



ZN Geo Services

**THE PROPOSED BERGVILLE WATER TREATMENT WORKS UPGRADE,  
UTHUKELA DISTRICT MUNICIPALITY, KWAZULU-NATAL PROVINCE, SOUTH  
AFRICA**

**DRAFT BASIC ASSESSMENT REPORT**

Public Review Period:

**13 November 2020 to 14 December 2020**

**COMPILED BY:**

ZN Geo Services (Pty) Ltd  
20 Park Lane  
Hyde Park  
Ladysmith  
3370

Tel: +2783 467 3532

Fax: +2786 620 3833

E-mail: [zama@znggeo.co.za](mailto:zama@znggeo.co.za)

Website: [www.znggeo.co.za](http://www.znggeo.co.za)

## I. PROJECT DETAILS

**Report Title** : Basic Assessment Report

**Report Status** : Draft

**Review Period** : 13 November 2020 – 14 December 2020

**Project Title** : The Proposed Bergville Water Treatment Works Upgrade, uThukela District Municipality, Kwazulu-Natal Province

**Applicant** : uThukela District Municipality

**Environmental Consultant** : ZN Geo Services (Pty) Ltd

**KZN EDTEA Reference No.:** New Application

## II. DOCUMENT CONTROL

**PREPARED BY:**

---

**Zama Sithole**  
*(MSc. Environmental Management)*  
SACNASP (400112/17), IAIASA, ELA

**REVIEWED BY:**

---

### III. DECLARATION

ZN Geo Services (Pty) Ltd was contracted by the uThukela District Municipality as the independent environmental consultant to undertake the environmental assessment process for the proposed Bergville Water Treatment Works (WTW) upgrade project. ZN Geo Services (Pty) Ltd is not a subsidiary of, or affiliated to the uThukela District Municipality. Furthermore, ZN Geo Services (Pty) Ltd does not have any interests in secondary developments that may arise out of the authorisation of the proposed Bergville WTW upgrade project.

### IV. APPLICANT DETAILS

<b>Name of applicant:</b>	uThukela District Municipality
<b>Applicant representative:</b>	Mr B.H. Khoza (Acting Municipal Manager)
<b>Position:</b>	Municipal Manager
<b>Contact number/s:</b>	036 638 5100
<b>E-mail address:</b>	<a href="mailto:mm@uthukela.gov.za">mm@uthukela.gov.za</a>
<b>Physical address:</b>	33 Forbes Street, Ladysmith, 3370
<b>Postal address:</b>	P O Box 116, Ladysmith, 3370

### V. ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)'s DETAILS

<b>Environmental Assessment Practitioner (EAP):</b>	Zama Sithole		
<b>Postal address:</b>	20 Park Lane, Hyde Park, Ladysmith		
<b>Postal code:</b>	3370		
<b>Telephone:</b>	+2783 467 3532	Cell:	+2783 467 3532
<b>E-mail:</b>	<a href="mailto:zama@zngeo.co.za">zama@zngeo.co.za</a>	Fax:	+2786 620 3833
<b>EAP Qualifications</b>	BSc Honours Geology MSc. Environmental Management		
<b>EAP Registrations/Associations</b>	SACNASP (400112/17), IAIASA, ELA		

Zama Sithole – The EAP for this project is a registered Professional Natural Scientist and holds a MSc. Degree in Environmental Management. She has over 10 years of experience within the field of environmental management with a key focus on environmental advice and solutions, environmental assessments, management of environmental projects and compliance reporting. She is currently an EAP at ZN Geo Services (Pty) Ltd responsible for several environmental management projects across KZN and the country.

Please refer to **Appendix H1** for EAP Expertise.

## VI. SPECIALIST'S DETAILS

Please refer to **Appendix F** for the specialist reports listed below.

Specialist	Specialist Report	Date
The Biodiversity Company	Wetland Assessment	July 2020
Fundor Enviro Service	Vegetation Assessment	October 2020
Fundor Enviro Service	Animal Assessment	October 2020
Umlando: Archaeological Surveys and Heritage Management	Heritage Survey	July 2020
Umlando: Archaeological Surveys and Heritage Management	Palaeontology Impact Assessment	July 2020

## VII. REQUIREMENT AND PURPOSE OF BASIC ASSESSMENT

The proposed project is subject to the requirements of the Environmental Impact Assessment Regulations (2014 EIA Regulations) in terms of the National Environmental Management Act (NEMA, Act 107 of 1998, as amended). NEMA is national legislation that provides for the authorisation of certain controlled activities known as "listed activities". In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these listed activities must be considered, investigated, assessed, and reported on to the competent authority (the decision-maker) charged by NEMA with granting of the relevant Environmental Authorisation. The uThukela District Municipality requires an Environmental Authorisation for this project in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and GNR 982, 983, 984 and 985 of the Environmental Impact Assessment Regulations, 2014 as amended in 07 April 2017 (GNR 326); a Basic Assessment (BA) Process is thus required for this project.

An Environmental Impact Assessment is an effective planning and decision-making tool as it provides the opportunity for the applicant to be forewarned of potential environmental issues and assess if potential environmental impacts need to be avoided, minimised or mitigated to acceptable levels. The Basic Assessment process includes certain feasibility studies for a proposed project and will inform the final design process in order to ensure that environmentally sensitive areas are avoided to an acceptable level as confirmed by the Environmental Assessment Practitioner (EAP). Comprehensive, independent environmental studies elaborated by specialists are required in accordance with the EIA Regulations to inform the EAP of its comprehensive recommendation and provide the Competent Authority with sufficient information in order to make an informed decision. The KZN Department of Economic Development, Tourism and Environmental Affairs (EDTEA) is the Competent Authority for the proposed project. The uThukela District Municipality has appointed ZN Geo Services (Pty) Ltd, as

independent environmental consultants, to undertake the Basic Assessment process and compile the Basic Assessment Report (BAR) and associated Environmental Management Programme (EMPr).

### **Objectives of the Basic Assessment process**

According to Appendix 1 of the 2014 EIA Regulations, 2014, Government Notice R982 (as amended), the objective of the basic assessment process is to, through a consultative process –

- (a) determine the policy and legislative context within which the proposed activity is located and how the activity complies with and responds to the policy and legislative context;
- (b) identify the alternatives considered, including the activity, location, and technology alternatives;
- (c) describe the need and desirability of the proposed alternatives;
- (d) through the undertaking of an impact and risk assessment process, inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage, and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and alternatives on these aspects to determine –
  - (i) the nature, significance, consequence, extent, duration, and probability of the impacts occurring to; and
  - (ii) the degree to which these impacts –
    - (aa) can be reversed;
    - (bb) may cause irreplaceable loss of resources; and
    - (cc) can be avoided, managed or mitigated; and
- (e) through a ranking of the site sensitivities and possible impacts the activity and alternatives will impose on the sites and location identified through the life of the activity to –
  - (i) identify and motivate a preferred site, activity and alternative;
  - (ii) identify suitable measures to avoid, manage or mitigate identified impacts; and
  - (iii) identify residual risks that need to be managed and monitored.

The main objective of the BAR and EMPr is to identify and assess potential environmental impacts associated with the proposed project, and to compile appropriate mitigation measures.

## ABBREVIATIONS

<b>BAR</b>	Basic Assessment Report
<b>BID</b>	Background Information Document
<b>CBA</b>	Critical Biodiversity Area
<b>CRR</b>	Comments and Response Report
<b>DBAR</b>	Draft Basic Assessment Report
<b>DEFF</b>	Department of Environment, Forestry and Fisheries
<b>DHSWS</b>	Department of Human Settlement and Water and Sanitation
<b>DRDLR</b>	Department of Rural Development and Land Reform
<b>EAP</b>	Environmental Assessment Practitioner
<b>EIA</b>	Environmental Impact Assessment
<b>EIS</b>	Ecological Importance and Sensitivity
<b>EMPr</b>	Environmental Management Programme
<b>ESA</b>	Ecological Support Areas
<b>FBAR</b>	Final Basic Assessment Report
<b>GN</b>	Government Notice
<b>HGM</b>	Hydrogeomorphic
<b>HIA</b>	Heritage Impact Assessment
<b>I&amp;AP's</b>	Interested and Affected Parties
<b>IDP</b>	Integrated Development Plan
<b>KZN – EDTEA</b>	Kwa-Zulu Natal Economic Development, Tourism and Environmental Affairs
<b>NEMA</b>	National Environmental Management Act (No. 107 of 1998) (as amended)
<b>NHRA</b>	National Heritage Resources Act (No. 25 of 1999)
<b>NWA</b>	National Water Act (No. 36 of 1998)
<b>OLM</b>	Okhahlamba Local Municipality
<b>PES</b>	Present Ecological Status
<b>PHRA (Amafa)</b>	Provincial Heritage Resource Agency (KZN – Amafa)
<b>PIA</b>	Palaeontological Impact Assessment
<b>PPP</b>	Public Participation Process
<b>REC</b>	Recommended Ecological Category
<b>RoD</b>	Record of Decision
<b>SAHRA</b>	South African Heritage Resources Agency
<b>SDF</b>	Spatial Development Framework
<b>SMP</b>	Stormwater Management Plan
<b>uTDM</b>	uThukela District Municipality

<b>WMA</b>	Water Management Area
<b>WSS</b>	Water Supply Scheme
<b>WTW</b>	Water Treatment Works
<b>WULA</b>	Water Use License Application

# TABLE OF CONTENTS

PUBLIC REVIEW OF THE DRAFT BASIC ASSESSMENT REPORT.....	xii
EXECUTIVE SUMMARY .....	xiii
1. ACTIVITY INFORMATION .....	1
2. Legislative Framework .....	16
3. Public Participation Process.....	26
4. Description of Alternatives.....	34
5. Biophysical Description of the Site .....	39
5.1.1 Land Use .....	39
5.1.2 Topography .....	40
5.1.3 Average Weather.....	40
5.1.4 Soil and Geology .....	42
5.1.5 Hydrology .....	44
5.1.6 Fauna .....	55
5.1.7 Vegetation .....	59
5.1.8 KwaZulu-Natal Biodiversity Sector Plan.....	65
5.2 Human Environment .....	67
5.2.1 Heritage Features.....	67
5.2.2 Palaeontological Assessment.....	71
5.2.3 Other Sensitivities.....	72
5.2.4 Socio-Economic Features.....	73
6. Environmental Sensitivity – Specialist Recommendations.....	80
7. Environmental Impact Assessment .....	84
7.1 Impact Assessment Methodology.....	84
7.2 Impact Assessment.....	87
7.3 No-Go Alternative.....	117
7.4 Cumulative Impacts.....	120
7.5 Environmental Impact Statement .....	121
8. CONCLUSIONS AND RECOMMENDATIONS.....	122



9. APPENDICES .....	126
---------------------	-----

## LIST OF FIGURES

Figure 1: External view of raw water pump station .....	3
Figure 2: Raw water pump station pumps and pipework .....	3
Figure 3: Header tank .....	4
Figure 4: Grit channels.....	5
Figure 5: Upper (sloped) section of flocculation channel .....	5
Figure 6: Lower section of flocculation channel.....	6
Figure 7: Circular sedimentation tanks .....	7
Figure 8: Launder pipes installed within clarifier.....	7
Figure 9: Auto-backwash gravity filters .....	8
Figure 10: Sludge drying bed.....	8
Figure 11: Clearwater reservoir.....	9
Figure 12: External view of clearwater pump station .....	10
Figure 13: Clearwater pump station pumps and pipework.....	11
Figure 14: Existing package treatment plant .....	12
Figure 15: Existing treatment works building.....	12
Figure 16: Access road to raw water pump station is in a state of disrepair .....	13
Figure 17: Proposed Upgrade Layout .....	1
Figure 18: Broader Locality Map .....	13
Figure 19: Google Earth Locality Map.....	14
Figure 20: Site Notice Locations .....	29
Figure 21: Route Alternatives.....	34
Figure 22: Alternative Routes – including Landowner Suggested Route .....	36
Figure 23: Registered Servitude for Preferred Alternative .....	38
Figure 24: Land Type Map.....	43
Figure 25: Illustration of land type Bb 137 terrain units .....	43
Figure 26: Hydrology Map.....	45
Figure 27: Aquatic Sensitivity Map.....	46
Figure 28: Wetland Map.....	48
Figure 29: Wetland Delineation Map .....	49
Figure 30: 10m wetland buffer requirement.....	53
Figure 31: Wetland Sensitivity Map.....	54
Figure 32: Animal Species Sensitivity Map .....	55
Figure 33: Plant Species Sensitivity .....	59

Figure 34: Delineated Vegetation Types Map .....	61
Figure 35: KwaZulu-Natal Biodiversity Sector Plan Map .....	66
Figure 36: Archaeological and Cultural Heritage Sensitivity .....	67
Figure 37: Location of Known Heritage Sites in the General Area .....	68
Figure 38: Farm Shed and Location of Original Route .....	69
Figure 39: Alternative Route 2 .....	69
Figure 40: Alternative Route 1 .....	70
Figure 41: Palaeontological Sensitivity Map .....	72
Figure 42: Vegetation Units .....	81
Figure 43: HGM units .....	83

## LIST OF TABLES

Table 1: Projected population figures for Bergville WSS .....	2
Table 2: Projected summer daily demands for Bergville WSS .....	2
Table 3: Details of New Raw Water Rising Main to Bergville WTW .....	2
Table 4: Design Parameters for Polymer Transfer Pumps .....	3
Table 5: Design Parameters for Coagulant Dosing Pumps .....	3
Table 6: Sedimentation Tank Design Criteria .....	3
Table 7: Rapid Gravity Sand Filter Design Criteria .....	4
Table 8: Details of New Clearwater Rising Main to Bergville WTW .....	7
Table 9: Water Treatment Works Specifications .....	9
Table 10: Coordinates .....	11
Table 11: Property Details .....	11
Table 12: Applicable Listed Activities to be authorized .....	16
Table 13: Applicable Legislation, Policies and/or Guidelines .....	18
Table 14: Identified I&APs .....	26
Table 15: Comparison between Alternatives .....	37
Table 16: Wetland classification .....	47
Table 17: Summary of the PES scores for HGM 2 .....	50
Table 18: Summary of the PES scores for HGM 3 .....	50
Table 19: Summary of the PES scores for HGM 4 .....	50
Table 20: The EcoServices being provided by the affected wetlands .....	51
Table 21: The EIS assessment results for the project area .....	52
Table 22: Wetland REC based on the PES and EIS results .....	52
Table 23: Animal Species Sensitivities .....	55
Table 24: List of Alien Invasive Plant Species on site .....	64

Table 25: Construction Phase Impacts ..... 87  
Table 26: Operation Phase Impacts..... 113  
Table 27: Potential impacts should the Development not be Approved ("No-Go" Alternative) . 117

**APPENDICES:**

- Appendix A:** Site plans
- Appendix B:** Photographs
- Appendix C:** Layout
- Appendix D:** Route Alignment Information
- Appendix E:** Public Participation
- Appendix F:** Specialist Studies
- Appendix G:** Environmental Management Programme
- Appendix H:** Other Information

## **PUBLIC REVIEW OF THE DRAFT BASIC ASSESSMENT REPORT**

---

The Draft Basic Assessment Report (BAR) has been prepared by ZN Geo Services (Pty) Ltd in order to assess the potential environmental impacts associated with the upgrading of Bergville Water Treatment Works (WTW) in the Okhahlamba Local Municipality (OLM) within the uThukela District Municipality (uTDM). The report is made available for a 30-day public review period from **13 November 2020 to 14 December 2020**.

In order to obtain further information, register on the project database or submit your written comments, the EAP's contact details are as follows:

### **Environmental Assessment Practitioner**

Name: **Zama Sithole (Pr.Sci.Nat)**  
Physical Address: 20 Park Lane, Hyde Park, Ladysmith, 3370  
Postal Address: Same as Physical  
Telephone Number: +2783 467 3532  
Fax Number: +2786 620 3833  
E-mail: [zama@zngeo.co.za](mailto:zama@zngeo.co.za)

The due date for comments on the Draft Basic Assessment Report is **Monday, 14 December 2020**.

## EXECUTIVE SUMMARY

---

The **uThukela District Municipality (uTDM)** is proposing the upgrading of Bergville Water Treatment Works (WTW) in the Okhahlamba Local Municipality (OLM) within the uThukela District Municipality (uTDM) from 2.6 mega litres to 10 mega litres per day. The raw water bulk pipeline from the abstraction works to the WTW will be made larger, i.e. from 200mm to 450mm pipeline diameter for an increased capacity. The clear water pipeline diameter from WTW to command reservoir will also increase from 200mm to 450mm. The command reservoir will also be upgraded. Chlorine will be utilised as the prime chemical utilised to treat the water to make it acceptable for drinking. The pipeline will be laid at a minimum depth of 750mm using a TLB and manual excavations.

The summer water daily demands in the Bergville Water Supply Scheme (WSS) area has increased from 8.48 in 2011 to 8.71 in 2020 as a result of the increase in population. A further increase is expected in population over the next 20 years and subsequently, the demand for water within the WSS area will increase as well.

In terms of development footprint, the dimensions of the proposed upgrades are as follows.

- Clearwater Pipeline Length (WTW to Command Reservoir) = 720.99m
- Raw Water Pipeline Length (Abstraction to WTW) = 158.70m
- WTW area 1) Existing = 607.94m<sup>2</sup>
- WTW area 2) Upgrade = 1322.28m<sup>2</sup>
- Command Reservoir area = 3449.43m<sup>2</sup>

The total development footprint is 5370m<sup>2</sup>.

The upgrade of the Clearwater Pipeline route connecting the WTW to Command Reservoir is the one component of the proposed project that triggered the need for the basic assessment and associated WUL Application. Four route alignment alternatives have been assessed in the BA for Clearwater Pipeline. The pipelines will be laid underground within the existing servitude(s) in certain areas that is highly transformed from its natural state. Therefore the impacts associated with the area are potentially moderate to low with the implementation of mitigation measures as outlined in the Environmental Management Programme (EMPr). Additionally, the project will entail the clearing of wetland vegetation and levelling of areas for the construction activities. This has the potential to increase erosion and sedimentation of

downstream habitats due to surface runoff during the wet season. Furthermore, due to the proximity of the construction to the water resources, direct impacts to the water resources are likely. Although the environmental impacts may be of high significance in some cases as discussed above, it will be for a limited duration. Once the construction has been completed, during the operational and maintenance phases, the environmental impact is considered to be of low risk with proper mitigation measures put in place to reduce impacts to local and downstream water resources.

This Draft BAR (DBAR) has provided a comprehensive assessment of the potential environmental impacts associated with the proposed Bergville WTW upgrade. These impacts have been identified by the EIA team which is inclusive of specialists. It is the opinion of the specialists that no fatal flaws have been identified for the proposed Bergville WTW upgrade. There are no environmental or social impacts of high significance that would prevent the establishment of the proposed project. It is therefore recommended that the project should proceed with adequate mitigation measures implemented to reduce environmental impacts anticipated.

Public participation is being conducted in line with the NEMA requirements. This entails engagement through site notices, newspaper advertisements and email correspondence with organs of state, stakeholders and Interested and Affected Parties (I&AP's) from the community, report review period and a public meeting.

# 1. ACTIVITY INFORMATION

---

## 1.1 Project Title

The Proposed Bergville Water Treatment Works Upgrade, uThukela District Municipality, Kwazulu-Natal Province, South Africa.

## 1.2 Project Background

The **uThukela District Municipality (uTDM)** is proposing the upgrading of the Bergville Water Treatment Works (WTW) in the Okhahlamba Local Municipality (OLM) within the uThukela District Municipality (uTDM). The Bergville Water Supply Scheme (WSS) provides water to Bergville town as well as to various rural communities in the surrounding area. The scheme currently abstracts raw water from the Tugela River which is then pumped to the Bergville Water Treatment Works (WTW). Treated water is pumped from the Bergville WTW to a set of command reservoirs on the outskirts of Bergville town before being distributed to the town itself and the various rural communities. The existing capacity of the WTW (approximately 2Ml/day) is insufficient to provide for the future water demand requirements of the Bergville WSS. A major upgrade of the works is therefore required.

## 1.3 Existing Infrastructure

The existing works consists of the following components:

- Raw water pump station (abstraction point) and rising main.
- Header tank / grit channels and flocculation channel (at WTW facility).
- Sedimentation tanks (at WTW facility).
- Auto-backwash gravity filters (at WTW facility).
- Clearwater pump station and rising main.
- Clearwater reservoir.

The existing works is estimated to have a design capacity of between 2 and 3Ml/day and therefore requires a substantial capacity upgrade to be able to cater for the projected water demands for the Bergville WSS.

## Population vs Water Demands

The population estimates for this project are based on the Statistics South Africa information obtained from the 2011 census. A growth rate of 0.5% has been applied to the base

population figures for the areas falling within the project footprint in order to determine the future projected design population. This is presented in Table 1 below.

**Table 1: Projected population figures for Bergville WSS**

Scheme	Projected Population Figures			
	2011	2020	2030	2040
Bergville WSS	23 613	24 697	25 960	27 288

The water demands for the Bergville WSS have been based on the average demands per capita and the projected population figures. The summer daily demands for the Bergville WSS are shown in Table 2 below.

**Table 2: Projected summer daily demands for Bergville WSS**

Scheme	Summer Daily Demands (Mℓ/day)			
	2011	2020	2030	2040
Bergville WSS	8.48	8.71	8.98	9.27

The various components of the existing works are described in further detail below.

### 1.3.1 Raw Water Pump Station

The raw water pump station currently houses three Gorman-Rupp T6A3S-B self-priming centrifugal pumps. The three pumps draw water directly from the Tugela River through a common steel manifold. Two of the pumps run simultaneously with the third serving as a backup pump.

The three pumps are controlled via a float switch installed in the clearwater reservoir. Pumps 1 and 2 are equipped with 18.5kW motors whilst Pump 3 is equipped with a 22kW motor. The existing pumps are not operating on curve and do not have sufficient capacity to meet the projected water demands of the Bergville WSS. The three pumps therefore need to be upgraded.

Further problems noted at the raw water pump station include:

- Flooding of the pump station by the Tugela River.
- Stormwater management measures around the pump station are required as the existing access road channels any stormflow directly towards the pump station entrance.
- The access road to the pump station has a very steep gradient and is in a poor condition.



- The sump pump in the pump station does not appear to be working as the pump station floor floods. Furthermore, the delivery pipe from the sump pump currently runs out of the pump station window.

Figure 1 below shows an external view of the raw water pump station. Figure 2 below shows the current pump/ pipework arrangement within the raw water pump station.



**Figure 1: External view of raw water pump station**



**Figure 2: Raw water pump station pumps and pipework**

### 1.3.2 Raw Water Rising Main

The existing raw water rising main is a 200mm diameter pipeline with an approximate length of 178m. The integrity of the existing pipeline is unknown but according to the works operators, it does not generally present any problems. The existing pipeline has however been assessed from a hydraulic perspective to determine whether or not it has sufficient capacity

to cater for the future projected water demands of the Bergville WSS. From the hydraulic calculations, the following has been identified:

- The velocity in the existing pipeline greatly exceeds the recommended 1.5m/s.
- Head loss in the pipeline is excessive and the pipeline would therefore not be operating efficiently at this flow.

The existing raw water rising main has insufficient capacity to cater for the projected future water demands of the Bergville WSS and therefore requires upgrading.

### 1.3.3 Header Tank, Grit Channels and Flocculation Channel

The raw water rising main discharges into the header tank at the head of the works. The header tank has three separate outlet weirs which allow flow into the three grit chambers/channels. Only one of the grit channels are usually utilised, however, sometimes two grit channels are used simultaneously when the turbidity of the raw water is high. There is therefore still spare capacity available within the header tank and grit channels. The header tank is shown in Figure 3 while a view of the three grit channels is depicted in Figure 4.



**Figure 3: Header tank**



**Figure 4: Grit channels**

A dosing room alongside the header tank houses the dosing tanks and dosing pumps. Coagulant is dosed at the head of the flocculation channel. The upper section of the flocculation channel is sloped with closely spaced baffles to ensure rapid mixing of the coagulant as depicted in Figure 5. Figure 6 assist in demonstrating the lower section of the flocculation channel has a much flatter gradient to slow down the water flow and promote the flocculation process.



**Figure 5: Upper (sloped) section of flocculation channel**



**Figure 6: Lower section of flocculation channel**

#### 1.3.4 Sedimentation Tanks

Currently, sedimentation is carried out within the two existing circular sedimentation tanks that are fed from the flocculation channel depicted in Figure 7. Each clarifier has a diameter of 7.4m and an approximate depth of 3.2m. Assuming an upward flow of 1.5m/h, each tank can potentially accommodate a flow of approximately 1.4Ml/day (assuming 22 hours of operation).



**Figure 7: Circular sedimentation tanks**

The settled water enters a network of launder pipes installed approximately 500mm below water level (refer to Figure 8) and is then discharged into an outlet chamber before gravitating to the auto-backwash filters. Sludge/ overflow water from the sedimentation tanks gravitates to sludge drying beds. Please refer to section 1.3.6 which provided more details on the sludge drying beds.



