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OCTOBER 2020

FINAL BASIC ASSESSMENT REPORT
CONSTRUCTION OF THE UMSHWATHI /GREATER EFAYE WATER SUPPLY SCHEME: PHASE 4 - RETICULATION
UMGUNGUNDLOVU DISTRICT MUNICIPALITY
EIA REF NO: DC22/0011/2020

EVP1139

uMGUNGUNDLOVU
UMASIPALA WESIFUNDA
DISTRICT MUNICIPALITY
DISTRIK MUNISIPALITEIT

This report was prepared by EnviroPro Environmental Consulting in terms of Appendix 1 to GNR 982

3 (1) (a) details of (i) the EAP who prepared the report; and (ii) the expertise of the EAP. Please see Appendix I for EAP Declaration and full Curriculum Vitae;

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Executive Summary

The uMgungundlovu Municipality propose to construct Phase 4 of the uMshwathi / Efaye Water Supply Scheme and associated Reservoirs within Wards 3, 4 and 14 of the uMshwathi Local Municipality and Ward 1 of the Umvoti Local Municipality, uMgungundlovu District Municipality, KwaZulu-Natal. This will require infill and excavation of material from within multiple watercourses. The uMshwathi Water Supply Scheme is an existing project, where Phase 1 – 3 was for the construction of the bulk water pipelines and reservoirs. Phase 4 is the construction of the reticulation pipeline and additional infrastructure (reservoirs and water storage tanks). The community does not have a consistent supply of water due as there is no existing infrastructure in place, or existing infrastructure that has fallen into disrepair.

The full scope of the project will include the installation of new water reticulation pipelines (approximately 208.5km) with yard connections, break pressure tanks, water storage tanks (4kL – 22kL), and two reservoirs (50kL and 400kL). Only the small reticulation pipeline will cross 59 watercourses and cross a channelled valley bottom wetland 6 times. This will result in the infill and excavation of more than $10m^3$ of material within multiple watercourses and will also result in the development of infrastructure exceeding $100m^2$ in size within 32m of multiple watercourses and within the uMgungundlovu District Municipality EMF.

The following key impacts and mitigation measures were assessed:

- **Damage to the Mvoti River, watercourse banks, wetland areas, and riparian zones from construction activity:** Caution must be exercised when working near and within all watercourses and the Mvoti River (WC1-59). Top soil must be stockpiled more than 15m from the watercourse and wetland areas. Heavy vehicles must be kept at least 15m away from the watercourses and wetlands except where needed for pipeline construction. The construction footprint within WC1-WC59 must not be widened more than is necessary for construction.
- **Encroachment of alien vegetation into areas disturbed during construction:** Alien vegetation within the construction footprint must not be allowed to encroach onto the site footprint area and must be continually removed during construction.
- **Damage to Surrounding properties, services and businesses:** The construction activity could disrupt access to existing services, and residential properties. All services must be identified prior to construction and all stakeholders must be notified prior to road closures and service disruption. Temporary alternative access routes for affected properties must be created where required.
- **Pipeline impeding or altering flow of the watercourses and wetlands:** The pipes within the watercourse will be laid below the level of the river bed and encased in concrete. Reno Mattresses will be laid above the encasement and gabion baskets will be used to stabilise the banks of the river (if required). Where heavy stream flow is anticipated, the crossing will be anchored with the use of irons doweled into the river bed.
- **Loss of vegetation and riparian vegetation during excavation across watercourses:** Vegetation clearing is to be kept to a minimum due to the small size of the pipe and associated trench. Where possible, the trench must be dug by hand across the watercourses to prevent unnecessary clearance. The potential for erosion is to be monitored by the Contractor on an ongoing basis during clearing.
- **Improved services:** The water supply scheme will improve service delivery to the area increasing the potable water supply for future expansion of the area. This is a positive impact.

These impacts can be mitigated by following the recommendations in this report and EMPr. Construction activities will be monitored and controlled through the implementation of the Environmental Management Program (EMPr).

Taking into consideration the above impacts and mitigation measures, it is the EAP's opinion that there are no significant environmental impacts associated with the proposal which cannot be mitigated. Therefore, it is recommended that the project be authorised.

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Section 1: Scope of Work and Location of Activity

1.1 Project Title

Construction of the uMshwathi / Greater Efaye Water Supply Scheme: Phase 4 – Reticulation.

1.2 A Description of the Activities to Be Undertaken Including Associated Structure and Infrastructure As per Section 3(d) (ii)

The uMgungundlovu Municipality propose to construct Phase 4 of the uMshwathi / Efaye Water Supply Scheme and associated Reservoirs within Wards 3, 4 and 14 of the uMshwathi Local Municipality and Ward 1 of the Umvoti Local Municipality, uMgungundlovu District Municipality, KwaZulu-Natal. This will require infill and excavation of material from within multiple watercourses. The uMshwathi Water Supply Scheme is an existing project, where Phase 1 – 3 was for the construction of the bulk water pipelines and reservoirs. Phase 4 is the construction of the reticulation pipeline and additional infrastructure (reservoirs and water storage tanks). The community does not have a consistent supply of water as there is either no existing infrastructure in place, or existing infrastructure has fallen into disrepair.

The full scope of the project will include the installation of new water reticulation pipelines (approximately 208.5km) with yard connections, break pressure tanks, water storage tanks (4kL – 22kL), and two reservoirs (50kL and 400kL). The project will provide water to the following villages: Faya, KwaZibusele, Mtulwa, Mbulwane and Nadi. Only the small reticulation pipeline will cross 59 watercourses and cross a channelled valley bottom wetland 6 times. This will result in the infill and excavation of more than $10m^3$ of material within a watercourse and will also result in the development of infrastructure exceeding $100m^2$ in size within 32m of a watercourse and within the uMgungundlovu District Municipality EMF.

The project comprises the following:

- 0.5km of 315Ø gravity main pipeline;
- 1.3km of 250Ø gravity main pipeline;
- 2.12km of 200Ø gravity main pipeline;
- 12.37km of 160Ø gravity main pipeline;
- 15.25km of 110Ø gravity main pipeline;
- 17.28km of 90Ø gravity main pipeline;
- 34.84km of 75Ø gravity main pipeline;
- 124.8km of 50Ø gravity main pipeline;
- One (1) 400kL Reservoir;
- One (1) 50kL Reservoir;
- Thirty-five (35) Break Pressure Tanks;
- One (1) Elevated Tank;
- Four hundred and forty-six (446) Precast Chambers;
- Six (6) Water Storage Tanks (ranging from 4kL – 22kL); and,
- Two thousand and thirty (2030) Yard Tap Connections.

A total of 208.5km of water pipeline is required to be installed for the uMshwathi Water Supply Scheme – Phase 4. Where possible, the pipeline route will run along road reserves. The pipeline trench will be up to 1.5m wide and 2-4m deep. There are fifty-nine (59) watercourse crossings (WC) proposed, of which six (6) have associated wetland that will be affected by the pipeline crossing.

An environmental authorisation is required only for the watercourse and wetland crossings, which will result in the infill or excavation of $2832m^3$ of material, as well as the development of $1888m^2$ of infrastructure constructed within 32m of a watercourse and within the uMgungundlovu District Municipality EMF. Therefore, this report and EMPr focuses on these specific areas.

The construction of the uMshwathi WSS will have a positive impact for local potable water access for the residents living in this area. There is currently limited water supplied to the community in this area and the uMgungundlovu District Municipality believes that constructing this water supply scheme will improve and increase the supply of water to the community.

1.3 Description Of Feasible Alternatives As Per Section 3(h)(i)

Technology/ Pipeline Design Alternatives

The aim of the project is to increase the reliable, potable water supply to this area with as little environmental and infrastructural disturbance/impact as possible. The pipeline routes have been designed, where possible, to follow existing watercourse and wetland crossing locations, thus reducing environmental impact. No alternative pipe routes or crossing points were considered as any alternatives would increase the number of watercourse crossings and the extent of trench excavation required. Two different pipe crossing technology/designs were investigated, namely;

Technology Alternative 1 (preferred): Casing the pipe in steel and concrete and running it under the bed of the watercourses and wetlands is the preferred alternative.

Technology Alternative 2: Constructing pipe bridges across the watercourses.

See Appendix A for Engineering Drawings.

The No Go Alternative

The construction of the water reticulation network and new reservoirs will not occur, and the existing water pipeline will remain in use and without maintenance. The new bulk water pipelines that have been constructed (Phase 1 – 3 of the uMshwathi WSS) will not be able to efficiently supply water through the old reticulation pipelines. Residents will continue to have to walk long distances to acquire water each day. Additionally, with the current and anticipated increase in water users in this area in the near future, this will place pressure on the existing water service infrastructure in this area. The new pipe lines and reservoirs will still be required to meet future water service demands should this upgrade not be authorised.

See Appendix A for Engineering Drawings.

1.4 All Listed And Specific Activities To Be Triggered And Being Applied For As Per Section 3(d)(i)

GNR	Activity Number	Activity as per the legislation	Activity as it applies to the proposal
GNR 327 Listing Notice 1 of the 2014 EIA Regulations, as amended	12	*The development of—* *(ii) infrastructure or structures with a physical footprint of 100 square metres or more;* *where such development occurs—* *(a) within a watercourse;*	The uMshwathi WSS – Phase 4 will entail the cumulative development of 1888m^2 of infrastructure within 32m of several watercourses (including the Mvoti River) in a rural area.
GNR 327 Listing Notice 1 of the 2014 EIA Regulations, as amended	19	*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 a watercourse;*	The applicant proposes to construct the pipeline through 59 watercourse crossings. This activity will result in more than 2832m^3 of material being moved/ deposited within multiple watercourses.
GNR 327 Listing Notice 3 of the 2014 EIA Regulations, as amended	14 KwaZulu-Natal (d.)-(viii.)	*The development of— (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;* d. KwaZulu-Natal viii. Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority.	The construction of the uMshwathi WSS – Phase 4 reticulation will also result in approximately 1888m^2 of infrastructure being constructed either within the identified watercourses or within 32m of such watercourses located within sensitive areas as identified in the uMgungundlovu District Municipality EMF.

1.5 Location Of Activity As Per Section 3 (b)(i)-(iii)

District Municipalities	uMgungundlovu District Municipality	
Local Municipalities	uMshwathi Local Municipality	Umvoti Local Municipality
Ward	Wards 3, 4 and 14	Ward 1
Area / Town / Village	25km north-east of Wartburg	
Co-ordinates:	**Latitude**	**Longitude**
Starting point:	29°17'7.65"S	30°46'53.27"E
End point:	29°14'40.64"S	30°54'12.17"E
WC 1:	29°15'36.09"S	30°53'43.75"E
WC 2:	29°15'31.25"S	30°53'46.90"E
WC 3:	29°15'25.59"S	30°53'35.04"E
WC 4:	29°15'16.75"S	30°53'52.08"E
WC 5:	29°15'13.29"S	30°53'43.87"E
WC 6:	29°15'9.84"S	30°53'36.67"E
WC 7:	29°14'45.63"S	30°53'59.17"E
WC 8:	29°14'47.88"S	30°54'1.97"E
WC 9:	29°14'45.07"S	30°54'1.82"E
WC 10:	29°15'28.05"S	30°52'36.91"E
WC 11:	29°15'23.29"S	30°52'34.35"E
WC 12:	29°15'23.67"S	30°52'32.48"E
WC 13:	29°15'10.26"S	30°52'30.49"E
WC 14:	29°15'10.28"S	30°52'30.24"E
WC 15	29°15'1.07"S	30°52'37.31"E
WC 16	29°14'33.17"S	30°53'2.76"E
WC 17	29°14'32.69"S	30°53'0.73"E
WC 18	29°14'16.29"S	30°52'54.91"E
WC 19	29°14'10.92"S	30°52'50.93"E
WC 20	29°14'1.77"S	30°52'39.65"E
WC 21	29°14'5.42"S	30°52'25.53"E
WC 22	29°14'39.24"S	30°51'53.97"E
WC 23	29°14'38.87"S	30°51'50.96"E
WC 24	29°14'43.69"S	30°51'49.07"E
WC 25	29°14'43.90"S	30°51'49.21"E
WC 26	29°14'44.36"S	30°51'47.94"E
WC 27	29°14'44.53"S	30°51'47.95"E
WC 28	29°15'1.41"S	30°51'0.20"E
WC 29	29°14'40.90"S	30°47'13.12"E
WC 30	29°14'30.16"S	30°47'49.25"E
WC 31	29°14'25.69"S	30°47'52.95"E
WC 32	29°14'22.73"S	30°47'53.69"E
WC 33	29°14'18.61"S	30°48'5.22"E
WC 34	29°14'11.90"S	30°48'9.49"E
WC 35	29°14'8.78"S	30°48'10.89"E
WC 36	29°14'11.50"S	30°47'48.32"E
WC 37	29°14'11.09"S	30°47'33.61"E
WC 38	29°14'2.27"S	30°47'2.47"E
WC 39	29°13'51.38"S	30°47'8.20"E
WC 40	29°13'45.93"S	30°47'6.33"E
WC 41	29°13'41.94"S	30°47'5.35"E
WC 42	29°13'38.43"S	30°47'3.36"E
WC 43	29°13'30.22"S	30°46'58.85"E
WC 44	29°13'28.28"S	30°46'58.53"E
WC 45	29°13'21.63"S	30°46'53.31"E
WC 46	29°13'18.52"S	30°46'48.05"E
WC 47	29°13'17.73"S	30°46'48.82"E
WC 48	29°13'15.10"S	30°46'41.73"E
WC 49	29°13'11.79"S	30°46'37.94"E
WC 50	29°14'11.61"S	30°46'9.63"E
WC 51	29°14'10.65"S	30°46'9.53"E

WC 52	29°14'2.86"S	30°46'10.38"E
WC 53	29°13'57.65"S	30°46'10.12"E
WC 54	29°13'53.44"S	30°46'12.16"E
WC 55	29°13'53.25"S	30°46'11.60"E
WC 56	29°13'51.10"S	30°46'12.14"E
WC 57	29°13'40.66"S	30°45'35.90"E
WC 58	29°13'38.74"S	30°45'38.10"E
WC 59	29°13'32.83"S	30°45'45.66"E
400kL Reservoir	29°14'23.08"S	30°48'15.53"E
50kL Reservoir	29°14'51.39"S	30°46'52.99"E
22kL Elevated Tank	29°13'46.94"S	30°48'35.76"E
10kL Water Storage Tank	29°14'25.20"S	30°51'43.64"E
3kL Water Storage Tank	29°14'52.52"S	30°51'43.67"E
10kL Water Storage Tank	29°14'47.68"S	30°52'18.65"E
16kL Water Storage Tank	29°15'11.40"S	30°51'58.46"E
16kL Water Storage Tank	29°15'11.11"S	30°53'2.06"E
22kL Water Storage Tank	29°14'7.41"S	30°52'39.37"E
Property Description:	**Parent Farm:**	**Farm Portion:**
	Farm: Umvoti Slopes 2239	Portion 1
		Portion 2
		Portion 3
		Portion 4
	Farm: Tennessee 8036	N/A
	Farm: Ifaye 7542	N/A
	Farm: Frenchay East 2241	Portion 1
		Remainder Portion
	Farm: Frenchay West 2235	Portion 1
		Portion 2
		Portion 4
		Remainder Portion
	Farm: Redcliff Vale 8365	Portion 2
		Portion 4
	Farm: Marchmont A 8212	N/A
	Farm: Twee Fonteinen 5721	Portion 5
		Portion 6
		Portion 7
		Portion 9
	Farm: Sand Spruit 1920	Portion 1
		Portion 3
		Portion 15
	Farm: Mount Elias 1327	Portion 32
	Farm: Umvoti Location 4667	Portion 17
		Portion 19
		Portion 20
		Portion 21

Figures 1 - 7 below provide a topographical overview of the pipeline route. Figures 11 – 18 and Table 8 provide illustrations of each watercourse and wetland crossing point along the route.

Figure 1: 1:50 000 Map Indicating the Location of the uMshwathi Water Supply Scheme (Red Line).

