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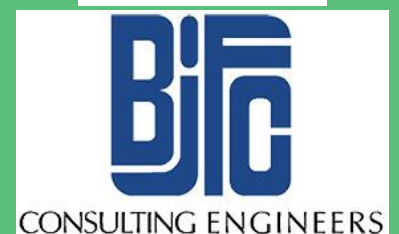
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**AUGUST 2019**  
**DRAFT BASIC ASSESSMENT REPORT**  
**CONSTRUCTION OF THE MPUNGOSE WATER**  
**SUPPLY SCHEME**  
**UMLALAZI LOCAL MUNICIPALITY**  
**KING CETSHWAYO DISTRICT MUNICIPALITY**  
**EIA REF NO.: DC28/0018/2019**



**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 King Cetshwayo District Municipality proposes to construct a network of bulk and reticulation water pipes in the Ngodini, Khabingwe and Mkhuphulan Gwenya (Mid-point: 28°46'14.40"S, 31°39'6.01"E), located approximately 23.7km west of Empangeni. The Mpungose Water Supply Scheme is located across Ward 23, 24, 25, 26 and 27, uMlalazi Local Municipality within the King Cetshwayo District Municipality. There is some existing pipeline infrastructure in place, however the pipes have fallen into disrepair and are mostly unfunctional. The new pipeline will run east from Habeni towards the villages of Ngodini, Khabingwe and Mkhuphulan Gwenya, where the surrounding community will be supplied through a network of reticulation water pipes and stand pipes. The pipeline will be located, where possible, within the road servitudes and along footpaths, and will be buried in a trench 800mm wide and 1.2m deep. The pipeline route will cross numerous watercourses and wetlands throughout the project footprint. The entire supply area covers approximately 10 000 hectares and includes approximately 350 000 km of pipeline to be installed. The water Sub Supply scheme is broken up into 5 areas (SSA 3, 1 – 5). The supply scheme will tie into and maintain two existing reservoirs (28°48'3.35"S, 31°32'33.23"E; and, 28°47'13.97"S, 31°36'36.94"E), and construct 4 new reservoirs throughout the project area.

The following key impacts and mitigation measures were assessed:

- **Damage to watercourse banks, wetland areas, and riparian zones from construction activity:** Caution must be exercised when working near and within all watercourses (WC1 - 63). Top soil must be stockpiled more than 32m from the watercourses. Heavy vehicles must be kept at least 32m away from the watercourses except where needed for pipeline construction. The construction footprint within WC1-WC63 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:** The pipelines within the watercourse will be laid below the level of the river bed and encased in concrete. Concrete anchors will be used to keep the pipeline in place during high flow events. Reno Mattresses will be laid above the encasement and gabion baskets will be used to stabilise the banks (if required).
- **Loss of riparian vegetation during excavation across watercourses and wetlands:** Vegetation clearing is to be kept to a minimum due to the small size of the pipe and associated trench. The trench must be dug by hand across the watercourses and wetlands where possible 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 proposed project 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 Mpungose Water Supply Scheme.

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

The King Cetshwayo District Municipality proposes to construct a network of bulk and reticulation water pipes in the Ngodini, Khabingwe and Mkhuphulan Gwenya (Mid-point: 28°46'14.40"S, 31°39'6.01"E), located approximately 23.7km west of Empangeni. The Mpungose Water Supply Scheme is located across Ward 23, 24, 25, 26 and 27, uMlalazi Local Municipality within the King Cetshwayo District Municipality. There is some existing pipeline infrastructure in place, however the pipes have fallen into disrepair and are mostly unfunctional. The new pipeline will run east from Habeni towards the villages of Ngodini, Khabingwe and Mkhuphulan Gwenya, where the surrounding community will be supplied through a network of reticulation water pipes and stand pipes. The pipeline will be located, where possible, within the road servitudes and along footpaths, and will be buried in a trench 800mm wide and 1.2m deep. The pipeline route will cross numerous watercourses and wetlands throughout the project footprint. The entire supply area covers approximately 10 000 hectares and includes approximately 350 000 km of pipeline to be installed. The water Sub Supply scheme is broken up into 5 areas (SSA 3, 1 – 5). The supply scheme will tie into and maintain two existing reservoirs (28°48'3.35"S, 31°32'33.23"E; and, 28°47'13.97"S, 31°36'36.94"E), and construct 4 new reservoirs throughout the project area.

An environmental authorisation is required where pipelines cross watercourses and wetlands, and will result in the infill or excavation of more than 10m<sup>3</sup> of material. Further to this, development exceeding 100m<sup>2</sup> in area within 32m of a watercourse also requires environmental authorisation approval. Therefore, this report and EMPr focuses on these specific areas.

The construction of the pipeline will have a positive impact on access to local potable water for the residents living in this area. There is currently limited water supplied to the community in this area and the King Cetshwayo 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)

#### Site Alternatives

The aim of the project is to increase a reliable supply of potable water to this area with as little environmental and infrastructural disturbance/impact as possible. The pipeline layout has been designed to reticulate water to the community, with the least number of watercourse crossings. The pipeline route will predominantly occur within existing road servitudes and footpaths, limiting the amount of vegetation to be cleared. Therefore, no alternative pipe routes or crossing points were considered. Different pipe crossing technology/designs were investigated.