**Figure 8: Launder pipes installed within clarifier**

### 1.3.5 Filters

Filtration at the works is carried out by two auto-backwash circular rapid gravity sand filters. The filters have an overall height of 4m and a diameter of 3.41m. Using a filtration rate of 7m/hr, each filter has a filtration capacity of approximately 1.47Ml/day (assuming 22 hours of operation). The filters backwash automatically when the filter operational head reaches its maximum operating level. Refer to Figure 9



**Figure 9: Auto-backwash gravity filters**

The filters are said to work well and generally produce good quality water. The auto-backwash filters require no electrical power and minimal operator input to operate which is seen as a significant advantage of this particular technology. Furthermore, the uTDM have advised that the auto-backwash technology is the preferred technology for the upgrading of the Bergville WTW.

#### 1.3.6 Sludge Drying Beds

Overflow/ sludge from the sedimentation tanks and backwash water from the filters gravitate to two sludge drying beds which are used alternately. The sludge should then be dried and either buried or disposed of. However, the sludge drying beds appear highly silted up and have a significant amount of vegetation growing in them. It therefore does not appear that any sludge has been removed from these beds in some time.



**Figure 10: Sludge drying bed**

### 1.3.7 Chlorination System

The existing disinfection system comprises a gas chlorination system through which chlorine solution is proportionally dosed into the clearwater reservoir. However, the chlorination system is currently not working and a chlorine solution is currently being dosed manually into the reservoir. Engineering inspection of the existing chlorine dosing facilities suggests that they do not meet current health and safety requirements and the entire chlorination system therefore should be upgraded. The proposed upgrade includes new housing facilities for the chlorine gas dosing equipment with the requisite health and safety measures, such as the provision of safety and warning systems for working with chlorine, incorporated into the system.

### 1.3.8 Clearwater Reservoir

Treated water from the filters flow under gravity to a reinforced concrete clearwater reservoir with an estimated capacity of approximately 500kl. Refer to Figure 11 The clearwater reservoir provides buffer storage for the clearwater pumps and is sufficiently sized for the works.



**Figure 11: Clearwater reservoir**

### 1.3.9 Clearwater Pump Station

The clearwater pump station currently houses two KSB ETA 80-250 self-priming centrifugal pumps. The two pumps draw water directly from the clearwater reservoir through separate suction pipes. The pumps function as duty and standby and at this stage cannot be run simultaneously. The two pumps are controlled via a float switch installed in one of the bulk reservoirs located at the Bergville town reservoir site.

Both pumps are equipped with 55kW motors. According to the pump curve and an approximate total head of 72m from the pressure gauge in the pump station, one pump is capable of providing approximately 47l/s of flow (approximately 4ML/day assuming 24 pumping hours). Previous flow measurements undertaken at the works revealed that the pumps were producing similar flows to this. The pumps therefore seem to be operating well. However, even if both pumps were able to run simultaneously, they would only be able to produce 8ML/day of flow and therefore do not have sufficient capacity to meet the projected water demands of 8.71 ML/day for the Bergville WSS. This scenario would also not allow for any backup as both pumps will be required to operate simultaneously. The pumps within the clearwater pump station therefore need to be upgraded.

Figure 12 depicts an external view of the clearwater pump station. Figure 13 depicts the current pump/ pipework arrangement within the clearwater pump station.



**Figure 12: External view of clearwater pump station**





**Figure 13: Clearwater pump station pumps and pipework**

#### 1.3.10 Clearwater Rising Main

The existing clearwater rising main is a 200mm diameter pipeline with an approximate length of 1134m. The integrity of the existing pipeline is said to be poor with regular shut-downs experienced. The existing pipeline has however been assessed from a hydraulic perspective to determine whether or not it has sufficient capacity to cater for the future projected water demands of the Bergville WSS. From the hydraulic calculations, the following has been identified:

- The velocity in the existing pipeline greatly exceeds the recommended 1.5m/s.
- Head loss in the pipeline is excessive and the pipeline would therefore not be operating efficiently at this flow.

The existing clearwater rising main has insufficient capacity to cater for the projected future water demands of the Bergville WSS and therefore requires upgrading.

#### 1.3.11 Existing Package Treatment Plant

An existing package treatment plant with a capacity of 1Ml/day was installed at the works in 2011. The plant is supplied from the outlet of the flocculation channel and utilises a clarifier and a bank of pressure filters for the treatment process. However, the plant has not been in use for some time. Furthermore, the uTDM have since requested that this plant be decommissioned as they have no intention of utilising it further at the Bergville WTW. Refer to Figure 14 below.



**Figure 14: Existing package treatment plant**

### 1.3.12 Treatment Works Buildings

The existing treatment works building at the Bergville WTW (refer to Figure 15) consists of a control room, a bathroom, a storage room, two other small rooms that are currently used for accommodation and a chlorine cylinder storage area.



**Figure 15: Existing treatment works building**

Further to what is described above, a separate building, located alongside the existing treatment works building, is currently being upgraded and will become the office of the uTDM's Okhahlamba Area Engineer. A separate fabricated steel structure is also currently utilised for chlorine storage.

It is noted that the works does not have the following essential facilities:

- A separate laboratory for carrying out water quality testing.

- A storeroom for spares materials, equipment and tools. Spare pipelines, valves and fittings are strewn around the site and are uncovered and therefore at risk of damage from the elements.
- A workshop where repairs could be carried out.

It is also noted that there are a number of old disused concrete structures present at the works. Many of these structures are deep and unprotected and thus pose a significant health and safety risk. Therefore, these disused structures should preferably be demolished and the rubble either removed from site or used as backfill material, or where practicable, the disused structures should be converted into additional working or storage spaces.

### 1.3.13 Access Roads

A gravel road provides access to the works and is in a relatively poor state and requires upgrading. This falls outside the scope of the BA.

Internal access roads within the Bergville WTW are gravelled although many are in a poor state and require upgrading. The access road to the raw water pump station is in particularly poor condition and requires significant upgrading to enable vehicular access to this pump station. Refer to Figure 16 below.



**Figure 16: Access road to raw water pump station is in a state of disrepair**

There was also evidence of ponding in the parking area alongside the clearwater reservoir which would indicate that additional stormwater management interventions are required in this area as indicated in Figure 11.

### 1.3.14 Electrical Supply and Lighting

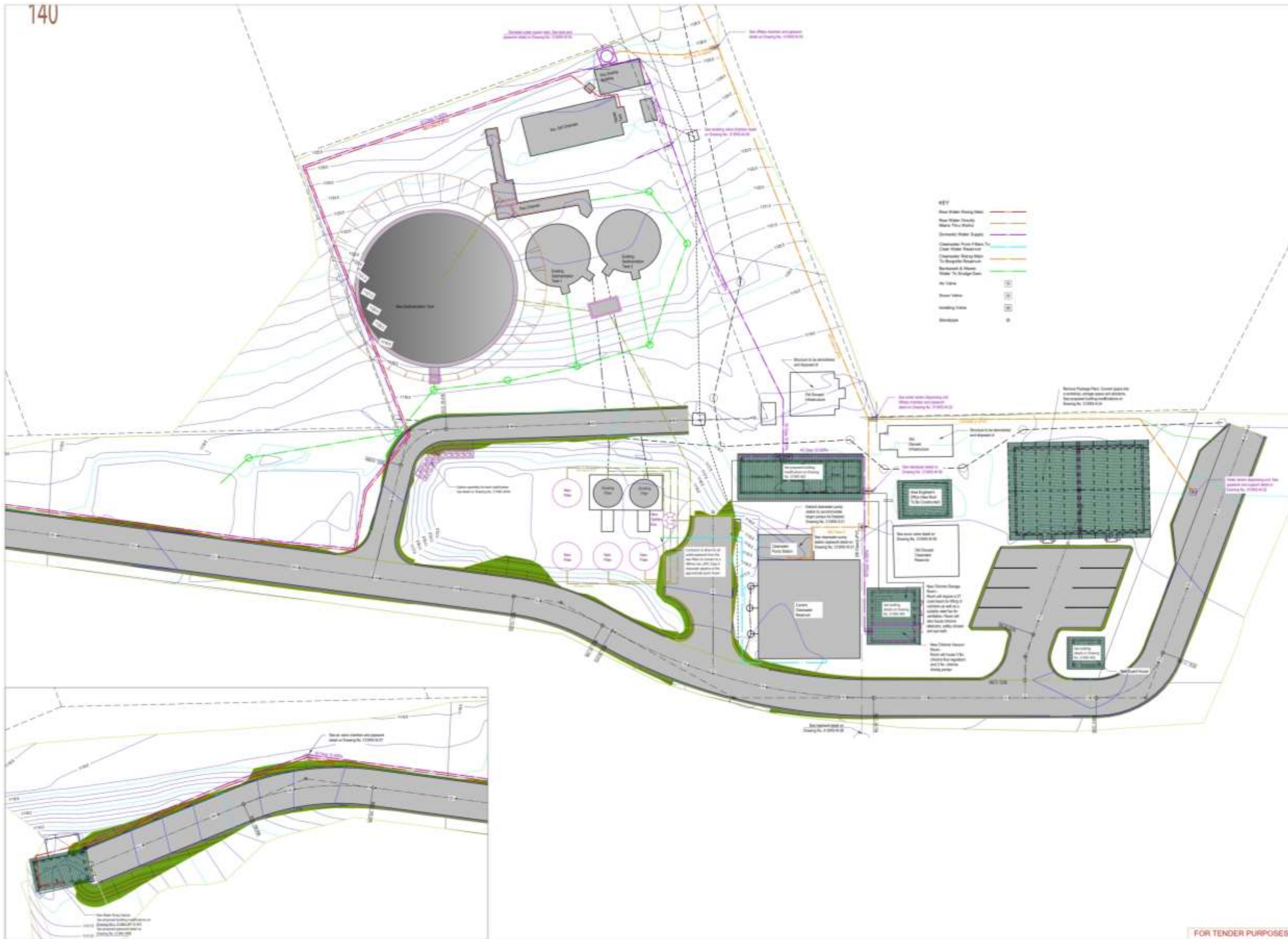
There is some floodlighting present at the existing works but it does not appear to provide adequate illumination at night. The incoming bulk power supply to the works is more than sufficient to cater for the power requirements of the existing infrastructure.

#### 1.3.15 Fencing

The existing works is enclosed by a 1.8m high weld mesh fence with concrete posts and a layer of razor wire along the top. Sections of the fence are in a fair condition but a number of the concrete fence posts are damaged.

### **1.4 Project Description for Proposed Upgrade of the Bergville WWTW**

The bulk infrastructure components providing supply to or forming part of the design of the WTW are described in the section above. The required upgrades to each of these components to cater for the projected future water demands of the Bergville WSS (up to a capacity of 9Ml/day) is described in detailed in the following sections. Note that these sections should be read in conjunction with the layout and site photographs attached as Appendix



**GENERAL NOTES**

1. The Engineer shall be responsible for the design and construction of the works shown on this plan.
2. The Contractor shall be responsible for the construction of the works shown on this plan.
3. The Contractor shall be responsible for the safety of the works shown on this plan.
4. The Contractor shall be responsible for the quality of the works shown on this plan.
5. The Contractor shall be responsible for the completion of the works shown on this plan.

**REFERENCE DRAWINGS**

Quantity Book	Ref	1/2024
Bill of Materials	Ref	1/2024
Contract Docs	Ref	1/2024

**imponce**  
CONSULTING ENGINEERS

**HN CONSULTING ENGINEERS**  
BLOK & HILTON OFFICE PARK  
77 KILBURN DRIVE  
HIGHTOWN, DUNELM  
TEL: 01323 84 2250 FAX: 01323 84 2255

**UTHUKELA DISTRICT MUNICIPALITY**

**BERGVILLE WATER SUPPLY SCHEME UPGRADE TO EXISTING WATER TREATMENT WORKS**

**WATER TREATMENT WORKS - SITE PLAN**

Scale: 1:1000

DATE: 2024-01-20

DESIGNED BY: JSM

CHECKED BY: CM

FOR TENDER PURPOSES 313WS - C.01 0

Figure 17: Proposed Upgrade Layout

#### 1.4.1 Raw Water Pump Station

The existing raw water pump station requires significant refurbishment and upgrading. This will consist of:

- Replacement of the existing pumps with a set of two duty / standby Gorman Rupp T8 selfpriming pumps fitted with 45kW motors. The new pumps have been designed based on the following specifications:
  - Static head = 14m
  - Total head = 19.2m
  - Design flow (per pump) = 120l/s
- An additional floor is to be constructed above the existing pump station to reduce the likelihood of flooding of the electrical infrastructure. In conjunction with this, all walls of the pump station below the new floor will be waterproofed to reduce the potential of flooding of the pumps.
- The MCC for the new pump sets will be installed on the new upper floor level.
- A new sump pump and pipework will be installed in the existing sump with the sump pump pipework being routed through the pump station wall. The pipework will be fitted with a non-return valve to prevent water flowing through this pipeline into the pump station in the event of the lower section of the pump station becoming inundated during a flood.
- The existing crawl beam will be reinstalled just below the new roof height of the pump station to accommodate the new set of pumps.
- The access road leading to the pump station will be raised to tie into the new upper floor level.
- Stormwater drainage measures will be implemented alongside and across the new access road to prevent runoff from the road from flowing directly into the pump station.
- Erosion control measures will be implemented above and below the access road to the pump station.

#### 1.4.2 Raw Water Rising Main

As indicated above, the existing raw water rising main does not have sufficient capacity to cater for the projected water demands of the Bergville WSS. As provided in Table 3, this pipeline will

therefore be upgraded to a 400mm diameter uPVC rising main (approximately 186m in length).

**Table 3: Details of New Raw Water Rising Main to Bergville WTW**

<b>Pipeline</b>	<b>Design flow (l/s)</b>	<b>Velocity (m/s)</b>	<b>Material</b>	<b>Diameter (mm)</b>	<b>Class (bar)</b>	<b>Length (m)</b>
Raw Water Rising Main	120	1.10	uPVC	400	9	186

#### 1.4.3 Header Tank, Grit Channels and Flocculation Channel

The existing header tank, grit channels and flocculation channel will be used with slight modifications to the existing structures. The header tank and grit channels will be retained without modification.

The flocculation channel will be modified to accommodate the new sedimentation tank. The modifications include the installation of a stainless-steel weir within the lower section of the flocculation channel to separate the flows to the existing sedimentation tanks and the proposed new sedimentation tank. A 400mm diameter pipeline will be constructed from the flocculation channel to feed the new sedimentation tank. All other portions of the existing flocculation channel will be retained without alteration.

#### 1.4.4 Coagulant Dosing, Coagulation and Flocculation

Coagulant dosing presently takes place immediately after the grit removal tanks. The dosing position will be retained however the flocculant dosing equipment will be upgraded to meet the increased water demand.

In the design, the selected coagulant is polyelectrolyte for ease of operation and continuation of the existing system. The upgraded dosing system includes bulk storage tanks, transfer pumps, dosing tanks and dosing pumps. The positive displacement transfer pumps pump polyelectrolyte from the bulk storage tanks to the dosing tanks. The dosing pumps are then fed from the dosing tanks.

The dosing rate will vary from day to day and jar tests should be performed to determine the optimum dosing rate. The equipment specified can handle a wide range of dosing rates. The dosing pumps will be housed in the existing dosing room at the head of the works.

Two polymer transfer pumps (one duty and one standby) will then be utilised to transfer the polyelectrolyte to the two tanks. 200l dosing tanks where it can be diluted if required. The two dosing pumps (one duty and one standby) will pump polyelectrolyte feed solution from the dosing tanks to the dosing point in the header tank.

Design parameters for the polymer transfer pumps are provided in Table 4 below.

**Table 4: Design Parameters for Polymer Transfer Pumps**

Design Parameters	Pumps 1 and 2
Pump Type	Positive displacement
Design Flow (Minimum)	1 l/s
Total Pumping Head Required	10m

Design parameters for the coagulant dosing pumps are provided in Table 5 below.

**Table 5: Design Parameters for Coagulant Dosing Pumps**

Design Parameters	Pumps 1 and 2
Pump Type	Positive displacement
Design Flow Range	1 - 10 l/h

#### 1.4.5 Sedimentation

A single sludge blanket sedimentation tank has been selected in the design for ease of operation and reduced maintenance costs. The sedimentation tank requires no mechanical equipment and is operated entirely under gravity flow. Water is fed into the tank at the top centre and flows down through the flocculation zone of the tank and then up through the sludge blanket and over the circumferential launder. Sludge settles to the bottom of the tank and is hydraulically scoured from the tank when required. De-sludging is required when the sludge blanket rises above a predetermined level in the sedimentation tank.

Design parameters for the sedimentation tank are provided in Table 6 below.

**Table 6: Sedimentation Tank Design Criteria**

Design Parameter	Units	Value
Type of sedimentation tank	Sludge blanket	
No of new tanks	No.	1
Minimum hydraulic retention time	hours	4
Maximum up flow rate	m <sup>3</sup> /h/m <sup>2</sup>	1.25



Launder loading rate	m <sup>3</sup> /m/h	3.77
Desludging by gravity		

The sedimentation tank launder channel discharges into the filter feed pipeline.

#### 1.4.6 Filters

To retain consistency of technology and performance, auto-backwash rapid gravity sand filters have been selected as the most appropriate technology for the upgrade. Auto-backwash filters do not require an external power source and require very little operator intervention. Four additional auto-backwash rapid gravity sand filters have been provided for in the upgrade. The upgraded works will therefore have a total of six auto-backwash filters of similar filtration capacity.

The filters each has dedicated filter feed pipes which are fed from the filter splitter box. The filter splitter box is fed from the filter feed pipeline from the sedimentation tanks. Each filter can be isolated for maintenance and repair when required.

The supply to the two existing filters will be rerouted through the new splitter box for improved control.

Design parameters for the rapid gravity sand filters are provided in Table 7.

**Table 7: Rapid Gravity Sand Filter Design Criteria**

Design Parameter	Units	Value
Type of filter		Rapid gravity sand
No of filters	No.	6
No of Duty Filters	No.	6
Maximum hydraulic capacity of filter	m <sup>3</sup> /m <sup>2</sup> /h	8
Design filtration rate	m <sup>3</sup> /m <sup>2</sup> /h	6.7
Filter media		Silica Sand
Depth of filter media	mm	TBA

Each filter should be backwashed automatically at least once within two days as required. However, more frequent backwashing may be required when the feed water turbidity is high for whatever reason and this shall occur automatically. Furthermore, the system has also been designed to allow for hydraulic scour only which will be triggered automatically when the filter

reaches its maximum operating head. The filter specification also requires a forced backwash ability which means that the filters can be backwashed on demand if the auto backwash is too infrequent.

The backwash water will be discharged onto the sludge drying beds.

In filter mode, the filters discharge water through the filtered water discharge pipe to the filtered water pipeline which in turn discharges into the existing clearwater reservoir.

#### 1.4.7 Sludge Drying Beds

Drying beds are the most widely used method of municipal sludge dewatering. The main advantages of sludge drying beds are as follows:

- Low capital cost
- Low energy consumption
- Low to no chemical consumption
- Low operator skill and attention required
- Less sensitivity to sludge variability
- Higher cake solids content than that of most mechanical methods.

Disadvantages include:

- Large space requirements
- The need for prior sludge stabilization
- Consideration of climatic effects
- Odour potential
- The fact that sludge removal is usually labour intensive.

Sludge drying beds may be classified as either conventional sand, paved, artificial media, and vacuum assisted.

As a result of the increase in capacity of the Bergville WTW infrastructure, additional sludge will be produced. The sediment present within the existing sludge drying beds will be removed and disposed of at an approved location.

#### 1.4.8 Clearwater Reservoir

The existing clearwater reservoir will be utilized as is and will only require minor modifications to the existing inlet and outlet reservoir pipework.

#### 1.4.9 Disinfection

The disinfection process chosen for this works is gas chlorination because of the quantity of chlorine required and the efficiency of the gas chlorination process. Two duty and standby chlorinators and chlorine gas cylinders have been provided in the design. The chlorine will be supplied in 1000kg cylinders. The chlorine will be dosed flow proportionally to maintain a residual chlorine level of 0.5mgCl<sub>2</sub>/l. The small amount of chlorine added to disinfect drinking water in accordance with EPA regulations is safe for consumption.

Chlorine disinfection will take place at the end of the clearwater pipeline where it discharges into the clearwater reservoir.

Facilities provided for the chlorine disinfection include a chlorine storage room, 2 x 1000kg chlorine cylinders, vacuum room and 3 x gas chlorinators.

#### 1.4.10 Clearwater Pump Station

The existing clearwater pump station requires the following upgrading:

- Replacement of the existing pumps with a set of 2 duty/ standby KSB Etanorm 200-150-400 centrifugal pumps fitted with 90kW motors. The new pumps have been designed based on the following specifications:
  - Static head = 49m
  - Total head = 52.3m
  - Design flow (per pump) = 136l/s
- The existing pump station is too narrow to accommodate the new pumps which are considerably larger than the existing pumps. The pump station therefore needs to be widened by 1m to accommodate this. Since the pump station is constructed up against the clearwater reservoir, the expansion of the pump station will be carried out in the direction of the existing treatment works building.
- The MCC for the new pump sets will be installed in the expanded section of the pump station.

#### 1.4.11 Clearwater Rising Main

As indicated above, the existing clearwater rising main does not have sufficient capacity to cater for the projected water demands of the Bergville WSS. This will pipeline will therefore be upgraded to a 400mm diameter uPVC rising main (approximately 870m in length). It is noted that the pipeline will be routed along a different route than the existing pipeline follows which will shorten its required length. Details of the new clearwater pipeline for the Bergville WTW are provided in Table 8 below.

**Table 8: Details of New Clearwater Rising Main to Bergville WTW**

Pipeline	Design flow (l/s)	Velocity (m/s)	Material	Diameter (mm)	Class (bar)	Length (m)
Clearwater Rising Main	136	1.25	uPVC	400	9	870

#### 1.4.12 Treatment Works Buildings

The footprint of the existing treatment works building will remain as is. However, the building will be modified internally to make better use of the available space in order to meet the needs of the treatment works from an operational perspective. The following internal modifications will be carried out under this project:

- The current control room will remain as is but will be refurbished internally. Two corner desks and chairs will be provided to create two separate workspaces for WTW operational staff.
- The existing bathroom footprint will also remain as is but will be refurbished internally.
- The existing storeroom is to be converted into a kitchen. Access to the kitchen will be provided from the existing verandah and the roller door will be bricked up. The kitchen will be internally fitted with counters / cupboards and a double sink.
- The two rooms currently used as accommodation are to be converted into a laboratory. The internal walls are to be removed and the room is to be internally fitted with counters/ cupboards, shelves and a double sink. The chlorine tank storage area is to be relocated and bricked up such that this space is incorporated into the laboratory.

In addition to the above, the existing package treatment plant, that is currently installed within one of the old disused slow sand filters, will be dismantled and relocated to a suitable location. The existing space occupied by the two slow sand filters will be converted into a workshop and

a storage area by raising the existing walls, creating access from the south facing walls and erecting a steel roof structure.

Furthermore, the following new buildings will also be constructed:

- A chlorine building that will be constructed alongside the existing clearwater reservoir. The building will be split into a chlorine storage room that will house the chlorine gas cylinders, chlorine detectors, a safety shower etc. as well as a chlorine vacuum room that will house the chlorine flow regulators and dosing pumps.
- A guard house will be constructed at the entrance to the Bergville WTW and will be furnished with a desk, chair and filing cabinet.

#### 1.4.13 Water Supply to Water Tanker Dispensing Unit

A domestic water supply to the water tanker dispensing unit is to be provided directly from the clearwater rising main. An off-take from the rising main is to be provided as well. The off-take to the water tanker dispensing unit will be metered.

A new dispensing unit will be installed at the same location as the existing unit and will be supplied by a 110mm uPVC pipeline fed from the off-take chamber on the clearwater rising main. The dispensing unit will be controlled by an isolating valve located inside the fenceline of the Bergville WTW.

#### 1.4.14 Domestic Water Supply

A domestic water supply to the treatment works buildings, raw water pump station and new chlorine building is to be provided directly from the clearwater rising main. An off-take from the rising main is to be provided as well. The off-take to the domestic water supply for the treatment works buildings will be metered. The off-take from the rising main will supply a plastic storage tank located at the top of the works behind the flocculation dosing building.

Water will gravitate from the plastic storage tank to the various supply points within the WTW. Provision has also been made for the installation of standpipes at certain locations around the WTW to assist with operation and maintenance practices.

#### 1.4.15 Access Roads

The access roads around the Bergville WTW will require significant upgrading. The following upgrades are to be carried out to the existing access roads within the site:

- Upgrading of existing road subbase, base and surface. Interlocking brick pavers will be utilised for the road surface.
- A new paved parking area for light delivery vehicles will be created.
- The turning area for water tankers outside the works will be upgraded and paved.

#### 1.4.16 Telemetry System

A telemetry and SCADA system will be installed at the works to control the raw water and clearwater pump stations and reservoirs (including the reservoirs located at the Bergville bulk reservoir site).

#### 1.4.17 Electrical Supply and Lighting

The treatment works has sufficient bulk power to provide for the upgraded raw and Clearwater pump stations. External and internal lighting across the entire works will also be upgraded.

### 1.5 Water Treatment Works Specifications

Table 9 below provides a summary of the WTW Specifications.