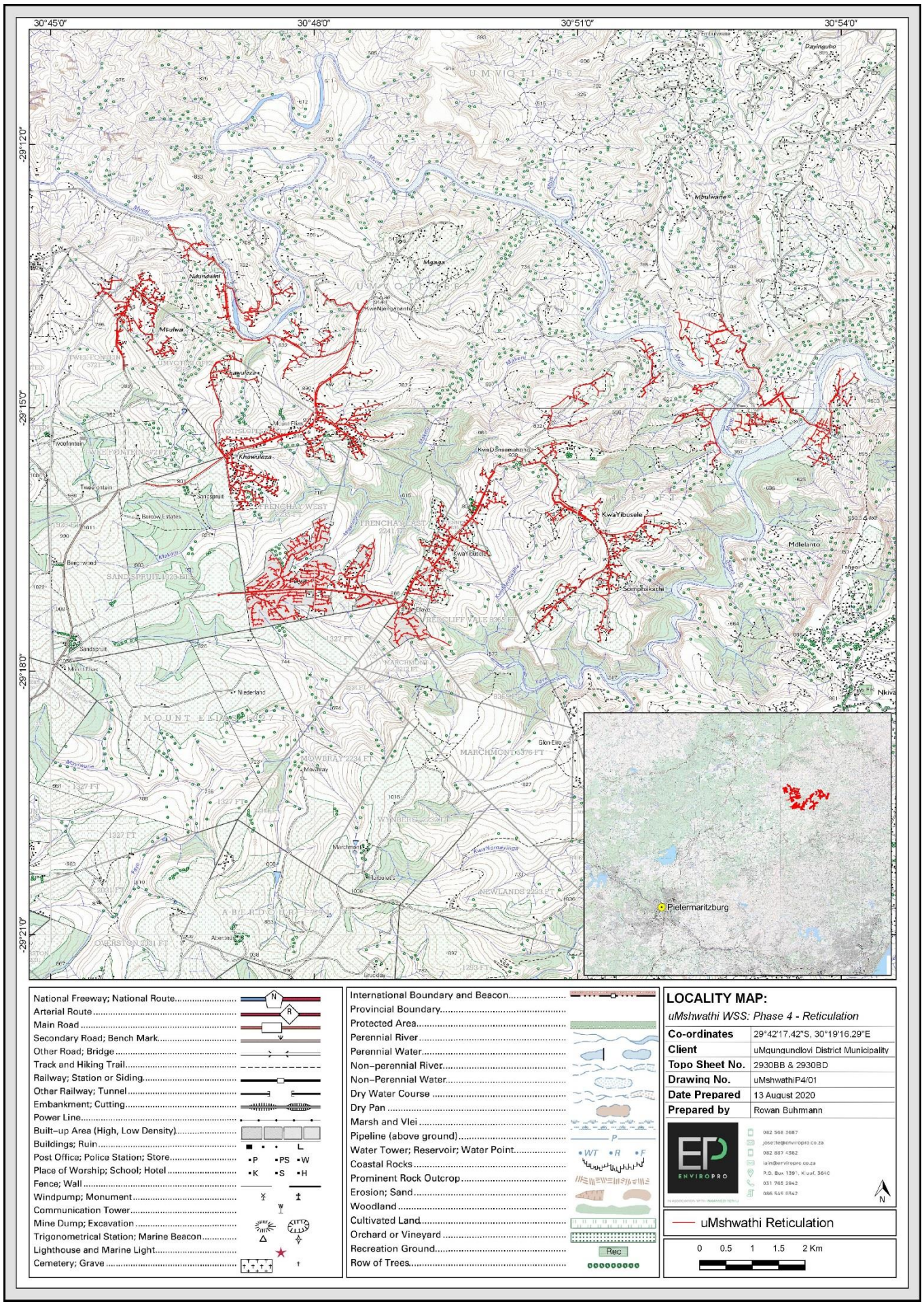


Figure 2: Aerial Photograph Showing an Overview of the uMshwathi Water Supply Scheme pipeline layout. QGIS, version 3.10.1.

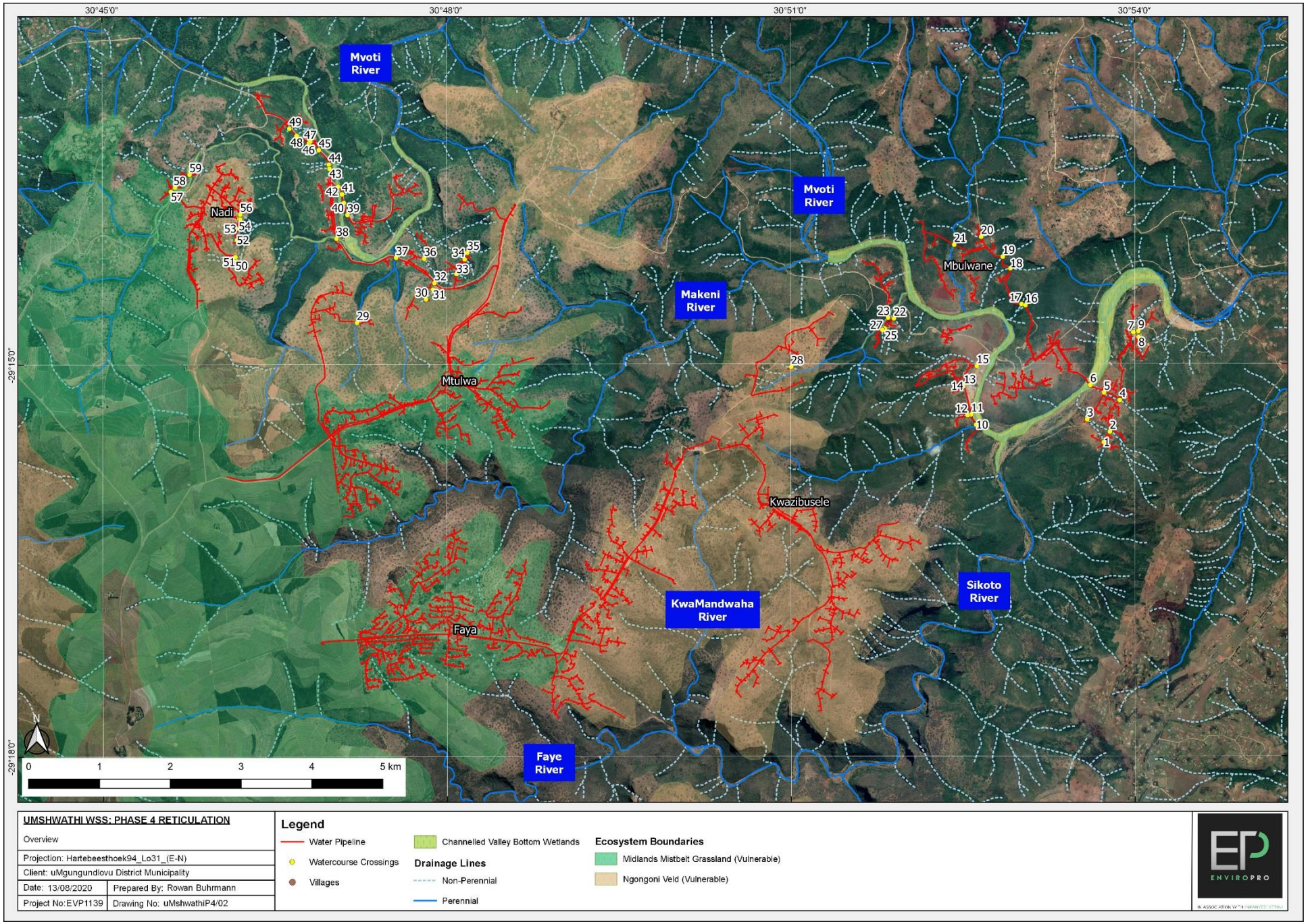


Figure 3: Aerial Photograph Showing an Overview of the uMshwathi Water Supply Scheme within the Faya Village. QGIS, version 3.10.1.

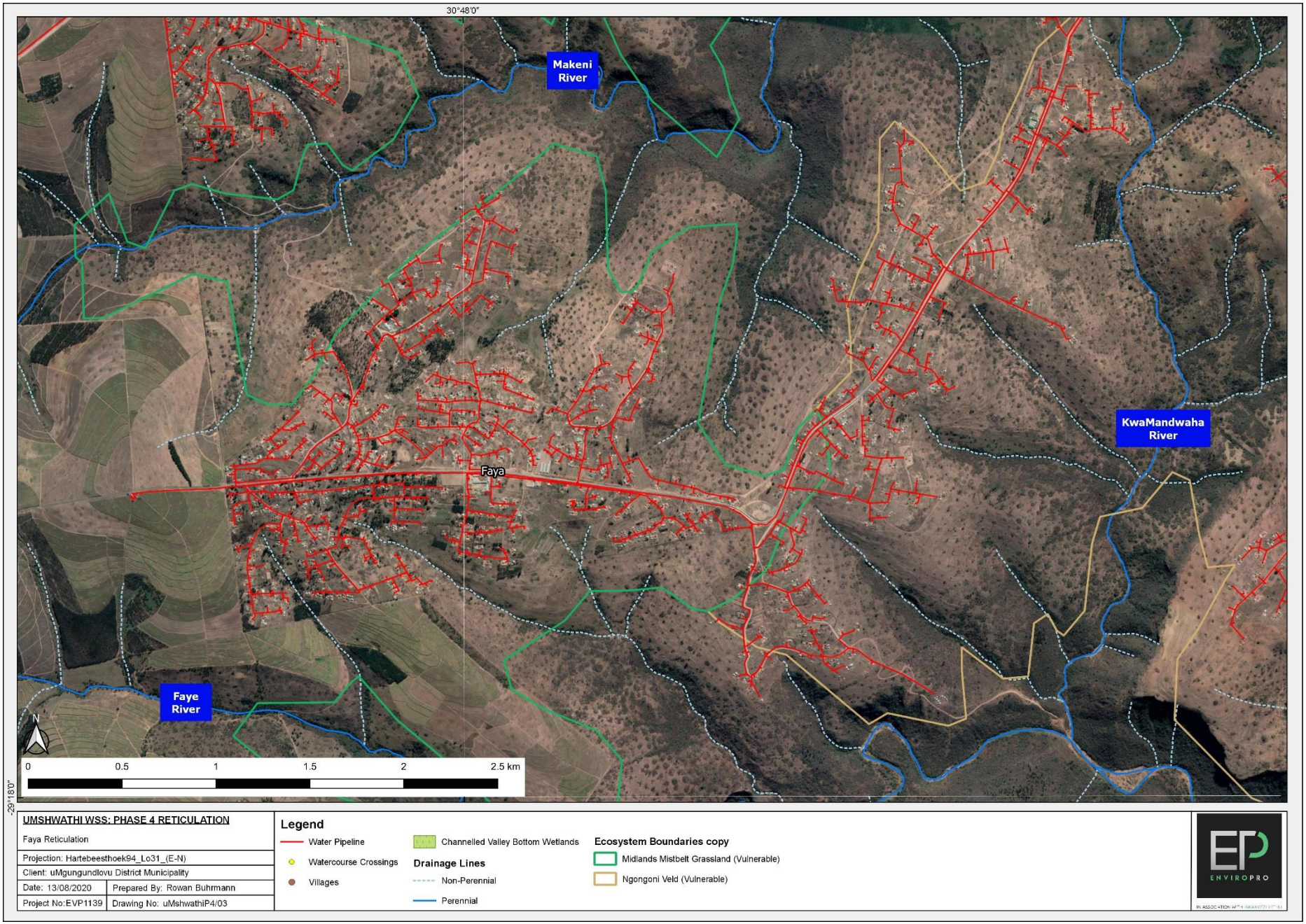


Figure 4: Aerial Photograph Showing an Overview of the uMshwathi Water Supply Scheme within the KwaZibusele Village. QGIS, version 3.10.1.

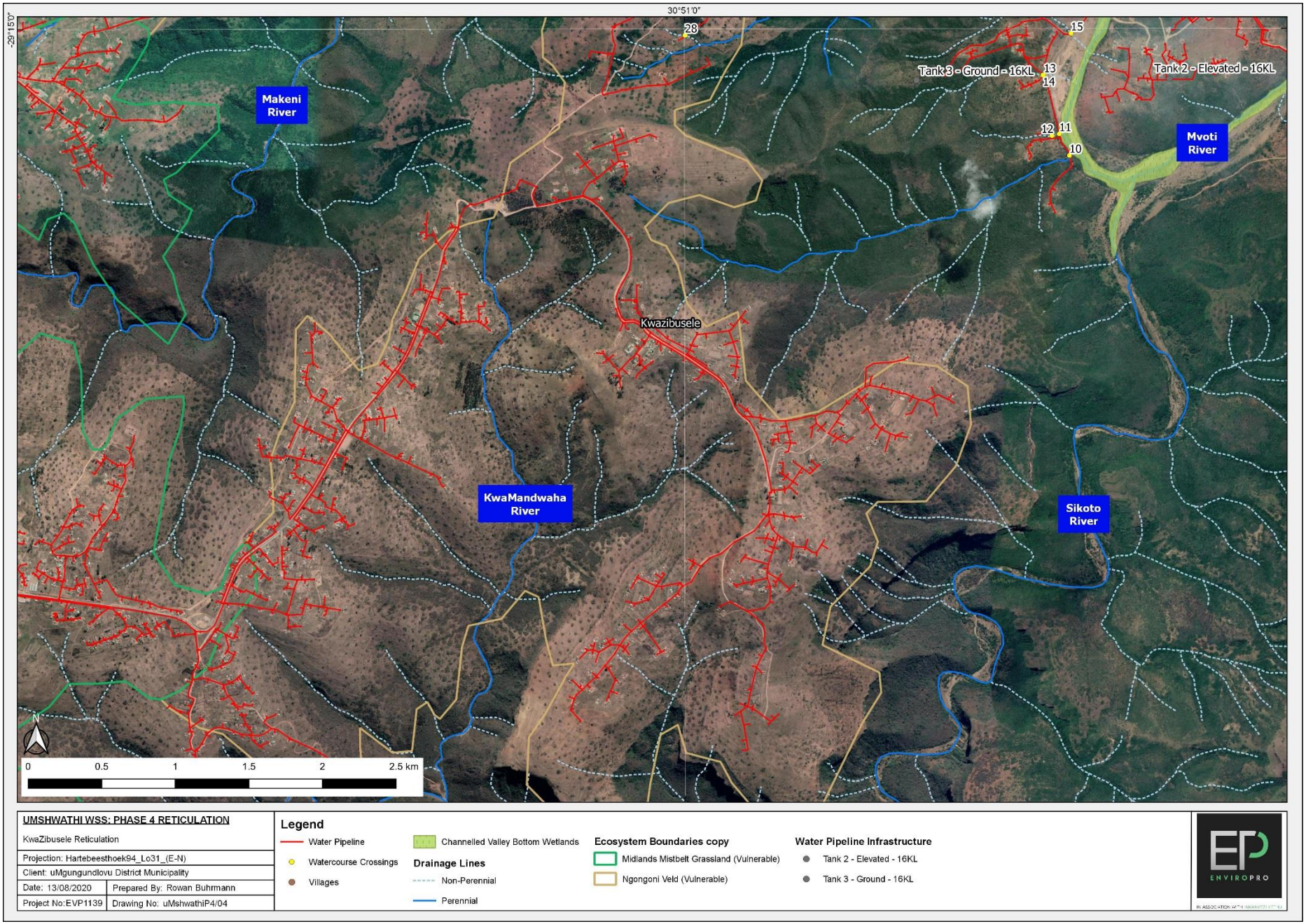


Figure 5: Aerial Photograph Showing an Overview of the uMshwathi Water Supply Scheme within the Mbulwane Village. QGIS, version 3.10.1.

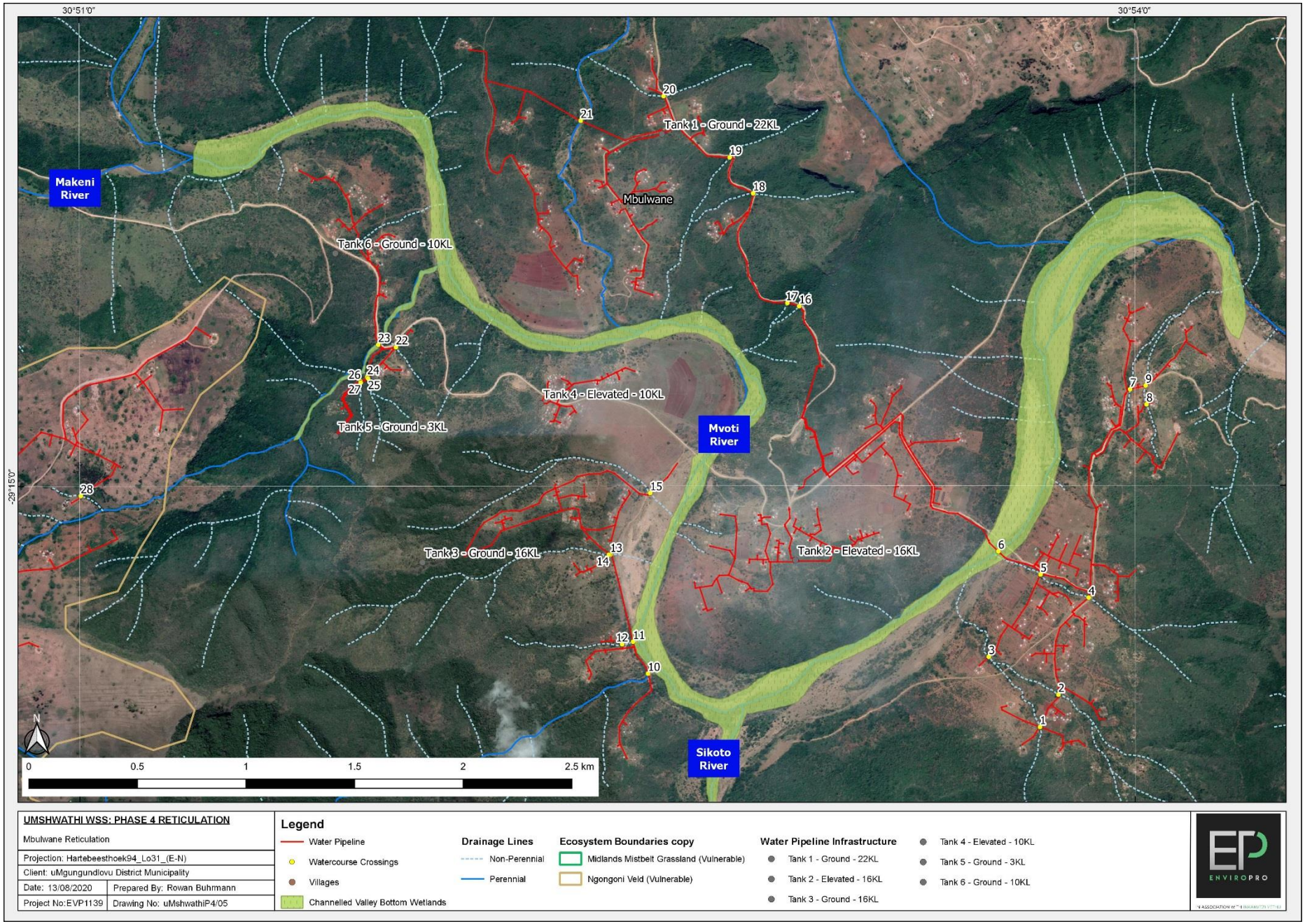


Figure 6: Aerial Photograph Showing an Overview of the uMshwathi Water Supply Scheme within the Mtulwa Village. QGIS, version 3.10.1.