Casing the pipe in concrete and running it under the bed of the watercourses below the water level is the preferred alternative to 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. 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)**

<b>GNR</b>	<b>Activity Number</b>	<b>Activity as per the legislation</b>	<b>Activity as it applies to the proposal</b>
GNR 327 Listing Notice 1 of the 2014 EIA Regulations, as amended	12	<i>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;</i>	The Mpungose WSS will entail the cumulative development of more than 100m <sup>2</sup> of infrastructure within 32m of several watercourses in a rural area.
GNR 327 Listing Notice 1 of the 2014 EIA Regulations, as amended	19.	<i>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;</i>	The applicant proposes to construct the pipeline through 17 watercourses. This activity will result in more than 10m <sup>3</sup> of material being moved/ deposited within multiple watercourses.
GNR 327 Listing Notice 3 of the 2014 EIA Regulations, as amended	14 (ii)(a) & (c) KwaZulu-Natal (d) – (x)(aa)	<i>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.  KwaZulu-Natal (x) Outside urban areas: (aa) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any terrestrial protected area identified in terms of NEMPAA or from the core area of a biosphere reserve;</i>	A portion of the Mpungose WSS occurs within 5km of the Ngoye and Ezigwayini Forest Reserves. As such, there will be more than 10m <sup>2</sup> of infrastructure being built within the watercourses. The pipeline will not directly pass through the Ngoye or Ezigwayini Forest Reserves, and therefore no vegetation or cumulative damage will occur.

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

<b>District Municipality</b>	King Cetshwayo District Municipality	
<b>Local Municipality</b>	uMlalazi Local Municipality	
<b>Ward</b>	Ward 23, 24, 25, 26 and 27 of the uMlalazi Local Municipality	
<b>Area / Town / Village</b>	23.7km west of Empangeni	
<b>Co-ordinates:</b>	<b>Latitude</b>	<b>Longitude</b>
<b>WC 1:</b>	28°47'4.79"S	31°37'12.48"E
<b>WC 2:</b>	28°45'43.01"S	31°35'50.32"E
<b>WC 3:</b>	28°45'44.06"S	31°35'44.81"E
<b>WC 4:</b>	28°45'34.66"S	31°36'9.16"E
<b>WC 5:</b>	28°45'19.42"S	31°36'48.36"E
<b>WC 6:</b>	28°46'25.90"S	31°38'0.44"E
<b>WC 7:</b>	28°45'46.69"S	31°38'54.65"E
<b>WC 8:</b>	28°44'50.64"S	31°38'44.39"E
<b>WC 9:</b>	28°44'39.70"S	31°38'49.39"E
<b>WC 10:</b>	28°44'38.27"S	31°38'57.91"E
<b>WC 11:</b>	28°43'16.44"S	31°39'0.78"E
<b>WC 12:</b>	28°43'9.22"S	31°38'59.32"E
<b>WC 13:</b>	28°43'16.13"S	31°39'7.69"E
<b>WC 14:</b>	28°43'15.71"S	31°39'9.69"E
<b>WC 15:</b>	28°43'13.58"S	31°39'8.95"E