**Table 9: Water Treatment Works Specifications**

<b>Design Parameters</b>	<b>Specifications</b>
<b>Water Treatment Works</b>	
Gross Treatment Capacity	10.35 MI/day
Net Treatment Capacity	9 MI/day
Raw Water Source	Surface water abstracted from Tugela River
<b>Design of Sedimentation Tank</b>	
Type of Sedimentation Tank	Sludge blanket
No. of Existing Tanks	2
No. of New Tanks	1
Minimum Hydraulic Retention Time	4 hours
Maximum Upward Velocity	1.25 m <sup>3</sup> /m <sup>2</sup> /h
Launder Loading Rate	3.77 m <sup>3</sup> /m/h
Settled Water Quality	< 20 NTU

<b>Design of Auto-Backwash Rapid Gravity Filters</b>	
Type of Filter	Auto-backwash rapid gravity sand
No of Filters (Existing)	2 No.
No of Filters (Upgrade)	4 No.
No of Duty Filters	6 No.
Maximum Hydraulic Filtration Rate	6.7 m <sup>3</sup> /m <sup>2</sup> /h
Design Filtration Rate	6.7 m <sup>3</sup> /m <sup>2</sup> /h
Filtered Water Quality	< 1 NTU
Filter Media	Silica Sand
Depth of Filter Media	> 1000 mm
<b>Disinfection</b>	
Method of Disinfection	Gas Chlorination
Chlorine Residual	0.5 mg Cl <sub>2</sub> /m <sup>3</sup>
<b>Bulk Pipelines</b>	
Maximum Allowable Pipeline Velocity	1.5m/s
Min. Pipeline Pressure Rating	9 bar

### 1.6 Development footprint

In terms of development footprint, the dimensions of the proposed upgrades are as follows.

- Clearwater Pipeline Length (WTW to Command Reservoir) = 720.99m
- Raw Water Pipeline Length (Abstraction to WTW) = 158.70m
- WTW area 1 Existing = 607.94m<sup>2</sup>
- WTW area 2 Upgrade = 1322.28m<sup>2</sup>
- Command Reservoir area = 3449.43m<sup>2</sup>

The total development footprint is 5370m<sup>2</sup>.

### 1.7 Locality

The town of Bergville is located in the north-western section of the KwaZulu-Natal province. Bergville Town is located 22km west of Winterton Town, about 93km north-west of Moor River, approximately 53km west of Ladysmith, approximately 150km north-west of Pietermaritzburg and approximately 350km south south-east of Johannesburg. The Bergville Water Supply Scheme (WSS) provides water to Bergville town as well as to various rural communities in the

surrounding area. The scheme falls under the jurisdiction of the uThukela District Municipality (uTDM) who are the Water Services Authority for the area. The proposed upgrade project falls within ward 11 of the Okhahlamba Local Municipality. Refer to Figure 18 below which depicts the broader locality of where the proposed development is situated.

The Bergville WTW is located behind Ridge Road and adjacent to the Tugela River from which it feeds from via an abstraction pipeline. The command reservoir is located on an unnamed road off Kingsway Raod. The proposed upgraded pipeline route will start at the Bergville WTW, moving north crossing over Ridge Road and then in a westerly direction, crossing a wetland area until it reaches the command reservoir. Refer to Figure 19 below for the Google Earth image which depicts the locality of the proposed development scope of works.

The coordinates are outlined in Table 10 below as follows:

**Table 10: Coordinates**

<b>Activity</b>	<b>Coordinates</b>
Abstraction Point	28°44'12.22"S; 29°20'53.62"E
Bergville WTW	28°44'10.96"S; 29°20'57.57"E
Clear water pipeline (Start)	28°44'10.43"S; 29°20'58.30"E
Clear water pipeline (Turning Point 1)	28°44'07.51"S; 29°20'57.19"E
Clear water pipeline (Turning Point 2)	28°44'05.21"S; 29°20'53.06"E
Clear water pipeline (Turning Point 3)	28°44'05.62"S; 29°20'48.66"E
Clear water pipeline (Turning Point 4)	28°44'05.34"S; 29°20'46.06"E
Clear water pipeline (End)	28°44'03.09"S; 29°20'37.29"E
Command Reservoir	28°44'02.49"S; 29°20'36.44"E

The affected properties are listed in Table 11 below along with the SG Codes for each property.

**Table 11: Property Details**

<b>Land Description</b>	<b>SG CODE</b>
Erf 140	N0GS0022000001400000
Portion 2 of Erf 139	N0GS0022000001390002
Portion 1 of Erf 356	N0GS0022000003560001
Rem. of Erf 356	N0GS0022000003560000
Portion 67 of the Farm Kleine Waterval 1227	N0GS00000000122700067
Portion 1 of Erf 356	N0GS00220000035600013
Portion 0 of Kleine Waterwal 1227	N0GS00000000122700000



Refer to **Appendix A** for the locality maps.

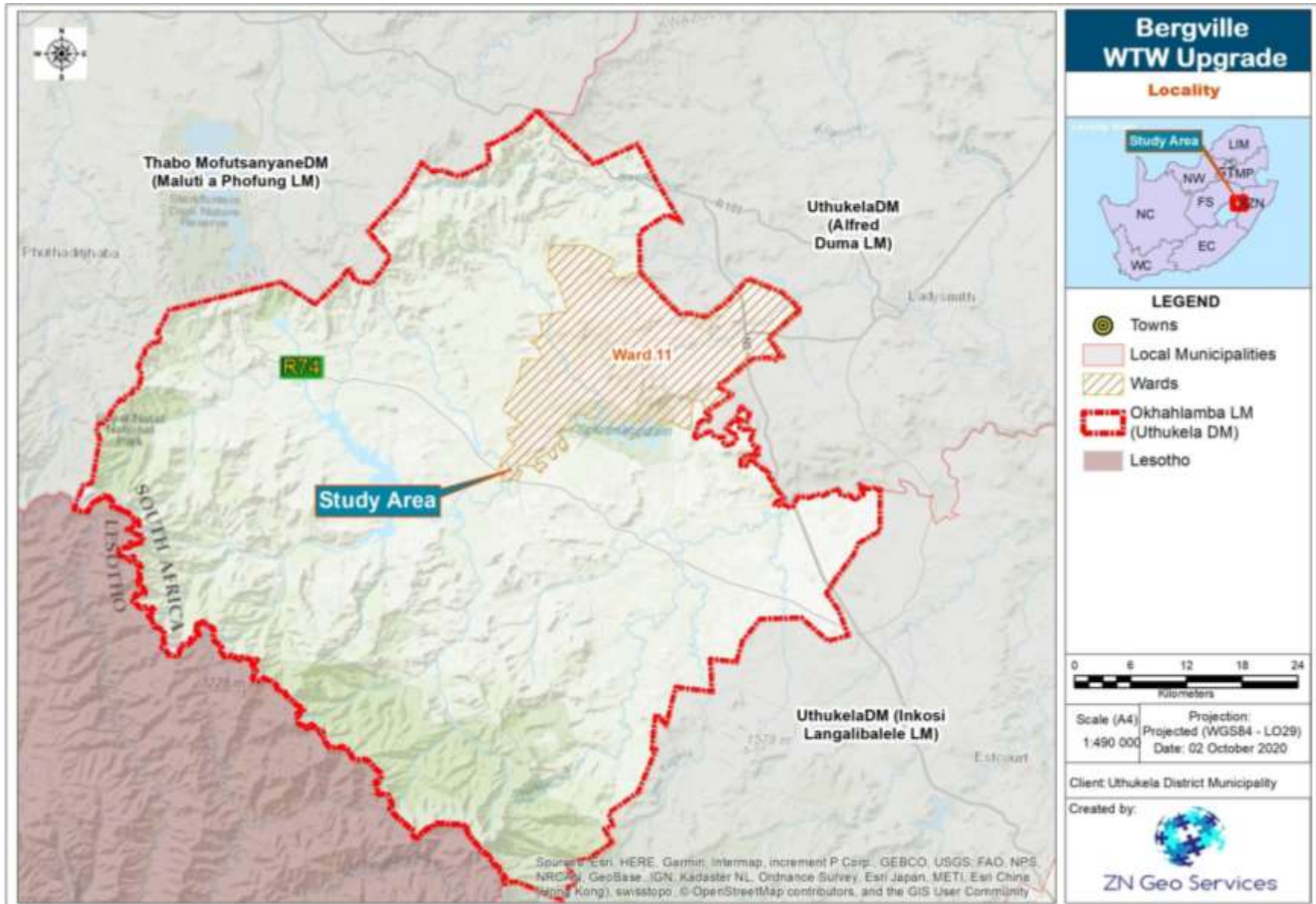


Figure 18: Broader Locality Map

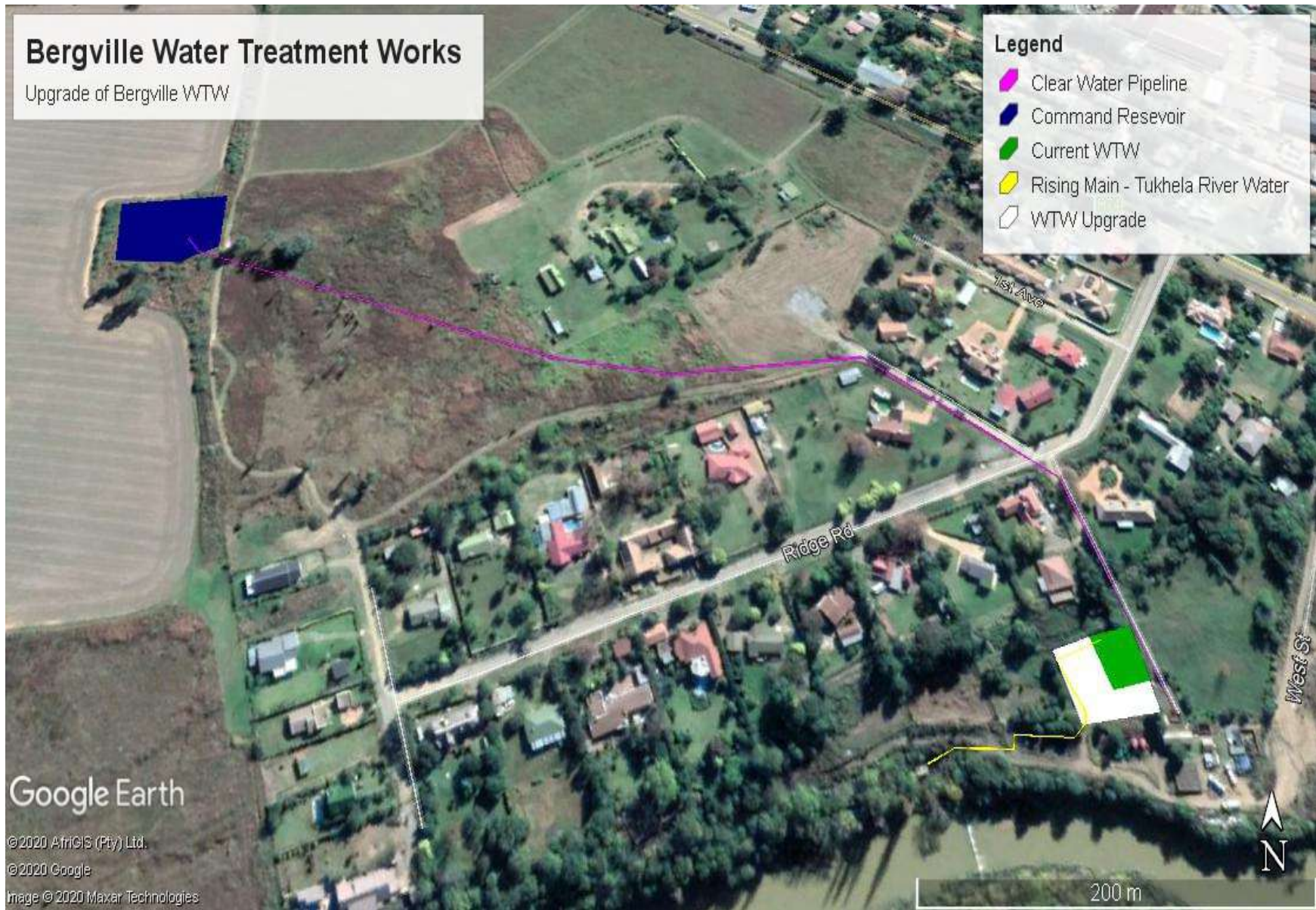


Figure 19: Google Earth Locality Map

### **1.8 Need and Desirability**

On 28 July 2010, through Resolution 64/292, the United Nations General Assembly explicitly recognized the human right to water and sanitation and acknowledged that clean drinking water and sanitation are essential to the realisation of all human rights.

The primary objective of this project is to improve and increase the water supply capacity as the existing infrastructure fails to deliver sufficient water to the community; from 2.6 mega litres to 10 mega litres per day. The summer water daily demands in the Bergville Water Supply Scheme (WSS) area has increased from 8.48 mega litres in 2011 to 8.71 mega litres in 2020 as a result of the increase in population. A further increase is expected in population over the next 20 years and subsequently, the demand for water within the WSS area will increase as well. The proposed upgrade seeks to fill the gap in terms of water supply in the area. The entire Bergville community will benefit from this project once implemented.

## 2. Legislative Framework

All legislation, policies and/or guidelines of any sphere of government that are applicable to the application as contemplated in the EIA Regulations are discussed below.

### 2.1 Applicable Listed Activities for Basic Assessment Process

In terms of sections 24(2) and 24D of the National Environmental Management Act (Act No. 107 of 1998), as read with the Environmental Impact Assessment (EIA) Regulations of GNR 982 to R985 (as amended by 07 April 2017 (GNR 326)), a Basic Assessment process is required for the proposed project. Table 2 below contains the listed activities in terms of the EIA Regulations and includes a description of those project activities which relate to the applicable listed activities.

**Table 12: Applicable Listed Activities to be authorized**

Listed activities	Description of project activity that triggers listed activity
<p><b>Listing Notice 1, Activity 9</b></p> <p>The development of infrastructure exceeding 1 000 metres in length for the bulk transportation of water or storm water—</p> <p>(i) with an internal diameter of 0,36 metres or more; or</p> <p>(ii) with a peak throughput of 120 litres per second or more.</p>	<p>The proposed project entails the development of a pipeline for the bulk transportation of water and the upgrade of the existing Bergville WTW infrastructure. This pipeline will be upgraded to a 400mm diameter uPVC rising main (approximately 870m in length). The output of the proposed upgrade is 10 mega litres per day.</p>
<p><b>Listing Notice 1, Activity 12</b></p> <p>The development of—</p> <p>(vi) bulk storm water outlet structures exceeding 100 square metres in size;</p> <p>(xii) infrastructure or structures with a physical footprint of 100 square metres or more</p> <p>where such development occurs—</p> <p>(a) within a watercourse;</p>	<p>The proposed project entails the development of a pipeline for the bulk transportation of water and the upgrade of the existing Bergville WTW infrastructure. The total development footprint is 5370m<sup>2</sup>. The proposed Clearwater pipeline is to cross through sections of wetland areas.</p>

<p>(b) in front of a development setback; or  (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.</p>	
<p><b>Listing Notice 1, Activity 19</b></p> <p>The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from –</p> <p>(i) a watercourse.</p>	<p>The proposed project will result in infilling and depositing of more than 10m<sup>3</sup> into a watercourse. In addition the excavation and removal of soil materials of more than 10 m<sup>3</sup> from a watercourse will take place during the construction of the pipeline.</p>

The above listed activities have triggered a Basic Assessment Process, these activities may not commence without an environmental authorization from the competent Authority. The aim of the Environmental Impact Assessment is to ensure that:

- The potential environmental impacts and risks associated with the proposed project are taken into consideration;
- Public Participation Process is conducted in line with EIA Regulations (i.e. to afford any Interested and or Affected parties (I&AP) sufficient opportunity to provide comments); and
- Sufficient information is provided to decision makers in order to ensure an informed decision making.

The nature and extent of the proposed project are explored in more detail in this Basic Assessment Report. This report has been compiled in accordance with the requirements of the EIA Regulations of 2014 and includes details of the activity description; the site, area and property description; the public participation process; the impact assessment; and the recommendations of the Environmental Assessment Practitioner.

### 2.2 Legislation and Guidelines that have informed the preparation of this EIA Report

Several other Acts, standards or guidelines have also informed the project process and the scope of issues assessed in this report. A listing of relevant legislation is provided in Table 13 below, where the level of applicability of the legislation or policy to the activity/project is detailed.

**Table 13: Applicable Legislation, Policies and/or Guidelines**

Title of legislation, policy or guideline (Promulgation Date)	Applicable Requirements	Administering Authority	Description of compliance
<p>National Environmental Management Act (Act No. 107 of 1998)</p>	<p>NEMA requires, inter alia, that:</p> <ul style="list-style-type: none"> <li>○ Development must be socially, environmentally, and economically sustainable.</li> <li>○ Disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied.</li> <li>○ A risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions.</li> </ul> <p>EIA Regulations have been promulgated in terms of Chapter 5. Activities which may not commence without an environmental authorisation are identified within these Regulations.</p> <p>In terms of S24(1) of NEMA, the potential impact on the environment associated with these listed activities must be considered, investigated, assessed and reported on to the competent authority charged by NEMA with granting of the relevant environmental authorisation.</p>	<p>National Department of Environment, Forestry and Fisheries (DEFF)</p> <p>KZN Department of Economic Development, Tourism and Environmental Affairs (EDTEA)</p>	<p>The Basic Assessment is undertaken in accordance with the requirements of Government Notice R326 of April 2017, as required in terms of the National Environmental Management, 1998 (Act No. 107 of 1998)</p>

Title of legislation, policy or guideline (Promulgation Date)	Applicable Requirements	Administering Authority	Description of compliance
<p>National Environmental Management Act (Act No. 107 of 1998)</p>	<p>A project proponent is required to consider a project holistically and to consider the cumulative effect of potential impacts.</p> <p>In terms of the Duty of Care provision in S28(1) the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to ensure that any pollution or degradation of the environment associated with a project is avoided, stopped or minimised.</p>	<p>National Department of Environment, Forestry and Fisheries (DEFF)</p> <p>KZN Department of Economic Development, Tourism and Environmental Affairs (EDTEA)</p>	<p>While no permitting or licensing requirements arise directly, the holistic consideration of the potential impacts of the proposed project has found application in the impact assessment phase.</p> <p>The implementation of mitigation measures is included as part of the Project EMPr and will continue to apply throughout the life cycle of the project.</p>
<p>National Water Act (Act No. 36 of 1998)</p>	<p>Section 21 water uses as per the NWA includes:</p> <p>21(a): Taking water from a water resource;</p> <p>21(b): Storing water;</p> <p>21(c): Impeding or diverting the flow of water in a watercourse;</p> <p>21(d): Engaging in a stream flow reduction activity;</p> <p>21(e): Engaging in a controlled activity;</p> <p>21(f): Discharging waste or water containing waste into a water resource through a pipe, canal, sewer or other conduit;</p> <p>21(g): Disposing of waste in a manner which may detrimentally impact on a water resource;</p> <p>21(h): Disposing in any manner of water which contains waste from, or which has been heated in any industrial or power generation process;</p>	<p>Department of Human Settlements and Water and Sanitation (DHSWS)</p>	<p>The proposed development requires a Water Use License as Section 21 a, c and i of the NWA are triggered as a result of the proximity to the wetland area. A Water Use License Application is currently being uploaded onto the DWS eWULAAS portal.</p>



Title of legislation, policy or guideline (Promulgation Date)	Applicable Requirements	Administering Authority	Description of compliance
	<p>21(i): Altering the bed, banks, course or characteristics of a watercourse;</p> <p>21(j): Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and</p> <p>21(k): Using water for recreational purposes.</p> <p>For wetland areas, development within a 500m buffer triggers the act. For rivers, development within a 100m buffer triggers the act. Any activity that triggers any of the above water uses will require a Water Use License.</p> <p>Given the sensitivity associated with a project, DWS will determine whether the project will follow a General Authorisation process or a Water Use License Application process.</p>		
<p>National Environmental Management: Biodiversity Act 2004 (Act No. 10 of 2004)</p>	<p>This Act provides management and conservation of South Africa’s biodiversity within the framework of the National Environmental Management Act (Act No. 107 of 1998); the protection of species and ecosystems that warrant national protection and the sustainable use of indigenous biological resources.</p>	<p>National Department of Environment, Forestry and Fisheries (DEFF)</p>	<p>While no permitting or licensing requirements arise from this legislation, this Act will find application during the construction phase of the project in proper management of the sensitive area (wetland) identified on site.</p>
<p>National Environmental Management: Waste Act (Act No. 59 of 2008)</p>	<p>The NEMA: WA came into effect on the on 1<sup>st</sup> July 2009. Section 20 of the Environment Conservation Act (Act No. 73 of 1989), under which waste management was previously governed, was repealed. In general, the act seeks to ensure</p>	<p>National Department of Environment, Forestry and Fisheries (DEFF)</p>	<p>No waste license activities are applicable to this project. The developer will however be required to store and manage waste in accordance with the</p>

Title of legislation, policy or guideline (Promulgation Date)	Applicable Requirements	Administering Authority	Description of compliance
	<p>that people are aware of the impact of waste on their health wellbeing and the environment, and in the process giving effect to Section 24 of the constitution, in ensuring an environment that is not harmful to health and wellbeing.</p>	<p>National Department of Environment, Forestry and Fisheries (DEFF) – lead authority for regulating hazardous waste.</p> <p>KZN Department of Economic Development, Tourism and Environmental Affairs (EDTEA) – for regulating general waste</p>	<p>requirements of this Act and associated Standards.</p>
<p>National Environmental Management: Air Quality Act (Act No. 39 of 2004)</p>	<p>Section 18, 19 and 20 of the Act allow certain areas to be declared and managed as “priority areas”.</p> <p>The Act provides that an air quality officer may require any person to submit an atmospheric impact report if there is reasonable suspicion that the person has failed to comply with the Act.</p> <p>Dust Control Regulation Control Regulations, R. No. 827 of 1 November 2013.</p>	<p>National Department of Environment, Forestry and Fisheries (DEFF)</p>	<p>While no permitting or licensing requirements arise from this legislation for the site, this Act will find application during the construction phase of the project.</p> <p>The implementation of dust mitigation measures are included as part of the project EMPr and will continue to apply throughout the life cycle of the project.</p> <p>Dust control regulations promulgated in November 2013 may require the implementation of a dust management plan.</p>

Title of legislation, policy or guideline (Promulgation Date)	Applicable Requirements	Administering Authority	Description of compliance
National Heritage Resource Act, 1999 (Act No. 25 of 1999)	<p>Section 38 states that Heritage Impact Assessments (HIAs) are required for certain kinds of development including the construction of a road, exceeding 300m in length.</p> <p>In accordance with the NHRA, an independent heritage consultant is to conduct a cultural heritage assessment to determine any impact on any sites, features or objects of cultural heritage significance. If none are identified, any archaeological sites or graves to be exposed during construction work must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.</p> <p>If a permit is required as per section 34 of the NHRA, no works are to commence before the permit is obtained.</p>	<p>South African Heritage Resources Association (SAHRA)</p> <p>Provincial Heritage Resource Agency (KZN – Amafa)</p>	<p>Should any heritage sites be unearthed during excavations, a permit would be required to be obtained from SAHRA/ Amafa.</p>
Promotion of Access to Information Act, 2000 (Act No. 2 of 2000)	<p>Legislation that allows the public access to information about activities that influence their well-being and to make contributions to decision making.</p>	<p>National Department of Environment, Forestry and Fisheries (DEFF)</p>	<p>No permitting is required. The act finds applicability during the public participation process phase of the Basic Assessment process.</p>
Occupational Health and Safety Act (Act No. 85 of 1993)	<p>The Occupational Health and Safety Act provides for the health and safety of persons at work and for the health and safety of persons in connection with the use of plant and machinery; the protection of persons other than persons at work, against hazards to health and safety arising out of or in connection with the activities of persons at work.</p>	<p>Department of Labour</p>	<p>While no permitting or licensing requirements arise from this legislation, this Act will find application during the construction phase of the project. Health and safety precautions measures must be put in place for the construction crew</p>

Title of legislation, policy or guideline (Promulgation Date)	Applicable Requirements	Administering Authority	Description of compliance
			and the general public. E.g. Protection of workers on site through provision of Personal Protective Equipment's; Training and other health and safety amenities.
<p><b>Other:</b></p> <ul style="list-style-type: none"> <li>➤ <b>National Development Plan – Vision 2030</b></li> </ul> <p>The National Planning Commission has developed the National Development Plan – Vision 2030 which focuses on enabling sustainable and inclusive development. Ten priority areas have been identified in the programme of action with the intention of turning around global economic slowdown, whilst also ensuring that the needs of all citizens are met. The ninth priority area is to ensure sustainable resource management and use; water.</p> <ul style="list-style-type: none"> <li>➤ <b>National Water Resource Strategy (2012)</b></li> </ul> <p>The National Water Resource Strategy of 2004 set the blueprint for water resource management in South Africa, and the National Water Resource Strategy of 2012 set out the strategic direction for water resources management.</p> <ul style="list-style-type: none"> <li>➤ <b>Kwazulu-Natal Provincial Growth and Development Strategy (PGDS) (2016)</b></li> </ul> <p>The PGDS strengthens the Province's commitment to achieving the vision of KwaZulu-Natal as a "Prosperous Province with a healthy, secure and skilled population, acting as a gateway to Africa and the world" by 2035. One of the main aims of the PGDS is the continued improvement of the quality of life of all people living in the province. This entails access to basic needs and services.</p> <p><b>In addition, the following must allow be consulted:</b></p> <ul style="list-style-type: none"> <li>➤ National Norms and Standards for Domestic Water and Sanitation Services (2017)</li> <li>➤ uThukela Integrated Development Plan (IDP) (2020/2021)</li> </ul>			

<b>Title of legislation, policy or guideline (Promulgation Date)</b>	<b>Applicable Requirements</b>	<b>Administering Authority</b>	<b>Description of compliance</b>
➤ Okhahlamba Local Municipality IDP (2020/2021)			

### **2.3 Applicable Water Uses for Basic Assessment Process**

As mentioned in the table above, the proposed development requires a Water Use License from the Department of Water and Sanitation (DWS) in terms of National Water Act (Act No. 36 of 1998) for the following specific water uses:

- Section 21 (a): taking water from a water resource;
- Section 21 (c): impeding or diverting the flow of water in a watercourse; and
- Section 21 (i): altering the bed, banks, course or characteristics of a watercourse.

