity in the watercourses is considered to be INSIGNIFICANT.	

Operational Phase

Potential Impacts

During the operational phase there is the potential for contamination due to spills or leaks of chemicals stored at the WTP.

Therefore, prior to mitigation the impact is considered to be LOW and with the implementation of mitigation measures would be VERY LOW (**Table 3-8**).

Mitigation

The following mitigation measures are recommended (see EMPr in Appendix G):

- All chemicals and toxins must be stored in a bunded area with sufficient capacity to retain 110 % of the volume of the spill;
- Material Safety Data Sheets for all applicable materials stored on site must be readily available to on site personnel;
- When the sludge is removed from the site this must be done by a licensed Business Partner and disposed of at a registered landfill site (or as appropriate); and
- All wastes that cannot be reused or recycled should be collected by approved waste Business Partners and stored at the Gamsberg Zinc Mine waste storage area before being transported to the Black Mountain Mine (BMM) waste site which is a registered landfill. Hazardous waste will follow the BMM hazardous waste procedure.

Monitoring

The following monitoring is recommended (see EMPr in Appendix G):

- Visual inspections should be undertaken on a weekly basis throughout the operational phase to ensure there are no spills or leaks and check the integrity of the storage containers and bunds.
- Records of correct disposal of waste to be audited on an annual basis throughout the operational phase.

Table 3-8: Impact summary – Reduced downstream water quality during the operational phase

Issue: Reduced downstream water quality during construction		
Phases: Construction Phase		
Criteria	Without Mitigation	With Mitigation
Intensity	Minor change, disturbance or degradation	Minor change, disturbance or degradation
Duration	Very long, more than 20 years	Very long, more than 20 years
Extent	Beyond the boundary, affecting immediate neighbours	A part of the site
Consequence	Medium	Medium
Probability	Possible	Unlikely
Significance	Low	Very Low
Nature of cumulative impacts		
	Due to the remoteness of the site and the lack of other potential sources of contamination in the area as well as the relatively small volumes of chemicals stored on site cumulative impacts are unlikely.	
Degree to which impact can be reversed		
	High, with implementation of mitigation measures the impact could largely be reversed.	
Degree to which impact may cause irreplaceable loss of resources		
	Unlikely, with mitigation.	
Residual impacts		
	The residual impact to the habitat integrity in the watercourses is considered to be VERY LOW.	

Decommissioning Phase

Potential Impacts

Impacts related to the reduction of downstream water quality during the decommissioning phase of the project will be similar to those described in the construction phase impacts section.

3.6 IMPACT ON TERRESTRIAL HABITAT

3.6.1 Description of impact

The area surrounding the servitude in which the Pella bulk water pipeline will be constructed is considered to be sensitive with the habitat regarded as being in a largely natural condition thus providing habitat for several faunal species including some threatened species. This expected diversity is indicative of the importance of these habitats to collectively provide refugia, food, and corridors for dispersal in and through the surrounding area.

Based on the Terrestrial Critical Biodiversity Area (CBA) map (SANBI, 2017), the project area falls within an area classified as CBA1, CBA2 and Ecological Support Area (ESA) and also falls within the Bushmanland Inselbergs Area as defined in the Succulent Karoo Ecosystem Programme (SKEP) priority area spatial data. The project area also intercepts a portion of the Haramoep and Black Mountain Mine Important Bird and Biodiversity Area (IBA) as well as crossing an area identified by the National Freshwater Ecosystem Priority Area (NFEP) as a true FEP wetland.

The project area was also superimposed on the ecosystem protection level map (Skowno *et. Al.*,2019) to assess the protection status of terrestrial ecosystems associated with the development. Based on this the terrestrial ecosystems associated with the proposed project area is rated as both not protected and poorly protected.

Based on the spatial analysis undertaken the area surrounding the proposed project area has an overall high sensitivity from a habitat perspective.