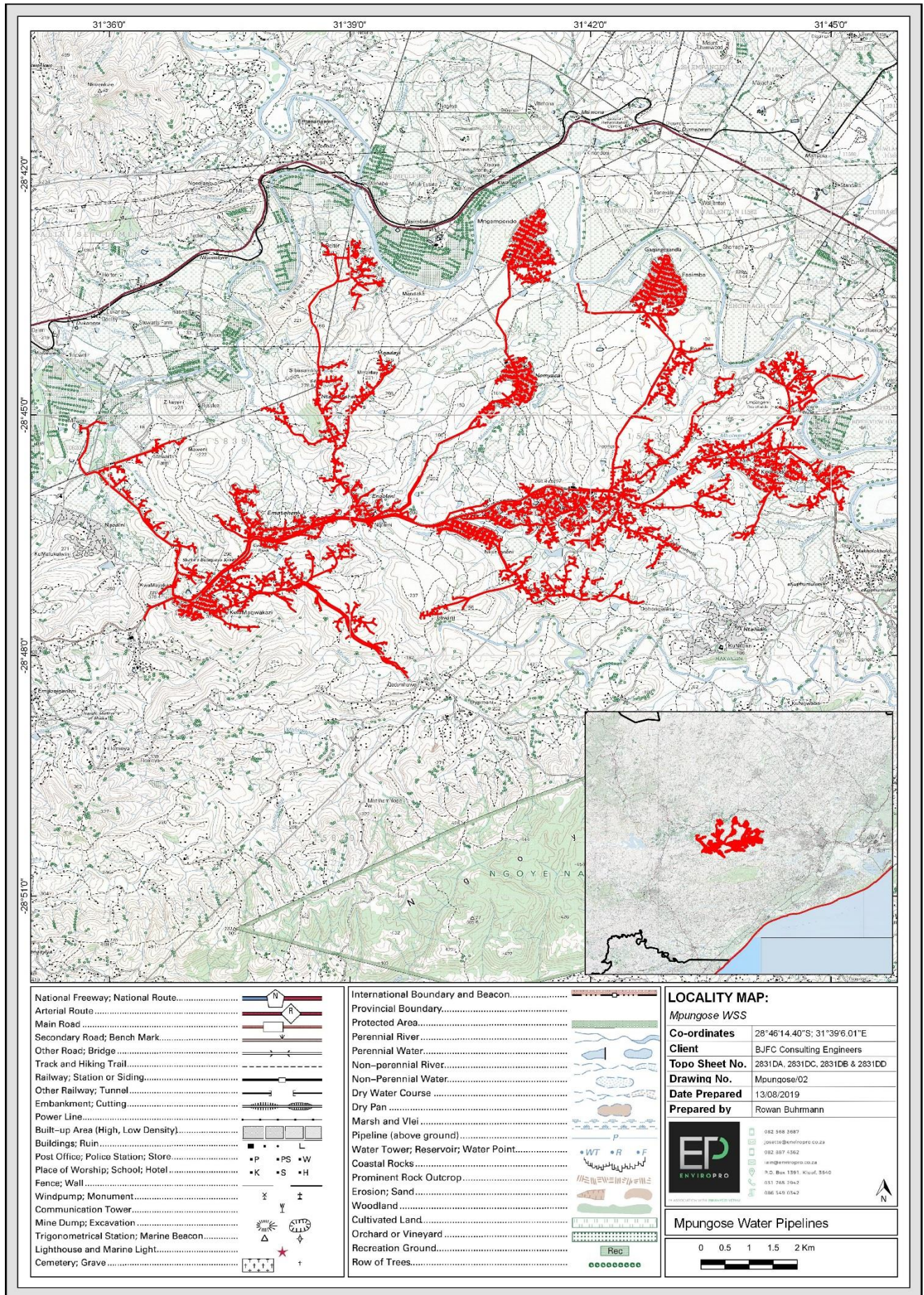
WC 16:	28°43'13.64"S	31°39'9.27"E	
WC 17:	28°43'16.10"S	31°39'15.52"E	
WC 18:	28°43'25.37"S	31°39'2.49"E	
WC 19:	28°43'29.78"S	31°39'6.16"E	
WC 20:	28°43'31.22"S	31°39'7.73"E	
WC 21:	28°42'54.39"S	31°41'23.00"E	
WC 22:	28°46'9.45"S	31°40'30.06"E	
WC 23:	28°46'8.44"S	31°40'35.02"E	
WC 27:	28°44'9.50"S	31°40'56.99"E	
WC 28:	28°43'32.99"S	31°40'58.19"E	
WC 30:	28°42'52.70"S	31°41'24.51"E	
WC 31:	28°47'21.99"S	31°40'14.83"E	
WC 32:	28°47'18.01"S	31°40'26.90"E	
WC 33:	28°47'17.13"S	31°40'27.54"E	
WC 34:	28°47'11.89"S	31°40'44.44"E	
WC 35:	28°46'21.88"S	31°41'9.00"E	
WC 36:	28°46'22.16"S	31°41'21.84"E	
WC 37:	28°46'9.35"S	31°41'18.06"E	
WC 38:	28°46'1.43"S	31°41'37.57"E	
WC 39:	28°46'3.59"S	31°41'37.56"E	
WC 40:	28°46'13.51"S	31°41'39.29"E	
WC 41:	28°46'33.59"S	31°41'46.75"E	
WC 42:	28°46'34.14"S	31°41'53.17"E	
WC 43:	28°46'18.04"S	31°42'6.93"E	
WC 44:	28°46'11.83"S	31°42'20.36"E	
WC 45:	28°46'11.47"S	31°42'23.43"E	
WC 46:	28°45'9.97"S	31°35'43.30"E	
WC 47:	28°45'39.20"S	31°42'21.12"E	
WC 48:	28°44'3.58"S	31°42'59.45"E	
WC 49:	28°43'42.56"S	31°42'50.89"E	
WC 50:	28°43'43.78"S	31°42'9.94"E	
WC 51:	28°44'49.21"S	31°43'35.34"E	
WC 52:	28°44'33.18"S	31°43'41.51"E	
WC 53:	28°44'22.08"S	31°44'14.30"E	
WC 54:	28°44'20.26"S	31°44'34.02"E	
WC 55:	28°44'37.33"S	31°44'44.38"E	
WC 56:	28°44'39.27"S	31°44'47.36"E	
WC 57:	28°44'52.76"S	31°44'35.96"E	
WC 58:	28°44'53.64"S	31°44'29.57"E	
WC 59:	28°44'53.48"S	31°44'28.94"E	
WC 60:	28°44'58.11"S	31°44'28.33"E	
WC 61:	28°46'16.90"S	31°44'5.87"E	
WC 62:	28°45'57.43"S	31°44'52.19"E	
WC 63:	28°43'10.61"S	31°39'1.62"E	
Existing Reservoir 1	28°48'3.35"S	31°32'33.23"E	
Existing Reservoir 2	28°47'13.97"S	31°36'36.94"E	
New Reservoir 1	28°45'56.17"S	31°41'35.82"E	
New Reservoir 2	28°45'57.28"S	31°41'39.44"E	
New Reservoir 3	28°47'14.79"S	31°41'18.97"E	
New Reservoir 4	28°43'2.44"S	31°38'48.75"E	
Property Description:	Parent Farm:	Farm Portion:	21 Digit Surveyor General's numbers:
	MPUNGOSE 17627	-	N0GU00000001762700000
	RESERVE NO 17 15837	20 21	N0GU00000001583700020 N0GU00000001583700021
	MZIMELA 17626	-	N0GU00000001762600000
	LOT 52 UMHLATUZI 10620	Remainder Portion	N0GU00000001062000000
	UMHLATUZI 17311	-	N0GU00000001731100000
	WEMA 15897	-	N0GU00000001589700000