The activity that triggers Section 21 a water use is the abstracting of water from the Tugela River. The activity that triggers Section 21 c and i water uses is the pipeline development that crosses a wetland area.

A Water Use License Application is currently being uploaded onto the DWS electronic Water Use Licence Application and Authorisation System (eWULAAS) portal.

DWS has been listed as an Interested and/ Affected Party/ Stakeholder on the projects database. The DBAR will also be submitted to DWS for the 30 days legislated period for comment. The process is being undertaken by another company.

### 3. Public Participation Process

---

#### 3.1 Aim of the Public Participation Process

The aim of the Public Participation Process is to allow Interested and Affected Parties (I&APs) the opportunity to gain an understanding of the project and consider all facets of the proposed activities. The Public Participation Process will:

- Provide I&APs with information about the proposed Bergville WTW upgrade activities and associated potential impacts;
- Allow I&APs the opportunity to provide input, such as concerns or queries, on the proposed project; and
- Incorporate the input raised by I&APs in the study and ultimate decision-making process.

#### 3.2 The following activities will take place during the public participation process:

- **Identification of Key Stakeholders**

As required by the EIA Regulations of 2014, relevant local, provincial and national authorities, local forums and representatives as well as surrounding land owners and occupants have been notified of the environmental process.

Relevant government authorities (organs of state) have been automatically registered as I&APs. In accordance with the EIA Regulations of 2014, all other persons must request in writing to be placed on the register, submit written comments or attend meetings in order to be registered as stakeholders and included in future communication regarding the project; the advertisement and notifications advise that I&APs register as such. All respondents are then to be placed on the project database. This database is supplemented by I&APs who contacts the project manager to be included on the database. The database is used throughout the process to inform the stakeholders of the project. The stakeholder database will be updated throughout the process.

Table 14 below depicts a summary of I&APs that have been identified for the project. A comprehensive list is attached as **Appendix E1**.

**Table 14: Identified I&APs**

Category	Department / Section	Contact Person
----------	----------------------	----------------

<b>Telkom</b>	Telkom	For Notifications
<b>Biodiversity</b>	EKZN Wildlife - Scientific Technician: IEM Planning Division	Nerissa Pillay
<b>DWS</b>	Licensing	Renelle Pillay
<b>Eskom</b>	Land Development	Michelle Nicol
<b>Regional Department of Economic Development, Tourism and Environmental Affairs</b>	KZNDEDETEA - Uthukela Region	Onwabile Ndzumo
<b>Local Department of Agriculture and Rural Development</b>	KZNDARD	Zamokwakhe Nkosi
<b>Department of Transport</b>	DoT - Regional Chief Director	Thembinkosi Sithomo
<b>Co-operative Governance and Traditional Affairs</b>	Director: Infrastructure Development	Andre Evetts
<b>Local Municipality</b>	Environmental Officer	Xoli Keswa
<b>Ward Councilor</b>	Ward 11 of Okhahlamba Local Municipality	Councilor Sigubudu
<b>KZN Heritage</b>	Impact Assessment Department	Bernadet Pawandiwa
<b>Landowner - abstraction line (Erf 140)</b>	Landowner	Scurr William Granville
<b>Landowner - clear water pipeline (Erf 356)</b>	Landowner	Erin Property Trust (Mr Louis Schmidt)
<b>Landowner - clear water pipeline (Portion 67 of Farm Kleine Waterval 1227)</b>	Landowner	GJ Schmidt Trust (Mr Louis Schmidt)



- **Background Information Document (BID)**

A Background Information Document (BID) will be distributed to I&APs (by-hand and/or via e-mail, or post/fax where necessary) informing stakeholders of the environmental assessment process and WULA being applied for by uTDM and other pertinent information as detailed herewith.

The BID is attached as **Appendix E2**. Proof of distribution will be attached within the FBAR.

- **Newspaper Advertisement**

An advertisement, notifying the public of the availability of the Draft Basic Assessment process and/ or requesting I&APs to register with, and/ or submit their comments to ZN Geo Services (Pty) Ltd will run in the Ladysmith Gazette (local press) on Friday, 13 November 2020.

Refer to **Appendix E3** for newspaper advert wording. Proof of the advert will be attached to the FBAR.

- **Site notices**

Four site notices were erected on site and at visible and accessible locations close to the site as depicted by Figure 20 in order to inform surrounding communities and immediately adjacent landowners of the proposed development and the availability of the DBAR for a 30-day public review period for commenting purposes.

Refer to **Appendix E4** for proof of site notices which also identifies the coordinates where each site notice was placed.



Figure 20: Site Notice Locations

- **Land Claim Enquiry**

A land claims query has been lodged with the Department of Rural Development and Land Reform (DRDLR) which will allow for more engagement with I&APs. Refer to **Appendix E5** for the land claim query letter and proof thereof.

- **SAHRIS Upload**

The project details have also been uploaded onto the SAHRIS portal which will allow for more awareness as well as more I&AP participation. Refer to **Appendix E8** for proof of upload.

- **Direct notification of Landowners and Correspondence**

The identified landowners were directly notified of the proposed development telephonically and followed through with an email along with the BID. The landowners were requested to sign the landowner notification forms. The landowner for both Remainder of ERF 356 (GJ Schmidt Trust) and Portion 67 of Farm Kleine Waterval 1227 (Erin Property Trust) has issued ZN Geo Services (Pty) Ltd (on behalf of uTDM) with a letter stating that it is not practical for uDTM to have a servitude of such a nature running through the middle of properties which are earmarked for future residential development. Both property owners have signed the landowner notification form. uDTM has advised that they have opted for this route as there is an already existing

servitude. To move the line elsewhere would require a new servitude to be registered. Furthermore, there would be impacts on the specialist studies already conducted; this could take some time and there is a need to provide water earnestly.

Refer to **Appendix E6** for the correspondence between the landowners and the EAP and the landowner notification form. Also refer to **Appendix E7** for the Comments and Response Report.

- **Notification Letters**

A notification letter has been prepared for release on Friday, 13 November 2020 along with the release of the DBAR for the 30-day public review period. Refer to **Appendix E9** for the letter. Proof hereof will be included within the FBAR. The notification letter includes a brief introduction to the proposed project, the environmental process as well as the availability of the DBAR for public review. Key stakeholders will be directly notified of the proposed development along with the availability of the DBAR by email/ hand-deliveries.

Attached within **Appendix E10** is a cover letter which is to accompany the DBAR upon release.

- **Meeting with landowner**

On 11 November 2020, a meeting with the landowner of Erf 140 (a property adjacent to the water treatment works) was held. The abstraction line will be along the boundary of this property. The landowner is in favour of the project, but would like to address the following concerns:

- Aesthetic/visible effects during the operational phase

It is suggested that large indigenous and fast-growing vegetation could be planted to screen the property from the upgraded water plant once construction is complete.

- Noise

It is suggested that the large indigenous vegetation could also serve as a noise buffer and the engineers / appointed contractor(s) should as far as is practicably possible, opt for pumps and other noise-generating equipment with the lowest sound output/decibels. Noise mitigation measures have also been incorporated into the EMPr attached as **Appendix G**.

- Unnecessary removal of vegetation for the project

Vegetation should only be removed when required for construction. Even so, the contractor should inform the landowner prior to the removal of such vegetation where required; and especially the larger trees, on the property. Where required, vegetation is to be replaced with indigenous species. Reference is also made within the EMPr.

- Concern about dogs' safety during construction

A temporary fence or adequate barrier to prevent the dogs from entering the construction area is to be erected during construction.

- Communication during construction by the contractor

The appointed contractor is to communicate the anticipated project timeframes and working times with the landowner and other affected landowners.

Refer to **Appendix E** for proof of correspondence.

- **Pre-application Meeting with EDTEA**

A pre-application site visit was held with the KZN Department of EDTEA for the proposed project on 12 November 2020. The outcome of this site visit meeting was the clarification of the listed activities and a site visit inspection. Refer to **Appendix E11** for correspondence between the EDTEA and the EAP.

- **Availability of Draft Basic Assessment Report for public review**

The DBAR will be released for a 30 day public review period from 13 November 2020 until 14 December 2020. Organs of state, I&AP's and stakeholders will be notified by email and/ or post of the availability of the report along with all appendices including the EMPr and specialist studies for public review and comment. Hard copies of the report will be delivered to the Competent Authority (EDTEA) as well as the Commenting Authorities (local municipality, DHSWS). A hard copy of the report will be available for review and at the Bergville Public Library. Proof will be attached to the FBAR. The report is also available via the following dropbox link:

[https://www.dropbox.com/sh/z0h11wxk3fk9tys/AADqv04GB\\_dtXjWz1JUUhNe-a?dl=0](https://www.dropbox.com/sh/z0h11wxk3fk9tys/AADqv04GB_dtXjWz1JUUhNe-a?dl=0)

During this period, comments/ concerns are expected from organs of state, stakeholders and I&APs. All comments received during the DBAR review period will be adequately addressed and incorporated into the FBAR.

- **Focus Group Meeting**

During the DBAR review period, a Focus Group Meeting with the councillor and ward committee of the respective ward will be scheduled to introduce the project and present the findings of the BAR to the ward committee. During this meeting, the councillor will advise whether a public meeting will be required or not. Meeting Minutes will be included in the FBAR.

- **Public Meeting**

As per above, if the councillor suggests a public meeting, one will be scheduled where all I&AP's will be invited to attend. As a result of Covid-19, social distancing practices will be ensured. The findings of the Basic Assessment Report will be presented for discussion and all comments and concerns raised will be addressed and included as Meeting Minutes within the FBAR.

- **Submission of FBAR**

Following the DBAR review period, all issues raised by authorities and the public will be summarised and responded to and included in the Comments and Response Report which will be included in the FBAR. The FBAR will be updated (where necessary), taking stakeholder input into account. The FBAR will then be submitted to EDTEA for the 107 day decision making period to issue a Record of Decision (RoD).

- **Notifying I&APs of RoD**

Once the RoD is received, I&APs will be notified of the outcome and granted a 20 day appeal period.

## 4. Description of Alternatives

Three potential pipeline routes were evaluated and aptly named: the Original, Alternative 1 and Alternative 2 pipeline routes in terms of the location of the Clearwater Pipeline, which is the pipeline from BWTW to Command Reservoir. The route (Alternative Route 2) was decided upon based on the outcome of evaluating the following criteria:

- Basic human right need for drinking water;
- Environmental impacts (impact area, , biodiversity and wetland);
- Social impacts (heritage, comments received from the landowners);
- Economic or financial implications; and
- Time (the need to urgently supply drinking water infrastructure, servitude registrations etc.)

Refer to Figure 21 below which depicts the locations of these three alternatives.



Figure 21: Route Alternatives

#### **4.1 Original Pipeline Route (blue)**

This route was initially evaluated and abandoned as it transverses through one of the buildings of Erf 356 on Portion 13. It thus had other implications in terms of finances (to compensate for the building which could be affected). This also affected the project's timeframes. The length of the pipeline (from Erf 356 to the command reservoir) was approximately 440.88m. This route also impacts on the wetland type HGM 2. It was thus considered a no-go option. Also, the municipality would need to apply for a new servitude for the pipeline to be on this route.

#### **4.2 Alternative 1 Pipeline Route (yellow)**

This pipeline route was evaluated so as to move the pipeline away from the building which was intersected by the original route. However, it also required for a new servitude to be registered, impacted on a HGM2 type wetland as well and the pipeline length (from Erf 356 to the command reservoir) was approximately 491.15m. The negative impacts on the biodiversity (flora and fauna) as well as heritage resources were assessed as being moderate for this alternative.

#### **4.3 Alternative 2 Pipeline Route (Preferred) (Orange)**

From a financial perspective and also taking into account the legal implications noted with the location of this clearwater pipeline, it is important to note that a servitude already exists along this line (unlike all the other routes). The servitude registration details are listed below:

SG: No3074/1996

Deed of Servitude: K176/1998S

SG Diagram No: 2820/2010

Width of servitude: 3.05 metres

Refer to Appendix H4 for Servitude Documents.

The impacts on the biodiversity (flora and fauna); see Appendix F2 and F3 and on heritage resources (Appendix F4) is noted to be very similar to that of Alternative 1. Furthermore, this pipeline also impacted on a HGM2 type wetland. However, the pipeline length (from Erf 356 to the command reservoir) is substantially shorter (i.e, by approximately 430.19m) thus making it the most feasible economic option and therefore the preferred Alternative.



#### 4.4 Landowner Recommended Pipeline Route (purple)

The landowners have consented to the project. However, during consultation it was suggested by the landowners that the pipeline be relocated away from the current servitude route and closer towards the boundary. This is because the land is earmarked for future residential development by the landowners. This is depicted in Figure 22 below. This suggestion came after the specialist studies were conducted. However, due to the available GIS files it could be plotted in relation to the wetlands. It was found to also intersect the wetland type HGM5, as per the Wetland Assessment (Appendix F1). This alternative therefore also impacts on the wetland. Furthermore, this route could result in the need to register a new servitude. Although not provided in terms of a surveyed or GPS aligned pipeline, the landowner recommended that the pipeline length is also the longest of the alternative routes at approximately 555.98m once onto Erf 356, because the pipeline length before Erf 356 is the same for all the routes. The financial implications of this are thus greater. Also, uTDM would need to halt or delay the process already in place to accommodate this alternative and time is critical as the need to provide water earnestly is of utmost importance.



Figure 22: Alternative Routes – including Landowner Suggested Route

#### 4.5 Final Route Justification:

Table 15 below provides a comparison of advantages and disadvantages between the alternatives.

**Table 15: Comparison between Alternatives**

Criteria	Original Pipeline Route (blue)	Alternative 1 Pipeline Route (yellow)	Alternative 2 Pipeline Route (Preferred) (Orange)	Landowner Recommended Pipeline Route (purple)
Basic human rights	✓	✓	✓	✓
Environmental impacts	Impacts on wetland	Impacts on wetland	Impacts on wetland	Impacts on wetland
Social impacts (Recommendation from I&AP)	X	X	X	✓
Economic/ financial	X	X	✓	X
Time	X	X	✓	X

The recommended route is thus the current existing servitude line. Since this servitude has been registered and is of sufficient width to accommodate the new pipes (i.e. some 3.05m wide). The environmental impacts relating to all the routes related to their impact on the wetland. For this, mitigation measures have to be implemented within the EMPr. The route length is also minimal compared to all the other alternatives. Therefore, the overall length to be impacted is not as expansive. Refer to Figure 23 below for the registered servitude.

The specialist's opinions on the Alternatives will be discussed in Section 6 below.

SUBDIVISIONAL DIAGRAM

SIDES Metres	DIRECTIONS	CO-ORDINATES System WG29 <sup>o</sup>		S.G. No.
		Y	X	
	Constants	+/- 0.00	+ 310000.00	2820/2010
AB 178,03	237 54 20	A - 33 739,93	+ 79 826,22	Approved: <i>[Signature]</i> for Surveyor-General: 2011-01-31
BC 183,01	300 15 50	B - 33 890,75	+ 79 731,63	
CD 96,38	33 07 30	C - 34 048,82	+ 79 823,88	
DE 47,07	122 55 50	D - 33 996,15	+ 79 904,60	
EF 162,56	71 10 00	E - 33 956,64	+ 79 879,01	
FA 122,60	149 09 30	F - 33 802,78	+ 79 931,48	
(227/2829)	BERGVILLE ▲	- 34 546,30	+ 80 022,72	Ordinance 27/1949 Consent of No.2008/964
(228/2829)	BETHANIE ▲	- 32 977,18	+ 74 777,88	
<p><b>DESCRIPTION OF BEACONS:</b> A B C D E F - 12mm Iron Peg</p> <p><b>SERVITUDE NOTE</b> The line a b represents the centre line of a Pipeline Servitude 3,05 metres wide, vide Diagram S.G No.3074/1996 and Deed of Servitude No.K176/1998S</p>				
<p>Scale 1:2 500</p> <p>The figure represents 3,4853 Hectares of land being <u>Portion 13 of Erf 356 BERGVILLE</u></p> <p>Situate in the Okahlamba Municipality, Registration Division GS Province of Kwazulu-Natal</p> <p>Surveyed in April and September 2008 By me <i>[Signature]</i> B.M.BARSDORF Professional Land Surveyor Registration Number PLS1119</p>				
This diagram relates to		The original Diagram is		File: / 23
No. <i>T.7202/2016</i>		S.G. No.149/1972		S.R.No. 843/2010
Registrar of Deeds:		Certificate of Reg. Title		Comp. GSSM - 233
		No.7973/1974		GSSM - 236

Figure 23: Registered Servitude for Preferred Alternative

## **5. Biophysical Description of the Site**

---

The following chapter presents an overview of the biophysical and socio-economic environment in which the proposed project is located to:

- Understand the general sensitivity of and pressures on the affected environment;
- Inform the identification of potential issues and impacts associated with the proposed project; and
- Inform the identification of practical mitigation measures.

### **5.1 Biophysical Characteristics of the Study Area and Surrounds**

#### **5.1.1 Land Use**

This site is situated within a town of Bergville. The existing WTW will be upgraded and the pipeline will be installed in an already transformed vegetation type, except for the Grassy-Hilltop vegetation which is on a natural and climax state. This is depicted in the vegetation maps to follow.

### **5.1.2 Topography**

The average elevation of the area is approximately 1139m.

The topography within approximately 3km of Bergville contains only modest variations in elevation, with a maximum elevation change of 109m and an average elevation above sea level of 1140m. The topography within approximately 16km contains only modest variations in elevation (680m). The topography within approximately 80km contains large variations in elevation (2820m).

The area within 3km of Bergville is covered by cropland (79%) and grassland (15%), within 16km by cropland (44%) and grassland (43%), and within 80km by grassland (63%) and shrubs (14%).

The proposed activity, as it is a linear activity, will place in slope which at the bottom and the top is relatively gentle and in between is steep. The sites highest point, which is the Command Reservoir, is 1163m above sea level and the lowest point, which is the WTW, is 1123m above sea level. The Tugela River is meters away from the WTW.

### **5.1.3 Average Weather**

In Bergville, the wet season is warm and partly cloudy and the dry season is comfortable and mostly clear. Over the course of the year, the temperature typically varies from 3°C to 28°C and is rarely below -1°C or above 32°C.

The best times of year to visit Bergville for warm-weather activities are from early February to mid-May and from late August to early October.

- Temperature

The warm season lasts for 4 months, from October to February, with an average daily high temperature above 26°C. The hottest day of the year is usually in January, with an average high of 28°C and low of 16°C.

The cool season lasts for 2 and a half months, from May to August, with an average daily high temperature below 21°C. The coldest day of the year is usually in July, with an average low of 3°C and high of 20°C.

- Clouds

In Bergville, the average percentage of the sky covered by clouds experiences significant seasonal variation over the course of the year.

The clearer part of the year in Bergville begins around the last week of February and lasts for 7 months, ending around September. At the end of June, the clearest day of the year occurs where the sky is either clear, mostly clear, or partly cloudy 88% of the time, and overcast or mostly cloudy 12% of the time.

The cloudier part of the year begins around the last week of September and lasts for 5 months, ending around February. In mid-November, the cloudiest day of the year occurs where the sky is either overcast or mostly cloudy 39% of the time, or clear, mostly clear, or partly cloudy 61% of the time.

- Precipitation

A wet day is one with at least 1.15mm of precipitation. The chance of wet days in Bergville varies very significantly throughout the year.

The wetter season lasts about 5 and a half months, from mid-October to the end of March, with a greater than 32% chance of a given day being a wet day. The chance of a wet day peaks at 60% in mid-January.

The drier season lasts about 6 and a half months, from the end of March to mid-October. The smallest chance of a wet day is 3% at the beginning of July.

The rainy period of the year lasts for approximately 10 months, from the last week of July to mid-May, with a sliding 31-day rainfall of at least 12.7mm. The most rain falls during the 31 days centered during the last week of January, with an average total accumulation of 135mm.

The rainless period of the year lasts for about 2 months, from mid-May to the last week of July. The least rain falls around the last week of June, with an average total accumulation of 8mm.

- Sun

The length of the day in Bergville varies over the course of the year. In 2020, the shortest day is June 20, with 10 hours, 19 minutes of daylight; the longest day is December 21, with 13 hours, 59 minutes of daylight.

The earliest sunrise is expected at 4:56 AM on December 2, and the latest sunrise was 2 hours, 0 minutes later at 6:56 AM on July 2. The earliest sunset was at 5:12 PM on June 10, and the latest sunset is expected 1 hour, 53 minutes later at 7:05 PM on January 10.

- Wind

The average hourly wind speed in Bergville experiences significant seasonal variation over the course of the year.

The windier part of the year lasts for about 5 and a half months, from the beginning of June to the end of November, with average wind speeds of more than 11km per hour. The windiest day of the year is around mid-September, with an average hourly wind speed of 14km per hour.

The calmer time of year lasts for about 6 and a half months, from the end of November to the beginning of June. The calmest day of the year occurs within the first week of March, with an average hourly wind speed of 8km per hour.

The predominant average hourly wind direction in Bergville varies throughout the year.

The wind is most often from the west for 9 months, from the last week of March to the last week of December, with a peak percentage of 62% on around mid-June. The wind is most often from the east for 3 months, from the last week of December to the last week of March, with a peak percentage of 41% in the beginning of January.

#### **5.1.4 Soil and Geology**

The project area falls within the Bb 137 land type which is depicted in Figure 24. Figure 25 illustrates the landscape catena for the land type. The land type is dominated by the midslope (3) landscape unit, which accounts for 79% of the land type. The expected soil forms within this

landscape position are the Avalon and Clovelly soils. The valley bottom landscape position accounts for the remaining 6% of the landscape and the expected soils are the Oakleaf, Rensburg and Dundee soil forms.