3.6.2 Impact assessment

Construction Phase

Potential Impacts

The clearing of the site for excavation and removal of the existing underground pipeline and installation of the new pipeline as well as the development of the laydown areas for the pipework and other equipment would directly impact habitat that is found in the vicinity. In addition to this the use of machinery on the site has the potential to directly impact habitat. Dust generated above the normal ambient dust levels and settling out on vegetation could also impact the ability of the vegetation to survive, particularly in very dry regions such as this area of the Northern Cape. It should be noted that the servitude has previously been cleared for the existing pipeline installations and as such is not considered as pristine habitat. There could, however, be some sensitive vegetation species that have re-established within and adjacent to the servitude.

Due to the potential sensitivity of the habitat and presence of protected or sensitive species in the area surrounding the proposed Pella bulk water pipeline the pre-mitigation impact is assessed to be HIGH, however, with the implementation of mitigation measures the impact is considered to be LOW ([Table 3-9](#)).

Mitigation

The following mitigation measures are recommended (see EMPr in Appendix G):

- Clearing of vegetation must be minimized and avoided as far as possible. Project area footprints must be demarcated to ensure no person/vehicle goes into adjacent areas. Construction vehicles must be restricted to existing roads and new pathways must be restricted;
- A method statement is required from the Business Partner(s) that indicates the location and layout of the laydown areas for construction materials as well as the old pipeline that will be removed; management of facilities; and wastewater management during the project;
- The planning and design for the laydown areas must avoid sensitive areas, and be established in an already disturbed or developed area;
- The Business Partner should inform all site staff on the use of supplied ablution facilities and under no circumstances shall indiscriminate excretion and urinating be allowed other than in supplied facilities;
- The Business Partner must supply sealable and properly marked domestic waste collection bins and all solid waste collected shall be disposed of at a licensed disposal facility;
- Any possible contamination of topsoil by hydrocarbons, concrete or concrete water must be avoided;
- Materials must be stored in leak-proof, sealable containers or packaging;
- Dust reducing mitigation measures must be put in place and must be strictly adhered to, during the construction phase of the project;

- An erosion control plan and an alien vegetation management plan must be compiled and implemented for the site;
- Business Partner needs to engage with the ECO to conduct screening for threatened or protected species prior to commencement of any clearing activities;
- Screening of all development areas by the ECO or any external ecologist/botanist is required to screen and identify any threatened or protected species as listed by the National Environmental Management Biodiversity Act, 2004 (Act No 10 of 2004) (NEM:BA, 2004) and the Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009) (NCNCA, 2009) and any protected trees as listed by the National Forest Act, 1998 (Act No. 84 of 1998) (NFA, 1998). Should any species be required to be removed or translocated, the relevant permits must be applied for from the NCDENC and the DAFF and once permits are approved plants must be translocated.;
- A rehabilitation plan must be compiled for the project, to be implemented from the onset of the activities. The plan must:
 - Provide detailed electronic colour photographs of the proposed site before any clearing may commence;
 - These records of the site should be kept by the EO, ECO, RE and Engineer for consultation during rehabilitation of the site in order to ensure that rehabilitation is, as a minimum, done to a standard similar to pre-construction;
 - Provide guidelines on how to restore the disturbed area to (as close as possible to) its natural state, the plan must also include the incorporation of natural vegetation, sloping plans as well as storm water management;
 - Rehabilitation of the disturbed areas existing in the project area must be made a priority. Topsoil must also be utilised, and any disturbed area must be re-vegetated with plant and grass species which are endemic to this vegetation type;
 - Any succulents in the footprint of the area to be disturbed must be identified and removed from the proposed areas of disturbance and relocated; and
 - Areas must be stabilised using appropriate indigenous vegetation (along the length of the pipeline) and geotextile matting (in areas with a gradient exceeding 20°). Indigenous grasses and shrubs found within the project area and surrounds would sustain the arid environment and are the preferred options. During the first year of establishment, these plants should be watered as often as possible to ensure their establishment. The first two to three weeks should be daily, thereafter weekly is recommended. This is subject to how the vegetation fairs during this time, and should be adapted accordingly. There is a risk of vagrant livestock impacting on this vegetation and fencing of these areas could be considered.