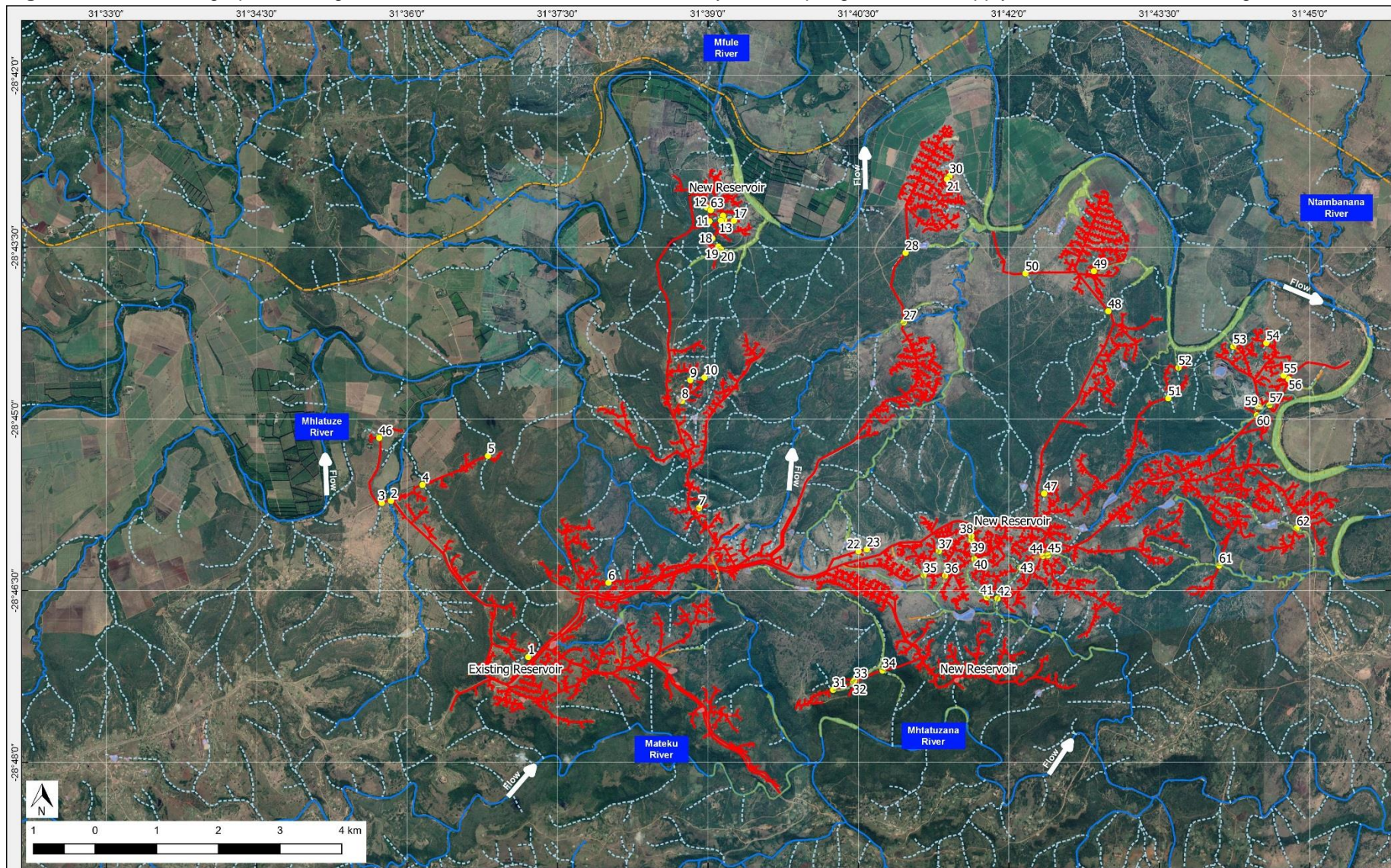
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		77	N0GU00000001278500077
		98	N0GU00000001278500098
		117	N0GU00000001278500117

Figure 1 below provides a topographical overview of the pipeline route. Figures 2 - 8 provide illustrations of each watercourse crossing point along the route.

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



**Figure 2: Aerial Photograph Showing an Overview of the Land Use and Locality of the Mpungose Water Supply Scheme. Generated using QGIS, version 3.6.1.**