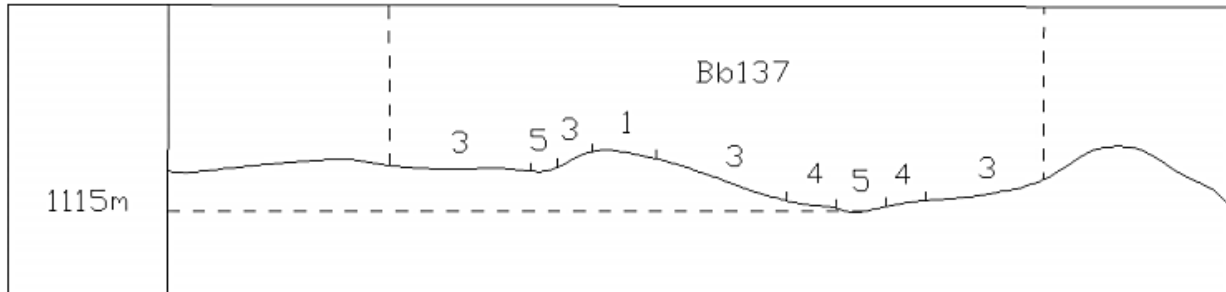


Figure 24: Land Type Map

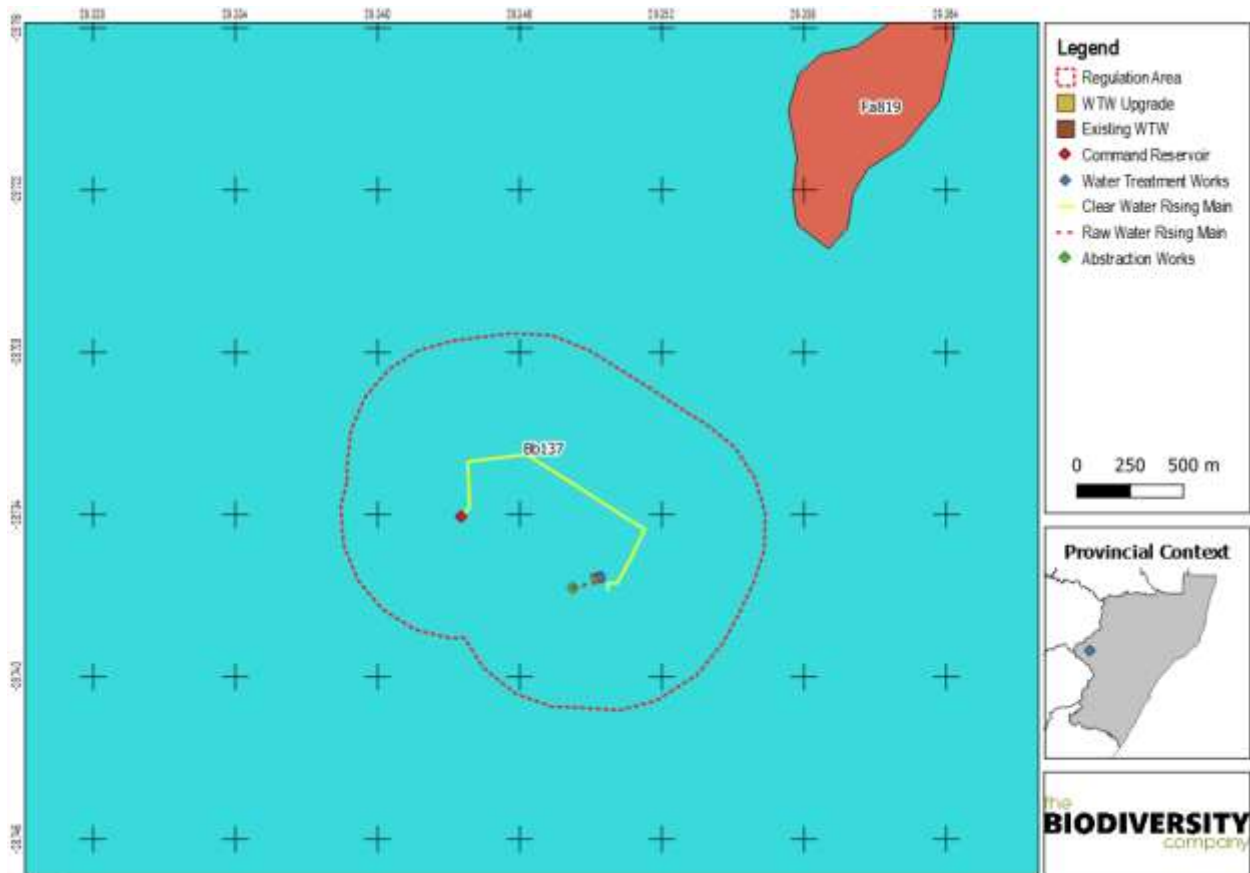


Figure 25: Illustration of land type Bb 137 terrain units

The geology of the Bb 137 land type is mainly sandstone, shale and mudstone of the Estcourt Formation, Beaufort Group with unconsolidated layered sediments of the Masotcheni Formation, isolated dolerite deposits and alluvium.



### 5.1.5 Hydrology

The site is situated in the Quaternary Catchments V11J within the Upper Thukela Water Management Area (WMA).

The Thukela WMA corresponds fully to the catchment area of the Thukela River and lies predominantly in Kwa-Zulu Natal. It is a funnel-shaped catchment, with several tributaries draining from the Drakensberg escarpment towards the Indian Ocean. Parts of the Thukela WMA enjoy a high ecological status. It is characterised by mountain streams in the upper reaches, where several parks and conservation areas are located, as well as a number of important wetlands and vleis. Rainfall is highest near the mountains and along the coast, and the mean annual precipitation is in the range from 600mm to 1500mm.

Because of the high mean annual runoff and favourable topography, the Thukela basin offers some of the best opportunities for water resources development in South Africa. Although several large dams have already been constructed in the upper reaches of the Thukela River and on the main tributaries, substantial undeveloped resource potential remains. One of the largest inter-catchment transfer schemes in the country conveys water from the Upper Thukela River to the Upper Vaal WMA. Other water transfers are from the Mooi River to the Mgeni River in the Mvoti to Umzimkulu WMA, from the Buffalo River to the Upper Vaal WMA, and from the lower Thukela River to the Usutu to Mhlutuze WMA. Owing to the relatively well-watered nature of the catchment, only a small proportion of the water requirements are supplied from groundwater.

Figure 26 depicts the hydrology map of the area in relation to the proposed development area and the current WTW infrastructure. The map indicates a river buffer of 30m and a wetland buffer of 10m.



Figure 26: Hydrology Map

As per the Screening Report attached as **Appendix H3**, the Aquatic Biodiversity Theme has a very high sensitivity rating in respect of Aquatic CBA and Strategic Water Source Area as the proposed development is to cross sections of a wetland and is within close proximity to the Tugela River. Refer to Figure 27 below.



Figure 27: Aquatic Sensitivity Map

According to the wetland assessment, three natural wetland types were found on site. The wetland types identified included four hillslope seeps, three unchannelled valley bottoms and two artificial depressions. These were then grouped into similar hydrogeomorphic (HGM) units as highlighted in Table 16

**Table 16: Wetland classification**

HGM No.	Level 1	Level 2		Level 3	Level 4		
	System	DWS Ecoregion	SALIAE Wet Veg Group	Landscape Unit	4A (HGM)	4B	4C
1	Inland	North Eastern Uplands	Sub-Escarpment Grassland	Valley Floor	River	Lower foothills	Active channel
2				Slope	Seep	Without channelled outflow	N/A
3				Slope	Seep	With channelled outflow	N/A
4				Valley Floor	Unchannelled Valley Bottom	N/A	N/A
5				Valley Floor	Depression	Dammed	N/A

The Tugela River is situated to the south of the pipeline and the associated infrastructure. The banks are steep with some Phragmites growing on the edges. The river however was not classified as a wetland and no health assessment was conducted. The artificial depressions were also not included in the health assessment as they are not natural systems.

Figure 28 depicts the wetlands in the area with a 10m wetland buffer. Figure 29 depicts the delineated wetland map which shows the proposed development in relation to the HGM's and the 500m regulated area.



Figure 28: Wetland Map



Figure 29: Wetland Delineation Map

- **Wetland Unit Setting**

Two natural wetland types were identified during the wetland assessment.

1. Hillslope Seep

Hillslope seep refers to wetland areas located on gently to steeply sloping land and dominated by colluvial (i.e. gravity-driven), unidirectional movement of water and material down-slope. Seeps are often located on the side-slopes of a valley, but they do not, typically, extend onto a valley floor. Water inputs are primarily via subsurface flows from an up-slope direction. Water movement through the seep is mainly in the form of interflow, with diffuse overland flow often being significant during and after rainfall events.

2. Unchannelled Valley Bottoms

Unchannelled valley bottom wetland is a valley bottom wetland without a river channel running through it. Unchannelled valley bottom wetlands are characterised by their location on valley floors, an absence of distinct channel banks, and the prevalence of diffuse flows.

- **Present Ecological State (PES)**

The PES is determined by using the WET-Health guidelines. The PES for the assessed HGM units are presented in Tables 17 to 19 below. The overall PES ratings for the HGM units ranged from **Moderately Modified (Class C) to Seriously Modified (Class E)**.

The wetlands health is split into three components namely; the hydrological, the geomorphological and the vegetational components.

**Table 17: Summary of the PES scores for HGM 2**

Component	PES Rating	Description
Hydrology	C	<b>Moderately Modified:</b> The catchment for these HGM units are on relatively flat slopes with irrigated agricultural fields upslope, possibly providing a source for vadose zone flows. The reduced vegetation cover as a result of the burning of the grass increases surface runoff.
Geomorphology	B	<b>Largely Natural:</b> The geomorphology is relatively intact with the hydrological inputs having a slight impact on the functionality.
Vegetation	C	<b>Moderately Modified:</b> The vegetation has been burnt, but in places where the vegetation is still intact there is evidence of alien vegetation present.
Overall	C	<b>Moderately Modified:</b> A moderate change in ecosystem processes and loss of natural habitats has taken place, but the natural habitat remains predominantly intact.

**Table 18: Summary of the PES scores for HGM 3**

Component	PES Rating	Description
Hydrology	C	<b>Moderately Modified:</b> The catchment for this seep is relatively small and is within private property. The grass has been cut short and the increased surface runoff from impervious surfaces has altered the hydrology.
Geomorphology	C	<b>Moderately Modified:</b> The catchment as well as some portions of this seep have been landscaped.
Vegetation	D	<b>Largely Modified:</b> The vegetation mainly consists of planted grasses.
Overall	C	<b>Moderately Modified:</b> A moderate change in ecosystem processes and loss of natural habitats has taken place, but the natural habitat remains predominantly intact.

**Table 19: Summary of the PES scores for HGM 4**

Component	PES Rating	Description
Hydrology	E	<b>Seriously Modified:</b> The catchment has been significantly altered by the urbanization upstream, increasing flows. The main road crossing has impacted on flow dynamics. The landfill has possibly encroached into wetland zones with an excavated depression found in the flow path. The landfill has also allowed extensive growth of <i>Arundo donax</i> to take over the wet areas.
Geomorphology	C	<b>Moderately Modified:</b> The changed hydrology as well as the altered shape has impacted on the geomorphology.
Vegetation	E	<b>Seriously Modified:</b> The altered shape as well as the dominance of <i>Arundo donax</i> has seriously impacted on the vegetation component.
Overall	E	<b>Seriously Modified:</b> The change in ecosystem processes and loss of natural habitats and biota is great, but the natural habitat features are recognizable.

- **Ecosystem Service Assessment**

The ecosystem services provided by the HGM units present were assessed and rated using the WET-EcoServices method. The summarised results for the HGM units are shown in Table 20 below.

The overall levels of service for all HGM units were rated as being Intermediate. The hillslope seeps of HGM 2 provide moderately high levels of service for the trapping of sediment as well as the assimilation of phosphates and nitrates. Hillslope seep HGM 3 provides no services rated as moderately high. The unchannelled valley bottom (HGM 4) provides moderately high levels of service for sediment trapping as well as the assimilation of phosphates, nitrates, and toxicants.

**Table 20: The EcoServices being provided by the affected wetlands**

				Wetland Unit				
				HGM 2	HGM 3	HGM 4		
Ecosystem Services Supplied by Wetlands	Indirect Benefits	Regulating and supporting benefits	Flood attenuation	1.7	1.8	1.9		
			Streamflow regulation	1.0	1.7	1.8		
			Water Quality enhancement benefits	Sediment trapping	2.3	1.4	2.4	
				Phosphate assimilation	2.1	1.5	2.4	
				Nitrate assimilation	2.2	2.0	2.4	
				Toxicant assimilation	1.7	1.3	2.5	
				Erosion control	1.9	1.9	1.5	
			Carbon storage	1.3	1.3	0.7		
	Direct Benefits	Biodiversity maintenance				1.2	1.1	0.6
			Provisioning benefits	Provisioning of water for human use	0.3	0.4	0.6	
				Provisioning of harvestable resources	1.0	1.0	1.0	
				Provisioning of cultivated foods	1.0	1.0	1.0	
		Cultural benefits	Cultural heritage	1.0	1.0	1.0		
			Tourism and recreation	0.1	0.0	0.0		
			Education and research	0.8	0.0	0.5		
		Overall				19.4	17.5	20.3
		Average				1.3	1.2	1.4

- Ecological Importance and Sensitivity (EIS)

The EIS for all the HGM units were calculated to be **Moderate (Class C)** importance. The wetlands have been altered and show low levels of diversity. The Hydrological Functionality of



all the HGM units were rated as **Moderate (Class C)** importance based on the water enhancing properties offered by the wetlands. The Direct Human Benefits were calculated to as **Low (Class D)** level of importance.

The results of the assessment are shown in Table 21 below.

**Table 21: The EIS assessment results for the project area**

Wetland Importance and Sensitivity	HGM 2	HGM 3	HGM 4
Ecological Importance & Sensitivity	C	C	C
Hydrological/Functional Importance	C	C	C
Direct Human Benefits	D	D	D

- **Recommended Ecological Category (REC)**

The REC is set based on the combination of the PES and EIS values and is determined to set targets for the ecological state of the identified wetlands during and after the project has occurred. Table 22 below shows the PES, EIS as well as the determined REC for the project area.

The REC for all the HGM units were set to either maintain or improve the current ecological states. HGM 2 and 3 will maintain a **Moderately Modified (Class C)** ecological category, whilst HGM 4 has been set to improve the ecological state from **Seriously Modified (Class E)** to **Largely Modified (Class D)** this will not be the responsibility of the pipeline construction project. This unit is seriously modified by the landfill site which has altered the shape, the hydrodynamics, and the vegetation composition.

**Table 22: Wetland REC based on the PES and EIS results**

HGM	Wetland Type	Overall PES	Overall EIS	REC
2	Hillslope Seep	C	C	C (Maintain)
3	Hillslope Seep	C	C	C (Maintain)
4	Unchannelled Valley Bottom	E	C	D (Improve – Not WTW responsibility)

- **Buffer zones**

According to Ezemvelo KZN Wildlife (EKZNW, 2013) a minimum recommended buffer size of 30m is required for wetlands within the province. The wetland buffer zone tool was used to calculate the appropriate buffer required for the upgrade of a bulk water pipeline. The model shows that the largest threat (High) posed during the construction phase is that of “increased

sediment inputs and turbidity”. During the operational phase the risks were rated as Low. According to the buffer guideline a high-risk activity would require a buffer that is 95% effective to reduce the risk of the impact to a low-level threat. The risks were then reduced to Low with the prescribed mitigation measures and therefore the recommended buffer was calculated to be 10m for the construction and operational phases.

A conservative buffer zone was suggested of 10m for the construction and operation phases respectively, this buffer is calculated assuming mitigation measures are applied. The buffer calculation as well as the pipeline layout with respect to the buffer shows that the proposed pipeline will cross HGM 2 in several places. Refer to Figure 30 below.



Figure 30: 10m wetland buffer requirement

- **Sensitivity Analysis**

Figure 31 below depicts a sensitivity map which visually represents the sensitivity of each HGM unit to the proposed development based on the findings of the wetland assessment. All identified HGM units were classified as having a **High** sensitivity while their associated 10m buffers were assigned a **Moderate** sensitivity. All other non-wetland areas within the 500m

regulated area were assigned a **Low** sensitivity from a wetland perspective. The sensitivity map shows that the pipeline will cross several areas of high to moderate sensitivity. The WTW as well as the abstraction plant are all within the **Low** sensitivity zones.



Figure 31: Wetland Sensitivity Map

### 5.1.6 Fauna

As per the Screening Report, the Animal Species Combined Sensitivity on the proposed development area is **High**. This is depicted in Figure 32 below. The animal sensitivity features found on site is depicted in Table 23 below.

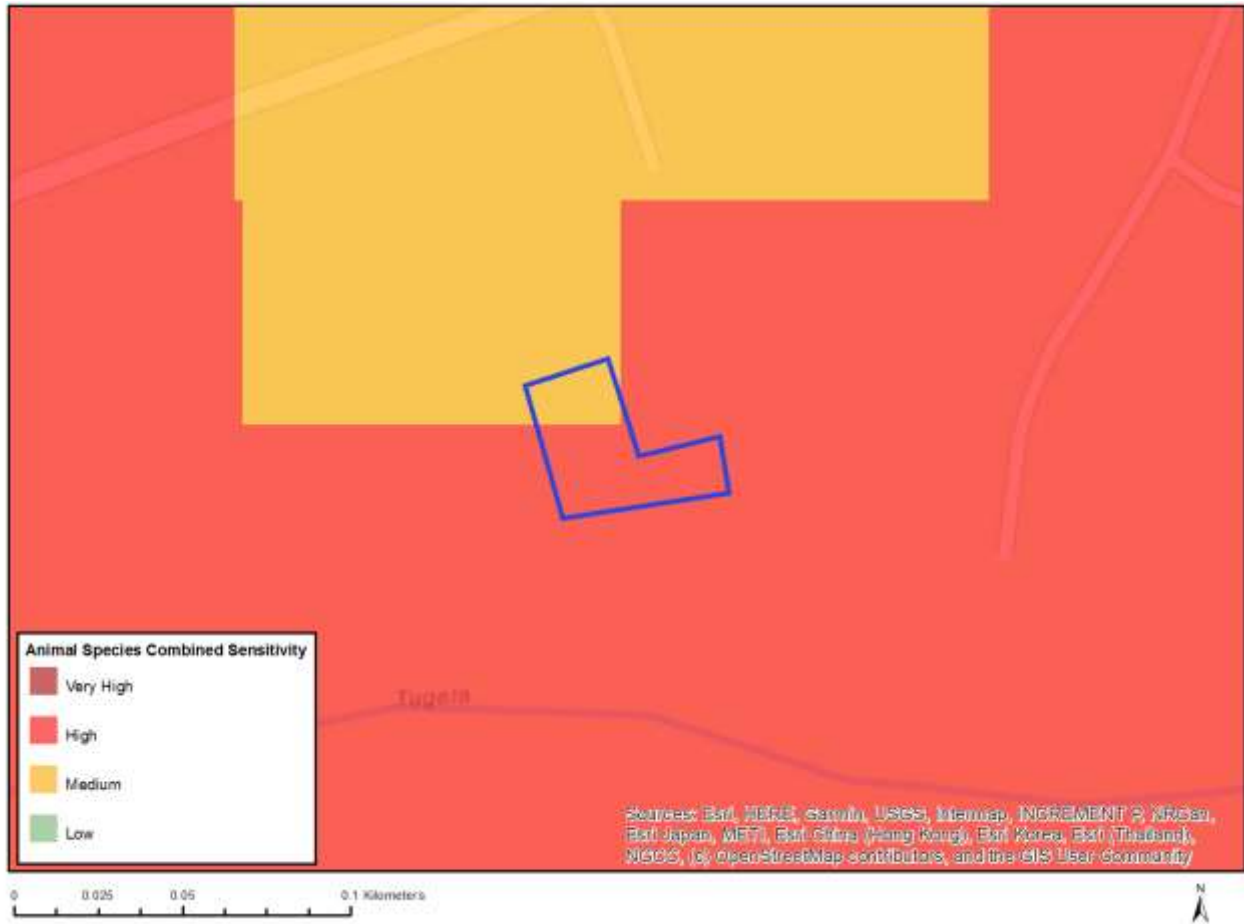


Figure 32: Animal Species Sensitivity Map

Table 23: Animal Species Sensitivities

Sensitivity	Feature(s)
High	Sensitive species 9
High	Aves-Sagittarius serpentarius
High	Aves-Circus ranivorus
Medium	Invertebrate-Clonia lalandei
Medium	Invertebrate-Thoracistus aureoportalis
Medium	Mammalia-Ourebia ourebi ourebi

According to the animal assessment, the site is situated on grassland vegetation, however, due to agricultural and urban development, certain animal species has been displaced and the area only favours those that are prone to human dwellings and agricultural activities.

It should be noted that animals are mobile and can use the site and areas beyond it as a habitat, feeding ground and a corridor.

- **Mammals**

The occurrence of local mammals is closely dependent on broadly defined habitat types, especially, terrestrial, arboreal, fossorial, rupicolous and wetland associated vegetation cover. On this site, only terrestrial, arboreal and fossorial were identified. This site lacks cave dwelling animals such as bats. The reservoir had a nest for the *Cecropis cucullata*.

The terrestrial habitat is extensive and diversified as per the vegetation units delineated (which will be discussed in Section 5.1.7 below). This site has flood plain vegetation, urban habitat vegetation (Gravelled-Herbaceous) and grassland vegetation (Tree-Grassy and Grassy-Hilltop). The first two habitat type sites have been disturbed due to human mediated activities such as urban development and infrastructural maintenance which includes vegetation clearing and road maintenance; whilst the more natural habitats (Tree-Grassy and Grassy-Hilltop vegetation units) consist of a mix of trees and graminoids (the former vegetation unit) and mainly grass from the Grassy-Hilltop vegetation unit. However, during the site visit, some parts of this vegetation were burned and other parts are recovering from seasonal burn.

Due to the diversity of habitats within the site, it is postulated that the animal diversity is greater than the density.

Mammal species that may occur within the study area, on the basis of available distribution records and known habitat requirement, are included in the Table 1 of the Animal Assessment attached as **Appendix F3**. Vervet Monkey species are confirmed to occur on the site. High Probability species include Woodland Mouse, Pygmy Mouse, Striped Mouse and Fat Mouse. Near Threatened species that has a medium probability of occurring on site include Cape clawless Otter and Swamp musk Shrew. One vulnerable species that has a medium probability of occurring on site is the White-tailed Rat. No Endangered species or Data Deficient mammal species are expected to occur on the proposed site.

- **Birds/Avifauna**

Amongst the faunal species assessed, birds are the most mobile species. Thus, their habitat range is greatly extensive. This site offers a number of habitat types for bird ecology and community structure. This includes water birds (Tugela River), arboreal birds (trees along the Tugela River and on the Tree-grassy vegetation unit), grassland birds (Grassy-Hilltop vegetation unit) and those that make use of human structures.

Table 3 of the Animal Assessment attached as **Appendix F3** provides a list of bird/ avifaunal species that were observed and are expected to occur on site. The following species are confirmed to occur on the site (all of which are of Least Concern):

- African Sacred ibis
- Amur falcon
- Cape robin-chat
- Cape wagtail
- Cape sparrow
- Cape turtle-dove
- Cattle egret
- Egyptian goose
- Hadedda ibis
- House sparrow
- Laughing dove
- Pied crow
- Pied starling
- Rock dove
- Southern masked-weaver
- Village weaver

A Near Threatened species that has a low probability of occurring on site is the Lanner falcon. Vulnerable species that have a low probability of occurring on site include African marsh-harrier and Southern Bald ibis. An Endangered species that has a low probability of occurring on site is the Grey Crowned crane. A CE species with a low probability of occurring on site is the Cape vulture. No Data Deficient bird/ avifaunal species are expected to occur on the proposed site.

- **Herpetofauna**

The majority of species that falls under this group are extremely secretive and difficult to observe during field surveys, especially as it was conducted in the winter season. These species are also sensitive to severe habitat fragmentation and alteration. The list of expected herpetofaunal species to occur on site is listed within Table 5 (reptiles) and Table 7 (amphibians) of the Animal Assessment attached as **Appendix F3**.

Amongst the reptile species expected to occur or use this site, one is regarded as being Near Threatened. This reptile has a high probability of occurrence on the study site and is the Coppery grassLizard.

In terms of amphibians, no Near Threatened, Endangered, Vulnerable or Data Deficient species are expected to occur on the site.

### 5.1.7 Vegetation

As per the Screening Report, the Relative Plant Species on the proposed development area is Medium. This is depicted in Figure 33 below.

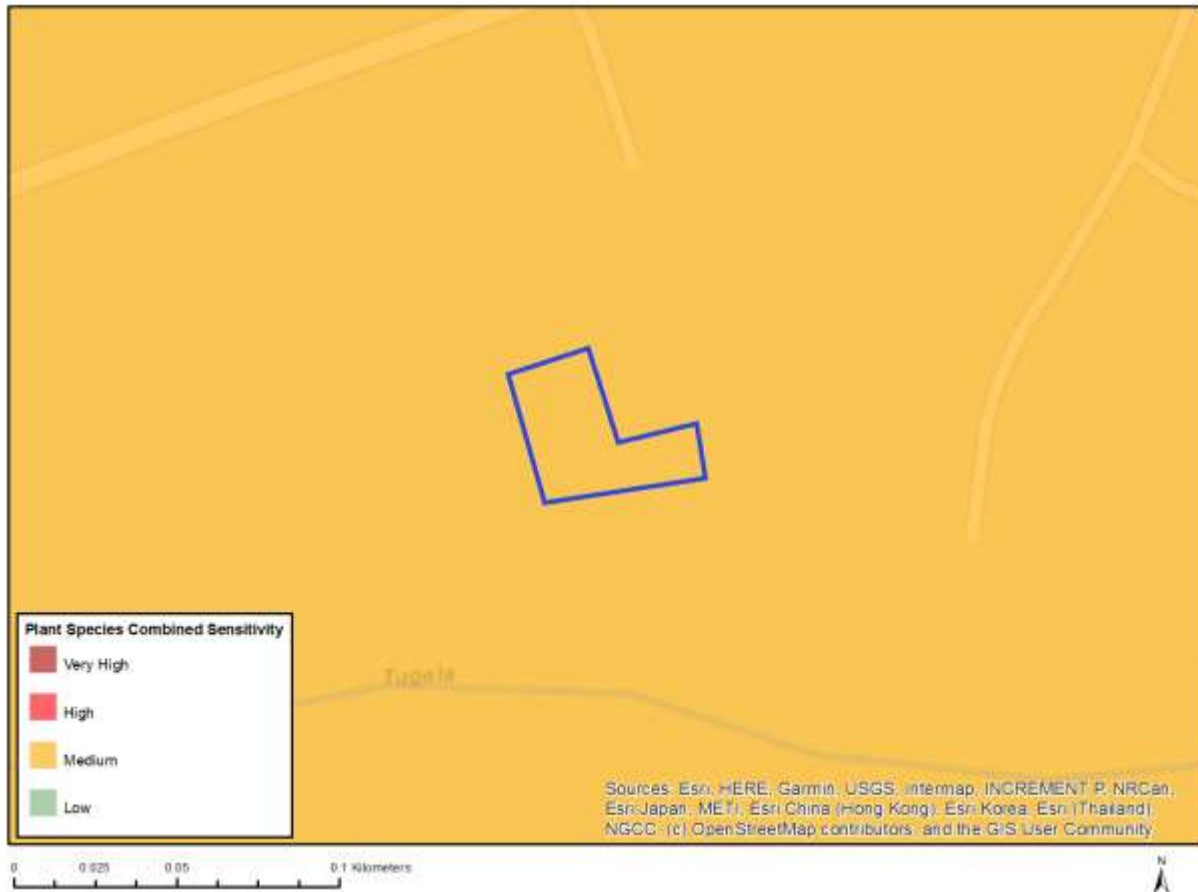


Figure 33: Plant Species Sensitivity

- **Overview of Historic Vegetation Type**
- Broad-Scale Vegetation Patterns

The site is situated in the Grassland Biome of Southern Africa. With summer rainfall combined with dry winters and frost with marked diurnal temperature variations are unfavourable to tree growth and therefore grasslands comprise mainly of grasses and plants with perennial underground storage organs, for example bulbs and tubers and less trees. In some grassland areas, the surface topography (e.g. rocky hills and protected valleys) creates habitats that are favourable to shrub lands and trees. Generally, the higher the surface rock cover, the higher the occurrence of woody vegetation such as trees and shrubs, relative to herbaceous vegetation.