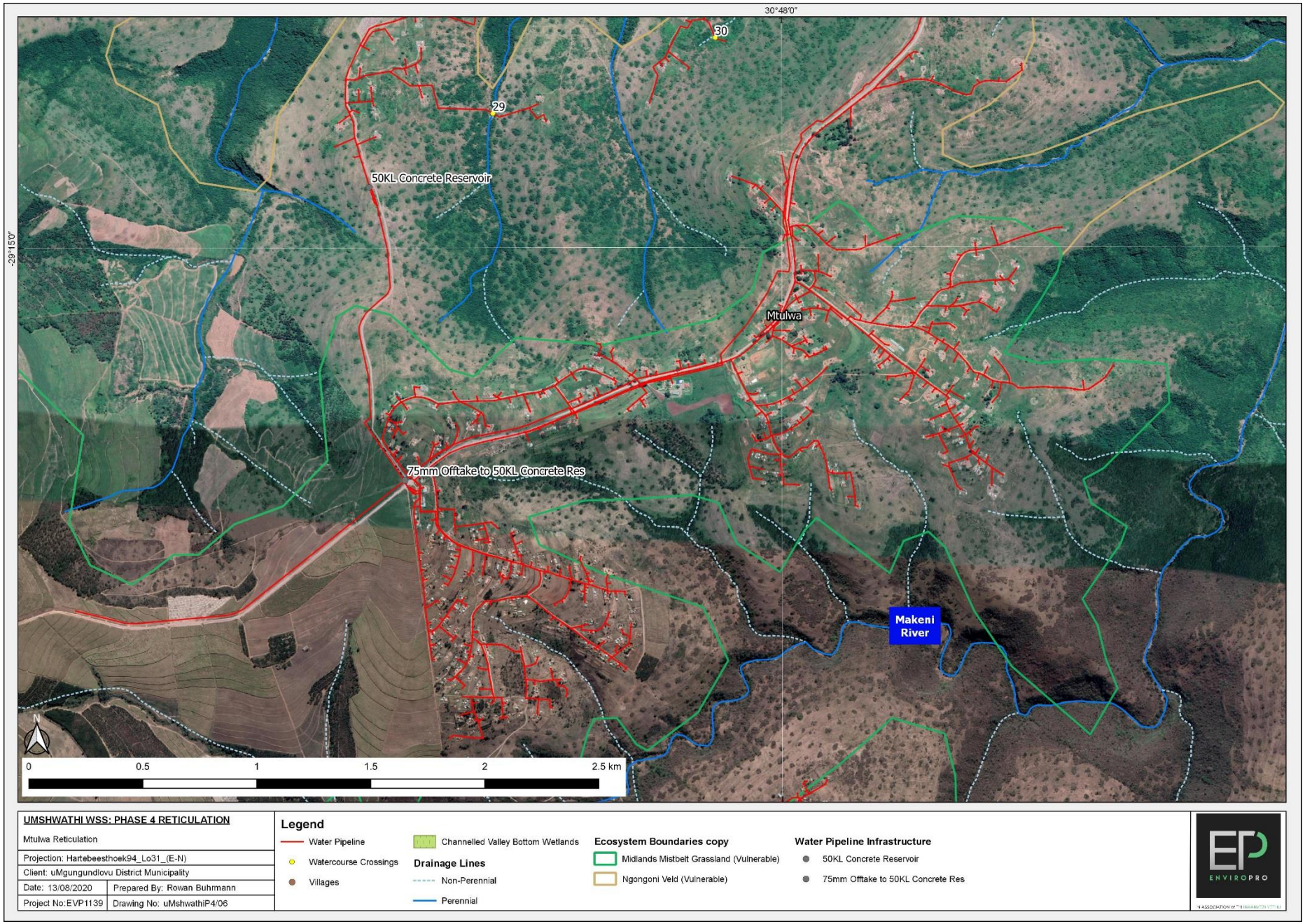


Figure 7: Aerial Photograph Showing an Overview of the uMshwathi Water Supply Scheme within the Nadi Village. QGIS, version 3.10.1.

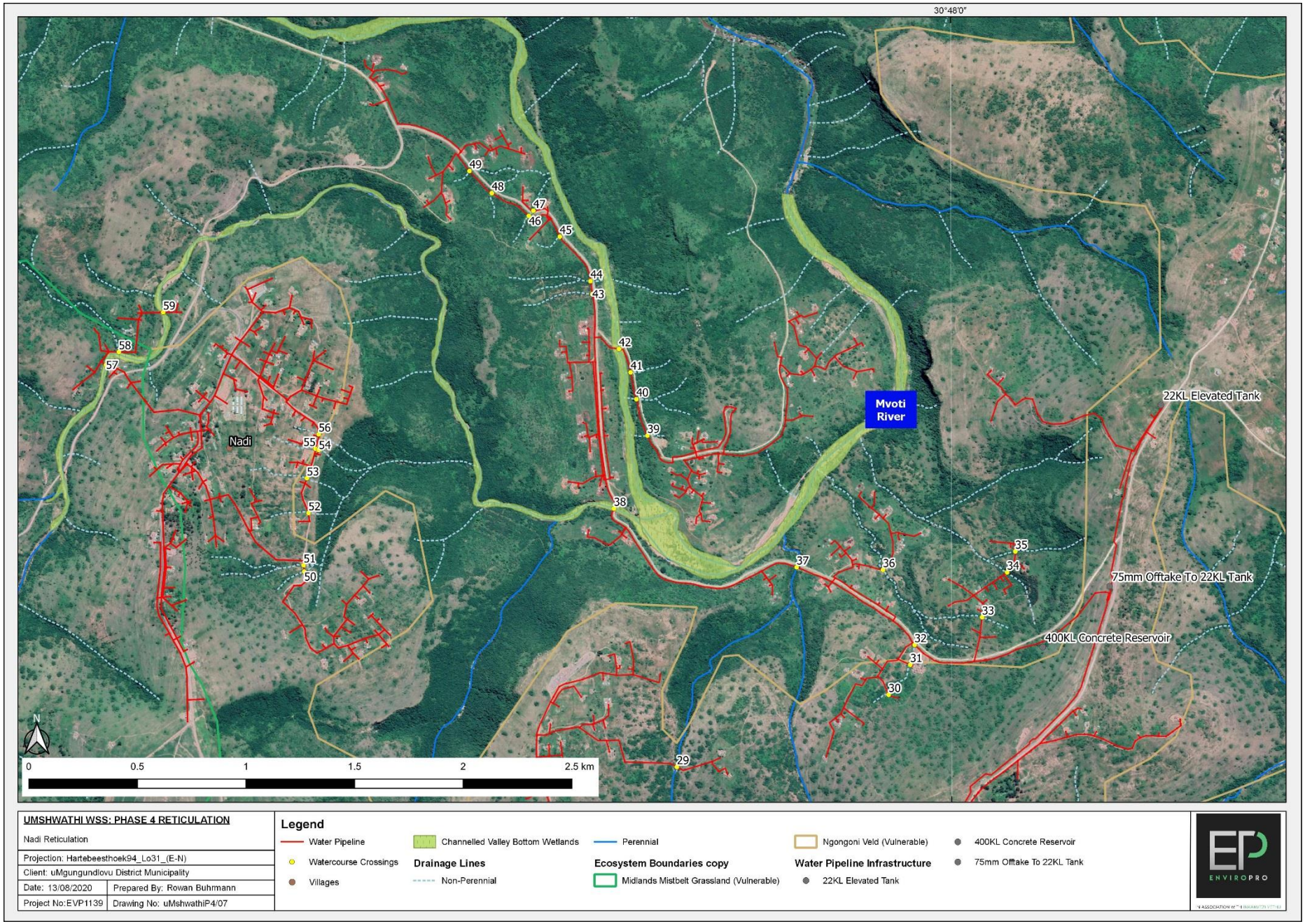
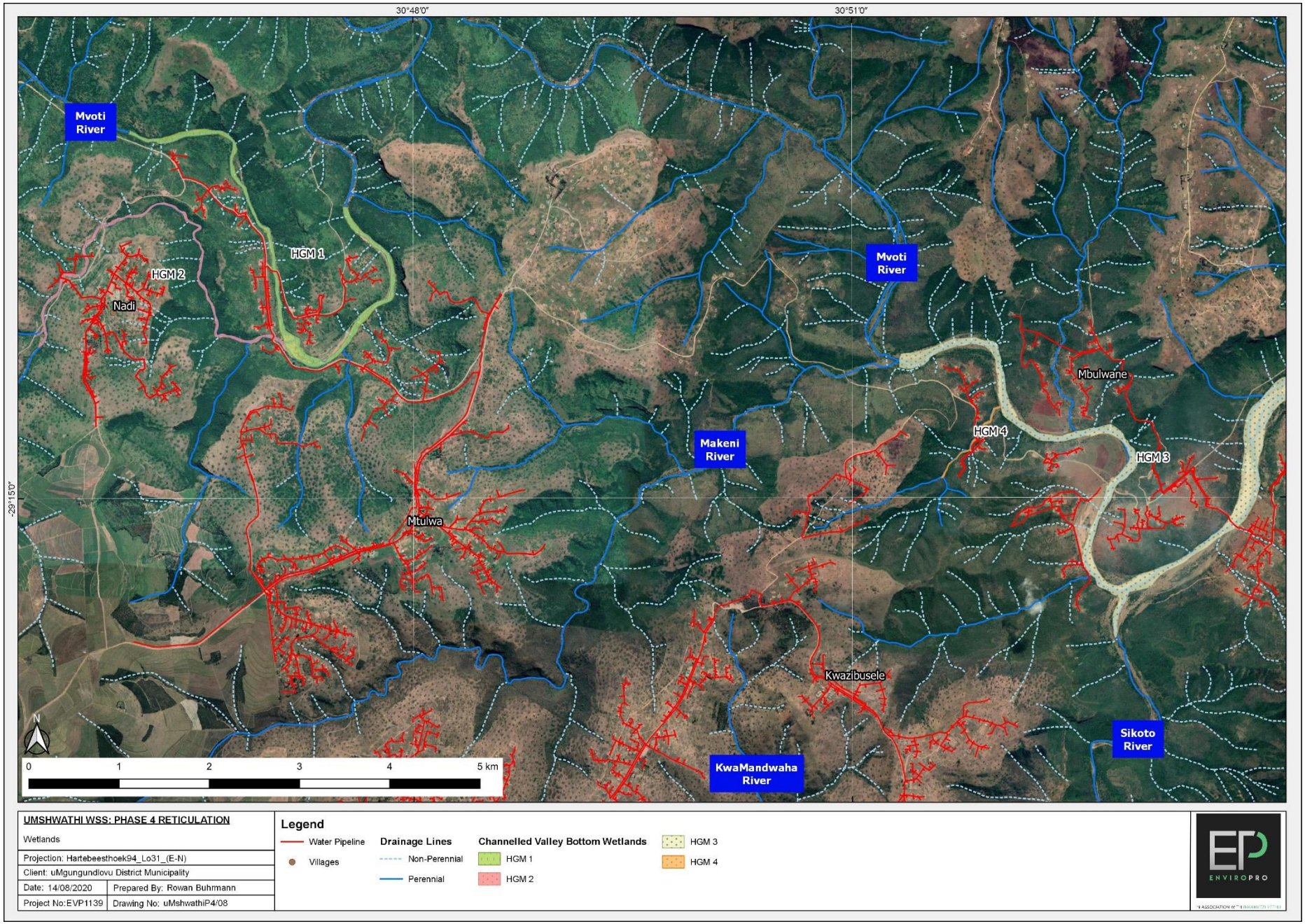


Figure 8: Aerial Photograph Showing an Overview of the uMshwathi Water Supply Scheme within the Nadi Village. QGIS, version 3.10.1.



SECTION 2: SITE DESCRIPTION AND SURROUNDING LAND USE as per section 3(h)(iv) and (k)

2.1 DEFF Screening Report

A Screening Report was generated via the DEFF Screening Tool (please refer to Appendix B for the full DEFF report) which details potential specialist reports that may be required based on a desktop level assessment conducted by the screening tool. Table 1 below summarises the screening tool recommendations, indicating whether they are applicable to the specifics of the site and project in question and where they are applicable, indicates the sections of the BAR where these have been addressed. As per the Screening Tool Guidelines, it is the responsibility of the EAP to confirm this list and to motivate in the BAR, the reason for not including any of the identified specialist studies by providing photographic evidence of the site situation.

Table 1: DEFF Screening Report Recommendations (Appendix B)

Specialist Assessment	Conducted	Reason
Agricultural Impact Assessment	No	Due to the nature of the project whereby the water pipelines will follow existing roads, foot paths and pipeline servitudes, an Agricultural Impact Assessment was not considered necessary to inform this assessment. The construction of the uMshwathi WSS Phase 4 will not have a significant impact on any formal or informal agricultural areas in this area. The water pipeline will have a positive impact on agricultural activity in this area as it will with increase and improve supply of water to each household. There are minimal formal agricultural areas adjacent to the pipeline that may be affected by the installation of the water pipeline. As such, an Agricultural Impact Assessment was not required.
Archaeological and Cultural Heritage Impact Assessment	Yes	The proposed pipeline has been aligned along existing roads, pipeline servitudes and on visible tracks. A previous Heritage Impact Assessment conducted on a previous phase of the project was consulted, revealing that no heritage sites or features were located within the development footprint. Additionally, the report continues to explain that the area is not part of any known cultural landscape (Appendix B). Therefore, the need for input from an Archaeological and Cultural Heritage Impact Assessment was not identified.
Palaeontology Impact Assessment	No	According to the SAHRIS PalaeoSensitivity Map, the proposed uMshwathi WSS Phase 4 project falls within an area of “Low” and “Insignificant /Zero” Palaeontological Sensitivity. Therefore, no Palaeontological Assessment was required. However, a protocol for finds has been included within the EMPr (Section 2)
Terrestrial Biodiversity Impact Assessment	No	As the project is located in an existing settlement with all pipes being aligned along existing roads, pipeline servitudes and on visible tracks, the need for input from a Terrestrial Biodiversity Impact Assessment was not identified.
Aquatic Biodiversity Impact Assessment	Yes	Please refer to *Surface Water and Ground Water* under Section 2.4; and Aquatic Assessment under Section 2.5.
Geotechnical Assessment	No	No Geotechnical Assessment has been conducted on the site. The Geotechnical Assessment will be conducted by the Engineer prior to breaking ground.
Socio-Economic Assessment	No	As the project is to provide water to the community surrounding the project area, and is an extension of an already existing water supply scheme supplied by the uMgungundlovu District Municipality, a Socio-Economic Assessment was not was required.
Plant Species Assessment	No	As the project is located in an existing settlement with all pipes being aligned along existing roads and on visible tracks, a Plant Species Assessment was not deemed necessary by the EAP. However please note that the Water Resource Assessment does identify vegetation associated with the wetland areas.

Animal Species Assessment	No	As the project is located in existing settlements with all pipes being aligned along existing roads and on visible tracks, an Animal Species Assessment was not deemed necessary by the EAP.

2.2 Topography And Physical Characteristics Of Site

The project area is dominated by large open areas of rural residential land. The pipeline is gravity fed and thus flows from high points to the rest of the pipeline network. The topography within the project area comprises of numerous rolling hills and plateaus. The area consists of scattered rural settlements of varying sizes with rural road infrastructure in place. The study area is located in the villages of Faya, KwaZibusele, Mtulwa, Mbulwane and Nadi, 25km north east of Wartburg in the province of KwaZulu-Natal, South Africa. The area surrounding the proposed project site consists of open mountainous land, small scale agricultural and livestock activities, and small rural settlements.

The gradient of the site is as follows:

Gradient	Description
Flat	Due to the extent of the project, the pipeline traverses' various gradients, ranging from flat plateaus, to steep hill sides.
1:50 – 1:20	
1:20 – 1:15	
1:15 – 1:10	
1:10 – 1:7.5	
1:7,5 – 1:5	
Steeper than 1:5	

The topographical features and landforms of the site and surrounding area are as follows (Figures 11 - 18):

Topographical Feature	Description
Ridgeline	Majority of the pipeline is located along ridgelines and on the plateau, while a small portion of pipeline traverses the side slope of the hill/ valley.
Plateau	
Side slope of hill/mountain	
Open valley	N/A
Closed valley	N/A
Plain	N/A
Undulating plain/low hills	NA
Dune	N/A
Sea-front	N/A

2.3 Climate[1]

This region is characterised by summer rainfall (Mean Annual Precipitation ranging from 650 - 1280mm) with some rainfall in the winter season. The maximum temperature for this region is 38.2°C in January, whereas the minimum temperature for this region is -10.8°C in June.