**MASTERPLAN: MPUNGOSE WSS**

Co-ordinates Mid-Point: 28°46'14.40"S, 31°39'6.01"E

Client: BJFC Consulting Engineers

Date: 13/08/2019 Prepared By: Rowan Buhrmann

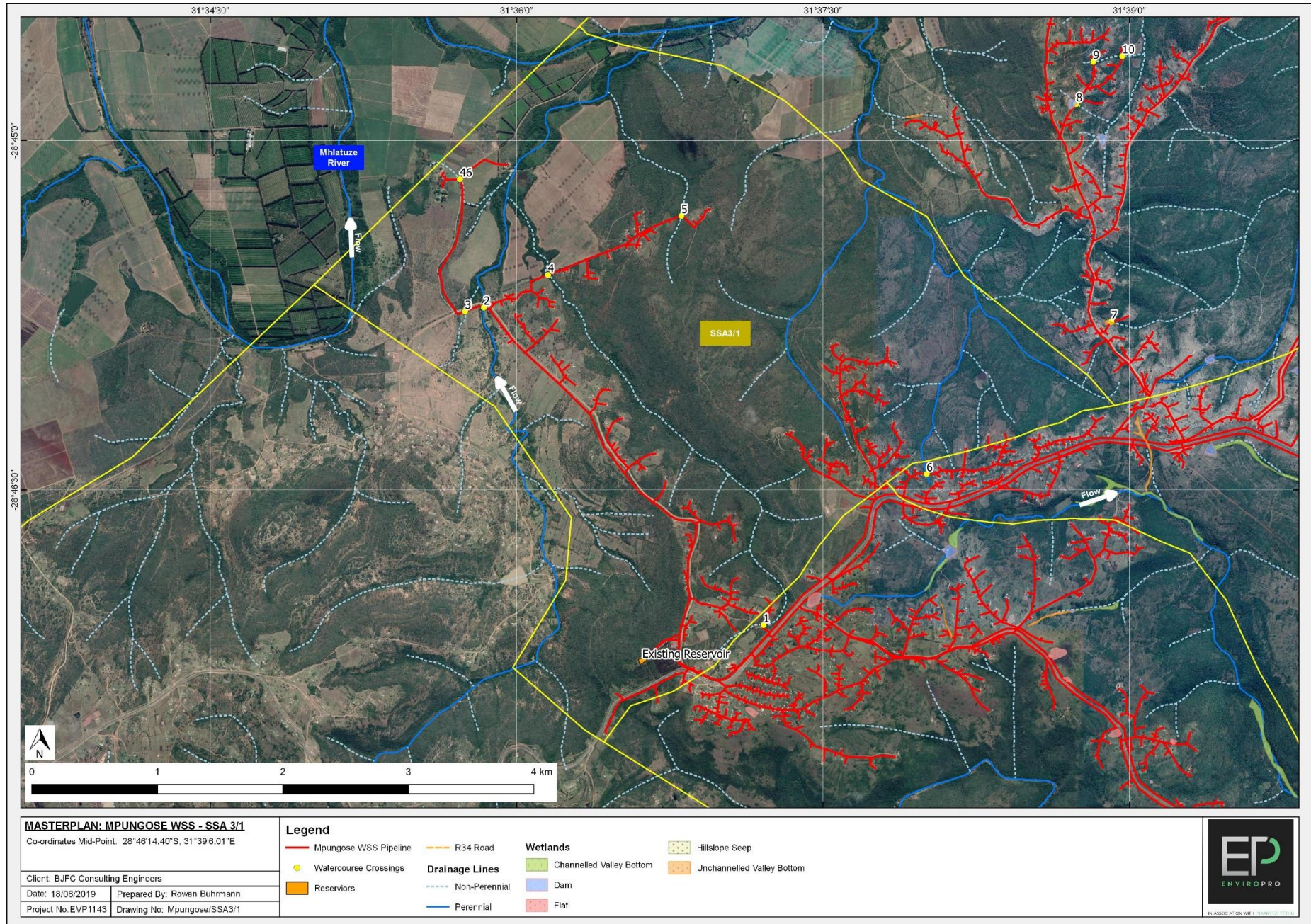
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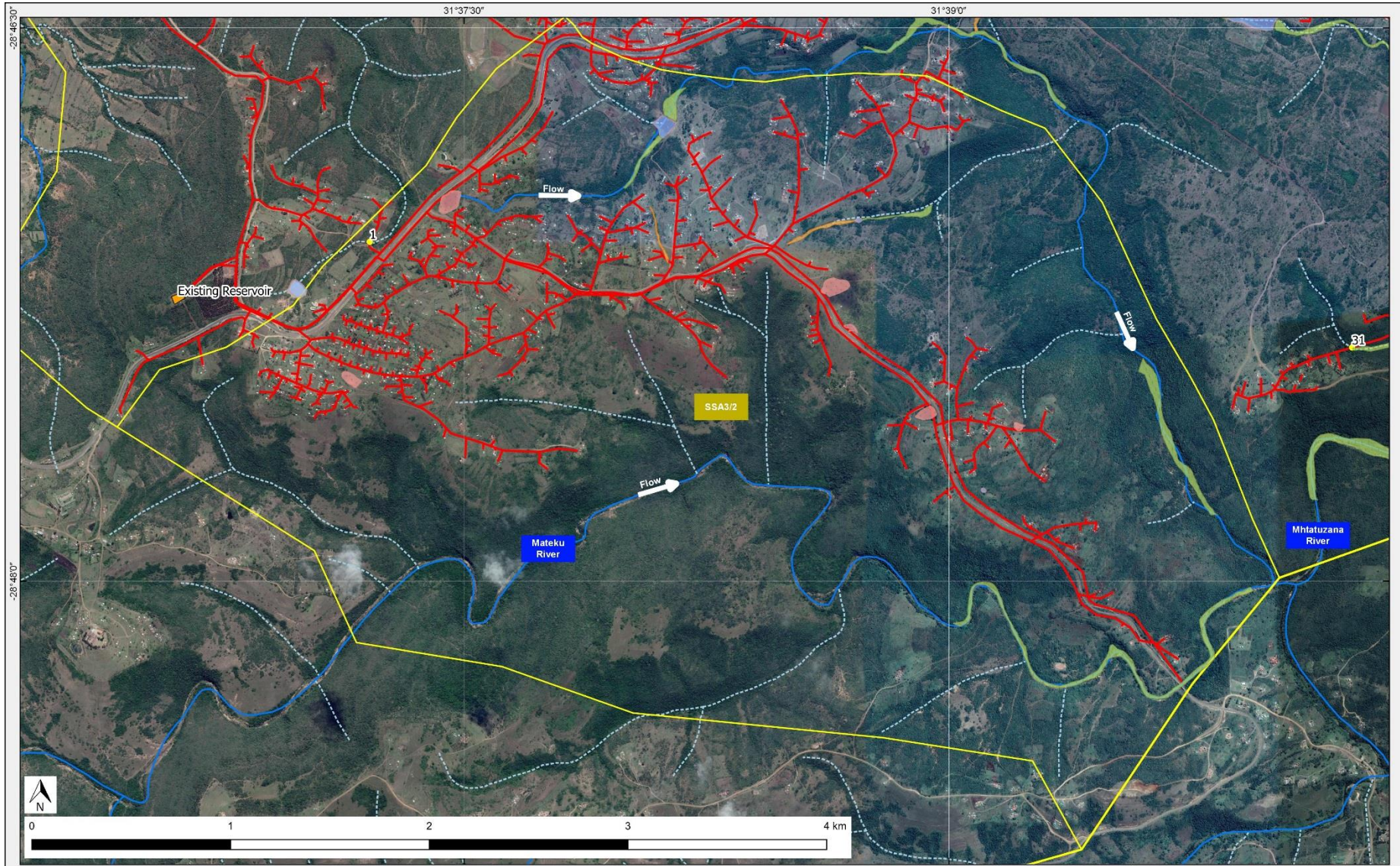
- |                       |                |                          |                            |
|-----------------------|----------------|--------------------------|----------------------------|
| Mpungose WSS Pipeline | R34 Road       | Wetlands                 | Hillslope Seep             |
| Watercourse Crossings | Drainage Lines | Channelled Valley Bottom | Unchannelled Valley Bottom |
| Reservoirs            | Non-Perennial  | Dam                      |                            |
|                       | Perennial      | Flat                     |                            |