Monitoring

The following monitoring is recommended (see EMPr in Appendix G):

- Visual inspections should be undertaken on a daily basis during the construction phase;
- Quarterly monitoring of rehabilitated areas should be undertaken to ensure that rehabilitation is effective. This should continue for a minimum of 5 years unless it can be proven that the rehabilitation is successful prior to that time.

- Quarterly monitoring should include the assessment of alien vegetation encroachment and, should there be significant encroachment, a programme needs to be established for the control and removal of alien invasive species.

Table 3-9: Impact summary – Destruction and fragmentation of habitat including protected species during construction

Issue: Destruction and fragmentation of habitat including protected species during construction		
Phases: Construction Phase		
Criteria	Without Mitigation	With Mitigation
Intensity	Prominent change, disturbance or degradation	Minor change, disturbance or degradation
Duration	Short-term	Short-term
Extent	Beyond the boundary, affecting immediate neighbours	A part of the site/property
Consequence	Medium	Very low
Probability	Probable	Probable
Significance	High	Low
Nature of cumulative impacts		
	No other construction activities are foreseen along the pipeline alignment, so additional cumulative impacts are unlikely.	
Degree to which impact can be reversed		
	High, with implementation of mitigation measures and concurrent rehabilitation as sections are completed the impact could largely be reversed.	
Degree to which impact may cause irreplaceable loss of resources		
	Unlikely, with mitigation.	
Residual impacts		
	The residual impact to the habitat integrity is considered to be VERY LOW.	

Operational Phase

Potential Impacts

During the operational phase, provided that rehabilitation has effectively been undertaken the potential impact is likely to be INSIGNIFICANT and no further assessment has been undertaken.

Decommissioning Phase

Potential Impacts

Impacts related to the destruction and fragmentation of habitat (including protected species) during the decommissioning phase of the project will be similar to those described in the construction phase impacts section.

3.7 IMPACT ON FAUNA

3.7.1 Description of impact

As discussed in Section 3.6.1 the area surrounding the proposed Pella bulk water pipeline has an overall high biodiversity sensitivity. The project area intercepts a portion of the Haramoep and Black Mountain Mine IBA where, based on the South African Bird Atlas Project Version 2 (SABAP2) database, 149 bird species are expected to occur in the vicinity of the project area of which eight species are listed as SCC either on a regional scale or international scale. In addition, 65 mammal species are expected of which seven are SCCs, 61 reptile species are expected and two are SCCs while 15 amphibian species with one SCC are expected. The majority of these species have a high likelihood of occurring in the project area and could be negatively impacted by various construction activities.

3.7.2 Impact assessment

Construction Phase

Potential Impacts

The clearing of vegetation for construction activities can have direct impacts on fauna (including possible threatened or protected species) in the project footprint in terms of displacement as well as having an impact in terms of noise, dust and vibrations. Vehicular movements and use of machinery can also result in direct mortalities of fauna.

Due to past impacts from both the existing above and underground pipelines as well as the vicinity to a public road the local fauna will be sensitized to some degree of activity. As such the impact is considered to be LOW without mitigation and VERY LOW with the implementation of mitigation measures ([Table 3-10](#)).

Mitigation

The following mitigation measures are recommended (see EMPr in Appendix G):

- All Business Partners and employees need to attend biodiversity awareness training;
- Collecting, killing and or transporting of any faunal species is prohibited. Any animals observed or recorded need to be reported to the ECO;
- Indicated speed limits on public roads must be adhered to;
- Schedule project activities and operations during least sensitive periods (largely during spring), in order to avoid migration, nesting and breeding seasons of SCC's;
- Clearing of vegetation should be minimized and avoided where possible;
- When vegetation is cleared, hand cutting techniques should be used as far possible in order to avoid the use of heavy machinery;
- Construction at night must be prohibited in order to reduce the impact on faunal species;
- Construction vehicles must be restricted to existing roads and new pathways must be restricted;
- Prior to and during vegetation clearance any larger fauna species noted should be given the opportunity to move away from the construction machinery;