2.4 Surface Water and Ground Water

A water resource assessment was undertaken by The Biodiversity Company[2] in November 2019 (Appendix B). The project is situated in the quaternary catchment U40C, U40D and U40E, within the Phongola to Mtumvuna Water Management Area (WMA 4). The proposed reticulation network will be crossing multiple tributaries of the Mvoti River (U40D-03957 and U40E-03967 Sub Quaternary Reach) (SQR), in the North Eastern Coastal Belt– Lower Aquatic Ecoregion. The system at a desktop level is regarded as largely natural (Class B by DWS, 2019a) due to rural settlements, alien invasive plants in riparian zones and subsistence farming[3]. The PES category of both the Sub Quaternary Reach's are classed as largely natural (class B) (Table 2). The largely natural state of the reach was due to impacts to instream habitat, wetland and riparian zone continuity, flow modifications and moderate potential impacts on physico-chemical conditions (water quality). Anthropogenic impacts identified within the Mvoti River sub-quaternary catchment include rural settlements, subsistence farming, road crossings, abstraction, alien invasive plants in the riparian zone[2].

[1] The Vegetation of South Africa, Lesotho and Swaziland. *Strelitzia* 19. South African National Biodiversity Institute, Pretoria. Mucina, L. & Rutherford, M.C. (eds) 2006.
[2] Water Resource Assessment for the proposed Umshwati Water Supply Scheme Pipeline Project, Umshwati, KwaZulu-Natal (November 2010). The Biodiversity Company.
[3] River Health Programme: South African Scoring System (SASS) Data Interpretation Guidelines. Report produced for the Department of Water Affairs and Forestry (Resource Quality Services) and the Institute of Natural Resources (2007). Dallas, H.F.

Table 2: Summary of the Present Ecological State of the SQRs associated with the Mvoti River reach[2]

SQR Importance and Sensitivity	Score
U40D-03957	
Present Ecological Status	Largely Natural (class B)
Ecological Importance	Very High
Ecological Sensitivity	High
Default Ecological Category	A
U40D-03967	
SQR Importance and Sensitivity	**Score**
Present Ecological Status	Largely Natural (class B)
Ecological Importance	High
Ecological Sensitivity	High
Default Ecological Category	B

As per the Aquatic assessment undertaken by The Biodiversity Company in October 2019[4], 41 sampling points were selected and assessed to determine the current state of the Mvoti River and its associated tributaries (see Section 8.4, Table 18 *of the Water Resource Assessment*[4]). This information was used to determine the potential risks that may result from the construction and operation of the uMshwathi Water Supply Scheme - Phase 4 (see section 2.5).

As per the Wetland assessment, one wetland type was identified, namely the channelled valley bottom systems. Four channelled valley bottom wetlands were identified within the study project area (see section 2.6). No NFEPA Wetlands were identified within 500m of the proposed pipeline.

2.5 Aquatic Assessment[4]

2.5.1 *In situ* water quality

In situ water quality for the Mvoti River as well as its associated tributaries indicate that these watercourses had adequate pH, Dissolved Oxygen (DO) and water temperatures, falling within the Target Water Quality Range (TWQR), and therefore meeting the requirements for aquatic ecosystems[5].

Table 3: In Situ Water Quality Analysis Of The Mvoti River And Its Associated Tributaries

Site	pH	Dissolved Oxygen (mg/l)	Temperature (°C)
TWQR*	**6.5-9***	**>5.00***	**5-30***
S0	8.1	6.7	22.7
S1	7.71	6.96	25.2
S7	8.28	7.38	25.5
S11	8.32	6.21	28.6
S17	8.49	7.58	24.6
S25	7.76	7.95	20.3
S26	8.16	7.57	21.3
S29	7.22	7.92	20.3
S35	8.09	8.40	20.7
S41	8.28	7.97	20.3

[4] Water Resource Assessment for the proposed Umshwati Water Supply Scheme Pipeline Project, Umshwati, KwaZulu-Natal (November 2010). The Biodiversity Company.
[5] South African Water Quality Guidelines. Volume 7: Aquatic Ecosystems. Department of Water Affairs and Forestry, Pretoria (1996). Department of Water and Sanitation (DWS).

2.5.2 Intermediate Habitat Integrity Assessment (IHIA)

According to the IHIA assessment, the Mvoti River instream and riparian habitat integrity were categorized as Category C (Moderately Modified) (*see Section 8.4.2. of the Water Resource Assessment*[4]). This indicates a loss or change of natural habitat and biota has occurred, but the basic ecosystem functions are still predominantly unchanged.

2.5.3 Aquatic Macroinvertebrate Assessment

The invertebrate habitat at the site was assessed using the South African Scoring System version 5 (SASS5) biotope rating assessment as applied in Tate and Husted (2015). The results of the biotope assessment range from poor to fair habitat conditions within the reach, with the tributaries of the Mvoti River representing poor habitat (see *Section 8.4.3.1 of the Water Resource Assessment*[2]).

The SASS5 assessment results categorised all but one site (S26) as a class A, which indicates natural conditions within the reach. The high number of taxa sampled during the survey are a clear indication that the sampled reach is in a natural condition, with between 18 (Site 1) to 36 (Site 25) taxa found within the system (Table 4).

Table 4: Macroinvertebrate Assessment Results Recorded During The Survey

Site	SASS Score	No. of Taxa	ASPT*	Category (Dallas, 2007)**
S0	160	29	5.51	**A**
S1	146	18	8.11	**A**
S7	198	34	5.82	**A**
S25	282	36	7.83	**A**
S26	87	19	4,58	**C**
S29	161	29	5.55	**A**
S35	196	31	6.32	**A**
S41	204	33	6.18	**A**

*ASPT: Average score per taxon; ** North Eastern Coastal Belt lower ecoregion

Eight of the eleven (11) expected fish species were collected during the October 2019 survey in the Mvoti River and tributaries (Table 5).

Table 5: List Of Fish Collected During The Sampling Of The Mvoti River And Associated Tributaries.

Note, LC = Least Concern). The fish sensitivities were determined according to the watercourse's flow rate and physical and chemical (phys-chem) properties.

Scientific name	Common name	IUCN Status	Sites				
			S0	S7	S25	S35	S41
Amphilius natalensis	Natal Mountain Catfish	LC	0	0	0	0	0
Anguilla mossambica	African Longfin Eel	LC	2	1	2	8	4
Awaous aeneofuscus	Freshwater Goby	LC	0	0	0	0	0
Clarias gariepinus	Sharptooth Catfish / Barbel	LC	1	4	15	2	3
Enteromius gurneyi	Redtail Barb	VU	0	0	0	0	0
Enteromius paludinosus	Straightfin Barb	LC	3	4	10	30	15
Enteromius trimaculatus	Threespot Barb	LC	15	25	70	40	33
Enteromius viviparus	Bowstripe Barb	LC	38	3	55	50	23
Labeobarbus natalensis	KwaZulu-Natal Yellowfish	LC	1	3	12	12	11

Oreochromis mossambicus	Mozambique Tilapia	NT	0	4	1	10	6
Tilapia sparrmanii	Banded Tilapia	LC	17	15	5	2	8
Total Native Species			**7**	**8**	**8**	**8**	**8**
Total Expected Native Species			**11**				
% Fish Community Sampled			**63**	**72**	**72**	**72**	**72**

Figure 9: Fish species collected during sampling.

2.6 Wetland Assessment[6]

At the desktop level, no NFEPA wetlands were identified within 500m of the uMshwathi WSS. However, the field assessment conducted by The Biodiversity Company in October 2019 identified one wetland type, a channelled valley bottom system within the project footprint. This system comprised of four hydrogeomorphic (HGM) / wetland units. Figure 8 shows the location of the four HGM units. The reticulation pipeline is noted to cross the four wetland units 6 (six) times throughout the project area. The Present Ecological State (PES) of the four delineated wetlands was determined to be Moderately Modified. The wetland PES scores and detailed descriptions of each component are seen in Table 6 below:

[6] Water Resource Assessment for the proposed Umshwati Water Supply Scheme Pipeline Project, Umshwati, KwaZulu-Natal (November 2010). The Biodiversity Company.

Table 6: Present Ecological State (PES) and Component Description Of The Four Wetland Units Present Within 500m Of The Proposed uMshwathi WSS, Phase 4.

Wetland Unit (HGM)	Component	PES Rating	Description
HGM 1	Hydrology	C	**Moderately Modified**: The catchment has been overgrazed and the surface roughness reduced. This has increased runoff potential within the system altering the hydrological inputs. The current crossing structures also alter flows within the wetlands.
	Geomorphology	C	**Moderately Modified**: severe erosion within the channel banks as well as the crossing structures have altered the geomorphology of the wetland.
	Vegetation	D	**Largely Modified:** The wetland unit has been overgrazed and sedimentation has altered the vegetation component. Alien vegetation has become prevalent.
	Overall	C	**Moderately Modified**. A moderate change in ecosystem processes and loss of natural habitats has taken place, but the natural habitat remains predominantly intact.
HGM 2	Hydrology	C	**Moderately Modified**: The increased runoff from overgrazed areas has caused erosion as well as sedimentation altering the hydrological inputs. The alien vegetation also reduces some flows.
	Geomorphology	C	**Moderately Modified**: The erosion in concentrated flow path areas has lowered the water table in some sections. The increased overland flow changes the hydrodynamics of the geomorphological setting.
	Vegetation	C	**Moderately Modified:** Alien vegetation has become dominant with the wetland vegetation being overgrazed.
	Overall	C	**Moderately Modified**. A moderate change in ecosystem processes and loss of natural habitats has taken place, but the natural habitat remains predominantly intact.
HGM 3	Hydrology	D	**Largely Modified**: The catchment has been overgrazed and the surface roughness reduced. This has increased runoff potential within the system altering the hydrological inputs. The current crossing structures also alter flows within the wetlands.
	Geomorphology	C	**Moderately Modified**: severe erosion within the channel banks as well as the crossing structures have altered the geomorphology of the wetland.

	Vegetation	D	**Largely Modified:** The wetland unit has been overgrazed and sedimentation has altered the vegetation component. Alien vegetation has become prevalent.
	Overall	C	**Moderately Modified**. A moderate change in ecosystem processes and loss of natural habitats has taken place, but the natural habitat remains predominantly intact.
HGM 4	Hydrology	D	**Largely Modified**: The catchment is within a rural setting where livestock graze the landscape. This increases the impervious/bare area within the catchment and increases the runoff that enters the wetland systems. The increased runoff increases erosion at the high velocity inflow areas but increases sedimentation within the wetland systems further downstream. The alien vegetation also reduces daily low flows as these plants tend to utilize more water.
	Geomorphology	C	**Moderately Modified**: The erosion in concentrated flow path areas has lowered the water table in some sections. The increased overland flow changes the hydrodynamics of the geomorphological setting.
	Vegetation	C	**Moderately Modified:** Alien vegetation has become dominant with the wetland vegetation being overgrazed.
	Overall	C	**Moderately Modified**. A moderate change in ecosystem processes and loss of natural habitats has taken place, but the natural habitat remains predominantly intact.

The channelled valley bottom wetlands had an overall Intermediate level of service. The direct benefits to the community were rated as Moderately-Low due to the wetlands being able to provide harvestable resources in all HGM units. The indirect benefits that were rated as Moderately High included; Flood attenuation and sediment control in all HGM units. HGM 1 and HGM 3 provided additional benefits at a higher level, which included the assimilation of phosphates and toxins, as well as erosion control.

The EIS for HGM 1 and HGM 3 were calculated to have a High (class B) level of importance, whilst the EIS for HGM 2 and HGM 4 were calculated to have a Moderate (class C) level of importance. The Hydrological/Functional Importance for all HGM units were rated as Moderate (class C) due to the ability of the wetland to enhance water quality and regulate streamflow. The Direct Human Benefits for both HGM units were rated as Low (class D) (Table 7).

Table 7: Ecological Importance And Sensitivity (EIS) Of The Sampled Wetlands Present Within 500m Of The Proposed uMshwathi WSS, Phase 4.

Wetland Importance and Sensitivity	HGM 1	HGM 2	HGM 3	HGM 4
Ecological Importance & Sensitivity	**B**	**C**	**B**	**C**
Hydrological/Functional Importance	**C**	**C**	**C**	**C**
Direct Human Benefits	**D**	**D**	**D**	**D**

Table 8: Summary Of The Wetlands Intercepted By The Proposed Pipeline

Wetland Number	Wetland HGM Type	GPS Coordinates	Image
WC 6 – Mvoti River	Channelled Valley Bottom	29°15'10.08"S, 30°53'37.08"E	
WC23	Channelled Valley Bottom	29°14'38.63"S, 30°51'50.82"E	
WC38	Channelled Valley Bottom	29°14'2.02"S, 30°47'2.70"E	
WC42 – Mvoti River	Channelled Valley Bottom	29°13'37.89"S, 30°47'3.14"E	

WC57	Channelled Valley Bottom	29°13'40.60"S, 30°45'35.82"E		
WC59	Channelled Valley Bottom	29°13'32.75"S, 30°45'46.01"E		

The construction of the new pipeline crossings (WC1-59) will formalise the watercourse crossing points and promote the free flow of water through the watercourses and wetland areas. The construction activity should have no long-term negative impact or influence on the wetlands along this pipeline route provided the mitigation measures provided in this report and EMP are followed.

2.7 Buffer Zones

The wetland buffer zone tool was used to calculate the appropriate buffer required for the uMshwathi WSS Phase 4. The model shows that the largest risks (Moderate) posed by the project during the construction phase is that of increased sediment inputs and turbidity. During the operational phase, the risks identified for the project were determined as considered low to very low due to the pipeline being for the supply of clean potable water to residents in the area. Please refer to table 9 below for the post-mitigation buffer requirement.

Table 9: Post-Mitigation Buffer Requirement.[7]

Required Buffer after mitigation measures have been applied	
Construction Phase	**15 m**
Operational Phase	**15 m**

2.8 Fauna and Flora

The proposed project area spreads within 2 Ecosystem Types, namely the Midlands Mistbelt (Gs 9) and the Ngongoni Veld (SVs 4). Both of these Ecosystem types are classified as Vulnerable.

According to Mucina and Rutherford, the project falls within five (5) vegetation units classified as Dry Coast Hinterland Grassland (Gs 19), Moist Coast Hinterland Grassland (Gs 20), KwaZulu-Natal Sandstone Sourveld (Gs 21 – formerly SVs 5), KwaZulu-Natal Hinterland Thornveld (SVs 3), and Eastern Valley Bushveld (SVs 6)[8]. These vegetation types are described as follows:

[7] Water Resource Assessment for the proposed Umshwati Water Supply Scheme Pipeline Project, Umshwati, KwaZulu-Natal (November 2010). The Biodiversity Company.

[8] The Vegetation of South Africa, Lesotho and Swaziland. *Strelitzia* 19. South African National Biodiversity Institute, Pretoria. Mucina, L. & Rutherford, M.C. (eds) 2006.

2.8.1 Dry Coast Hinterland Grassland (Gs 19)

Location	KwaZulu-Natal and Eastern Cape Provinces: From Melmoth in the north to near Libode in the former Transkei (including Camperdown, Umlaas Road, Eston, Bisi, iZingolweni, Ngqeleni near Mthatha) generally occurring above the SVs 3 KwaZulu-Natal Hinterland Thornveld, SVs 7 Bisho Thornveld and the SVs 6 Eastern Valley Bushveld.
Altitude	450 – 900m
Vegetation and Landscape	Undulating plains and hilly landscape mainly associated with drier coast hinterland valleys in the rain-shadow of the rain-bearing frontal weather systems from the east coast. Sour sparse wiry grassland dominated by unpalatable Ngongoni grass (*Aristida junciformis*) with this monodominance associated with low species diversity. In good condition dominated by *Themeda triandra* and *Tristachya leucothrix*. Wooded areas are found in valleys at lower altitudes, where this vegetation unit grades into SVs 3 KwaZulu-Natal Hinterland Thornveld and SVs 7 Bisho Thornveld. Termitaria support bush clumps with *Acacia* species, *Cussonia spicata*, *Ehretia rigida*, *Grewia occidentalis* and *Coddia rudis*.
Conservation Status	Vulnerable; Statutorily conserved in Oribi Gorge Nature Reserve.

2.8.2 Moist Coast Hinterland Grassland (Gs 20)

Location	KwaZulu-Natal and Eastern Cape Provinces: From near Melmoth in the north to near Libode in the south (including Eshowe, New Hanover, Thornville, Richmond, Harding, Lusikisiki) generally occurring below Gs 9 Midlands Mistbelt Grassland.
Altitude	450 – 900m
Vegetation and Landscape	Rolling and hilly landscape. Dense tall sour grassland dominated by unpalatable Ngongoni grass (*Aristida junciformis*) with this mono-dominance associated with low species diversity, when in good condition dominated by *Themeda triandra* and *Tristachya leucothrix*.
Conservation Status	Endangered; Statutorily conserved in Vernon Crookes and Entumeni Nature Reserves.

2.8.3 KwaZulu-Natal Sandstone Sourveld (Gs 21 – formerly SVs 5)

Location	KwaZulu-Natal Province: Elevated coastal inland sandstone plateaus from Mapumulo near Kranskop in the north to St Faiths near Port Shepstone in the south (including Noodsberg, Hillcrest, Kloof, Table Mountain, Inanda, Stony Hill, Umbumbulu, Mid-Illovo, Dumisa, Highflats).
Altitude	500 – 1100m
Vegetation and Landscape	Short, species-rich grassland with scattered low shrubs and geoxylic suffrutices. Proteaceae trees and shrubs (Protea, Leucospermum, Faurea) can be locally common. The dominating landscape features are flat (or rolling) plateau tops and steep slopes commonly forming table mountains.
Conservation Status	Endangered; Statutorily conserved in Krantzkloof Vernon Crookes Nature Reserves.