**Figure 3:** Aerial Photograph Showing the location of Sub Supply Area 3/1 along the Mpungose Water Supply Scheme. Generated using GQIS, version 3.6.1.



**Figure 4:** Aerial Photograph Showing the location of Sub Supply Area 3/2 along the Mpungose Water Supply Scheme. Generated using QGIS, version 3.6.1.



**MASTERPLAN: MPUNGOSE WSS - SSA 3/2**

Co-ordinates Mid-Point: 28°46'14.40"S, 31°39'6.01"E

Client: BJFC Consulting Engineers

Date: 18/08/2019 Prepared By: Rowan Buhmann

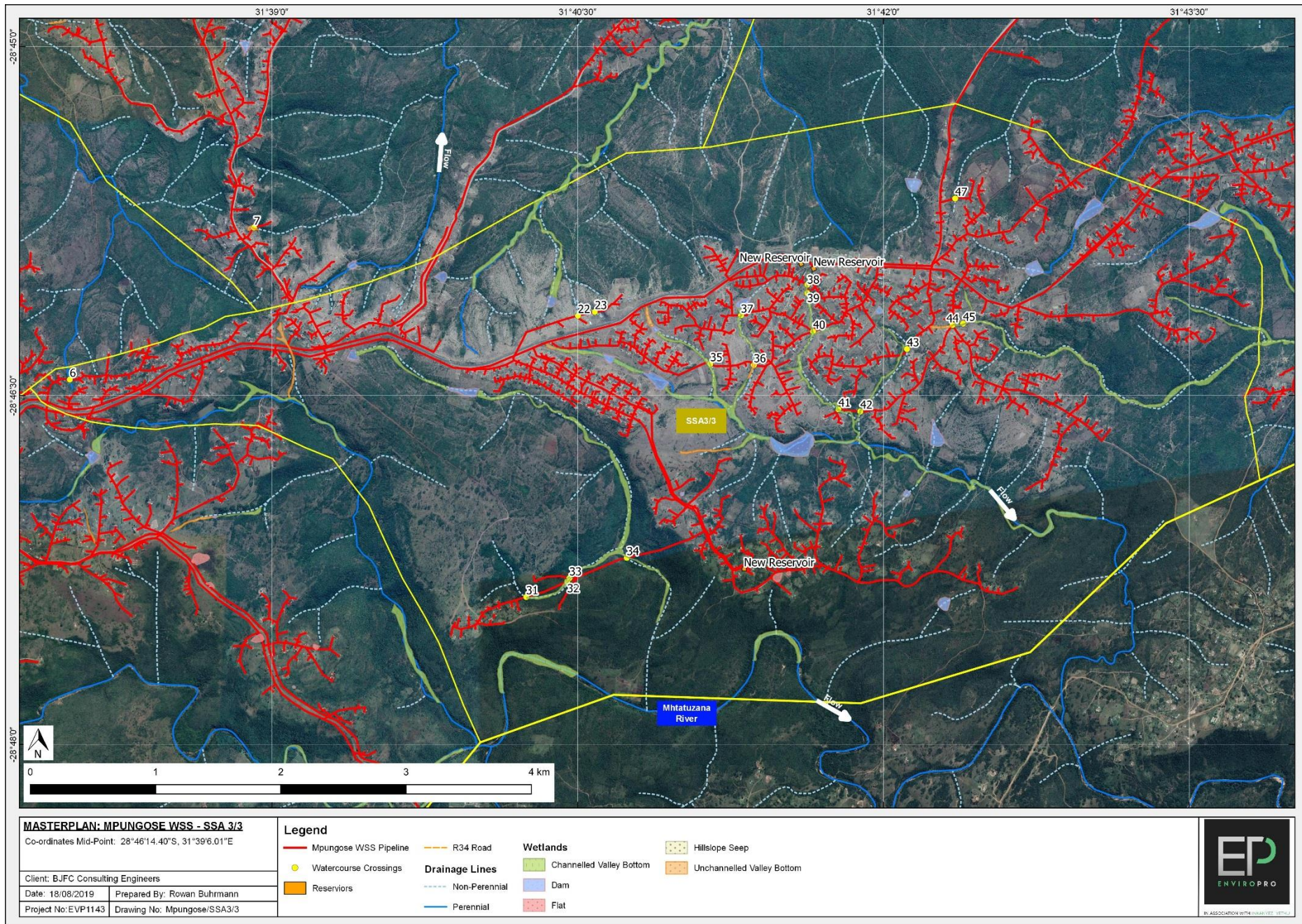
Project No: EVP1143 Drawing No: Mpungose/SSA3/2