The Grassland Biome consists of various vegetation types that would likely be present on site if no activities (e.g. cultivation) had modified it from this reference state.

The site falls within the Northern KwaZulu-Natal Moist Grassland which is hilly and rolling landscapes supporting tall tussock grassland usually dominated by *Themeda triandra* and *Hyparrhenia hirta*. Open *Acacia sieberianar var. woodii savannoid* woodlands encroach up the valleys, usually on disturbed or strongly eroded sites.

- Fine-Scale Vegetation Patterns

The site comprised of vegetation that was broadly grouped based on the dominant plant type and habitat type. The site vegetation cover has been transformed especially where the Abstraction and WTW is situated (flood plain), and also along the Gravelled-grassy vegetation type. The maintenance of the WTW favours pioneer species and graminoids, thus they dominate this part of the site. Trees dominate along the river banks. The Gravelled-grassy vegetation type due to road maintenance is dominated by pioneer annual plant species and ornamental Palm trees.

Vegetation found on the Tree-grassy type is a mix of naturally occurring graminoids and alien plant species. This vegetation type consists of climax stage vegetation, especially grasses thus indicating that this vegetation type has not had any fire disturbance from the past two or more years. There is also a trench that diverts water from the site, which presumably acts as a fire break. The site was either used or still used as a rubble dump site.

The site, being transformed, especially the Roadside lawn and Bushveld-floodplain vegetation habitats, is characterised by having pioneer plant species. Trees present on site were natural, ornamental and invasive alien trees.

Since the whole development is an upgrade of the existing water provision system and which is also situated in town (highly transformed), the vegetation in and around the site is prone to disturbance due to maintenance (WTW and paved road edges/pavements) and fire (area in around the reservoir).

Four broad vegetation groups were delineated in and in the immediate surroundings of the site. Refer to Figure 34 below for the delineated vegetation types map.



Figure 34: Delineated Vegetation Types Map

These are outlined below.

» Floodplain vegetation

This vegetation type is located on the floodplain where the WTW and water extraction point is situated. This vegetation type is characterised by the dominance of trees and pioneer plants (maybe due to regular maintenance or clearing of vegetation).

The dominant grass species on this vegetation type is *Eragrostis spp.* and *Digitaria tricholaenoides*. Other grass species found on this vegetation type includes *Chloris virgate*, *Melinis repens*, *Aristida congesta*, *Panicum maximum*, *Cortadera selloana*, *Hyparrhenia hirta*, *Cynodon dactylon* and *Sporobolus spp.*

The dominant herbaceous plant is *Helichrysum caespititium*, *Euryops transvaalensis* and *Plantago lanceolate*. Other non-graminoid plants are *Cirsium vulgare*, *Glechoma hederacea*, *Solanum viarum*, *Oxalis purpurea*, *Tageta minuta*, *Bidens pilosa*, *Teraxacum officinale* and *Senecio burchallii*.

Tree and shrubs that are on this vegetation type are *Populus simonii*, *Melia azedarach*, *Pinus spp.*, *Ligustrum lucidum*, *Cypressus spp.*, *Ehritia rigida* and *Ziziphus mucronata*.

» Gravelled-herbaceous vegetation

This vegetation type is located on the roadside pavement and is subjected to disturbance by the property owners and the municipality. It is characterised by having gravel/crusher stones and is dominated by pioneer plants especially annuals and ornamental trees such as palm trees.

One side of the road is characterised by having pioneer annual vegetation and graminoids. Whilst the other side has water canal that has herbs (lettuce milkweed) and *Typha latifolia*.

Graminoids that dominate this vegetation type includes *Pennisetum clandestinum* and *Paspalum scrobiculatum*. Other graminoids that occurs on the vegetation type includes *Eragrostis spp.*, and *Cynodon dactylon*.

Herbaceous vegetation that occurs on this vegetation type includes *Plantago lanceolate*, *Bidens pilosa*, *Teraxacum officinale*, *Oxalis purpurea*, *Amaranthus retroflexus* and *Euryops transvaalensis*.

» Tree-grassy vegetation

This vegetation type is located adjacent to the Grassy-hilltop vegetation, thus it shares similar grass and annual species. However, this vegetation type has trees on it.

Graminoids that dominate this vegetation type includes *Hyparrhenia hirta*, *Pennisetum clandestinum* and *Paspalum scrobiculatum*. Other graminoids that occurs on the vegetation type includes *Eragrostis spp.*, *Cynodon dactylon* and *Panicum maximum*.

Herbaceous vegetation that occurs on this vegetation type includes *Plantago lanceolate*, *Bidens pilosa*, *Teraxacum officinale*, *Oxalis purpurea*, *Amaranthus retroflexus* and *Euryops transvaalensis*. Trees that are on this vegetation type are *Melia azedarach*, *Morus alba*, *Acacia mearnsii*, *Searsia leptodictya* and *Searsia dentate*. Other vegetation occurring on this vegetation type includes *Opuntia ficus-indica* and *Agave Americana*.

» Grassy-Hilltop vegetation

During the site assessment, some parts of this vegetation unit were burned. However, where the pipeline is expected to run through, the vegetation was still intact and in its climax stage.

This vegetation unit is dominated by the tall *Hyparrhenia hirta* grass stand. For herbaceous vegetation, *Plantago lanceolate* dominates the ground floor. The woody vegetation that is present on this vegetation group is *Melia azedarach* which by observation was used as a fence or windbreaker by the neighbouring farm.

- **Listed Ecosystems**

The proposed activity will take place on a vegetation group that is considered to be Vulnerable. However, this activity will take place on a town which have already been disturbed or transformed as a result of urban development and agricultural activities.

- **Plants of Conservation Concern (Red Data species)**
- Threatened or Protected Plant Species (TOPS)

No TOPS species were recorded on the site and none are likely to have been present.

- Threatened species or species of concern

No threatened species or species of concern were recorded on the site and none are likely to have been present.

- **Alien Invasive Plant Species**

Invasive species recorded on site were from categories 1, 2 and 3. Only two species occurring on site are not listed in terms of the categories. Table 24 below depicts this.

**Table 24: List of Alien Invasive Plant Species on site**

Species Name	Common Name	Category
<i>Acacia mearnsii</i>	Black wattle	2
<i>Agave americana</i>	American agave	3
<i>Cirsium vulgare</i>	Spear Thistle	1b

<i>Cynodon dactylon</i>	Couch grass	2
<i>Glechoma hederacea</i>	Ground Ivy	Not listed
<i>Melia azedarach</i>	China berry	3
<i>Morus alba</i>	White Mulberry	3
<i>Opuntia ficus-indica</i>	Sweet prickly pear	1
<i>Pennisetum clandestinum</i>	Kikuyu	1b (In protected area and wetlands)
<i>Pinus spp.</i>	Pine tree	1b
<i>Taraxacum officinale</i>	Common dandelion	Not listed

### 5.1.8 KwaZulu-Natal Biodiversity Sector Plan

The KwaZulu Natal Biodiversity Sector Plan includes reference to Critical Biodiversity Areas (CBA's) which are terrestrial and aquatic features in the landscape that are critical for retaining biodiversity and supporting continued ecosystem functioning and services. These form the key output of a systematic conservation assessment and are the biodiversity sectors inputs into multi-sectoral planning and decision making. CBA's are therefore areas of the landscape that need to be maintained in a natural or near-natural state to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. In other words, if these areas are not maintained in a natural or near-natural state then biodiversity conservation targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity-compatible land uses and resource uses. In addition, the conservation assessment also made provision for Ecological Support Areas (ESA's), which are areas that are not essential for meeting biodiversity representation targets/thresholds but which nevertheless play an important role in supporting the ecological functioning of critical biodiversity areas and/or in delivering ecosystem services that support socio-economic development, such as water provision, flood mitigation or carbon sequestration.

The proposed site is situated on the Northern KwaZulu-Natal Moist Grassland which is considered to be Vulnerable. According to Figure 35 below, the entire proposed site does not fall within a CBA or areas of conservation importance such as ESAs and NFEPA Wetland.

It should be noted that this site has been transformed due to residential and urban development, as well as agricultural activities.



**Figure 35: KwaZulu-Natal Biodiversity Sector Plan Map**

## 5.2 Human Environment

### 5.2.1 Heritage Features

As per the Screening Report, the Archaeological and Cultural Heritage Sensitivity on the proposed development area is High. This is depicted in Figure 36 below.



Figure 36: Archaeological and Cultural Heritage Sensitivity



As per the HIA, the archaeological sites tend to be open Stone Age and Iron Age scatters of low significance. This is depicted in Figure 37. These sites are found in similar locations as the route alignment of the proposed project. The top of hills have artefacts in secondary context. An upper grinding stone and a MSA flake were noted near the main reservoir. These are in a secondary context and part of a previously ploughed field. The artefacts are of low significance and do not constitute a site. Other isolated artefacts are likely to occur on the hill. These artefacts are not significant and do not constitute a site.



Figure 37: Location of Known Heritage Sites in the General Area

The Original Route and Alternative Route 2 occur within the boundary of the farm owned by the Erin Property Trust. The Original Route will occur within 3m of the original farm shed. Refer to Figure 38 below which depicts this by means of a yellow line. Alternative Route 2 will occur within the original open area related to the shed. It is a possible kraal. Alternative Route 2 occurs within 10m of the building. Refer to Figure 39 below which depicts this by means of a green line. Alternative Route 1 will not affect any buildings. Refer to Figure 40 below which depicts this by means of a blue line.



**Figure 38: Farm Shed and Location of Original Route**



**Figure 39: Alternative Route 2**

The buildings and associated middens are older than 60 years in age and are thus automatically protected by the heritage legislation. The Original pipeline Route and Alternative 2 occur within 10m of the buildings and could thus affect them. The Original Route occurs too close to the building and will require an assessment by an architect historian if this option is chosen. The

excavation will need to be monitored for historical middens during the construction phase if this option is chosen by means of the EMPr.

Alternative 2 is near the old kraal buildings, and goes through the old outer kraal area. It might need to be assessed by an architect historian. It would require monitoring during construction as it passes through potential historical middens during the construction phase if this option is chosen by means of the EMPr.

Alternative 1 does not affect any heritage features.



**Figure 40: Alternative Route 1**

Accordingly, from a heritage perspective, Route Alternative 1 is the preferred alignment due to its minimal impact on heritage resources.

### **5.2.2 Palaeontological Assessment**

The Screening Report and the palaeontological assessment noted that the proposed development occurs in a very sensitive area as depicted in Figure 41.

Bergville is located within Permian Era rocks, about 50m below the Permo-Triassic Boundary, which represents the greatest extinction event in the Earth's history. This figure was abstracted from the Harrismith Geological Map and could be out by +/-20m due to the map's contour control. The Upper Permian is separated from the Triassic by an Extinction Event known as the Great Dying when 95% of life on Earth became extinct.

This stratigraphic boundary is expected to be found within marine sediments where a complete time record may accumulate. In contrast, the Adelaide Subgroup comprises terrestrial sedimentary rocks. Preservation requires a large number of geological processes to come together, but these are less likely to take place during terrestrial deposition. Consequently the placement of the Permo-Triassic Boundary is not accurately known, if it has in fact been preserved in southern Africa, but it must be considered. Present evidence indicates that the Permo-Triassic Boundary is unlikely to be located in the development area.

- **Trace fossils**

Evidence of bioturbation is ubiquitous within the Adelaide Subgroup siltstones and mudstones; however, the various trace fossil (ichnofossil) types are not always identifiable. Trace fossils are very common within the Beaufort Group. These have limited Palaeontological usage.

- **Vertebrate Fossils**

The Beaufort Group is known internationally for its fossils. It contains plant- and animal- fossils. The latter include a wide variety of body fossils, including the mammal-like reptiles such as the Upper Permian-Dicynodon and the Triassic- aged Lystrosaurus and trace fossils. The Adelaide Subgroup is known world-wide for its fossils.

- **Karoo Dolerite**

Karoo Dolerite is also present. This is an igneous intrusive rock and by definition cannot be fossiliferous.

However, it also noted that the area was already disturbed and that the rock was highly weathered. The proposed infrastructure is unlikely to affect palaeontological layers and no further mitigation is required, apart from a Chance Find Protocol to form part of the EMPr.



Figure 41: Palaeontological Sensitivity Map

### 5.2.3 Other Sensitivities

In terms of other sensitivities as per the Screening Report, the Civil Aviation and Defense Themes are of low significance and are not expected to be impacted on by the proposed upgrade project. Refer to **Appendix H3** for comprehensive Screening Report.

#### **5.2.4 Socio-Economic Features**

The uThukela District Municipality is one of the 11 districts of the KwaZulu-Natal province and covers an area of 11 326.12 km<sup>2</sup>. The uThukela District Municipality is made up of five local municipalities. The proposed Bergville WTW is located within the Okhahlamba Local Municipality.

- **Population**

The total population recorded for KwaZulu Natal in 2011 was 11.06 million, an increase from the population of 10.2 million in 2011, making it the second largest province in the country in terms of population size. 52% of the population in the province are female and 48% are male. Majority of the population are black (87%), followed 8% indian, 4% white, and 1% coloured. The predominant language within the province is Zulu (81%), followed by English (12%). The number of households increased from 2 539 429 in 2011 to 2 875 843 in 2016.

According to Census 2016, the Uthukela District Municipality has a total population of 706 589 individuals within 161 787 households. In terms of the gender, 53% of the population in the province are female and 47% are male. Majority of the population are black (96%), followed 2% indian, 1% coloured and 1% white. The predominant language within the Municipality is Zulu (93%).

According to Census 2016, the Okhahlamba Local Municipality has a total population of 135 132 individuals within 29 509 households. In terms of gender, 53% of the population in the province are female and 47% are male. Majority of the population are black (98%). The predominant language within the Municipality is Zulu (94%).

According to Census 2011, Bergville covers an area of 4.73 km<sup>2</sup> and has a total population of 1274 individuals within 284 households. In terms of the gender, 52% are male and 48% are female. Majority of the population are black (59%), followed by white (23%), indian (13%) and 4% coloured. The predominant languages are Zulu (40%), followed by English (27%) and Afrikaans (16%).

- **Economic Profile**

KwaZulu-Natal plays a significant role in South Africa's economy and is the second largest contributor to the country's economy. The province contributes 16% to the national GDP after Gauteng's share of 34%.

The diversified nature of the KwaZulu-Natal economy is a key strength and has enabled a resilient response to the economic instability experienced. The lead economic sectors are industrial development and manufacturing, finance, real estate and business services, infrastructure development and construction, transport storage and communications, tourism, mining and beneficiation as well as wholesale and retail trade.

In terms of contribution to GDP, these are:

- Manufacturing 22%
- Finance, Real Estate and Business Services 20%
- Wholesale and Retail Trade, Catering and Accommodation 15%
- Transport, Storage and Communications 14%
- Agriculture sector 4%

The provincial economy is driven mainly by the eThekweni Metropolitan Municipality and other district municipalities especially those dominated by urban areas. eThekweni contributes the most, 61%, which is attributable to economic activities such as tourism, harbour ports, and sugar refinery, among others.

- Agriculture

At 4%, the agriculture sector has a relatively low direct contribution to the provincial GDP. However, KwaZulu-Natal produces almost 30% of national agricultural output and hence contributes significantly to food security in South Africa. Although the province covers a small portion of South Africa's land area, a significant percentage of the country's small-scale farmers are based here. The sector is slowly recovering from the severe droughts experienced over the period 2015 through 2016.

Forestry in the areas around Vryheid, Eshowe, Richmond, Harding and Ngome is one of the major sources of income, the largest forest owners being Sappi and Mondi. The KwaZulu-Natal sugar industry is an important contributor to the economy, which is characterised by high employment and linkages with major suppliers, support industries and customers.

Inputs into the agricultural production chain that contribute to economic growth include the local procurement of capital equipment, consumables and services required by the sector. Agriculture also offers potential for renewable energy projects, notably those that use biomass (sugar and forestry industries).

➤ Mining and Beneficiation

The mining sector is a small economic sector which contributes less than 2% to KwaZulu-Natal's GDP and employs approximately 4000 direct employees, rising to more than 15000 indirectly. The industry is concentrated around the mining of coal, titanium dioxide, zircon, aggregate and other minerals in lesser quantities. Richards Bay Minerals (RBM) and Tronox are key companies in this sector.

The increased beneficiation of minerals especially in aluminium, coal, iron and steel, phosphates and mineral sands is being promoted.

➤ Transport, Storage and Communication

Transport continues to be a catalyst of economic growth in the country in general as well as in KwaZulu-Natal.

To meet the growing demands of a global world, flagship projects in the province include the Dube TradePort, which has been constructed north of the city. Special Economic Zones (SEZ) are one of the Government's strategic instruments implemented to drive an inclusive economic growth, deepen industrialisation and industrial rebalancing.

Richards Bay Industrial Development Zone (RBIDZ) provides the province with an ideal platform to maximise opportunities related to the ocean economy, manufacturing, beneficiation, as well as new and innovative oil and gas energy options.

➤ Blue Economy

Africa's busiest and largest ports, Durban and Richards Bay handle 78% of South the continent's cargo tonnage, so KwaZulu-Natal as a province is very reliant economically on the maritime sector.

The Blue economy is underpinned by Operation Phakisa Oceans Economy, which aims to unlock the economic potential of South Africa's ocean economy and fast track the achievement



of the National Development Plan 2030 goals. The KwaZulu-Natal Provincial Integrated Maritime Strategy goal is to direct the province with respect to the priorities to broaden the developmental scope of the ocean economy. This refers to large scale ship repair and maintenance works.

➤ Manufacturing

After Gauteng, KwaZulu-Natal's diversified manufacturing sector is the second largest in the country with almost 30% of the country's manufactured exports produced in the province.

Industrial development is the anchor of the KwaZulu-Natal economy and its growth is fundamental to the creation of employment opportunities that will contribute to inclusive economic growth in the province. The top five manufacturing industries in the province, in terms of employment, are clothing, textiles and footwear; food and beverages; basic iron, steel and metal products; chemicals and plastic; and paper and publishing. Major players in the KwaZulu-Natal manufacturing sector include: Unilever, Engen, Sapref, Mondi, Sappi, Aspen Pharmacare, Corobrik, Constantia Afripack and Hulamin to name a few. KwaZulu-Natal is a significant producer of vehicles and components (e.g. Toyota, Volvo, Desmond Equipment, MAN, Bell).

➤ Infrastructure, Development and Construction

Development succeeds where there is good infrastructure. The KwaZulu-Natal government recently announced that it will spend more than R13 billion on infrastructure projects to stimulate growth and create jobs. In addition, several catalytic construction projects are underway in the province, many because of significant partnerships between the private and public sectors. These partnerships have resulted in local and international property developers investing billions of rands in new mixed-use developments across KwaZulu-Natal.

➤ Tourism

The province is one of the country's prime tourist destinations for both domestic and international tourists. The contribution of tourism to the provincial GDP grew from R9bn in 2014 to more than R10 billion in 2018.

Owing to its strategic location along the east coast, the province has a competitive advantage in so far as tourism is concerned. KwaZulu-Natal's tourism assets include great accommodation facilities, excellent beaches, two World Heritage sites, the iSimangaliso Wetland Park and the

uKhahlamba Drakensberg Mountains Park, private and public game reserves where one can spot the Big Five, the battlefields, numerous golf courses as well as cultural and heritage sites.

The excellent climate allows many sport and leisure opportunities and a range of business opportunities has grown to meet the demand of these markets. In line with the above, the province hosts several international events that bring people from around the world.

➤ Tertiary Sector

The tertiary sector namely retail trade; transport/logistics; finance/business services and community/social services sectors accounts for close to 70% of the provincial GDP.

Business process outsourcing (BPO) is a major market sector within the province. The province is home to more than 60 BPO centres and accounts for almost 50% of the country's financial services call centres. KwaZulu-Natal boasts a strong finance, real estate and business services sector which is growing fast. Many domestic and foreign institutions already provide a full range of services from commercial and retail, to merchant banking, mortgage lending and insurance, as well as investments. KwaZulu-Natal has been ramping up its capabilities in the technology and innovation sphere with the development of Techno Hubs, a project which the provincial government, led by the KwaZulu-Natal Treasury, adopted as part of its Provincial Growth Development Plan.

➤ Informal economy

South Africa's informal business sector serves a burgeoning consumer market worth more than R100 billion in the country's rural areas, townships and cities, presenting opportunities for corporates and traditional small businesses.

Durban is credited as being the first city in South Africa to develop a policy for street traders. eThekweni currently has more than 197 000 people employed in the informal sector with each person supporting another three people on average.

KwaZulu-Natal is currently aspiring to be South Africa's biggest economic contributor. Currently massive opportunities exist across the value chain of the economy to contribute significantly to economic development. However, opportunities for the youth and people from previously disadvantaged communities to participate in the economy need to be created in order to develop a sustainable and inclusive economy and society.

The key spatial features of the uThukela District Municipality impacting on economic development include:

- Ladysmith-Ezakheni (greater Ladysmith), Estcourt, **Bergville** and Winterton are seen as the economic development nodes in the district with greater Ladysmith as the key economic development node.
- The N3 passes the centre of the district slightly to the west of Estcourt and to the east of Ladysmith.
- The functional national rail route connects Gauteng, Newcastle and Ladysmith to Ethekeini.
- The majority of the formal urban settlement in the district is located in and around greater Ladysmith and to a lesser extent the smaller rural towns listed above.
- There are large areas of the district which are owned by the Ingonyama Trust Board which are under rural settlement and limited subsistence agriculture.
- The remainder of the land area in the district is under land reform (mainly subsistence) and commercial agriculture.
- Each local municipality in uTDM has its own IDP and SDF. These plans include development nodes and capital infrastructure alignment for the future of the region.

- **Employment**

Unemployment remains one of the major constraints to KwaZulu-Natal's socio-economic prospects; contributing to high levels of poverty and inequality and worsening the overall quality of life of the people of the province.

In terms of the youth employment status, 54.9% of youth (aged 15-24) are unemployed in the province which is a little higher than the rate in South Africa which is 52.4%. 13.2% of youth are employed, which is about 80% of the rate in South Africa which is 16.4%. 76.9% of employed youth are employed within in the formal sector which is a little higher than the rate in South Africa at 74.7%.

With regards to employment, education and training status, 32.3% of youth are not in employment, education or training (NEET) which is about the same as the rate in South Africa at 32.2%.

In terms of household adult employment, 49.9% of youth live in households without an employed adult which is about 20% higher than the rate in South Africa at 42.2%.

The total economically active population of Bergville (excluding children under the age of 15 and pensioners) is estimated to be 73 617, which is 54% of the total population. Only 12 533 people are occupied in formal employment, which is about 17% of the total population. The remaining 83% are unemployed. The dependency ratio is at 44.

- **Education**

In terms of highest educational level, 53.3% of youth aged 20-24 have completed matric/matric equivalent or higher a little higher than the rate in South Africa which is 51%. In terms of educational attendance, 55.5% of youth aged 15-24 attend an educational institution about the same as the rate in South Africa which is 56.1%.

The province is home to a number of educational facilities which includes schools and tertiary institutions. The province is home to the University of KwaZulu Natal which is a globally recognized university.

In Bergville, 7.8% of the population over the age of 20 has no form of schooling, 25.7% with some form of higher education and 38.1% with matric. Bergville is home to a few schooling facilities which includes Bergville Christian Academy, Bergville Primary School and Bergville Pre-Primary School.

## 6. Environmental Sensitivity – Specialist Recommendations

---

The following specialist studies were undertaken for the proposed Bergville WTW upgrade project:

1. Wetland Assessment
2. Animal Assessment
3. Vegetation Assessment
4. Heritage Survey
5. Paleontology Impact Assessment

Initial assessments took place in July 2020 and due to the consideration of the other alternatives, subsequent assessments were undertaken on the other alternatives (between October – November 2020). The assessment's however, do not account for the landowner suggested route, but it does fall within the broader area studied.