2.8.4 KwaZulu-Natal Hinterland Thornveld (SVs 3)

Location	KwaZulu-Natal Province: Patches, scattered immediately above SVs 6 Eastern Valley Bushveld, in river valleys of mainly the Mpisi (in the Thukela River catchment), Mvoti, Umgeni (below the Howick Falls), Mlazi, and Lufafa (vicinity of Ixopo) and Mtungwane (tributaries of the Mkomazi).
Altitude	450 – 900m
Vegetation and Landscape	Vegetation is open Thornveld dominated by Acacia species on undulating plains found on upper margins of river valleys.
Conservation Status	Vulnerable; None conserved in statutory conservation areas.

2.8.5 Eastern Valley Bushveld (SVs 6)

Location	KwaZulu-Natal and Eastern Cape Provinces: Deeply incised valleys of rivers including the lower reaches of the Thukela, Mvoti, Mgeni, Mlazi, Mkhomazi, Mzimkulu, Mzimkulwana, Mtamvuna, Mtentu, Msikaba, Mzimvubu (and its several tributaries), Mthatha, Mbhashe, Shixini, Qhorha and Great Kei. Very seldom extending to the coast.
Altitude	100 – 1000m
Vegetation and Landscape	Semi deciduous savanna woodlands in a mosaic with thickets, often succulent and dominated by species of Euphorbia and Aloe. Most of the river valleys run along a northwest-southeast axis which results in unequal distribution of rainfall on respective north-facing and south-facing slopes since the rain-bearing winds blow from the south. The steep north-facing slopes are sheltered from the rain and also receive greater amounts of insulation adding to xerophilous conditions on these slopes.
Conservation Status	Least Threatened; Statutorily conserved in Luchaba Wildlife Reserve and Oribi Gorge Nature Reserve.

2.8.6 Vegetation noted on site

The vegetation associated with the proposed pipeline footprint comprises of both indigenous and alien invasive plant species. Sections of the pipeline running parallel to the road will run through vegetation characteristic of secondary stages of ecological succession. Ecological succession is caused by disturbance, e.g. previous upgrade and clearing of the road surface or pipelines along the roadside. Phase 2 of the uMshwathi Water Supply Scheme (installation of bulk water pipeline) is currently taking place within the region, causing an influx of invasive and successional species.

Most of the vegetation noted along the proposed pipeline route is highly disturbed, most likely from previous construction activities. The vegetation observed along the pipeline route was predominantly comprised of alien invasive plant species including *Solanum mauritianum* (Bugweed), *Lantana camara* (Lantana), *Senna didymobotrya* (Peanut butter cassia), *Ricinus communis* (Castor-oil plant), and *Datura stramonium* (Common thorn apple; Figure 7). Bugweed, Lantana, Castor-Oil plant, Common thorn apple and Mexican sunflower are all Category 1b invaders. In accordance with the National Environmental Management Act, NEMBA Act No. 10 of 2004, Government Gazette No. 40166, 29 July 2016 (Notice No. 864), Category 1b invader plant species may not be owned, imported into South Africa, grown, sold, or released into a water course. These species need to be removed and destroyed immediately [section 75(1), (2), and (3) of NEMBA], and consist of species which are major invaders and may require government assistance to be removed.

Figure 10. Alien invasive plant species; (a) *Lantana camara* (Lantana); (b) *Datura stramonium* (Common thorn apple); and (c) *Senna didymobotrya* (Peanut butter cassia).

2.9 Surrounding Environment and Land Uses

The environment and land uses surrounding the pipeline are as follows:

- Located within a rural area.
- The land surrounding the pipeline consists of:
  - Open indigenous grasslands (on the plateaus) and dense bushveld (in the valleys);
  - Subsistence farming; and,
  - Grazing land;
- The area the pipeline will run through is predominantly used for rural housing.

Figure 11 - 18 below provides photographs of the site taken on the 14th August 2019. The red line represents the proposed location of the new water pipeline; the yellow line represents the existing infrastructure; the blue line represents watercourse features.

Figure 11: (a): Large tributary of the Mvoti river at WC10; **(b):** Existing pipeline infrastructure was noted throughout the project area (WC7); **(c):** The majority of the watercourses have been impacted by the previous water pipeline and the Phase 2 of the WSS.

Figure 12: (a): Steep gradient where the pipeline follows the existing road at WC16; **(b):** Numerous watercourses were noted to have large amounts of loose sediment (WC18); **(c):** Pipeline predominately crosses the watercourses along existing roads (WC20).

Figure 13: (a): Small drainage line located at WC 21. The pipeline will follow an existing footpath and the existing pipeline route; **(b):** Phase 2 of the uMshwathi WSS currently taking place. The smaller reticulation pipeline will follow the same route as the bulk pipeline currently being installed (WC23); **(c):** Rocky terrain and drainage lines noted throughout.

Figure 14: (a): Pipeline to cross at WC31 to provide a yard connection for these households; **(b):** Pipeline to cross at WC32 along an existing gravel road; **(c):** Existing pipeline encased in concrete at WC36.

Figure 15: (a): Existing pipeline noted at WC37. **(b):** The pipeline crossed the channelled valley bottom wetland leading into the Mvoti River at WC38; **(c):** Bridge with existing pipeline tied to the structure over the Mvoti River (WC42).

Figure 16: (a): The pipeline tied onto the bridge structure at WC42 is in poor condition and requires replacement; **(b):** The pipeline route follows the existing gravel road at WC47; **(c):** Exposed bedrock visible at WC51.

Figure 17: (a): The watercourse at WC57 is flanked by a wall of rock; **(b):** Water course and CVB wetland to be crossed by water pipeline at WC59; **(c):** Gravel road showing signs of erosion at WC33.

Figure 18: (a): Incised watercourse channel at WC34; **(b):** Image of the exposed waterpipe within the drainage channel at WC34; **(c):** Existing pipeline encased in concrete at WC35.

2.10 Heritage And Cultural Aspects[9]

According to a Cultural Heritage Impact Assessment, conducted in March 2017 by *Active Heritage cc* on the previous uMshwathi Bulk Water Supply Scheme, no items of archaeological or cultural significance were identified in the immediate area or near the pipeline route. As the new uMshwathi WSS Phase 4 project falls predominantly within the same footprint as the previous assessment, and follows existing roads, paths and servitudes, it is unlikely that other archaeological or culturally significant aspects are present within the pipeline route. Construction workers will be cautioned to operate with care on site and should a culturally sensitive aspect be discovered on site, construction activities will be stopped temporarily and the issue assessed and the authorities (AMAFA) be notified.

[9] Cultural Heritage Impact Assessment of the proposed Greater Efaye Pipeline and Reservoirs, uMshwathi Local Municipality, Kwazulu-Natal. Active Heritage cc, 2017.

2.11 Socio Economic Environment

The environment and surrounding land uses within and adjacent to the pipeline are described as follows:

- Located within a rural, residential area;
- The land is predominately used for residential purposes, with small subsistence farms spread throughout the project area;
- It is highly unlikely that the pipeline and WSS infrastructure will affect any future development within the area due to the pipeline's proximity to the existing road reserve and foot paths. With the majority of the pipeline and reservoirs falling within areas that are not conducive for development.
- The land that the pipeline passes through is government and ITB tribal land.

The surrounding environment and land use will not be negatively affected by the water pipeline as the construction footprint will follow the same alignment as existing roads/ footpaths and servitudes. No local infrastructure or services will be affected by the construction of this pipeline. The pipeline will be located underground and will therefore not deter from the aesthetics of the area during operation. No fences and homestead access roads should require relocation, however should there be a need for the relocation of infrastructure, an agreement must be made with the contractor and community member.

Section 3: Policy And Legislative Context

3.1 Identification of All Legislation, Policies, Plans, Guidelines, Spatial Tools, Municipal Development Planning Frameworks and Instruments as Per Section 3(e) (i) And Compliance of Proposed Activity with Legislation and Policy 3(e) (ii)

Legislation	Compliance of Activity
The Constitution of South Africa (No. 108 of 1996)	The Constitution cannot manage environmental resources as a standalone piece of legislation hence additional legislation has been promulgated in order to manage the various spheres of both the social and natural environment. Each promulgated Act and associated Regulations are designed to focus on various industries or components of the environment to ensure that the objectives of the Constitution are effectively implemented and upheld on an on-going basis throughout the country. In terms of Section 24, the constitution gives every person the right to an environment that is not harmful to their health and wellbeing.
National Environmental Management Act (Act 107 of 1998)	The National Environmental Management Act (Act 107 of 1998) (NEMA) is South Africa's overarching environmental legislation. It includes a set of principles that govern environmental management and against which all Environmental Management Programmes (EMPr) and actions are measured. These principles include and relate to sustainable development, protection of the natural environment, waste minimisation, public consultation, the right to an environment that is not harmful to one's health or wellbeing, and a general duty of care. The Environmental Impact Assessment (EIA) Regulations, 2014: GNR.982, R.983, and R.985 under Section 24 of the NEMA define the activities that require Environmental Authorisation and the processes to be followed to assess environmental impacts and obtain Environmental Authorisation. The proposed development triggers Activities 12 and 19 of Listing Notice 1, and Activity 12 of Listing Notice 3. The proposed development thus requires EA in the form of a BA process. The associated EMPr will include mitigation measures, recommended by specialists that are required to be implemented to ensure that environmental resources are protected.
National Water Act (Act 36 of 1998)	NWA states that a person may only use water if the water use is authorised by a license under NWA or if the responsible authority has dispensed with a license requirement if it is satisfied that the purpose of the NWA will be met by the granting of a license, permit or other authorisation under any other law. There will be alterations to the bed and banks of wetlands and watercourses. Therefore, a water use authorisation will be required as per Section 21 (c) and (i) of the National Water Act.
National Environmental Management: Waste Act (Act 59 of 2008)	To reform the law regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development; to provide for institutional arrangements and planning matters; to provide for national norms and standards for regulating the management of waste by all spheres of government; to provide for specific waste management measures; to provide for the licensing and control of waste management activities; to provide for the remediation of contaminated land; to provide for the national waste information system; to provide for compliance and enforcement; and to provide for matters connected therewith. Section 19 allows the Minister to publish a list of activities, which require a Waste Management License. The most recent list is published in Government Gazette 37083 Notice No. 921 dated 29 November 2013. It is unlikely that any activities carried out by the development will trigger a Waste Management Activity.
National Environmental Management: Air Quality Act (Act 39 of 2004)	To reform the law regulating air quality in order to protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development; to provide for national norms and standards regulating air quality monitoring, management and control by all spheres of government; for specific air quality measures; and for matters incidental thereto.

	It is unlikely that any activities carried out by the development will impact on the local and regional air quality.
National Environmental Management: Protected Areas Act (Act 57 of 2003)	The National Environmental Management: Protected Areas intends to provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes, for the establishment of a national register of all national, provincial and local protected areas, for the management of those areas in accordance with national norms and standards, for intergovernmental co-operation and public consultation in matters concerning protected areas, and for matters in connection therewith. The proposed development will not have an impact on any protected areas.
National Environmental Management: Integrated Coastal Management Act (Act 24 of 2008)	The National Environmental Management: Integrated Coastal Management Act aims to establish a system of integrated coastal and estuarine management in the Republic, including norms, standards and policies, in order to promote the conservation of the coastal environment, and maintain the natural attributes of coastal landscapes and seascapes, and to ensure that development and the use of natural resources within the coastal zone is socially and economically justifiable and ecologically sustainable, to define rights and duties in relation to coastal areas, to determine the responsibilities of organs of state in relation to coastal areas, to prohibit incineration at sea, to control dumping at sea, pollution in the coastal zone, inappropriate development of the coastal environment and other adverse effects on the coastal environment, to give effect to South Africa's international obligations in relation to coastal matters and to provide for matters connected therewith. The proposed development will not have an impact on any coastal areas.
National Forest Act (Act 84 of 1998)	To reform the law on forests as government recognises that everyone has the constitutional right to have the environment protected for the benefit of present and future generations, natural forests and woodlands form an important part of that environment and need to be conserved and developed according to the principles of sustainable management, plantation forests play an important role in the economy; plantation forests have an impact on the environment and need to be managed appropriately, the State's role in forestry needs to change; and the economic, social and environmental benefits of forests have been distributed unfairly in the past. The proposed development will not have an impact on any forest areas.
Environmental Conservation Act (Act 43 of 1996)	This Act makes provisions for the application of general environmental principles for the protection of ecological processes, promotion of sustainable development and the protection of the environment. This Act has mostly been repealed by NEMA.
National Environmental Management: Biodiversity Act (Act 10 of 2004)	The National Environmental Management: Biodiversity Act intends, to provide for the management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act, 1998, the protection of species and ecosystems that warrant national protection, the sustainable use of indigenous biological resources, the fair and equitable sharing of benefits arising from bioprospecting involving indigenous biological resources, the establishment and functions of a South African National Biodiversity Institute and for matters connected therewith.
National Heritage Resources Act (Act 25 of 1999) KwaZulu-Natal Heritage Act (Act 4 of 2008)	The National Heritage Act (No. 25 of 1999) aims to promote good management of the national estate in order to preserve the country's unique heritage for current and future generations. The KwaZulu-Natal Heritage Act (Act No. 4 of 2008) provides for the conservation and preservation of the physical and intangible heritage resources of the KwaZulu-Natal province. No significant archaeological artefacts will be disturbed during this project; therefore; no permits will be required from the provincial heritage authority, AMAFA.
Mineral & Petroleum Resources Development (Act 28 of 2002)	To provide for the sustainable development of the nation's mineral and petroleum resources which includes activities carried out for the winning of any mineral on, in or under the earth (i.e. the use of borrow pits). Mined material used during construction must be obtained from licensed sources.
Occupational Health and Safety Act (Act 181 of 1993)	These regulations provide for the health and safety of persons at work, including aspects which are hazardous to health and safety. In terms of major hazardous installation, the regulations shall apply to employers, self-employed

	persons and users, who have on their premises, either permanently or temporarily, a major hazard installation or a quantity of a substance which may pose a risk that could affect the health and safety of employees and the public. During both the construction phase of this development all the requirements of Occupational Health and Safety Act 1993 will need to be adhered to.
Hazardous Substances Act (Act No. 15 of 1973)	This Act aims to provide for the control of substances which may cause injury or ill-health to or death of human beings by reason of their toxic, corrosive, irritant, strongly sensitizing or flammable nature or the generation of pressure thereby in certain circumstances, and for the control of certain electronic products, to provide for the division of such substances or products into groups in relation to the degree of danger; to provide for the prohibition and control of the importation, manufacture, sale, use, operation, application, modification, disposal or dumping of such substances and products and to provide for matters connected therewith. A Spill Contingency Plan will be compiled for managing spills during construction of the proposed Development.
National Building Regulations and Building Standards Act (Act 103 of 1977)	This Act aims to provide for the promotion of uniformity in the law relating to the erection of buildings in the areas of jurisdiction of local authorities and for the prescribing of building standards.
Guideline on Need and Desirability (2017)	Guideline considered determining the need and desirability of proposed development.
Municipal Planning Framework	
uMshwathi Integrated Development Plan (IDP), 2016-2017.	This project falls in line with the Municipality's sustainable development goals and better service delivery in previously marginalised rural areas within the local municipality.

Section 4: Motivation, Need and Desirability

4.1 Need And Desirability As Per Section 3(F)

The following table has been prepared as per the 2017 Integrated Environmental Management Guideline: Guideline on Need and Desirability compiled by the Department of Environmental Affairs.