- Daily inspection of trenches to record any faunal species that may have fallen into the trenches. Where any are recorded, the ECO must be informed and the species must be removed and translocated to a safe place. Photographic evidence and GPS coordinates must be retained for both the area of rescue and release;
- Dust reducing mitigation measures must be put in place and must be strictly adhered to, during the construction phase of the project;
- No trapping, killing or poisoning of any wildlife is to be allowed on site, including snakes, birds, lizards, frogs, insects or mammals;
- Rehabilitation of the disturbed areas within the project area must be made a priority. Topsoil must also be utilised, and any disturbed area must be re-vegetated with plant and grass species which are endemic to this vegetation type;
- As a portion of the pipeline is replaced, the section of the pipeline must be rehabilitated. Rehabilitation must be concurrent with the upgrading of the pipeline; and
- A rehabilitation plan must be compiled for the project, to be implemented from the onset of the activities. The plan must provide guidelines on how to restore the disturbed area to (as close as possible to) its natural state. The plan must also include the incorporation of natural vegetation, sloping plans as well as storm water management.

Monitoring

The following monitoring is recommended (see EMPr in Appendix G):

- Visual inspections should be undertaken on a daily basis during the construction phase;
- Monitoring of any fauna species recorded, translocated as well as any animal mortalities need to be recorded and reported on a monthly basis during the construction phase; and
- Monthly monitoring should be undertaken of rehabilitated areas to ensure that the rehabilitation is effective.

Table 3-10: Impact summary –Direct displacement of fauna due to habitat loss and disturbance during construction

Issue: Direct displacement of fauna due to habitat loss and disturbance during construction		
Phases: Construction Phase		
Criteria	Without Mitigation	With Mitigation
Intensity	Minor change, disturbance or degradation	Minor change, disturbance or degradation
Duration	Short-term	Short-term
Extent	Beyond the boundary, affecting immediate neighbours	A part of the site/property
Consequence	Low	Low
Probability	Definite	Possible
Significance	Low	Very Low
Nature of cumulative impacts		
	No other construction activities are foreseen along the pipeline alignment, so additional cumulative impacts are unlikely.	
Degree to which impact can be reversed		
	High, with implementation of mitigation measures and concurrent rehabilitation as sections are completed fauna are likely to return to the area.	
Degree to which impact may cause irreplaceable loss of resources		
	Unlikely, with mitigation.	
Residual impacts		
	The residual impact to the habitat integrity in the watercourses is considered to be VERY LOW.	

Operational Phase

Potential Impacts

During the operational phase there are two likely scenarios that could impact directly on fauna, the one is the increase of alien invasive plant species which could displace indigenous faunal species due to loss of habitat (which has been covered in Section 3.6.2) and the other is mortalities caused by maintenance or other vehicles using the public road that runs within the servitude. This impact is likely to be INSIGNIFICANT and has not been further assessed.

Mitigation

The following mitigation measures are recommended (see EMPr in Appendix G):

- Indicated speed limits on public roads must be adhered to.

Decommissioning Phase

Potential Impacts

Impacts related to the direct displacement of fauna due to habitat loss and disturbance during the decommissioning phase of the project will be similar to those described in the construction phase impacts section.

3.8 IMPACT ON TRAFFIC

3.8.1 Description of impact

During the construction phase there would be an increase in the numbers of vehicles accessing the area bringing equipment, supplies and staff for the construction of the pipeline and the associated infrastructure. The main access route to the area is the N14 highway which is the main road in this part of the Northern Cape Province and the main road between Upington and Springbok. From there construction traffic will use the Pella Street and access the pipeline servitude via the Klein Pella Road thus bypassing the town of Pella. Traffic numbers would be significantly reduced during the operational phase with only a few vehicles expected for undertaking maintenance along the pipeline route.