**Legend**

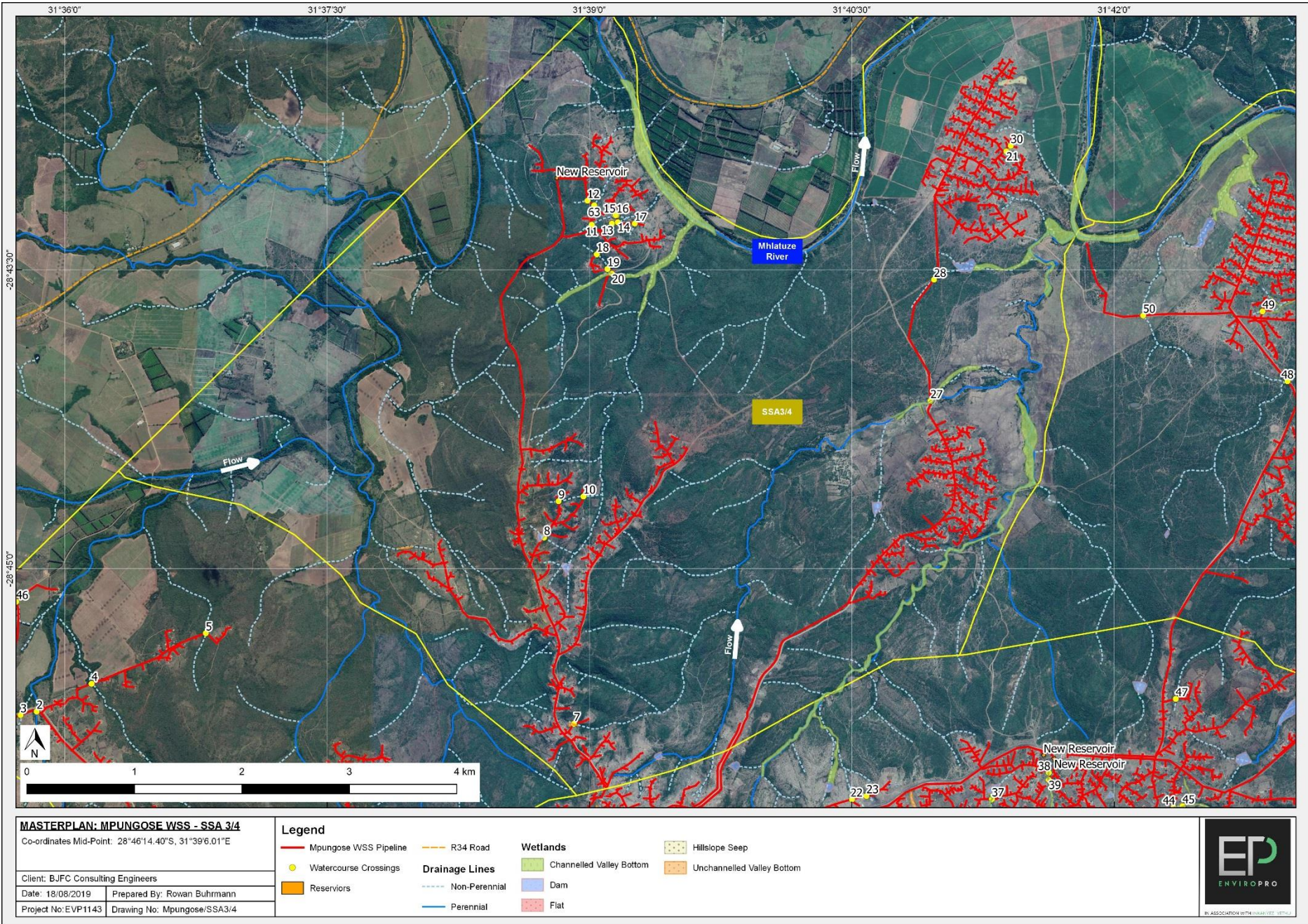
- |                       |                       |                          |                            |
|-----------------------|-----------------------|--------------------------|----------------------------|
| Mpungose WSS Pipeline | R34 Road              | <b>Wetlands</b>          | Hillslope Seep             |
| Watercourse Crossings | <b>Drainage Lines</b> | Channelled Valley Bottom | Unchannelled Valley Bottom |
| Reservoirs            | Non-Perennial         | Dam                      | Flat                       |
|                       | Perennial             |                          |                            |