- **Biodiversity (Fauna and Vegetation) Assessment**

Figure 42 indicates the vegetation units observed by the specialist. As depicted, the preferred route encounters the grassy hilltop vegetation only, whereas the abandoned Alternative 1 encounters two such vegetation types (grassy hilltop and tree-grassy). The specialist recommendation is as follows:

Since there are two pipeline route options on the Grassy-Hilltop Vegetation, option one (Grassy-Hilltop Vegetation 1) is recommended for this project as this is an already existing pipeline. This option will traverse on the single vegetation type, unlike option two that will traverse two vegetation types, the Grassy-Hilltop Vegetation 1 and the Tree-Grassy Vegetation.



Figure 42: Vegetation Units

- **Heritage Assessment**

The original pipeline route could have other heritage implications as it traverses through a building on portion 13 of Erf 356. As no information was available of the age of this building it could have been more than 60 years old. According to the National Heritage Resources Act (NHRA) (Act No. 25 of 1999) and the KwaZulu-Natal Amafa and Research Institute (Act No. 05 of 2018), no structure which is, or which may reasonably be expected to be older than 60 years, may be demolished, altered or added to without the prior written approval of the Council having been obtained on written application to the Council.

- **Wetland Assessment**

The Wetland Assessment attached as **Appendix F1** relates to the re-assessing of the pipeline in November 2020. The pipeline will intersect wetland HGM 2 (as the other options; and HGM5 for the landowners recommended pipeline). With the exception of the water pipeline which traverses a wetland area, namely HGM 2, the risk assessment undertaken by the specialist concluded that the upgrade of the abstraction pump as well as the WTW would pose Low risks to the wetland systems based on the anticipated footprints remaining outside of the buffer zone, provided that the mitigation measures are implemented.

The pipeline upgrade will cross HGM 2 and the associated buffer. The remaining HGM units are not at risk. The pre-mitigation moderate risk impacts were identified as:

- Servitude clearing;
- Excavation of pipeline route; and
- Alteration of surface and sub-surface drainage.

Specialist recommended mitigation measures include:

- The footprint area of the pipeline must be kept a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas;
- Trenches must be side dug (where possible) from the existing access routes. In the absence of access routes, temporary routes may be considered;
- Trenches will be dug on-line (where applicable) creating narrower trenches;
- Where trench breakers are required, these will be imported appropriately and installed by the backfill crew, ahead of backfilling;
- Careful separation of soil types/ strata as far as is practicably possible;
- No vegetation should be cleared prior to stripping of topsoil, and vegetation must be stripped with the topsoil to retain a seedbank;
- Topsoil will be stripped to a depth of at least 25cm and placed on one side of the trench;
- Subsoil (remaining soil profile will be stripped to the required trench depth and place on the opposite side of the trench to avoid topsoil and subsoil from mixing.



Figure 43: HGM units



## **7. Environmental Impact Assessment**

---

### **7.1 Impact Assessment Methodology**

The following methodology and criteria were used in assessing impacts related to the proposed development.

- The **Nature**, a description of what causes the effect, what will be affected, and how it will be affected.
- **The Extent**, wherein it is indicated whether:
  - 1 is limited to the immediate area or site of development
  - 2 is the local area
  - 3 is regional
  - 4 is national
  - 5 is international
- The **Duration**, wherein it is indicated whether:
  - The lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
  - The lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
  - Medium-term (5–15 years) – assigned a score of 3;
  - Long term (> 15 years) - assigned a score of 4; or;
  - Permanent - assigned a score of 5.
- The **Magnitude**, quantified on a scale from 0-10, where a score is assigned:
  - 0 is small and will have no effect on the environment;
  - 2 is minor and will not result in an impact on processes;
  - 4 is low and will cause a slight impact on processes;
  - 6 is moderate and will result in processes continuing but in a modified way;
  - 8 is high (processes are altered to the extent that they temporarily cease); and
  - 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- The **Probability of occurrence**, which describes the likelihood of the impact actually occurring. Probability is estimated on a scale, and a score assigned:
  - Assigned a score of 1–5, where 1 is very improbable (probably will not happen);
  - Assigned a score of 2 is improbable (some possibility, but low likelihood);
  - Assigned a score of 3 is probable (distinct possibility);
  - Assigned a score of 4 is highly probable (most likely); and
  - Assigned a score of 5 is definite (impact will occur regardless of any prevention measures).
- The **Significance**, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high.
  - The status, which is described as **positive, negative** or **neutral**.
  - The degree to which the impact can be reversed.
  - The degree to which the impact may cause irreplaceable loss of resources.
- The degree to which the impact can be mitigated.

The significance is determined by combining the criteria in the following formula:

$S = (E + D + M) P$ ; where

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

The significance weightings for each potential impact are as follows:

- **< 30 points: Low** (i.e. where this impact would not have a direct influence on the decision to develop in the area),
- **30-60 points: Medium** (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated),
- **> 60 points: High** (i.e. where the impact must have an influence on the decision process to develop in the area).

### 7.2 Impact Assessment

Table 25 summarises the impacts for all alternative routes as the associated impacts are similar; however, the length differs between the pipeline routes which implies that the construction timeframes would differ but the impacts significance of the development irrespective of the route, is still medium risk. This will be discussed in the Impact Statement section to follow.

**Table 25: Construction Phase Impacts**

Potential impacts	Significance rating of impacts	Proposed mitigation	Significance rating of impacts with Mitigations	Risk of the impact and mitigation not being implemented
<b>IMPACT ON WETLAND</b>				
<p>The wetland impacts are expected to occur as a result of the following activities:</p> <ul style="list-style-type: none"> <li>• Servitude clearing</li> <li>• Excavation of pipeline route</li> <li>• Installation of pipeline</li> <li>• Filling pipeline trenches</li> <li>• Rehabilitation of servitude</li> <li>• Operation of equipment and machinery</li> <li>• Waste and ablutions</li> <li>• Storage of pipeline sections and construction material</li> <li>• Proliferation of alien vegetation</li> <li>• Alteration of surface &amp; sub-surface drainage</li> <li>• Clearing of increased footprint &amp; compaction</li> <li>• Construction of WTW</li> <li>• Rehabilitation of impacted areas</li> <li>• Drainage patterns change due to altered sub-surface flow paths</li> <li>• Failure and leaking of pipeline</li> </ul>				

- Construction traffic
- Hydrocarbon spills from pump and machinery operations

<p><b>Clearing of land for construction camps and potential pollution of the soil and water</b></p> <p>These may be at one or several locations, area will be cleared and levelled where necessary, site offices may be temporary structures, machinery, building supplies and temporary staff facilities (excluding accommodation) will be housed here. The impacts could include:</p> <ul style="list-style-type: none"> <li>• Removal of vegetation</li> <li>• Levelling and compaction of soils</li> <li>• Storage of machinery, supplies and staff facilities</li> </ul> <p>This could lead to the loss of vegetation, alteration and loss of microhabitats, altered vegetation cover, increased erosion and contamination of soil and groundwater.</p>	<p><b>Medium</b></p>	<ul style="list-style-type: none"> <li>• No construction camps should be planned outside of the final development footprint.</li> <li>• Keep the clearing of natural vegetation to a minimum.</li> <li>• Stay within demarcated temporary construction areas and strictly prohibit any off-road driving or parking of vehicles and machinery outside designated areas.</li> <li>• Prevent spillage of construction material and other pollutants, contain and treat any spillages immediately, strictly prohibit any pollution/littering according to the relevant EMPr.</li> <li>• No open fires may be lit for cooking or any other purposes, unless in specifically designated and secured areas.</li> <li>• No vehicles may be washed on the property, except in suitably designed and protected areas.</li> <li>• No vehicles may be serviced or repaired on the site, unless it is an emergency situation in which case adequate spillage containment must be implemented.</li> <li>• After construction remove all foreign material prior to starting the rehabilitation.</li> <li>• Monitor the establishment of invasive</li> </ul>	<p><b>Medium</b></p>	<p><b>Medium</b></p>
--	----------------------	--	----------------------	----------------------

<ul style="list-style-type: none"> <li>• <b>Loss of aquatic habitat and biota</b></li> <li>• <b>Loss of indigenous vegetation due to vegetation clearing for construction activities</b></li> <li>• <b>Modification of riparian zone</b></li> </ul> <p>This refers to direct development within watercourse areas, including crossings. Loss and disturbance of watercourse habitat and fringe vegetation due to direct development within the wetland as well as changes in management, fire regime and habitat fragmentation.</p>	<p><b>Medium</b></p>	<ul style="list-style-type: none"> <li>• Where construction occurs in the demarcated wetland and buffer, extra precautions should be implemented to so as to minimise wetland loss.</li> <li>• Other than approved and authorized structures, no other development or maintenance infrastructure is allowed within the delineated wetland or associated buffer zones.</li> <li>• Demarcate the wetland areas and buffer zones to limit disturbance, clearly mark these areas as no-go areas.</li> <li>• Monitor the establishment of alien invasive species within the areas affected by the construction and take immediate corrective action where invasive species are observed to establish.</li> <li>• Do not plan construction or storage camps within areas of medium to high sensitivities.</li> <li>• Plan servitudes to be disturbed to impact on as little vegetation possible. It is recommended that no more than 6m around the route be disturbed.</li> <li>• Restrict the disturbances and plan to rehabilitate these areas on completion of the pipeline.</li> <li>• An independent Environmental Control Officer (ECO) should be</li> </ul>	<p><b>Low</b></p>	<p><b>High</b></p>
---	----------------------	--	-------------------	--------------------

<p><b>Siltation of watercourse due to erosion and run off from construction site and construction works</b></p>	<p><b>Medium</b></p>	<ul style="list-style-type: none"> <li>• Consider the various methods and equipment available and select whichever method(s) that will have the least impact on watercourses.</li> <li>• Water may seep into trenching and earthworks. It is likely that water will be contaminated within these earthworks and should thus be cleaned or dissipated into a structure that allows for additional sediment input and slows down the velocity of the water thus reducing the risk of erosion. Effective sediment traps should be installed.</li> <li>• Construction in and around watercourses must be restricted to the dryer winter months where possible.</li> <li>• Remove only the vegetation where essential for construction and do not allow any disturbance to the adjoining natural vegetation cover.</li> <li>• Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and work areas.</li> <li>• Runoff from the construction area must be managed to avoid erosion and pollution problems.</li> <li>• Implementation of best management</li> </ul>	<p><b>Medium</b></p>	<p><b>High</b></p>
---	----------------------	---	----------------------	--------------------



		<p>practices.</p> <ul style="list-style-type: none"> <li>• Maintain buffer zones to trap sediments.</li> <li>• Monitoring should be done to ensure that sediment pollution is timeously dressed.</li> </ul>		
<p><b>Erosion of wetland</b></p>	<p><b>Medium</b></p>	<ul style="list-style-type: none"> <li>• Plan stormwater measures to prevent erosion of the slope during construction, rehabilitation and operation.</li> <li>• Method statement by engineer for water released from the pipeline (e.g. faulty or burst pipe) can be contained and diverted to where slow release or infiltration of the water is allowed, particularly on slopes.</li> <li>• During the construction phase measures must be put in place to control the flow of excess water so that it does not impact on the surface vegetation.</li> <li>• Implement stormwater management measures prior to construction on slopes. Do not allow erosion to develop on a large scale before taking action.</li> <li>• Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction/earthworks in that area.</li> </ul>	<p><b>Low</b></p>	<p><b>High</b></p>

		<ul style="list-style-type: none"> <li>• Runoff must be managed to avoid erosion and pollution problems.</li> <li>• Ensure that runoff from compacted or sealed surfaces is slowed down and dispersed sufficiently to prevent accelerated erosion from being initiated (erosion management plan required).</li> <li>• Colonisation of the disturbed areas by plants species from the surrounding natural vegetation must be monitored to ensure that indigenous vegetation cover is sufficient within one growing season.</li> <li>• Monitor alien invasive species via monitoring plan.</li> <li>• Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and work areas.</li> <li>• After construction clear any temporarily impacted areas of all foreign materials, re-apply and/or loosen topsoils and landscape to surrounding level.</li> </ul>		
<ul style="list-style-type: none"> <li>• <b>Flow sediment equilibrium change</b></li> <li>• <b>Impeding the flow of water</b></li> </ul> <p>This refers to changing the amount of sediment</p>	<p><b>Medium</b></p>	<ul style="list-style-type: none"> <li>• Construction methods should be carefully reviewed to ensure the least impact to the watercourse is ensured.</li> <li>• It is recommended that watercourse</li> </ul>	<p><b>Medium</b></p>	<p><b>High</b></p>

<p>entering the water resource and associated change in turbidity (increasing or decreasing the amount).</p> <p>Construction and operational activities will result in earthworks and soil disturbance as well as the removal of natural vegetation. This could result in the loss of topsoil, sedimentation of the watercourse and increase the turbidity of the water.</p> <p>Possible sources of the impacts include:</p> <ul style="list-style-type: none"> <li>• Earthwork activities during construction.</li> <li>• Clearing of surface vegetation will expose the soils, which in rainy events would wash through the wetland, causing sedimentation. In addition, indigenous vegetation communities are unlikely to colonise eroded soils successfully and seeds from proximate alien invasive trees can spread easily into these eroded soil.</li> <li>• Disturbance of soil surface.</li> <li>• Disturbance of slopes through creation of roads and tracks adjacent to the watercourse.</li> </ul>		<p>crossings and pipe implementation should be conducted during the dry season (winter) to help reduce the risk of flooding damage following rainfall events.</p> <ul style="list-style-type: none"> <li>• Where the pipeline lies positioned parallel to the stream channel or banks of the watercourse, care should be taken to release intercepted water from adjacent slopes in such a manner so as to not cause preferential flowpaths and erosion. Water should be released back into the watercourse in a diffuse manner. This is relevant to the construction and operational phase of the development.</li> <li>• Construct temporary running tracks on raised material on top of geotextile across the entire width of the delineated watercourse where vehicles and machinery need to access the works area.</li> <li>• A temporary fence or demarcation must be erected around No-Go Areas outside the proposed works area prior to any construction taking place as part of the contractor planning phase when compiling work method statements to prevent access to the adjacent portions of the watercourse.</li> </ul>		
---	--	--	--	--

<ul style="list-style-type: none"><li>• Erosion (e.g. gully formation, bank collapse).</li></ul>		<ul style="list-style-type: none"><li>• Effective stormwater management should be a priority during the construction phase. This should be monitored as part of the EMP. High energy stormwater input into the watercourses should be prevented at all cost.</li><li>• Sediment control should be effective and not allow any release of sediment pollution downstream. This should be audited on a weekly basis to demonstrate compliance with upstream conditions.</li><li>• Effective design of pipeline infrastructure and watercourse crossings is key to the management of potential long-term impacts associated with this development. Design should be informed by the analysis of local and downstream flow dynamics associated with different scenarios.</li><li>• Ensure effective rehabilitation after closure of the trench so that the topography is returned to its pre-development condition.</li><li>• Particular attention should be given to the protection of downstream areas during the construction phase, particularly erosion and sedimentation.</li></ul>		
--	--	--	--	--

		<ul style="list-style-type: none"> <li>• Rigorous monitoring should determine if design and rehabilitation targets are being met, and should aim to highlight any unintended negative impacts downstream resulting from changed hydrology, for example bank instability or erosion where water flowpaths have been altered.</li> <li>• Where necessary, corrective action should be determined by a team of specialists including engineers, hydrologists and ecologists.</li> </ul>		
<p><b>Water quality impairment</b></p> <p>Construction activities may result in the discharge of solvents and other industrial chemicals, leakage of fuel/oil from vehicles and the disposal of sewage resulting in the loss of sensitive biota in the wetlands/river and a reduction in watercourse function.</p>	<p><b>Medium</b></p>	<ul style="list-style-type: none"> <li>• Provision of adequate sanitation facilities located outside of the watercourse or its associated buffer zone.</li> <li>• Implementation of appropriate stormwater management around the excavation to prevent the ingress of run-off into the excavation and to prevent contaminated runoff into the watercourse.</li> <li>• The development footprint must be fenced off from the watercourses and no related impacts may be allowed into the watercourse e.g. water runoff from cleaning of equipment, vehicle access etc.</li> <li>• After construction, the land must be cleared of rubbish, surplus materials, and equipment, and all parts of the land shall be left in a condition as close as possible to that prior to use.</li> </ul>	<p><b>Medium</b></p>	<p><b>High</b></p>

		<ul style="list-style-type: none"> <li>• Maintenance of construction vehicles/equipment should not take place within the watercourse or watercourse buffer.</li> <li>• Maintenance of buffer zones to trap sediments with associated toxins.</li> <li>• Treatment of pollution identified should be prioritized accordingly.</li> </ul>		
<p><b>Compaction and destruction of soils</b></p> <p>The movement of heavy machinery over vegetated areas during construction and maintenance will result in soil compaction that may modify habitats, destroy vegetation and inhibit re-vegetation. Soil compaction because of vehicles and traffic, could lead to a decrease of water infiltration and an increase of water runoff. Such areas are more likely to be colonised by pioneer, alien invasive plant species, than indigenous species. This will further transform the vegetation of the area. The health of the topsoil is imperative for re-vegetation. Incorrect stripping, handling and storage could lead to failed rehabilitation.</p>	<p><b>Medium</b></p>	<ul style="list-style-type: none"> <li>• Plan to use manual labour, particularly along the watercourse.</li> <li>• Vehicles and machinery may not veer from the dedicated roads.</li> <li>• Once construction is complete, obsolete roads should be obliterated by breaking the surface crust and erecting earth embankments to prevent erosion, while the natural species composition should be re-established.</li> <li>• Prior to construction, the topsoil must be removed and stored separately from subsoil. The topsoil is imperative for the successful re-establishment of indigenous vegetation and it carries seed from the existing vegetation.</li> <li>• Topsoil is an important natural resource; where it must and can be stripped, never mix it with subsoil or any other material, store and protect it separately until it can be re-applied, minimise handling of topsoil.</li> <li>• Topsoil is typically stored in berms with a width of 150 – 200 cm, and a maximum height of 100 cm, preferably</li> </ul>	<p><b>Low</b></p>	<p><b>Medium</b></p>

		<p>lower, ideally in a disturbed but weed-free area. Place berms along contours or perpendicular to the prevailing wind direction.</p> <ul style="list-style-type: none"> <li>• Rapid decomposition of organic material in warm, moist topsoils decreases microbial activity necessary for nutrient cycling, and reduces the number of beneficial micro-organisms in the soil. Therefore, topsoil should therefore not be stored for extensive periods and it is recommended that the reapplication of topsoil takes place as soon as possible. Adhere to the following general rule: the larger the pile of topsoil storage needs to be, the shorter should be the time it is stored.</li> <li>• Topsoil handling should be limited to stripping, piling (once), and re-application.</li> <li>• Any movement of heavy machinery or vehicles over stored topsoils must be strictly prohibited.</li> </ul>		
<b>IMPACT ON FAUNA</b>				
<b>Destruction of animal habitat</b>	<b>Low</b>	<ul style="list-style-type: none"> <li>• Vegetation clearing should be limited where activities will be taking place.</li> <li>• Animals encountered or fell in the trenches should be handled properly and be released at a proper and safe place.</li> <li>• Trenches should be closed as soon as</li> </ul>	<b>Very Low</b>	<b>Medium</b>

		the pipeline as soon as pipeline has been installed.		
<p><b>Soil compaction and destruction of possible underground habitat habitats</b></p> <p>Construction activities are generally associated with high ambient noise levels as well as habitat destruction. Sources of this impact may include construction equipment and increased number of people within the area.</p> <p>Some species will vacate the area and become displaced during construction. It is however unlikely that the fauna community structures will change although there may be temporary changes in the distribution and abundance of fauna species during the construction phase.</p>	<b>Low</b>	<ul style="list-style-type: none"> <li>• Construction personnel should undergo awareness training regarding fauna assemblages and the correct procedures to follow should fauna be found within the site. They should be encouraged not to harm any wildlife. They should also be informed of any policies and procedures applicable for fauna and the environment.</li> <li>• Only use existing roads as the site has a good network of roads.</li> </ul>	<b>Very Low</b>	<b>Low</b>
<b>IMPACT ON VEGETATION</b>				
<p><b>Destruction of natural vegetation on the site</b></p>	<b>Low</b>	<ul style="list-style-type: none"> <li>• The removal of vegetation should be kept to a minimum.</li> <li>• Existing road infrastructure should be utilized during construction and operation.</li> <li>• The development area should be rehabilitated and re-vegetated as soon as possible using an appropriate rehabilitation plan which incorporates indigenous plant species.</li> <li>• Degraded portions of natural vegetation should be cleared of invasive as a minimum, and could be</li> </ul>	<b>Very Low</b>	<b>Medium</b>



		<p>used for limited components of the development, provided that this is located on areas with the highest present level of disturbances</p> <ul style="list-style-type: none"><li>• During the design phase, aim to have connection routes coinciding with existing roads to reduce the disturbance to vegetation and avoid creating new roads and areas of compaction by construction machinery.</li><li>• Site establishment is to be done only in an area identified as not being environmentally sensitive and approved by the ECO or EMS representative, prior to establishment.</li><li>• Prior to establishment of the site camp(s), the Contractor shall produce a plan showing the positions of all buildings, lay down yards, batch plants, vehicle wash areas, vehicle repair area, batching areas and infrastructure for approval by the Resident Engineer or PM.</li><li>• No accommodation for workforce on site except a security presence.</li><li>• During construction, grassland can be removed as sods and replanted during rehabilitation of the areas affected by construction.</li></ul>		
--	--	--	--	--

		<ul style="list-style-type: none"> <li>• Place and maintain erosion control barriers especially on steep slopes.</li> <li>• Colonisation of the disturbed areas by plants species from the surrounding natural vegetation must be monitored to ensure that vegetation cover is sufficient within one growing season. If not, then the areas need to be rehabilitated with a grass seed mix containing species that naturally occur within the study area. It is recommended that grasslands in the way of construction, be removed as sods that can be replanted as part of rehabilitation.</li> </ul>		
<p><b>Increase in alien invasion</b></p> <p>The moving of soil and vegetation resulting in opportunistic invasions after disturbance and the introduction of seed in building materials and on vehicles. Invasions of alien plants can impact on hydrology, by reducing the quantity of water entering a watercourse, and outcompete natural vegetation, decreasing the natural biodiversity. Once in a system alien invasive plants can spread through the catchment. If allowed to seed before control measures are implemented alien plans can easily colonise and impact on downstream users.</p>	<p><b>Low</b></p>	<ul style="list-style-type: none"> <li>• All alien seedlings, and saplings plants must be cleared during construction activities, with follow up clearing being undertaken after 6 months.</li> <li>• All construction vehicles and equipment, as well as construction material should be free of plant material. Therefore, all equipment and vehicles should be thoroughly cleaned prior to access on to the construction areas. This should be verified by the ECO.</li> <li>• If filling material is to be used, this should be sourced from areas free of invasive species.</li> </ul>	<p><b>Very Low</b></p>	<p><b>Medium</b></p>

IMPACTS ON THE HERITAGE FEATURES				
Heritage Features	Low	<ul style="list-style-type: none"> <li>Despite the finds being insignificant in terms of heritage sensitivity, these must be avoided.</li> <li>Should further graves, fossils or any archaeological artefacts be exhumed during construction, work on the area where the artefacts were found must cease immediately and it should immediately be reported to the police, ECO and heritage practitioner or local museum so that an investigation and evaluation of the finds can be made.</li> </ul>	Low	Low
IMPACTS ON PALEONTOLOGICAL RESOURCES				
Palaeontology Features	Low	<ul style="list-style-type: none"> <li>The Environmental Control Officer must familiarise him- or herself with the formation present and its fossils.</li> <li>The development may go ahead, but the ECO must survey for fossils before and or after drilling, excavating or blasting.</li> <li>Chance Find Protocol</li> </ul>	Low	Moderate
VISUAL IMPACTS				
<ul style="list-style-type: none"> <li>Pollution may occur due to the littering and illegal dumping on the site and surrounding areas which can affect the visual character of the site.</li> </ul>	Medium	<ul style="list-style-type: none"> <li>Ensure that no litter, refuse, waste, rubbish, rubble, debris and builders wastes generated on the premises be placed, dumped or deposited on</li> </ul>	Low	Medium

<ul style="list-style-type: none"> <li>• During construction, the area of construction works will not be appealing as a result of building material, rubble, machinery, personnel, etc.</li> </ul>		<p>adjacent or surrounding properties including road verges, roads or public places and open spaces during or after the construction period. All waste/litter/rubbish etc. must be disposed of at an approved dumping site as approved by the Council.</p> <ul style="list-style-type: none"> <li>• Bare surfaces must be rehabilitated as soon as possible with indigenous vegetation that will be able to grow in the area;</li> <li>• The landscape must be rehabilitated in such a way that it corresponds to the surrounding topography;</li> <li>• Manage construction activities in accordance with the accepted/ approved construction EMPr.</li> <li>• Screen Construction site from neighbouring area by means of a fence and opaque cover/sheeting</li> <li>• Ensure appropriate housekeeping</li> <li>• No construction rubble, construction material, refuse, litter or any other material not found naturally in the surroundings should be allowed at any time to be lying around on the construction site.</li> </ul>		
<b>NOISE IMPACTS</b>				