Table 9: Need And Desirability As Per The 2017 Guideline On Need And Desirability

"securing ecological sustainable development and use of natural resources"	
How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?	The uMshwathi Water Supply Scheme, Phase 4 pipelines will be constructed along existing roads, foot paths and pipeline servitudes. The majority of the impacts on the ecology will occur during the construction phase of the project. Post construction, the wetland and grassland areas surrounding the pipeline are expected to grow back and revegetate the construction footprint. The vegetation and wetland specialists have rated the impacts on these natural resources as 'low' and therefore, there will be little long term impact on the local ecological integrity of the area.
How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity? What measures were explored to firstly avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	There will be a temporary loss of biological diversity in some of the pipeline footprint. During construction, there will be partial clearance of vegetation to provide access to the site and excavation of the pipeline trench. Post construction the cleared areas will be revegetated, allowing for the reestablishment of biological diversity within the construction footprint. Due to the 59 watercourses/ wetlands that currently cross the pipeline, the excavating for the new pipeline will impact on the watercourse and wetland systems in these areas. Due to the pipelines being encased in concrete and placed below the river bed, the wetland specialists anticipate some drainage improvements and resultant improved wetland function in some cases along the route. The wetland disturbance is therefore considered a 'low' impact once the pipeline has been constructed.
How will this development pollute and/or degrade the biophysical environment? What measures were explored	**The temporary impacts during construction may include**: • Clearing vegetation from the site footprint,

to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	• Impacts to the wetland areas for the construction of the new pipelines, • Erosion of exposed material in the construction areas resulting in the siltation of watercourses and wetlands, • There will be more general waste in this area during construction, and potentially more pollution, • Hazardous goods management and spill risks, and Measures explored to avoid these impacts included: • Maintaining the alignment of the proposed pipeline along existing roads, foot paths and existing pipeline servitudes. • The measures taken to minimise the loss of vegetation within the pipeline footprint include: ▪ Clear demarcation of the no-go areas in the construction areas prior to construction. ▪ Clear demarcation of protected species within the construction footprint prior to construction for search and rescue purposes. Acquiring removal permits from KZN Wildlife prior to the replanting of these plants. ▪ Search and rescue operations to replant endangered vegetation species outside of the construction footprint prior to construction. ▪ Demarcating surrounding wetland areas outside of the project footprint as no-go areas during construction. These temporary impacts are largely unavoidable and can be adequately mitigated with the application of the mitigation measures provided in the EMPr. **The long-term biophysical impacts may include:** • The long-term loss of the vegetation within the construction footprint, and • Improved drainage line and wetland functionality from the correct installation of the pipeline across the drainage lines and wetlands. This is a positive impact. Measures explored to avoid these impacts included: • Maintaining the alignment of the proposed pipeline along existing roads, foot paths and existing pipeline servitudes. • The measures taken to minimise the loss of vegetation within the pipeline construction footprint include: Due to the small areas of vegetation that would be cleared in the pipeline footprint compared to the vast surrounding vegetated areas that would remain un-affected, an offsetting mitigation option was not considered necessary. The loss of grassland in the project footprint was considered insignificant in light of the larger areas of better-quality vegetation in the greater area.
What waste will be generated by this development? What measures were explored to firstly avoid waste, and where waste could not be avoided altogether, what measures were explored to minimise, reuse and/or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable waste?	General waste and a small amount of hazardous waste will be generated through this development. An EMPr has been provided to ensure waste is sufficiently managed on-site. The site specific EMP also employs a strict waste protocol to ensure waste is minimised, reused and/or recycled.
How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	There are no negative or positive impacts on any cultural heritage sites.
How will this development use and/or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the	There may be water abstracted for dust suppression during construction. This will be a temporary impact on the natural water resources in this area. If required, the abstraction point

resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	will be authorised through DWS, water volumes abstracted will be recorded and strict management criteria of the abstraction point will be monitored through the implementation of the EMPr.
How will this development use and/or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and/or impact on the ecosystem jeopardise the integrity of the resource and/or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts? • *Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. de-materialised growth)? (note: sustainability requires that settlements reduce their ecological footprint by using less material and energy demands and reduce the amount of waste they generate, without compromising their quest to improve their quality of life)* • *Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used (i.e. what are the opportunity costs of using these resources this the proposed development alternative?)* • *Do the proposed location, type and scale of development promote a reduced dependency on resources*	The natural resources that will be used for the construction of the pipeline may include: • Sand material. This must be sources from a licenced source. ie. No unpermitted local DOT Borrow Pit or Sand Mine may be used unless the site has been authorised through DMR. Should the material be sourced from a licenced facility and be excavated in a responsible manner (according to the authorised site EMPr) then the integrity of the sand in this area will not be jeopardised. Water abstraction for dust suppression. Should abstraction take place from a licenced source and location according to the authorised quantities, this should have little to no impact on the natural water resources in this area.
How were a risk-averse and cautious approach applied in terms of ecological impacts? • *What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)* • *What is the level of risk associated with the limits of current knowledge* • *Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?*	The most significant impacts relating to wetland loss and vegetation loss were addressed by following existing roads, foot paths and pipeline servitudes. The limits in terms of knowledge gaps: • A wetland specialist and vegetation specialist has delineated the areas of concern on site. The assumption is that they were able to identify all wetlands and protected species along the proposed project footprint. • The level of risk would be low. A cautious approach was applied to these assessments. They were conducted by independent specialists with no vested interest in this project and development whatsoever.
How will the ecological impacts resulting from this development impact on people's environmental right in terms following • *Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?* • *Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?*	On the whole, the construction of the water pipeline will enhance/ better the surrounding community's access to water, therefore improving health and sanitation within the region. The negative impacts associated with the temporary loss in vegetation and wetlands should not negatively impact the community in this area in any significant fashion.

Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?	The construction of this pipeline will improve the living conditions of the surrounding community and provides a basic human right to access water. There would be some informal grazing of livestock in the construction footprint and the loss of vegetation within the footprint could have some impact on usual grazing routes. The amount of vegetation lost however is negligible. This is not a significant impact. The economic and social benefits of having running water in this area far outweigh any negative socio-economic factors.
Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives/targets/considerations of the area?	The temporary loss of wetland and vegetation will have a negative short-term impact on biological integrity in this area however the long term impact will be positive due to the improved flow of water in this system over the pipelines. The new pipeline will require less maintenance and therefore less future impact on these systems.
Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the "best practicable environmental option" in terms of ecological considerations?	No feasible site alternatives have been considered as the water pipeline follows existing roads, foot paths and pipeline servitudes, and therefore the current route is most feasible from a construction perspective. The site has previously been transformed through the creation of roads, footpaths and the previous pipeline installation. Selection of another site would require extensive vegetation clearing which would impact on the biophysical environment.
Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?	The negative accumulative impacts: • Clearing of vegetation. This reduces the species composition accumulatively in the surrounding area. • The infill of wetlands and watercourses may have an accumulative impact on the broader wetland and aquatic systems. The accumulative impacts were determined to be "Low" by the water resource assessment (Appendix B). The positive accumulative impacts: By constructing the new water pipeline below the watercourse channel (preferred technical alternative 1), the risk of erosion and altered water flow is reduced.
"promoting justifiable economic and social development"	
What is the socio-economic context of the area, based on, amongst other considerations, the following considerations: • *The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks of policies applicable to the area,* • *Spatial priorities and desired spatial patterns (e.g. need for integrated of segregated communities, need to upgrade informal settlements, need for densification, etc.),* • *Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.), and* • *Municipal Economic Development Strategy ("LED Strategy").*	The area is rural in nature, used for homesteads and public facilities such as schools, clinics and tribal councils. This water pipeline is improving the water supply within the area. These water pipelines will improve the longevity of this area and the living conditions people living in this area.
Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area?	The short-term socio economics during construction may be hampered by obstructed roads and paths during the construction of the pipeline. This may be outweighed however by the short-term employment opportunities for local labour in this area during construction. The long-term socio- economic benefit to this area will be significant with improved and continual access to water.
How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?	The construction of the uMshwathi WSS, Phase 4 will be significant for surrounding communities as water is vital for the continued success of these communities. Water is required for survival and aids in improving sanitation. The supply of water to these communities will aid in their development and growth.

Will the development result inequitable (intra- and inter-generational) impact distribution, in the short- and long-term?	The Socio-economic impacts associated with the uMshwathi WSS, Phase 4 will, for the most part, be distributed long term.
Will the impact be socially and economically sustainable in the short- and long-term?	Yes, the uMshwathi WSS, Phase 4 will be socially and economically sustainable both short and long term. Provided the pipeline is built to appropriate standards, the reduced maintenance costs of a well-built water pipeline outweigh those of an old and degraded pipeline which requires annual maintenance and repair.
In terms of location, describe how the placement of the proposed development will: • *result in the creation of residential and employment opportunities in close proximity to or integrated with each other,* • *reduce the need for transport of people and goods,* • *result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms public transport),* • *compliment other uses in the area,* • *be in line with the planning for the area,* • *for urban related development, make use of underutilised land available with the urban edge,* • *optimise the use of existing resources and infrastructure,* • *opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement),* • *discourage "urban sprawl" and contribute to compaction/densification,* ▪ *contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs,* ▪ *encourage environmentally sustainable land development practices and processes,* ▪ *take into account special locational factors that might favour the specific location (e.g. the location of a strategic mineral resource, access to the port, access to rail, etc.),* ▪ *the investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential),* ▪ *impact on the sense of history, sense of place and heritage of the area and the socio-cultural and* ▪ *cultural-historic characteristics and sensitivities of the area, and* *in terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?*	The water pipeline will result in a small number of employment activities during the construction phase. With the supply of water into the region, additional employment and agricultural opportunities will be created. The increase in water supply will decrease urban sprawl, allowing these communities to grow, providing further economic development to the area.
How were a risk-averse and cautious approach applied in terms of socio-economic impacts?: • *What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?* • *What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge?*	There have been no long-lasting significant negative socio-economic impacts identified and such a risk-averse approach was not considered.

Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	
How will the socio-economic impacts resulting from this development impact on people's environmental right in terms following • *Negative impacts: e.g. health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?* *Positive impacts. What measures were taken to enhance positive impacts?*	There have been no long-lasting significant negative socio-economic impacts identified which will affect the local communities' environmental rights.
Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socio-economic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?	The supplying of water into this region will reduce the dependencies of the community on the small dams, and watercourses for supply of water. This will therefore reduce the current ecological impact that these water resources are experiencing through water abstraction by the community.
What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?	The proposed water pipeline follows existing areas that have been impacted upon (i.e. roads, foot paths and pipeline servitudes). Therefore, the best practicable environmental option was to select the previously impacted sites.
What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)?	The proposed pipeline is to provide water into the community. Therefore this is a positive impact and the community will benefit.
Considering the need for social equity and justice, do the alternatives identified, allow the "best practicable environmental option" to be selected, or is there a need for other alternatives to be considered?	The alternatives identified allow for the "best practicable environmental option" to be selected.
What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?	The construction of the water pipeline will facilitate and provide basic human needs that ensure human wellbeing (provision of water).
What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?	During the construction phase of this development all the requirements of Occupational Health and Safety Act 1993 will need to be adhered to.
What measures were taken to: • *ensure the participation of all interested and affected parties,* • *provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation,* • *ensure participation by vulnerable and disadvantaged persons,* • *promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means,* • *ensure openness and transparency, and access to information in terms of the process,* • *ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge* *ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein were be promoted?*	The following steps were followed during the public participation process. The Public Participation Plan was first approved by EDTEA. • Signboards detailing the project were placed along the pipeline route. Five (5) signboards were placed throughout the project area within each small village (Faya, KwaZibusele, Mbulwane, Mtulwa and Nadi) on the 16th July 2020. • The Ward Councillors (Wards 3, 4 and 14 of the uMshwathi Local Municipality and Ward 1 of the Umvoti Local Municipality) were notified electronically. The Ward Councilors were provided information (maps and project description) to discuss with the local Inkhosi's and with interested residents in the community. • All relevant authorities and registered I&APs have been notified of the application and copies of the BAR provided. All relevant authorities and registered I&APs will be given the opportunity to review complete copies of the Draft Basic Assessment Report, which will be circulated for 30 days.

Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments of the community (e.g.. a mixture of low-, middle- and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?	Due to the nature of the water supply scheme, there are large positive impacts on the local community, including the provision of a jobs during the construction period.
What measures have been taken to ensure that current and/or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?	Full health, safety and environmental induction will be conducted on all employees. This induction brings to the attention of the employees all potential human health hazards and environmental dangers associated with the workings of the site. Inductions also indicate that all employees have a right to work in a clean and safe environment.
Describe how the development will impact on job creation in terms of, amongst other aspects: • *the number of temporary versus permanent jobs that will be created,* • *whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area),* • *the distance from where labourers will have to travel,* • *the location of jobs opportunities versus the location of impacts (i.e. equitable distribution of costs and benefits), and* *the opportunity costs in terms of job creation (e.g. a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.).*	Due to the nature of this project, there will be numerous temporary jobs will be created during the construction phase, with minimal permanent jobs. It is unlikely that there will be any permanent jobs created during the post construction phase, besides general maintenance of the pipeline over time.
What measures were taken to ensure: • *that there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment, and* *that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?*	This proposed project is funded and implemented by the uMgungundlovu District Municipality to improve living conditions for the people within the project area of the uMshwathi Local Municipality.
What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?	The proposed water pipeline will be situated on previously disturbed land (roads, foot paths and pipeline servitudes). The main environmental impact is linked to the construction of the pipeline within the watercourses and wetlands. The impacts of the pipeline on the water resources have been assessed by a wetland and aquatic specialist, and the impacts were deemed to be "Low". These impacts will be monitored and mitigated through the implementation of the EMPr during the construction phase.
Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?	All mitigations proposed are realistic and practical. The only long-term environmental legacy linked to the development will be the pipeline infrastructure to be constructed.
What measures were taken to ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?	*The EMPr will designate responsibility for all conditions. This document will be legally binding and such any non-compliances with the conditions of the EMPr will effectively be breaking the law and such the applicant, uMgungundlovu District Municipality, will prioritise these items.*
Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations?	The proposed water pipeline is to be constructed on previously disturbed areas (roads, footpaths and existing pipeline servitudes). No feasible site alternatives have been considered as relocating the pipeline will result in greater environmental impact through disturbing virgin areas. The proposed site is already transformed and selection of another site would require extensive vegetation clearing which would impact on the biophysical environment.
Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments in the area?	There will be no negative cumulative socio-economic impacts related with this project. In terms of positive cumulative impacts, there will be an improvement in the living conditions and sanitation. This will aid in the promotion of businesses in

	the area and assist with increasing the economy, ultimately uplifting this community.
How were a risk-averse and cautious approach applied in terms of socio-economic impacts?: • *What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?* • *What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge?* *Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?*	There have been no long-lasting significant negative socio-economic impacts identified and such a risk-averse approach was not considered.

The uMshwathi WSS Phase 4 aims to provide a reliable supply of water, in greater volumes over a large rural residential area in the uMgungundlovu District Municipality. The pipeline will supply safe and reliable potable water to residential households in this immediate area. The reticulation pipeline will tie directly into the Bulk pipeline that is currently under construction within the area. The uMshwathi WSS Phase 4 aims to supply the growing water demand in the area. The proposed pipeline has been designed taking into consideration the future population growth, future increase in water supply demand and terrain in the area. Having carried out a capacity analysis, the engineers are confident that all of the proposed infrastructure will be able to serve the communities and have taken into account future predicted increases in water demand.

4.2 Motivation For Preferred Site, Activity And Technology Alternative

The proposed pipeline mainly follows previously disturbed areas, including road reserves, foot paths, and existing pipeline servitudes, therefore no site alternative routing has been considered. Working closely with the engineers, the pipeline routes have been chosen to follow existing watercourse crossing locations.

4.2.1 Preferred Alternative 1 – Concrete Pipe Casing

The applicant plans to run the pipeline through the watercourses, in a concrete casing in the bed of the systems. The pipeline will be below the ground, attached to the bedrock, below the water surface. Reno Mattresses will be laid above the pipe encasement and gabion baskets will be used to stabilise the banks of the river (where required). Where heavy stream flow is anticipated, the crossings will be anchored with the use of irons doweled into the river bed.

The pipe will not block or impede the flow of water in the watercourses WC1-59. This crossing technique will have a larger construction impact on the watercourses in terms of construction work in the bed and banks of WC1-59 but will have less impact long term post construction for the lifespan of the pipe.

4.2.2 Technology Alternative 2 – Pipe Pier Bridges

The alternative watercourse crossing technology would be to construct pipeline bridges at each watercourse. This would entail building pier structures into the watercourse beds to support the pipes above ground as they cross the watercourse.

This approach will have a larger environmental and visual impact at the crossings WC1-59. Constructing pier bridges across the watercourses would potentially incur long term water flow impedance from the piers in the watercourse beds and banks. The pipe will be very visible at each crossing should it be above ground and raised above the water level. This technique would make the pipe susceptible to damage during flood events when the water levels rise, which would demand more infrastructural maintenance and repair for the uMgungundlovu District Municipality and threaten the consistent potable water supply for all users in this area.

It is the opinion of the EAP that there are no significant environmental impacts that cannot be mitigated against and that the preferred alternative 1 (concrete pipe casing through WC1-59) be authorized.

Section 5: Public Participation

5.1 Notification of Interested and Affected Parties

1) *fixing a notice board at a place conspicuous to and accessible by the public at the boundary, on the fence or along the corridor of-*
   i. *the site where the activity to which the application or proposed application relates is or is to be undertaken; and*
   ii. *any alternative site.*

Five noticeboards (in isiZulu and English) were placed within the five (5) villages within the project area (Faya, KwaZibusele, Mtulwa, Mbulwane and Nadi) on the 16th July 2020. The noticeboards detailed the Municipality's plan to construct the uMshwathi WSS Phase 4, subject to a basic assessment and water use authorisation. See Appendix C – Proof of Placement of Notice Board.

2) *giving written notice, in any of the manners provided for in section 47D of the Act, to-*
   i. *the occupiers of the site and, if the proponent or applicant is not the owner or person in control of the site on which the activity is to be undertaken, the owner or person in control of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;*
   ii. *the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area;*
   iii. *the municipality which has jurisdiction in the area;*
   iv. *any organ of state having jurisdiction in respect of any aspect of the activity, and;*
   v. *any other party as required by the competent authority;*

The majority of the pipeline will be placed in the Municipal Road Reserves and therefore the uMgungundlovu District Municipality have been included in the I&AP list to receive more information on the project. The sections of pipeline that fall outside the road reserves fall on either municipally owned land or tribal land, owned by the Ingonyama Trust Board (ITB). The following steps were followed during the public participation process:

- The Ward Councillors (Wards 3, 4 and 14 of the uMshwathi Local Municipality and Ward 1 of the Umvoti Local Municipality) were notified electronically. The Ward Councilors were provided information (maps and project description) to discuss with the local Inkhosi's and with interested residents in the community.
- Signboards detailing the project were placed along the pipeline route in five different locations on the 16th July 2020.
- All relevant authorities and registered I&APs have been notified of the application and copies of the BAR provided.
- A number of stakeholders were also tracked down electronically and information has been provided to them via email.
- The Draft BAR was circulated for a legislated 30 day comment period.
- All comments received within the comment period will be included in Appendix G of the BAR; and,

See Appendix D – Proof of Notification.

i. *owners, persons in control of, and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;*

Email notifications to all I&APs were sent out on the 09th July 2020. See Appendix D – Proof of Notification.

3) *placing an advertisement in-*
   i. *one local newspaper; or*
   ii. *any official Gazette that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations;*
4) *placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or district municipality in which it is or will be undertaken: Provided that this paragraph need not be complied with if an advertisement has been placed in an official Gazette referred to in paragraph (c)(ii); and*

An English and IsiZulu advert was placed in the Ilanga local newspaper on the 30 August 2020 detailing the proposed project, Basic Assessment and WUA process, providing contact details for EnviroPro for anyone wanting to register as an I&AP. See Appendix E – Proof of Advert Placement.