3.8.2 Impact assessment

Construction Phase

Potential Impacts

During the construction phase there would be an increase in vehicle movement to and from the area of construction along the pipeline route. This increased vehicle movement is largely associated with the delivery of construction material, pipework and associated infrastructure and has the potential to impact on traffic using the existing road network in the area.

The increase in traffic could generate additional noise (Section 3.2), dust (Section 3.1) and safety impacts for fauna (Section 3.7), other road users and people living or working within close proximity to the roads used for accessing the construction site. In addition to this, the increased volume of traffic along the transport route (excluding the N14) may increase the wear and tear on these roads and possibly lead to deterioration in road conditions.

There may also be some disruptions to traffic associated with the laying of sections of piping at road crossings. There are a total of four road crossings, including three minor gravel roads and a Provincial secondary road. The level of use of the secondary and farm roads is low with a very low number of vehicle movements.

The impact will occur over the short term construction phase and with the low level of use of the provincial and secondary roads and the limited disturbance of the road crossings the impact is assessed to have a MEDIUM significance. However, with implementation of mitigation measures this can be reduced to a LOW significance. (Table 3-11).

Mitigation

The following mitigation measures are recommended (see EMPr in Appendix G):

- Ensure that construction activities are staggered and vehicular activities are kept to a minimum, during daylight hours and as far as possible outside of peak traffic times'
- The Business Partner must ensure that one lane of the road remains open when constructing underground sections of piping across roads;
- Appropriate routes for heavy vehicle and machinery movement must be identified and agreed with the local roads authorities (and landowners). The aim would be to ensure that trucks transporting abnormal loads (i.e. pipelines) avoid residential areas and use the strategic highway network wherever possible;
- Undertake driver awareness training, use traffic warning signs and ensure adherence to speed limits;
- If a person or animal is injured by transport activities this must be handled in accordance with the Business Partner's emergency response procedure; and
- Implementation of a grievance procedure whereby issues can be raised / reported and transparently and timeously addressed.

Monitoring

The following monitoring is recommended (see EMPr in Appendix G):

- Monitor and evaluate use of relevant road intersections.

Table 3-11: Impact summary – Increased Traffic during construction

Issue: Increased traffic during construction		
Phases: Construction and Decommissioning Phases		
Criteria	Without Mitigation	With Mitigation
Intensity	Moderate change or disturbance	Minor (slight) change
Duration	Short-term	Short-term
Extent	Regional/ national	Regional/ national
Consequence	High	Medium
Probability	Possible	Possible
Significance	Medium	Low
Nature of cumulative impacts	There is likely to be a significant increase in traffic accessing the area for the construction phase. Should the Gamsberg Smelter Project, as well as various other renewable projects in the vicinity, also be approved there is likely to be significant additional traffic accessing this part of the Northern Cape via the N14. However, due to the short term nature of the construction phase and the fact that the majority of the traffic concerns relate to the secondary and farm roads the cumulative impact is assessed to be LOW.	
Degree to which impact can be reversed	Moderate, there are not many alternate routes that can be used in this part of the Northern Cape Province, so all access would be via the N14.	

Degree to which impact may cause irreplaceable loss of resources	Could result in serious injury or death of people or animals.
Residual impacts	Any accidents that occur as a result of project related traffic would likely have residual impacts. The potential for accidents would, however, cease once the construction phase has been completed.

Operational Phase

Potential Impacts

The maintenance and inspection services that would be accessing the site at irregular intervals, as well as the number of vehicles that such activities would require, is likely to have an INSIGNIFICANT impact on the existing traffic within the study area. As such, this impact has not been further considered.

Decommissioning Phase

Potential Impacts

Impacts related to traffic during the decommissioning phase of the project will be similar to those described in the construction phase impacts section.