<ul style="list-style-type: none"> <li>• Increase in noise pollution due to, among others, excavations and site clearing, noise from construction vehicles and construction staff and or drilling activities.</li> <li>• Noise pollution caused during construction could potentially be a nuisance to property owners.</li> </ul>	<p><b>Medium</b></p>	<ul style="list-style-type: none"> <li>• Construction activities must be limited to normal working hours and according to municipal bylaws, i.e. working hours must be limited to weekdays only.</li> <li>• If construction is required on the weekend; permission from adjacent landowners will be required prior to construction.</li> <li>• No sound amplification equipment such as sirens, loud hailers or hooters are to be used on site except in emergencies and no amplified music is permitted on site.</li> <li>• Equipment that is fitted with noise reduction facilities (e.g. side flaps, silencers etc) must be used as per operating instructions and maintained properly during site operations.</li> <li>• Construction activities must abide by the national noise laws and the municipal noise by-laws with regard to the abatement of noise caused by mechanical equipment.</li> <li>• Introduce a formal recording system/grievance mechanism to capture public perceptions and complaints with regard to noise impact.</li> </ul>	<p><b>Low</b></p>	<p><b>Medium</b></p>
<p>IMPACTS ON THE AIR QUALITY</p>				

<p>Construction activities have the potential to be sources of fugitive dust on site. These include:</p> <ul style="list-style-type: none"> <li>• Dust from access roads.</li> <li>• Dust from area cleared for construction.</li> <li>• Emissions from construction machinery and equipment.</li> <li>• Trucks transporting spoil and fill material.</li> </ul>	<p><b>Low</b></p>	<ul style="list-style-type: none"> <li>• Dust suppression measures must be implemented on access roads and working areas during dry periods.</li> <li>• Water used for this purpose must be in quantities that do not result in the generation of run-off.</li> <li>• Adherence to speed limits on site roads to prevent the liberation of dust into the atmosphere must be enforced</li> <li>• All site workers will need to wear the appropriate PPE</li> <li>• Transported material that can be blown off as dust must</li> <li>• Contractor to provide method statement of site specific dust control measures</li> <li>• A speed limit of 40km/h to be maintained on all dirt roads.</li> <li>• Dust suppression by means of either water or biodegradable chemical agent is required.</li> </ul>	<p><b>Low</b></p>	<p><b>Low</b></p>
--	-------------------	--	-------------------	-------------------

**TRAFFIC IMPACTS**

<ul style="list-style-type: none"> <li>• Anticipated impact on traffic owing to construction vehicles and heavy vehicles delivering materials to the site.</li> <li>• Traffic congestion in and around the area may offend property owners during the construction phase.</li> </ul>	<p><b>Low</b></p>	<ul style="list-style-type: none"> <li>• Construction vehicles are not to be parked on the roads thereby blocking the way to the properties.</li> <li>• Clear signs should be displayed and entrance to the site indicating a construction site and turning construction vehicles.</li> <li>• Construction vehicles are to avoid main roads during peak traffic hours and mitigation measures outlined in the EMP are to be implemented.</li> <li>• Ensure an appropriate access procedure to avoid backlog of traffic at the entry point to the site.</li> </ul>	<p><b>Low</b></p>	<p><b>Low</b></p>
<b>POLLUTION DUE TO INAPPROPRIATE HANDLING OF GENERATED WASTE ON SITE</b>				
<p>Waste generation could have negative impacts on the environment if not controlled adequately. Waste streams likely to include domestic waste, spent grinding material, mixed concrete, paint cans and brushes, construction rubble and other construction waste</p>	<p><b>Low</b></p>	<ul style="list-style-type: none"> <li>• General waste should be placed in a water tight container and disposed of on a regular basis.</li> <li>• Where possible construction waste should be recycled or reused.</li> <li>• Waste should be temporarily stored on site before being disposed of appropriately.</li> <li>• Records of all waste taken off site and disposed of must be kept as evidence.</li> <li>• Building rubble must be re-used, where possible, where this is not possible, the rubble will be disposed of at an appropriate site.</li> </ul>	<p><b>Low</b></p>	<p><b>Low</b></p>

		<ul style="list-style-type: none"> <li>Burning of waste material will not be permitted.</li> <li>Any hazardous waste that may be generated should be separated from general waste and stored in clearly marked and properly sealed secondary containers.</li> </ul>		
<b>SOCIO- ECONOMIC (POSITIVE)</b>				
<ul style="list-style-type: none"> <li>Creation of job opportunities as a result of construction activities</li> <li>Labour will be required for construction activities of the proposed development. It is therefore expected that jobs will be created during the construction period.</li> <li>The construction labour requirements have not been estimated as yet. It is expected that much of the work will require mechanised construction methods because of the bulk of the works. However, there will also be a need for manual labour for construction.</li> </ul>	<b>Medium</b>	<b>Enhancements:</b> <ul style="list-style-type: none"> <li>It is recommended that local employment policy is adopted to maximise the opportunities made available to the local labour force.</li> <li>This provides the opportunity for affected communities to benefit, but also provides an opportunity to reduce crime to the area.</li> <li>Training and skills development programmes should be provided to all employees.</li> <li>The recruitment selection process should seek to promote gender equality and the employment of women wherever possible</li> </ul>	<b>High (+)</b>	<b>Low</b>
<b>LANDOWNER IMPACTS</b>				
<ul style="list-style-type: none"> <li>Preferred Alternative cuts through the</li> </ul>	<b>High</b>	<ul style="list-style-type: none"> <li>It is suggested that large indigenous</li> </ul>	<b>Medium</b>	<b>High</b>



<p><b>middle of properties earmarked for future development.</b></p> <ul style="list-style-type: none"> <li>• <b>Aesthetic/visible effects during the operational phase</b></li> <li>• <b>Noise</b></li> <li>• <b>Unnecessary removal of vegetation for the project</b></li> <li>• <b>Concern about dogs' safety during construction</b></li> <li>• <b>Communication during construction by the contractor</b></li> </ul>		<p>and fast-growing vegetation could be planted to screen the property from the upgraded water plant once construction is complete.</p> <ul style="list-style-type: none"> <li>• It is suggested that the large indigenous vegetation could also serve as a noise buffer and the engineers / appointed contractor(s) should as far as is practicably possible, opt for pumps and other noise-generating equipment with the lowest sound output/decibels.</li> <li>• Vegetation should only be removed when required for construction. Even so, the contractor should inform the landowner prior to the removal of such vegetation where required; and especially the larger trees, on the property. Where required, vegetation is to be replaced with indigenous species.</li> <li>• A temporary fence or adequate barrier to prevent the dogs from entering the construction area is to be erected during construction.</li> <li>• The appointed contractor is to</li> </ul>		
---	--	---	--	--

		communicate the anticipated project timeframes and working times with the landowner and other affected landowners.		
<b>HEALTH AND SAFETY AND SECURITY</b>				

<ul style="list-style-type: none"> <li>• Influx of workers looking for employment opportunities to the area.</li> <li>• Local security is also likely to be comprised during the construction phase by the presence of workers on site and job seekers.</li> <li>• Increased risk of theft associated with construction activities.</li> <li>• Injuries and incidents to site construction workers and also to the public/surrounding community</li> </ul>	<p><b>Medium</b></p>	<ul style="list-style-type: none"> <li>• Ensure that the construction vehicles are under the control of competent personnel and are in proper working order.</li> <li>• Ensure that only suitably qualified personnel use construction vehicles</li> <li>• Ensure that the contact details of the police or security company and ambulance services are available on site</li> <li>• Limit access to the construction crew camp to construction workers through access control.</li> <li>• Comply with the requirements of the Occupational Health and Safety Act, 1993 (Act No.85 of 1993) requirements.</li> <li>• Ensure that the handling of equipment and materials is supervised and adequately instructed.</li> <li>• The site and crew are to be managed in strict accordance with the Occupational Health and Safety Act, 1993 (Act No.85 of 1993) and the National Building Regulations.</li> <li>• Staff must be regularly updated about the safety procedures via toolbox tools that must be held on site once a week or as determined by the appointed Safety Health and Environmental</li> </ul>	<p><b>Low</b></p>	<p><b>Medium</b></p>
--	----------------------	--	-------------------	----------------------

		<p>Officer.</p> <ul style="list-style-type: none"><li>• Emergency facilities must be available and adequately supplied for use by staff and customers.</li><li>• Limit access to the construction crew camp only to the workforce.</li><li>• Any crimes to be reported to the local South African Police Service (SAPS). These incidents are either reported by the Project Manager or through the knowledge of the Project Manager</li><li>• All employees to be clearly identifiable.</li><li>• Proper supervision of employees at all times.</li><li>• Construction activities must remain within construction footprint.</li><li>• No unauthorized people to be allowed on site.</li><li>• Appropriate notification signs must be erected, warning the residents, pedestrians and cyclist about the hazards around the construction site and presence of heavy vehicles.</li><li>• Those areas surrounding the construction site that are not part of the demarcated development area should be considered as “no-go” areas for employees, machinery or even visitors.</li><li>• Safe drinking water for human</li></ul>		
--	--	--	--	--

		<p>consumption shall be available at the site offices and at other convenient locations on site. All water used on site must be taken from a legal source and comply with the recognised standards for potable and other uses.</p> <ul style="list-style-type: none"><li>• Mechanisms should be implemented to deal with people seeking employment in order to minimize any issues related to the influx of people.</li><li>• All construction activities should be limited to the demarcated areas.</li><li>• The permit holder must make provision for sanitation facilities on site in line with the Occupational Health and Safety Act, 1993 (Act 85 of 1993)</li><li>• All staff is to use the toilets at all times rather than informal defecation in the environment.</li><li>• Toilets are to meet the minimum requirements of the Occupational Health and Safety Act,1993 (Act 85 of 1993)</li></ul>		
--	--	---	--	--

**Table 26: Operation Phase Impacts**

Potential impacts	Significance rating of impacts	Proposed mitigation	Significance rating of impacts with Mitigations	Risk of the impact and mitigation not being implemented
<b>IMPACT ON WETLAND</b>				
<ul style="list-style-type: none"> <li>• Impeding the flow of water</li> <li>• Altered flow dynamics</li> <li>• Water quality impairment</li> </ul>	<b>Medium</b>	<ul style="list-style-type: none"> <li>• Care should be taken to release intercepted water from adjacent slopes in such a manner so as to not cause preferential flowpaths and erosion. Water should be released back into the wetland in a diffuse manner. This is relevant to the construction and operational phase of the development.</li> <li>• Implementation of best management practices during maintenance.</li> <li>• Monitoring should be done to ensure that sediment pollution is timeously dressed.</li> <li>• Monitor the establishment of alien invasive species within the areas affected by the construction and maintenance and take immediate corrective action where invasive species are observed to establish.</li> <li>• Rehabilitate or revegetate disturbed areas.</li> <li>• Operational activities should not take place within wetland or buffer zones, nor should edge effects impact on these areas</li> <li>• Operational activities should not impact on rehabilitated or naturally vegetated areas.</li> <li>• Control of waste discharges and do not allow dirty water from operational activities to enter the</li> </ul>	<b>Low</b>	<b>Medium</b>

Potential impacts	Significance rating of impacts	Proposed mitigation	Significance rating of impacts with Mitigations	Risk of the impact and mitigation not being implemented
		wetland.		
<b>IMPACT ON FAUNA</b>				
Destruction of underground animal habitat	Low	<ul style="list-style-type: none"> <li>Repair and maintenance must be conducted timeously.</li> </ul>	Very Low	Medium
<b>IMPACT ON VEGETATION</b>				
Increased flows due to leaks or pipe failure	Very Low	<ul style="list-style-type: none"> <li>Regular inspections and maintenance of the pipeline must be undertaken during the operational phase, with any leaks repaired immediately.</li> <li>Maintenance activities should be restricted to previously disturbed areas, while limiting vegetation loss.</li> <li>Ensure that maintenance work is done according to a fixed plan.</li> <li>Repair all erosion damage as soon as possible.</li> </ul>	Very Low	Low
<b>IMPACTS ON THE HERITAGE FEATURES</b>				

Potential impacts	Significance rating of impacts	Proposed mitigation	Significance rating of impacts with Mitigations	Risk of the impact and mitigation not being implemented
Heritage Features	Low	<ul style="list-style-type: none"> <li>Should graves, fossils or any archaeological artefacts be exhumed during maintenance and operation, work on the area where the artefacts were found must cease immediately and it should immediately be reported to the police, ECO and heritage practitioner or local museum so that an investigation and evaluation of the finds can be made.</li> </ul>	Low	Low
<b>IMPACTS ON PALEONTOLOGICAL RESOURCES</b>				
Palaeontology Features	Low	<ul style="list-style-type: none"> <li>Chance Find Protocol applies during operation and maintenance as well.</li> </ul>	Low	Medium
<b>VISUAL IMPACTS</b>				
Visual Impacts	Low	<ul style="list-style-type: none"> <li>Regular maintenance of water pipe.</li> </ul>	Low	Low
<b>NOISE IMPACTS</b>				



Potential impacts	Significance rating of impacts	Proposed mitigation	Significance rating of impacts with Mitigations	Risk of the impact and mitigation not being implemented
Noise Impacts during maintenance and operation	<b>Medium</b>	<ul style="list-style-type: none"> <li>• Inform residents of planned maintenance works.</li> <li>• Maintenance and the use of construction machinery should be limited between 06h00 and 18h00 on weekdays only.</li> <li>• Institute noise control measures throughout maintenance periods.</li> <li>• Maintenance activities must abide by the national noise laws and the municipal noise by-laws with regard to the abatement of noise caused by mechanical equipment.</li> </ul>	<b>Low</b>	<b>Medium</b>
<b>IMPACTS ON THE AIR QUALITY</b>				
Dust Impacts	<b>Low</b>	<ul style="list-style-type: none"> <li>• Dust suppression and wet spraying should be implemented during maintenance works.</li> </ul>	<b>Low</b>	<b>Low</b>
<b>SOCIAL ECONOMIC (POSITIVE)</b>				
Water supply and pressure will be constant. Access to potable water is a basic human right. This will result in overall community upliftment.	<b>Medium</b>	<b>Enhancements:</b> <ul style="list-style-type: none"> <li>• Maintenance of infrastructure.</li> <li>• Maintenance must comply with safety regulations.</li> </ul>	<b>High (+)</b>	<b>Low</b>

**7.3 No-Go Alternative**

This is the option of not upgrading the Bergville WTW and associated infrastructure. This option will result in limited impacts already occurring in the study area. However, should the infrastructure not be upgraded as proposed, community upliftment will fail to occur as water supply capacity in the area will remain low and the current pipes will continue to deteriorate and cause long term health risks to the community. This is an undesirable option for the project as it will pose negative impacts on the social and economic perspective and is not considered desirable. The negative impacts of the no go option alternative are considered to outweigh the positive impacts of this alternative. The no go option is therefore not preferred.

**Table 27: Potential impacts should the Development not be Approved ("No-Go" Alternative)**

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
Loss of aquatic habitat and biota – No-go would mean study site status quo is maintained.	P – Medium	There are no mitigation measures	P – Medium	Low risk
Loss of indigenous vegetation – No-go would mean study site status quo is maintained.	P – Medium	There are no mitigation measures	P – Medium	Low risk
Modification of riparian zone – No-go would mean study site status quo is maintained.	P – Medium	There are no mitigation measures	P – Medium	Low risk
Siltation of watercourse – No-go would mean study site status quo is maintained.	P – Medium	There are no mitigation measures	P – Medium	Low risk
Erosion of watercourse – No-go would mean study site status quo is maintained.	P – Medium	There are no mitigation measures	P – Medium	Low risk
Flow sediment equilibrium change – No-go would mean study site status quo is maintained.	P – Medium	There are no mitigation measures	P – Medium	Low risk
Impeding the flow of water – No-go would mean study site status quo is maintained.	P – Medium	There are no mitigation measures	P – Medium	Low risk
Water quality impairment – No-go would mean study site status quo is maintained.	P – Medium	There are no mitigation measures	P – Medium	Low risk

Clearing of land for construction camps and potential pollution of the soil and water – No-go would mean study site status quo is maintained.	P – Medium	There are no mitigation measures	P – Medium	Low risk
Compaction and destruction of soils – No-go would mean study site status quo is maintained.	P – Medium	There are no mitigation measures	P – Medium	Low risk
Destruction of animal habitat – No-go would mean study site status quo is maintained.	P – Medium	There are no mitigation measures	P – Medium	Low risk
Soil compaction and destruction of possible underground habitat habitats – No-go would mean study site status quo is maintained.	P – Medium	There are no mitigation measures	P – Medium	Low risk
Destruction of natural vegetation on the site – No-go would mean study site status quo is maintained.	P – Medium	There are no mitigation measures	P – Medium	Low risk
Increase in alien invasion – No-go would mean study site status quo is maintained.	P – Medium	There are no mitigation measures	P – Medium	Low risk
Loss and disturbance of heritage sites – No-go would imply no heritage sites or artefacts will be disturbed.	P – Low	There are no mitigation measures	P – Low	Low risk
Loss and disturbance of palaeontological features due to the development – No-go would imply no palaeontological artefacts will be disturbed.	P – Low	There are no mitigation measures	P – Low	Low risk
Health, safety and security – No-go would imply that the area remains as is.	P – High	There are no mitigation measures	P – High	High risk
Air Quality – Dust generation – No-go would mean study site status quo is maintained.	P – High	There are no mitigation measures	P – High	Low risk
Noise – No-go would imply no construction noise and no added noise during operation.	P – High	There are no mitigation measures	P – High	Low risk
Traffic – No-go would imply no need for additional traffic load within the area	P – Medium	There are no mitigation measures	P – Medium	Low risk
Pollution as a result of waste – No-go would imply no generation of additional waste to the area	P – High	There are no mitigation measures	P – High	Low risk
Landowner Impacts – No-go would imply	P – High	There are no mitigation measures	P – High	Low risk

no generation of additional waste to the area		measures		
Socioeconomic impacts anticipated during the construction period – No-go would mean no local job opportunities for general and skilled labourers as well as no opportunities for local retailers.	N – High	The project will provide job opportunities for locals and for local suppliers.	N – High	High risk
Socioeconomic impacts anticipated during the operational period – No-go would mean that overall community upliftment will not occur and the water supply would remain insufficient for the community.	N – High	Upgrading of the water pipe will increase the water supply capacity to provide water at sufficient capacities to the community thus providing a basic human right.	N – High	High risk
Visual: during construction – No-go would imply that the study site will remain as is.	P – Medium	There are no mitigation measures	P – Medium	Low risk
Visual: during operation – No-go would imply the study site will remain as is.	N – High	An upgraded pipe and associated infrastructure would be aesthetically appealing and complement the area. However, not much of the area is visible to public.	N – High	Medium risk

## 7.4 Cumulative Impacts

Cumulative impacts can result from actions which may not be significant on their own but which are significant when added to the impact of other similar actions. The anticipated cumulative impacts of this development include the following:

- **Impacts on the Wetland**

Impacts associated with construction could increase the significance of this impact already present as a result of other activities in the area such as dumping; erosion and pollution input and infilling are amongst the most significant impact.

- **Spread of alien vegetation**

Disturbance during construction will result in more alien plant species occurring on site as such plant species proliferate in disturbed areas.

- **Increased socio-economic upliftment as a result of the proposed development**

Constructing the proposed development will result in direct jobs being created during the construction phase. Upgrading of the water pipe will increase the water supply capacity for the community being supplied by the Bergville WTW.

Responsible environmental management will be required during the entire project life cycle. These management measures should be guided by the Environmental Management Programme (EMPr), attached as **Appendix G**.

## **7.5 Environmental Impact Statement**

All alternatives would provide a long term solution to the problem, however, in terms of construction, Alternative 2 (orange) is preferred as the route is more financially feasible and time efficient in comparison to the original route, Alternative 1 and the landowner's suggested route. Alternative 2 will however cross through the middle of private owned property which is earmarked for future development by the landowners. However, the preferred pipeline route is to follow an existing servitude which makes it more favourable in terms of time and finance.

All alternatives would result in additional traffic impacts en route to the proposed site within the Bergville community, however it would be temporary. The pipeline length of Alternative 2 (from Erf 356 to the command reservoir) was the shortest, at approximately 430.19m. This is positive as the length to be impacted on environmentally is much less. This would result in less time for construction and less impacts in relation to the original route, Alternative 1 and the landowner's suggested route.

## 8. CONCLUSIONS AND RECOMMENDATIONS

---

### 8.1 Conclusion (Impact Statement)

This Report has identified and assessed the potential impacts on the environment associated with the proposed Bergville WTW upgrade project.

The findings of the specialist studies undertaken within this EIA to assess both the benefits and potential negative impacts anticipated as a result of the proposed project conclude that the project will result in some unavoidable environmental impacts during both construction and operation but there are **no environmental fatal flaws** that should prevent the proposed project from proceeding, provided that the recommended mitigation and management measures outlined are implemented. The significance levels of the majority of identified negative impacts have been reduced to acceptable levels by implementing the mitigation measures recommended by the specialist team during the EIA process, which included the consideration of the proposed layout in relation to environmental sensitivities identified. The development on areas of environmental sensitivities must be avoided as far as possible. Where required, respective mitigation measures must be implemented. The project has considered environmental constraints and is considered to meet requirements of sustainable development if mitigation measures are effectively implemented. Environmental specifications for the management of potential impacts are detailed within **Appendix G**.

### 8.2 Recommendations

ZN Geo Services (Pty) Ltd thus suggests the approval of the preferred Route Alternative 2 (orange) as a result of the least construction impacts anticipated by this alternative in comparison to all three other alternatives. It is believed that the impacts associated with Alternative 2 can be mitigated to an acceptable level provided that the mitigation measures implemented are in line with measures set out in the EMPr. The proposed development is further subject to approval by DWS by means of a Water Use License, without which development cannot commence.

Based on the assumption ZN Geo Services (Pty) Ltd believes through effective implementation of the stipulated mitigation measures, the adverse impacts can be reduced. With the proposed mitigation measures, EDTEA may agree that the proposed upgrade be granted approval.

### General Recommendations

ZN Geo Services (Pty) Ltd recommends that the preferred alternative as per above, be considered for approval subject to the following general recommendations:



1. Implementing the EMPr to guide construction and operational activities to provide a framework for the on-going assessment of environmental performance.
2. Water Use License: The relevant authorisations and water use licenses must be obtained from the Department of Water and Sanitation prior to the commencement of construction activities.
3. No development other than the authorized activities will be allowed within a wetland or buffer of the wetland measured from the edge of the wetland.
4. An independent ECO must be appointed/ designated to ensure that regular inspections are performed during the construction phase and to ensure the implementation of mitigation measures. Furthermore, an ECO must monitor compliance with all the conditions of the EMPr and the environmental authorization once issued.
5. There is continued consultation with relevant stakeholders/landowner through an appointed community liaison officer during construction.
6. Reports on the status of construction and legal compliance are submitted to EDTEA at stipulated intervals.
7. Clearance of the area should be as minimal as possible and construction activities be confined to areas where construction will take place (development footprint) to prevent negative impacts onto the surrounding environment.
8. Avoid, as far as reasonably possible, disturbing the wetlands. Similarly, restore wetlands that will remain intact if they have been affected by construction activity – this project constitutes activities within a wetland.
9. Adequate measures must be put in place to prevent polluted runoff water from entering the, wetland and soil, thus preventing surface and groundwater pollution.
10. Servicing/maintenance/washing of vehicles must not be carried on the construction site and only emergency repairs can be done on site.
11. In the event of a major incident (e.g. fire causing damage to property and environment, major spill or leak of contaminants), the relevant authorities should be notified as per the notification of emergencies/ incidents, as per the requirements of Section 30(3) of NEMA.
12. Construction noise on site must not exceed 85 decibels (DB) as stipulated in the Occupation Health and Safety Act (Act No. 85 of 1993).
13. All relevant legislation and requirements of other government departments (National, Provincial), in particular of Section 28 (duty of care) of NEMA, must be complied with.
14. Compliance with all legal requirements in relation to environmental management and conditions of the authorisation issued by EDTEA.

15. Maximise the employment of local people and the procurement of local resources during the construction and maintenance phases to ensure maximum benefit to the provincial/local economy.
16. Implement the recommendations made in the specialist studies and EMPr.
17. The EMPr should form part of the contractor's tender documentation.

From the impact assessment, it is evident that prior to mitigation, impacts associated with the proposed development are generally moderate. Thus, based on the specialist recommendations, it is the opinion that the project be considered favourably and environmental authorisation granted for the proposed activities, provided the essential and recommended mitigation measures as defined in this report are strictly adhered to.

## **9. APPENDICES**

---

The following appendixes are attached:

### Appendix A: Site plans

A1: Locality Map

A2: Topography Map

A3: CBA/ ESA Sensitivity Map

A4: Hydrology Map

A5: Wetland Map

A6: Vegetation Map

A7: Geology Map

A8: Elevation Map

A9: Landuse Map

### Appendix B: Photographs

### Appendix C: Layout

### Appendix D: Route Alignment Information

### Appendix E: Public Participation

E1: I&AP Database

E2: Background Information Document

E3: Proof of Newspaper Advert

E4: Proof of Site Notices

E5: Land Claims

E6: Proof of Correspondence

E7: Comments and Response Report

E8: SAHRIS

#### Appendix F: Specialist Studies

F1: Wetland Assessment

F2: Vegetation Assessment

F3: Animal Assessment

F4: HIA

#### Appendix G: Environmental Management Programme

#### Appendix H: Other Information

H1: EAP CV & Qualifications

H2: Specialists & EAP Declarations

H3: Screening Tool Report