5.2 Registered Interested and Affected Parties

42. A proponent or applicant must ensure the opening and maintenance of a register of interested and affected parties and submit such a register to the competent authority, which register must contain the names, contact details and addresses of-

(a) all persons who, as a consequence of the public participation process conducted in respect of that application, have submitted written comments or attended meetings with the proponent, applicant or EAP;

(b) all persons who have requested the proponent or applicant, in writing, for their names to be placed on the register; and

(c) all organs of state which have jurisdiction in respect of the activity to which the application relates.

The contact details of all I&APs that have registered have been provided in the Registered I&AP list in Appendix F.

5.3 Comments

Comments of interested and affected parties to be recorded in reports and plans 44.

1) The applicant must ensure that the comments of interested and affected parties are recorded in reports and plans and that such written comments, including responses to such comments and records of meetings, are attached to the reports and plans that are submitted to the competent authority in terms of these Regulations.

2) Where a person desires but is unable to access written comments as contemplated in subregulation (1) due to-

i. a lack of skills to read or write;
ii. disability; or
iii. any other disadvantage;
iv. reasonable alternative methods of recording comments must be provided for.

All comments received from I&APs have been recorded in the comments and response table. The original comments provided have been provided together with the C&R table. This report has been provided to the uMshwathi and Umvoti Local Municipalities and uMgungundlovu District Municipality for comment. See Appendix G – Comments and Response table and Comments Received.

Section 6: Impact Assessment

6.1 Methodology To Determine And Rank Significance And Consequences Of Impacts Associated With All Alternative As Per Section 3(h)(vi)

Impacts are assessed qualitatively and quantitatively, looking at the duration / frequency of the activity and likely impacts associated with that activity during both construction and operation. If the activity happens frequently, the risk of the associated impact occurring is much higher than if the activity happens less frequently. The geographical extent of the impact is assessed i.e. will the impact be restricted to the point of occurrence or will have it have a local or regional effect. Impacts are also reviewed looking at severity levels and consequences should the impact occur i.e. will the severity be low, medium or high and then probability of the impact occurring is taken into account.

Whether or not the impact can be mitigated and the extent to which it can be avoided, managed, mitigated or reversed is assessed i.e. the probability of occurrence after mitigation has been applied. This also takes into account likelihood of human error based on construction and operational auditing experience i.e. even though spills can be completely mitigated against and prevented, there is always a small chance that spills will still occur (residual risk). Based on all of these factors, the impact is then rated to determine its significance. For example an impact can have a regional affect with severe environmental implications, however the probability of it occurring is very low and the implementation of the proposed mitigation measures means that the ultimate rating is medium or low.

Please see below a description of the scoring. The full impact scoring tables detailing how the significance rating was calculated can be found in Appendix H.

Scoring of Impacts	
Duration / Frequency of activity likely to cause impact	0 = No impact 1 = short term / once off 2 = medium term / during operation 3 = long term / permanent
Geographical Extent	0 = No impact 1 = point of impact / restricted to site 2 = local / surrounding area 3 = regional
Severity (level of damage caused) if impact were to occur	0 = No impact 1 = minor 3 = medium 5 = major
Probability of impact without mitigation	1 - 5 = low. 6 -10 = medium. 11 -14 = high.
Significance before application of Mitigation Measures	A score of between 1and 5 is rated as low. A score of between 6 and 10 is rated as medium. A score of between 11 and 14 is rated as high.
Will activity cause irreplaceable loss of resources?	10 = Yes 0 = No
Mitigation measures	0 = No impact - 5 = can be fully mitigated - 3 = can be partially mitigated -1 = unable to be mitigated
Probability of impact after mitigation	0 = No impact 1 = Low 2 = Medium 3 = High
Significance after application of Mitigation Measures	A score of between 1and 5 is rated as low. A score of between 6 and 10 is rated as medium. A score of between 11 and 14 is rated as high.

6.2 Preferred Site and Technology Alternative

uMshwathi WSS, Phase 4 (Site-specific)

See Appendix H for the full impacts scoring matrix, which assesses the impacts on the above system. The below impacts relate to the site-specific preferred site and technology alternatives.

Aspect	Nature and Consequences of impact	Sig. rating of impacts[10]:	Proposed mitigation and Extent to which impact can be reversed/avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
Construction				
Direct Impacts				
A. Clearing, earthworks and the operation of the construction site in the wetlands and watercourses along the pipeline route.	**1)** Direct impact: Erosion and loss of soil from the watercourse leading to sedimentation of the downstream, wetlands and watercourses.	7 (Medium)	The following measures must be carried out to mitigate against erosion along the uMshwathi WSS pipeline route: • The areas of the Mvoti River and its associated riparian and wetland areas must be demarcated as 'no-go' areas. • Areas exposed to erosion must be protected through the use of sandbags, berms and efficient construction processes i.e.: limiting the extent (footprint) and duration period that areas are exposed. • No excavated material or fill material may be stored within the Mvoti River and its associated riparian and wetland areas or within 15m of the Mvoti River and its associated riparian and wetland areas. • Bedding material that will be used must not be stored within 15m of the watercourse before it is used. The recommended buffer of 15m must be implemented. • An approved storm water plan (by the ECO) must be adhered to during construction.	4 (Low)
	2) Cumulative Impacts: Erosion and loss of material leading to deposition of material downstream of the wetland affecting other wetland systems.	9 (Medium)		5 (Low)
	3) Direct Impact: The habitat for fauna living within the construction footprint will be modified, resulting in habitat destruction within the Mvoti River and its associated riparian and wetland areas.	9 (Medium)	The following measures must be carried out to mitigate against excessive habitat destruction along the uMshwathi WSS pipeline route: • Erosion prevention and sediment control measures must be implemented. Temporary and permanent erosion control methods may include silt fences, interceptor ditches, seeding and sodding, riprap of exposed embankments, and mulching; • The project footprint must be kept as small as possible;	6 (Medium)

[10] See Appendix H for more details.

Aspect	Nature and Consequences of impact	Sig. rating of impacts[10]:	Proposed mitigation and Extent to which impact can be reversed/avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
Construction				
Direct Impacts				
	4) Cumulative Impact: Increase in turbidity of water affecting water quality impacting on aquatic fauna.	7 (Medium)	• Direct impacts to the Mvoti River and its associated riparian and wetland areas substrate/habitat outside the construction footprint must be avoided by ensuring the Mvoti River and its associated riparian and wetland areas outside the construction footprint are demarcated as a 'no go' zone during construction. • Heavy machinery must not be permitted to move beyond the demarcated footprint; • Sand and aggregate for concrete must not be obtained from within the riverbed or riparian zone but must be sourced from a permitted source; • A spill containment plan is required to be in place prior to construction to minimize the potential impacts of spills or leaks of hazardous substances; • Contamination of the Mvoti River and its associated riparian and wetland areas with unset cement must be prevented as it is detrimental to aquatic biota. • Any animal found within the project construction area must be removed unharmed from the site.	3 (Low)
B. Careless operation by the contractor within the wetlands during the construction of the pipeline.	**5)** Direct Impact: This would result in direct and cumulative damage to the wider wetland areas outside of the construction area.	9 (Medium)	The following measures must be carried out to mitigate against potential damage to the wetlands during construction of the pipeline: • There will be work within wetlands as per the layout, however areas of the wetland not within the construction footprint must be demarcated as no-go areas; • Heavy vehicles must avoid working near the wetland as far as possible. Where heavy vehicles are required to work in the wetland during the construction of the pipeline, these vehicles must remain in the authorised pipeline construction footprint. There must be no haphazard entry into / exit from the wetlands along the route. i.e. construction plant and vehicles may only travel along the construction areas as per Figures 2 - 7 and may only use a single point of entry into and out of the wetland area. • The contractor must limit in-stream work to minimize streambank and bed disturbance. • Construct the pipe crossings in the dry season where possible when water levels will be lowest and the risk of erosion and downstream siltation is lowest.	5 (Low)

Aspect	Nature and Consequences of impact	Sig. rating of impacts[10]:	Proposed mitigation and Extent to which impact can be reversed/avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
Construction				
Direct Impacts				
			• Any disturbed area within the construction footprint must be rehabilitated within a month of occurrence to the satisfaction of the ECO and or EDTEA Compliance Authorities. • All activity within the wetlands and watercourses must be strictly according to the prescribed engineering designs and approved drawings. • Erosion prevention and temporary sediment control measures must be implemented in areas prone to channelled flow and erosion. Temporary and permanent erosion control methods may include silt fences, interceptor ditches, seeding and sodding, riprap of exposed embankments, and mulching. • No soil stockpiling may take place within 15m of any wetland or watercourse.	
C. Movement of vehicles and construction of pipeline within wetland areas located at crossings WC6, WC23, WC38, WC42, WC57 & WC59.	**6)** Direct Impact: Physical damage to wetland areas associated with the rivers and tributaries during excavation, resulting in the loss of wetland.	10 (Medium)	Construction activities are to be restricted strictly to the pipeline route across the wetlands (i.e. no wider than 1.2m and 2-4m deep). A maximum construction servitude width of 5m must be adhered to when working within the wetlands. The surrounding area must be demarcated as 'no-go areas' to prevent workers from unintentionally encroaching into wet areas. Furthermore: • The pipeline is to run as close to all existing pipelines as possible to reduce the disturbance footprint. • The pipe must be tied to existing structures at the watercourse, where feasible to reduce the amount of construction activities within the watercourse. • No storage of material, vehicles or equipment is permitted within the wetland areas; • Apart from where the pipeline crosses the wetlands, a buffer of 15m is to be maintained around wetland areas; • The trenches within the watercourses and wetland must not stay open for longer than 7 days. • Soil must be excavated and stockpiled in different layers. Once the pipe has been laid, the stockpiled material must be replaced in the same order it was taken out. This will promote the rehabilitation of the site. • No heavy vehicles will be permitted to work in the wetland areas unless exceptionally hard material is encountered and	6 (Medium)

Aspect	Nature and Consequences of impact	Sig. rating of impacts[10]:	Proposed mitigation and Extent to which impact can be reversed/avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
Construction				
Direct Impacts				
			the trench cannot be dug by hand. Pipework around these sensitive areas should be laid by hand. • No dumping of material or waste may occur within these areas. All material and waste must be taken back to the construction camp at the end of the day. • Designated stockpile storage areas must be established outside of the wetland areas. This impact can be managed during construction through the implementation of the EMPr.	
D. Draining excavated areas during construction.	**7)** Direct Impact: Draining the excavated areas can cause major siltation of downstream wetland and watercourses.	9 (Medium)	The draining of the excavated areas during construction is essential in order for construction activity to take place for the creation of the concrete encased pipe crossings within watercourses (such as pouring concrete). The following mitigation measures must be carried out: • Where possible, all excavated areas must be drained into a temporary settling pond before releasing the water into the downstream wetland area, • Where this is not possible or practical, the pumped water must be released onto reno-mattresses or pack rock to prevent the scouring and resultant downstream erosion from the pumped pipe outflow, • Drip trays must be used under all fuel operated machinery at all times.	5 (Low)
	8) Direct Impact: Hydrocarbon spills can occur through careless management of fuel operated machinery such as pumps and generators.	7 (Medium)		5 (Low)
E. Clearing of vegetation along the pipeline construction footprint.	**9)** Direct Impact: This will result in the loss of vegetation within the Dry Coast Hinterland Grassland (Gs 19), Moist Coast Hinterland Grassland (Gs 20), KwaZulu-Natal Sandstone Sourveld (Gs 21 – formerly SVs 5), KwaZulu-Natal Hinterland Thornveld (SVs 3), and Eastern Valley Bushveld (SVs 6) vegetation types.	8 (Medium)	The following measures must be carried out to mitigate against excessive vegetation clearing along the pipeline construction footprint: • This impact cannot be fully mitigated as it will result in the loss of some indigenous vegetation found within the Dry Coast Hinterland Grassland (Gs 19), Moist Coast Hinterland Grassland (Gs 20), KwaZulu-Natal Sandstone Sourveld (Gs 21 – formerly SVs 5), KwaZulu-Natal Hinterland Thornveld (SVs 3), and Eastern Valley Bushveld (SVs 6) vegetation types. However, minimal vegetation will be cleared and the vegetation along the roads, footpaths and existing pipeline servitude is predominantly composed of alien species. • The vegetation that will be cleared must be restricted to the construction footprint of pipeline. No vegetation may be cleared outside of the construction footprint other than that required for access to the site or for the construction activities	6 (Medium)

Aspect	Nature and Consequences of impact	Sig. rating of impacts[10]:	Proposed mitigation and Extent to which impact can be reversed/avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
Construction				
Direct Impacts				
			associated with the construction of uMshwathi WSS, Phase 4. • Contractors must avoid damaging any vegetation that is not within the construction footprint; • The ECO must be consulted should a tree or any vegetation require clearing outside of the designated construction footprint area.	
F. Clearance of vegetation (general)	**10)** Indirect Impact: Encroachment of alien vegetation into cleared areas i.e. Castor Oil. Proliferation of weeds was identified as an impact in the specialist assessments.	8 (Medium)	There is currently a significant amount of alien vegetation located on the site and within the surrounding area. • Alien vegetation must not be allowed to encroach onto the site and must be continually (monthly) removed during construction. Construction must not promote further alien plant disturbances in the surrounding area.	4 (Low)
	11) Direct Impact: Removal of alien invasive vegetation found along the uMshwathi WSS pipeline route.	0 (Positive)	This is a positive impact.	0 (Positive)
G. Construction activity in areas with no vegetated cover.	**12)** Direct Impact: Erosion on exposed banks and areas resulting in scouring, blocked storm water systems and the siltation of watercourses and wetlands.	7 (Medium)	This impact is partially unavoidable as the construction activity will need to take place over cleared exposed areas. The following mitigation measures must however be applied: • No more than 2km of the construction area may be cleared at one time. • Exposed banks that are susceptible to erosion within 15m of the edge of any wetland or watercourses must not be left exposed for more than 2 months at any time. • Erosion/ storm water protection measures must be implemented above and below the slope in the form of sand bag berms, pack rock berms or even vegetation berms to slow runoff down the slope. • Any accumulated siltation that enters a wetland area must be removed by spade and shovel (by hand). • Exposed cut and fill slopes near the wetland areas must be top soiled, hydro seeded or have grass sods planted within 4 weeks of being cut.	5 (Low)
H. Sourcing of layer work material	**13)** Indirect Impact: Sourcing material from unlicensed borrow pits and sand mines in an illegal and unplanned manner can be	9 (Medium)	Bedding material is often sourced from local borrow pits or sand mines. The following criteria must be adhered to: • Any local borrow pit or sand mine used must be a permitted source through DMR.	5 (Low)

Aspect	Nature and Consequences of impact	Sig. rating of impacts[10]:	Proposed mitigation and Extent to which impact can be reversed/avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
Construction				
Direct Impacts				
	dangerous to the surrounding community and detrimental to the local environment.		• The contractor excavating the material must do so within the parameters of the mining permit, adhering to the EMP conditions for that particular site. • The borrow pit and sand mine must be shaped post excavation.	
I. Clearing and excavation for creation of pipeline trench.	**14)** Direct Impact: Impact on existing services i.e. powerlines, water pipes etc.	7 (Medium)	All existing services must be identified and be relocated prior to construction.	5 (Low)
J. Construction Phase of the uMshwathi WSS.	**15)** Indirect impact: This is a positive impact for the community through the potential creation of local employment.	0 (Positive)	This is a positive impact.	0 (Positive)
K. Compaction of soil above water pipeline/ trench.	**16)** Indirect impact: A temporary increase in hardened surfaces may increase stormwater runoff resulting in increased erosion of nearby areas and impacting on the drainage lines below the road. This is temporary and will be mitigated after the area has revegetated.	5 (Low)	The following stormwater management measures must be implemented to prevent erosion: • Stone pitching stormwater drains must be constructed to direct stormwater flow away from the structure; • Gabion mattresses must be used for slope stabilization.	3 (Low)
L. Placement of the water pipelines below the bed of the watercourses and wetlands.	**17)** Direct Impact: Incorrect placement of the pipes within the wetland and watercourse has the potential to alter the flow dynamics within the watercourse systems.	8 (Medium)	The following measures must be carried out to avoid potential alteration of flow dynamics within the watercourse: • The contractor must construct the watercourse pipe crossing as per the approved designs, as it has been designed to ensure that the natural flow of the system is not interrupted. • Conduct bi-annular inspections on the culvert to ensure no blockages have occurred. • During maintenance the working area must be cordoned off to prevent unnecessary intrusion into the wetland and spill contingency measures applied.	4 (Low)
M. Removal of exposed, old and obsolete pipes during installation of new water pipeline.	**18)** Cumulative impact: Improved water flow within drainage lines and wetlands will prevent further scouring and erosion of the banks associated with the drainage lines.	0 (Positive)	This is a positive impact.	0 (Positive)
N. Having a functional water pipeline supplying	**19)** Cumulative impact: Construction of the water pipeline will be a positive operational impact. The	0 (Positive)	This is a positive impact.	0 (Positive)

Aspect	Nature and Consequences of impact	Sig. rating of impacts[10]:	Proposed mitigation and Extent to which impact can be reversed/avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
Construction				
Direct Impacts				
water to the surrounding communities.	broader community will benefit with easy access to safe drinking water. This will aid in the improvement of sanitation within the area.			

uMshwathi WSS, Phase 4 (Standard Construction Impacts)

See Appendix H for the full impacts scoring matrix, which assesses the impacts on the above system. The below impacts relate to the preferred site and technology alternatives – Generic Impacts.