3.9 IMPACT ON SOCIO-ECONOMICS: EMPLOYMENT

3.9.1 Description of impact

The main socio-economic impacts associated with the project relate to the benefits for the local economy such as creation of employment and procurement of local goods and services. This is particularly as the proposed Pella bulk water pipeline is in association with the Gamsberg Smelter Project (subject to a separate Environmental Impact Assessment Process) which, if it were to go ahead, could generate numerous jobs, directly and indirectly, for the people of both the Namakwa District and Khâi-Ma Local Municipal areas.

The proposed Pella bulk water pipeline and associated infrastructure would also mean that the water supply to surrounding towns and communities would not only be less erratic but would, in time allow a greater water supply for the towns. Currently Sedibeng Water has a permit to abstract 44ML/day, however, the current abstraction design capacity is only 40 ML/day and treatment capacity is 28 ML/day. There is thus unutilised authorised water available to abstract a further 4 ML/day. Additional water supply has also been planned for the towns of Pella (0.5ML/day), Pofadder (1ML/day) and Aggeneys (2ML/day) allowing for future growth and development of the towns.

3.9.2 Impact assessment

Construction Phase

Potential Impacts

The design and construction phase of the Project is expected to create both direct and indirect employment opportunities for the local population. Overall, an estimated 250 jobs will be created through the proposed

upgrade of the WTP and the underground pipeline. The skills mix would include highly skilled personnel, semi-skilled and unskilled personnel. All the design (and engineering) jobs during the construction phase will be temporary in nature, as will all construction related employment. It is the intention to mainly employ people from the Pella, Aggeneys and Pofadder areas and thereafter regionally. Indirect employment will be created through employment in procurement of local goods and services. The construction work will create an opportunity for 'on-the-job' training thus increasing general skills levels.

It is intended that the majority of the goods and services required for the Project would be procured locally and regionally, as far as possible. Local businesses are expected to benefit from the project primarily through civil and construction works, hospitality and services (such as accommodation and catering cleaning), transport, vehicle servicing and security services. Due to the nature of the project and short construction period, the procurement benefits are likely to be limited. With the relatively high unemployment levels in the Namakwa District and Khâi-Ma Local Municipal areas the additional short terms jobs would represent a benefit.

Due to the short term nature of the construction phase, employment opportunities that would be generated are considered a VERY LOW (POSITIVE) impact. With the implementation of enhancement measures the impact would increase to a LOW (POSITIVE) ([Table 3-12](#)).

Mitigation/ Enhancement

The following mitigation/enhancement measures are recommended (see EMPr in Appendix G):

- Local employment requirements must be agreed with the local authority and Business Partner upon advertising for jobs. Before any project commencement in Khâi-Ma Local Municipality – all Business Partners must meet with the local authority to discuss employment and local business opportunities.
- Clearly advertise the nature and numbers of jobs available during the project phases in surrounding communities, and ensure that communities understand the Project's local recruitment procedures.
- Recruitment processes to be followed as agreed with the Khâi-Ma Local Municipality. A recruitment registry should be created for jobseekers to record relevant qualifications, work experience and contact details;
- Women and youth should receive preferential employment opportunities in the company recruitment policy, as far as possible. Performance indicators for promoting the employment of women and youth should be developed and implemented by the Project and Business Partners;
- The developer will ensure that the Business Partners follow the required recruitment process and prioritise local people;
- Develop and implement a Community Skills Development programme to facilitate local employment. An updated skills database should be in place in advance of the construction Business Partner being appointed and should be kept up to date throughout the Project. The database should include documentation verifying the eligibility status of applicants;
- Considering the fact that construction related employment will only be for a relatively short-term, the skills registers generated should be shared with other construction or infrastructure development companies in the regional study area;
- Where possible, labour-based methods of construction (e.g. digging of trenches), should be used to maximise the Project's requirements for unskilled labour;
- Consider the unbundling of tenders to provide appropriate opportunities for local service providers;