Aspect	Nature and Consequences of impact	Sig. rating of impacts[11]:	Proposed mitigation and Extent to which impact can be reversed/avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
Construction				
Direct Impacts				
No generic direct impacts				
Indirect Impacts				
O. Cleared exposed surfaces from the construction activity.	**20)** On site erosion due to improper management of storm water by the contractor during construction.	7 (Medium)	Areas exposed to erosion must be protected. The following apply to erosion control on site: • Sand bags, berms, stone pitching must be used to control erosion from forming during construction. • No excavated material or fill material may be stored within the watercourses or within 15m of the watercourses. • Bedding material that will be re-worked may not be stored within 15m of the watercourses before it is used. • Temporary stormwater measures should be implemented to ensure that material does not wash off the surface into any watercourse during construction.	3 (Low)
P. Construction vehicles driving along gravel roads and moving across areas of exposed soil Dusty conditions generated during	**21)** Dusty conditions impacting on air quality affecting community members and fauna along the construction route.	8 (Medium)	There will be increased dust generated during the construction phase; however, this will be on a temporary basis i.e. the site will be worked continuously for a few months until construction is completed. Further to this:	5 (Low)

[11] See Appendix H for more details.

Aspect	Nature and Consequences of impact	Sig. rating of impacts[11]:	Proposed mitigation and Extent to which impact can be reversed/avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
Construction				
Direct Impacts				
No generic direct impacts				
Indirect Impacts				
construction and by construction vehicles.			• Vehicle speed limits within the construction areas must be reduced to 40km/hr to reduce the amount of dust raised along the gravel roads to and from the site. • The material being transported to the site in the back of the trucks must be covered. • Water carts must be used on site should dust levels elevate to a nuisance level. • Shade cloth is must be utilised for stockpiled materials where required. • The applicant must comply with the National Dust Regulations (Government Notice R827, 2013) with regards to dust levels produced on site.	
Q. Construction vehicles and personnel working in the area during construction.	**22)** Creating a nuisance to the surrounding area and residents.	7 (Medium)	Sections of the pipeline run close to residential areas. The work area is to be designated to prevent trespassing onto adjacent farms/properties. Speed limits will be obeyed and enforced by the contractor. A complaints register will be kept on site in the environmental file. This impact can be avoided and managed.	3 (Low)
R. Increase daily presence of heavy vehicle and plant traffic on the dirt roads and along the pipeline.	**23)** Impacting existing traffic conditions and pedestrians.	7 (Medium)	The construction activity will pose an increased risk to pedestrians and traffic. This cannot be avoided as traffic will increase during the construction phase temporarily (for a few months) until construction is completed. • Appropriate construction safety signage must be erected to notify of construction activities and potential hazards on site; • Appropriate barriers must be used to cordon off construction excavations, hazardous areas, and areas undergoing construction. • Flagmen must be in attendance to direct traffic where required.	5 (Low)
S. An increase in heavy vehicles and plant.	**24)** Emissions from construction vehicles associated with the construction of the uMshwathi WSS, Phase 4.	6 (Medium)	The construction phase of the project will see the increase in vehicles moving through the area which will result in the increase of emissions into the atmosphere. All construction vehicles operating on the site must be fitted with the appropriate silencers and exhausts in order to reduce the emissions and noise into the atmosphere.	4 (Low)
T. Excavations taking place on site.	**25)** Unidentified existing services being impacted on site.	8 (Medium)	Services have been identified on the site; however, any unidentified services that will be impacted on must follow:	4 (Low)

Aspect	Nature and Consequences of impact	Sig. rating of impacts[11]:	Proposed mitigation and Extent to which impact can be reversed/avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
Construction				
Direct Impacts				
No generic direct impacts				
Indirect Impacts				
			• As standard construction practice, the engineer and contractor must identify any potential existing services that may be affected before construction. • Any infrastructure that is removed must be replaced, and any damage caused by construction must be repaired.	
U. Generation and storage of waste during construction.	**26)** Improper storage of waste on site resulting in littering and impact on environment on site affecting surrounding community. Incorrect disposal of waste leading to pollution at the dump site or at sites where waste may be illegally disposed of.	8 (Medium)	The construction phase of the project will see an increase in workers on site and therefore an increase in waste in the area. • Littering will not be permitted in the study area; • Designated waste storage areas with appropriate waste receptacles must be set up within the construction site camp; • Waste will be removed from site and disposed of at a registered waste disposal site; • Safe disposal slips for the disposal of all waste must be obtained and kept on site as proof of safe disposal. • Waste management will be controlled through the implementation of the EMPr. This impact can be managed and mitigated.	4 (Low)
V. Insufficient number of toilet facilities on site	**27)** Construction staff having to use the surrounding areas as ablutions, resulting in contamination of the environment.	9 (Medium)	The increase in construction personnel during the construction phase will require an appropriate number of toilet facilities for the site. • Appropriate and sufficient toilet facilities (1 toilet per 15 employees) must be provided by the contractor; • All toilet facilities must be checked on a daily basis; • All toilet facilities must be emptied and cleaned on a weekly basis.	5 (Low)
W. Inappropriate disposal of toilet waste.	**28)** Resulting in the contamination of the environment.	7 (Medium)	The following mitigation measures must be adhered to: • All toilet facilities on site utilised by the construction personnel must be checked on a daily basis and emptied on a weekly basis by the contactor. • A registered waste removal contractor must remove sewage waste from site or sewage waste must be disposed of at a permitted Waste Water Treatment Site; • Safe disposal slips for the disposal of effluent waste must be obtained and kept on site as proof of safe disposal.	2 (Low)
X. Generation of noise associated with the	**29)** Excessive noise pollution on site.	8 (Medium)	The construction phase of the project will see the increase in vehicles moving through the area which will result in the increase of noise.	5 (Low)

Aspect	Nature and Consequences of impact	Sig. rating of impacts[11]:	Proposed mitigation and Extent to which impact can be reversed/avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
Construction				
Direct Impacts				
No generic direct impacts				
Indirect Impacts				
construction plant and activity.			• All construction vehicles operating on site must be fitted with standard silencers to reduce the noise levels produced.	
Y. Construction work taking place outside of the construction footprint.	**30)** Damage to adjacent properties during construction.	7 (Medium)	The following mitigation measures must be adhered to: • All services must be identified prior to construction through notifying surrounding stakeholders prior to any potential traffic congestion; • The contractor must create alternative access routes to the properties where required; • The contractor must be aware of the stakeholders' movements and where possible, disruptive activities must be scheduled outside of peak traffic hours; • Surrounding land owners and stakeholders must be notified prior to disruptive activities during construction; • Any infrastructure that gets removed must be replaced and any damage caused from construction must be repaired.	3 (Low)

6.3 Technology Alternative 2

uMshwathi WSS, Phase 4 (Site-specific) – Pipe pier bridges across watercourses

See Appendix H for the full impacts scoring matrix, which assesses the impacts on the above system. The impacts relating to the preferred Alternative and Alternative 2 are very similar, therefore the impacts below include the impacts which differentiate the most between the two alternatives.

Aspect	Nature and Consequences of impact	Sig. rating of impacts[12]:	Proposed mitigation and Extent to which impact can be reversed/avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
Construction				
Direct Impacts				
Z. Larger footprint, and therefore more clearance and	**31)** There is a greater potential for erosion to take place within the Mvoti River and its associated	11 (High)	The following measures must be carried out to mitigate against erosion at the pier bridges:	9 (Medium)

[12] See Appendix H for more details.

Aspect	Nature and Consequences of impact	Sig. rating of impacts[12]:	Proposed mitigation and Extent to which impact can be reversed/avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
Construction				
Direct Impacts				
disturbance, required for the construction of piers across the watercourses and wetlands.	riparian and wetland areas, resulting in downstream sedimentation of this eroded material.		• The areas of the Mvoti River and its associated riparian and wetland areas must be demarcated as 'no-go' areas. • Areas exposed to erosion must be protected through the use of sandbags, berms and efficient construction processes i.e. limiting the extent (footprint) and duration period that areas are exposed. • No excavated material or fill material may be stored within the Mvoti River and its associated riparian and wetland areas or within 15m of the Mvoti River and its associated riparian and wetland areas.	
AA. Pipe pier bridges remaining exposed above the water line.	**32)** Pier obstructing flow within the watercourses. This increases the potential for erosion to take place within the Mvoti River and its associated riparian and wetland areas, resulting in downstream sedimentation of this eroded material.	12 (High)	The following measures must be carried out to mitigate against erosion at the watercourse crossings: • The areas of the Mvoti River and its associated riparian and wetland areas must be demarcated as 'no-go' areas. • Areas exposed to erosion must be protected through the use of sandbags, berms and efficient construction processes i.e. limiting the extent (footprint) and duration period that areas are exposed. • No excavated material or fill material may be stored within the Mvoti River and its associated riparian and wetland areas or within 15m of the Mvoti River and its associated riparian and wetland areas.	14 (High)
	33) Having a raised pipe above the surface level would expose the pipe to flood damage and consequential ongoing maintenance and service disruption.	10 (Medium)	The pipeline must be raised above the 1:100 year floodline level to avoid flood damage. The raised pipe would require additional reinforcement for protection from weathering.	8 (Medium)
	34) The exposed pipes will detract from the aesthetics of the surround area.	11 (High)	This cannot be mitigated.	11 (High)

uMshwathi WSS, Phase 4 (Standard Construction Impacts) – Pipe pier bridges across watercourses
Generic impacts for the uMshwathi WSS, Phase 4 will be the same for both alternatives.

2.5. Environmental Impact Statement as per section (l)

The key impacts associated with the construction of the uMshwathi WSS, Phase 4 relate to those during the construction period. Issues such as clearing indigenous vegetation, damaging watercourses and wetlands, and the management of erosion need to be addressed. This can be best managed by minimising the clearing of vegetation to strictly the project footprint, managing the watercourses WC1-59 and the associated wetlands as sensitive no-go areas and by implementing effective stormwater measures. All construction activity is to be confined to the existing pipeline footprint area. Should a large tree or section of riparian vegetation require clearing, the ECO must be consulted before clearing takes place. All vehicles must use the existing road and operate within the existing route. The watercourse and wetlands within 500m are not expected to be affected by the pipeline construction as long as the mitigation measures are adhered to during construction. Once construction is complete there should be no significant impacts related to the operation of the pipeline.

Taking into consideration the above impacts and mitigation measures, it is the EAP's opinion that the construction of the uMshwathi WSS, Phase 4, be authorised.

2.6. Impact Management Objectives And Outcomes For The Development For Inclusion In The EMP As Per Section 3(m)

The following objectives and outcomes must be considered for this project:

- Objectives:
  - For there to be no lasting negative impacts on the environment once construction is complete, specifically within the watercourses and wetlands.
  - To practice responsible construction, 'best practice' with regards to housekeeping on site during construction (outlined within the EMPr) and enforce the polluter pays principle. The applicant / contractor must be responsible for their actions on site during construction and the rehabilitation of the site post construction.
- Outcomes:
  - To promote sustainable development. Create infrastructure and an environment that is healthy and sustainable for future generations to come.

2.7. Assumptions, Uncertainties And Gaps In Knowledge Relating To The Assessment And Mitigation Measures Proposed As Per Section 3(o)

The information in this report is based on findings from the Aquatic and Wetland assessments. The design drawings and typical cross sections through the watercourses, have been provided to the EAP by the engineer. The EAP is therefore satisfied that there are no gaps in knowledge relating to this assessment.

2.8. Period For Which Authorization Is Required, Proposed Monitoring And Auditing And Post Construction Requirement's

Environmental authorisation is required for the construction of the pipeline within the 2021 business plan for the uMgungundlovu District Municipality. The authorization would need to be valid for a period of five years, within which time construction would need to commence. Due to the length of the pipeline, construction may be split into two phases, each phase requiring one year.

Given the nature of this project, it is recommended that **monthly** ECO audits be carried out for the duration of the construction phase of this project. One post construction audit should be conducted once construction is complete.

The EMPr details the post construction, rehabilitation and closure objectives which will be monitored by the ECO and compliance authorities.

2.9. Financial Provisions As Per Section 3(s)

The contractor is responsible for and must ensure that the site has been rehabilitated in full before leaving the site. No upfront financial provision is required for this project.

2.10. EAP Opinion On Whether Or Not To Authorize Activity And Recommendations And Conditions For Authorisation As Per Section 3(n) And (p)

With respect to the technology alternatives, it is recommended that preferred alternative 1, which is to encase the pipe in concrete and run it beneath the watercourse beds, be authorised. Impacts associated with the pipeline construction are considered 'low'.

2.11. Summary of Recommendations for the construction of the uMshwathi WSS:

Stakeholders, Properties & Services

- As standard construction practice the engineer and contractor should identify all existing services that may be affected prior to construction.
- Any structures that need to be removed, should be replaced and any damage repaired.
- The pipeline route must run adjacent to existing roads, footpaths and services, wherever feasible.
- Environmental induction at the start of the construction is to be conducted and proof retained in the site file.

Traffic & Construction Vehicles

- Appropriate signage and trench demarcation must be used to cordon off construction areas.
- All construction vehicles should be fitted with the appropriate silencers and exhausts.
- Speed limits must be obeyed.
- Existing roads must be used with no ad hoc roads being created.

Housekeeping, waste management, storage and materials handling

- Littering must not be permitted on site.
- All hazardous materials and substances should be stored within a secured area in the construction camp. The storage area should be a hard surfaced, bunded and covered area.
- Cement mixing must be done on a hard surface that is protected from storm water runoff.
- Contractors should be required to dispose of construction rubble at an appropriate landfill site. Delivery notes and safe disposal certificates to prove appropriate disposal should be available.
- Appropriate and sufficient toilet facilities must be provided by the contractor.
- Toilet facilities must be provided by a registered company and all sewage must be disposed of at an appropriate facility. Safe disposal certificates must be kept on record.
- Toilet facilities must not be located within 32m of any watercourses.

Dust and erosion control

- A water cart should be used to dampen dusty surfaces and suppress dust.
- Exposed areas should be rehabilitated and re-vegetated as soon as possible during construction.
- Areas exposed to erosion must be protected through the use of sand bags, berms and efficient construction processes i.e.: limiting the extent (footprint) and duration period that areas are exposed. The contractor must ensure that any blockages created during construction are resolved.

Stormwater management and protection of watercourses

- The engineer/contractor must ensure that only clean stormwater runoff enters the environment. Any contaminated run off must be collected and disposed of.
- No excavated material or fill material may be stored within or directly adjacent to the watercourses / wetlands.
- Only the area directly in the path of the trench may be cleared of vegetation.
- The contractor must ensure that invasive species do not gain a foothold along the cleared route until the indigenous vegetation has had time to re-establish itself.
- Heavy vehicles should avoid working near the watercourses as much as possible. Trenches to preferably be dug by hand.
- Once construction is complete, it must be ensured that no material whatsoever is left in the stream channels or near the banks where it may be washed into the watercourses in a high flood event. It is recommended this material be removed from site entirely if it is not used in the construction process.
- During the exaction of trenches, flows must be diverted around the active work areas to prevent channelled flow.

Trenching

- Only the minimum area required for the trench may be cleared.
- Trenches must not remain open indefinitely.
- Trench work must be completed in sections and then closed once the pipe has been laid in that section.
- Cleared areas may not be left exposed for long periods of time and must be re-vegetated at each stage of pipework is completed.
- Trenches must not remain open during building shut down periods i.e. over Christmas and Easter.
- Soil in the trenches must be compacted effectively to the same level or higher than the surrounding land to prevent settling which could create depressions for water to travel along, creating erosion funnels and exposing the pipeline.

- Indigenous grasses must be replanted after the soil has been compacted and that this vegetation has taken successfully before contractors leave the site.
- Trench rehabilitation must be effectively carried out before contractors leave the site, especially where approaching the watercourse crossings and on steeper hills.
- A maximum width of 10m wide construction footprint buffer must be maintained along the pipeline in the sections outside the watercourses.

Watercourse Crossing construction

- All watercourses (including wetlands) must be identified and demarcated at the start of construction.
- Work in stream beds should preferably be carried out during winter when flow rates are lower.
- Erosion protection features (i.e. gabions) must be installed at the watercourse crossings if there are no existing structures.
- Pipework must be laid in the river bed flush with the bedrock or the stream bed so as not to create a point for erosion.
- A buffer of 15m is to be maintained around the watercourses and wetlands (excluding the actual crossings).

Protection of Heritage Resources

- A 10m buffer must be maintained around all homesteads to reduce the chance of excavating “invisible” graves.
- A buffer of 20m is to be maintained around any graves that are encountered during construction.
- Attention is drawn to the South African Heritage Resources Act, 1999 (Act No. 25 of 1999) and the KwaZulu-Natal Heritage Act (Act no 4 of 2008) which, requires that operations that expose archaeological or historical remains should cease immediately, pending evaluation by the provincial heritage agency.

Appendix A: Drawings & Maps

Appendix B: Specialist Reports

#	Title of Report	Specialist	Date
1	Water Resource Assessment	The Biodiversity Company	November 2019
2	First Phase Heritage Impact Assessment	Active Heritage	March 2017

Appendix C: Proof of Placement of Notice Board

Appendix D: Proof of Notification

Appendix E: Adverts

Appendix F: Registered I &Aps

Appendix G: Comments and Response table and Comments Received

Appendix H: Impacts Scoring Matrix

Appendix I: EAP declaration and Curriculum Vitae

Appendix J: Environmental Management Program