- Tender criteria should require Business Partners and sub-contractors to provide training and skills development to the locally recruited workforce. Where possible, training should be aimed at providing skills to employees that might allow them to apply for any permanent positions that become available once construction is complete, or at the proposed Gamsberg Smelter Project;
- Provide employees with reference letters that they can submit to gain further employment. Also, provide certificates of completion for on-the-job training;
- Follow-up compliance monitoring should also be undertaken to ensure that the Project and its subcontractors honour local employment policies and other measures to enhance local employment. Feedback to local communities should be undertaken on a regular basis in a transparent manner;
- Ensure that the appointed project contractors and suppliers have access to Health, Safety, Environmental and Quality training as required by the project;
- Performance indicators for promoting the employment of women and youth should be developed and implemented by the Project and Business Partners. The positions reserved for these groups may only be filled with persons outside of these categories when it can be demonstrated that no suitable persons are available;
- Establish a procurement policy which:
 - sets reasonable targets for the procurement of goods and services from South African residents /suppliers, particularly local residents as far as possible; and
 - identifies and invites bids from local suppliers;
- Adopt transparent adjudication process for tender awards;
- Sedibeng Water will identify local Namakwa suppliers (as a first preference) with the appropriate level of capacity to supply goods and services over the operational lifetime of the project (specifically BBBEE companies); and
- Sedibeng Water to ensure that the appointed project contractors and suppliers have access to Health, Safety, Environmental and Quality training as required by the Project.

Monitoring

The following monitoring is recommended (see EMPr in Appendix G):

- It is proposed that a monitoring programme be developed and implemented to monitor the implementation of social management actions. Furthermore, it is recommended that this is conducted by a competent monitoring and evaluation officer as the implementation of monitoring tools (surveys, databases, etc.) will require specialised skills.

Table 3-12: Impact summary – Socio-economic Impacts (Employment opportunities)

Issue: Socio-economic Impacts (Employment opportunities)		
Phases: Construction Phase		
Criteria	Without Mitigation	With Mitigation
Intensity	Insignificant change or improvement	Minor change or improvement
Duration	Short-term	Short-term

Extent	Local area, extending far outside the boundary	Local area, extending far outside the boundary
Consequence	Low	Low
Probability	Possible	Probable
Significance	Very Low (Positive)	Low (Positive)
Nature of cumulative impacts	The Northern Cape Province, and Khâi-Ma Local Municipality in particular, have very high unemployment rates. Creation of employment opportunities and training is thus under huge demand. The construction of the pipeline, is however, a very short term Project and will only employ a relatively small number of people, and as such the cumulative impact is VERY LOW (positive).	
Degree to which impact can be reversed	N/A as a positive impact. However, post the construction phase there is the potential that those employed would again be searching for employment opportunities.	
Degree to which impact may cause irreplaceable loss of resources	N/A	
Residual impacts	The residual impact is considered to be a LOW (POSITIVE)	

Operational Phase

Potential Impacts

During the operational phase there are unlikely to be many opportunities in terms of direct employment, however, the impact of a more efficient water supply as well as additional volumes for the surrounding towns of Aggeneys, Pella and Pofadder would increase the potential for other indirect job opportunities such as subsistence farming, agriculture etc. as well as adding to the quality of life for the people of these towns.

Decommissioning Phase

Potential Impacts

Socio-economic impacts related to the decommissioning phase of the Pella bulk water pipeline and associated facilities will be similar to those described in the construction phase impacts section.

3.10 IMPACT ON SOCIO-ECONOMICS: SOCIAL ILLS AND DISRUPTION

3.10.1 Description of impact

There are a number of social ills that can be associated with development of the pipeline in an area where there is a large need for employment. The potential for employment could result in a population influx which in turn could have an impact on the following:

- Increased pressure on local services and facilities, especially in areas where service delivery is already lacking;

- Establishment and growth of informal settlements which due to their lack of access to services, tend to be associated with several economic, social and health-related problems, such as increased dependency on local government;
- Increase in social pathologies such as substance abuse, prostitution, crime, increased incidence of sexually transmitted diseases and other communicable diseases; and
- Hostility or conflict between newcomers and incumbent population.

3.10.2 Impact assessment

Construction Phase

Potential Impacts

The design and construction phase of the Project is expected to create both direct and indirect employment opportunities for the local population. Overall, an estimated 250 jobs will be created through the proposed upgrade of the WTP and the underground pipeline. The skills mix would include highly skilled personnel, semi-skilled and unskilled personnel. All the design (and engineering) jobs during the construction phase will be temporary in nature, as will all construction related employment. It is the intention to mainly employ people from the Pella, Aggeneys and Pofadder areas and thereafter regionally.

Although the employment numbers are low, if news spreads of potential employment opportunities this could result in some influx of jobseekers. However, due to the short term nature of the construction phase and the small number of potential jobs, the potential social ills associated with the construction phase are considered to be VERY LOW impact. With the implementation of mitigation measures the impact would reduce to INSIGNIFICANT ([Table 3-13](#)).

Mitigation/ Enhancement

The following mitigation/enhancement measures are recommended (see EMPr in Appendix G):

- Develop an induction programme, including a Code of Conduct, for all workers;
- All workers will agree to the Code of Conduct and be aware that contravention of the Code could lead to dismissal;
- A Grievance Procedure will be established whereby complaints are recorded and responded to; and
- An HIV Policy and Awareness Plan must be developed and implemented.

Monitoring

The following monitoring is recommended (see EMPr in Appendix G):

- It is proposed that a monitoring programme be developed and implemented to monitor the implementation of social management actions. Furthermore, it is recommended that this is conducted by a competent monitoring and evaluation officer as the implementation of monitoring tools (surveys, databases, etc.) will require specialised skills.

Table 3-13: Impact summary – Socio-economic Impacts (Employment opportunities)

Issue: Socio-economic Impacts (Social Ills and Disruption)		
Phases: Construction Phase		
Criteria	Without Mitigation	With Mitigation
Intensity	Minor change or improvement	Insignificant change or improvement
Duration	Short-term	Short-term
Extent	Beyond the site boundary, affecting immediate neighbours	Beyond the site boundary, affecting immediate neighbours
Consequence	Low	Low
Probability	Conceivable	Unlikely
Significance	Very Low	Insignificant
Nature of cumulative impacts		
	The Northern Cape Province, and Khâi-Ma Local Municipality in particular, have very high unemployment rates. Creation of employment opportunities and training is thus under huge demand . The Gamsberg Smelter Project is likely to generate a large number of jobs and local employment thus attracting a large number of people to the surrounding towns of Pella, Pofadder and Aggeneys. The construction of the pipeline, is however, a very small Project and in comparison is unlikely to attract a large potential workforce. As such the cumulative impact is VERY LOW (positive).	
Degree to which impact can be reversed	Moderate	
Degree to which impact may cause irreplaceable loss of resources	N/A	
Residual impacts	The residual impact is considered to be INSIGNIFICANT	

3.11 CUMULATIVE IMPACTS

The cumulative impacts of the pipeline project as a result of the direct impacts of the pipeline along with other developments in the area (most notably the Gamsberg Smelter Project and Renewable Energy Projects) have been assessed to be of low significance due to the disturbed nature of the pipeline servitude. This is primarily due to the remote nature of the pipeline servitude and the limited overlap of the direct area of influence of the Gamsberg Smelter Project. The most significant positive cumulative impact of the pipeline project combined with the Gamsberg Smelter Project is the potential social benefits (direct and indirect job opportunities). Negative cumulative impacts as a result of the traffic generated by the pipeline project and the Gamsberg Smelter Project may have some cumulative impact on the N14, however there are no other cumulative impacts on the secondary unpaved roads, as it is unlikely that that there will be an overlap in the use of these roads. As a result of the low significance of the cumulative impacts, no additional mitigation measures, over and above those recommended for the direct impact of the pipeline project, have been recommended.

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