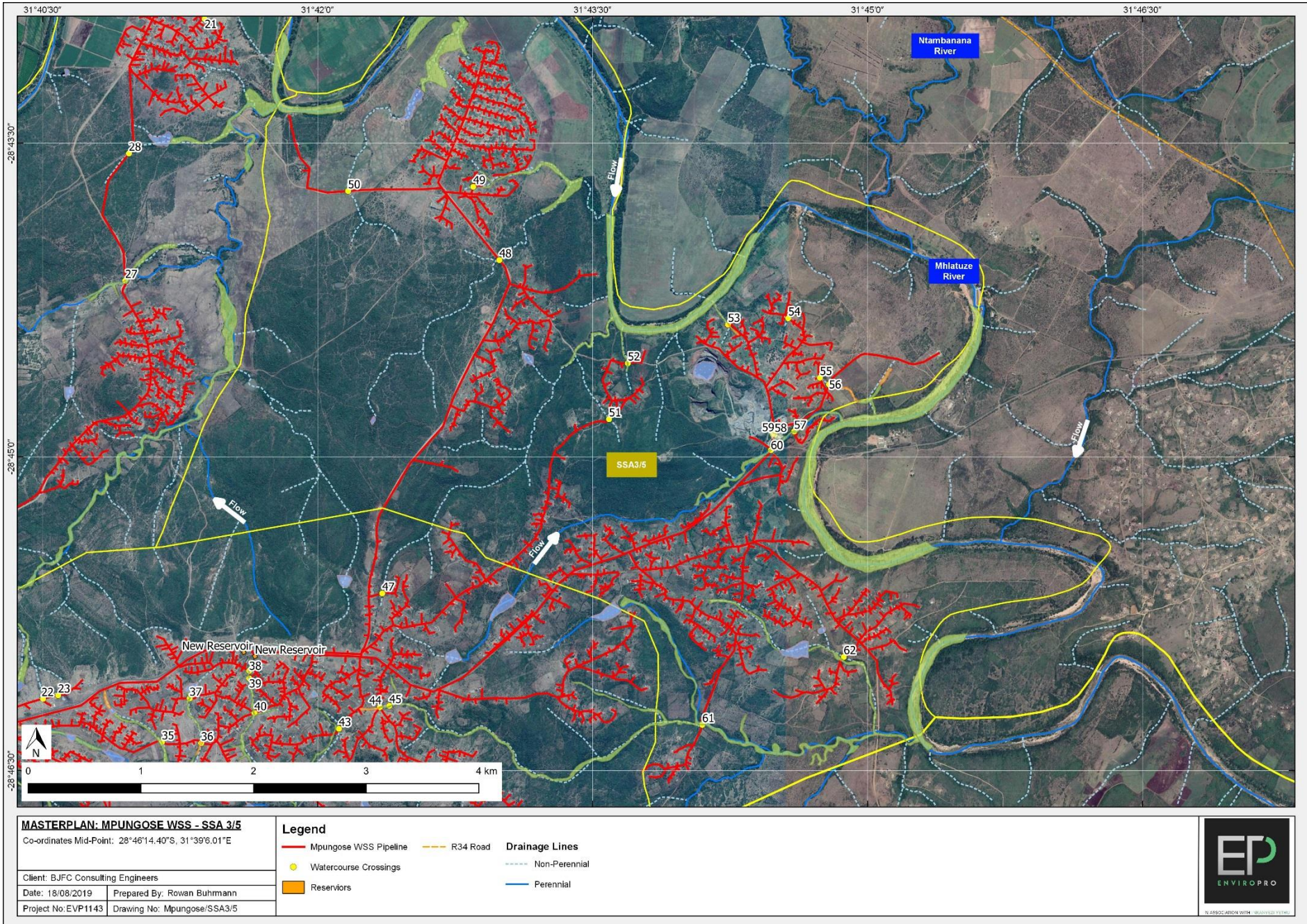
**Figure 5:** Aerial Photograph Showing the location of Sub Supply Area 3/3 along the Mpungose Water Supply Scheme. Generated using GQIS, version 3.6.1.



**Figure 6:** Aerial Photograph Showing the location of Sub Supply Area 3/4 along the Mpungose Water Supply Scheme. Generated using QGIS, version 3.6.1.



**Figure 7: Aerial Photograph Showing the location of Sub Supply Area 3/5 along the Mpungose Water Supply Scheme. Generated using QGIS, version 3.6.1.**





**Section 2: Site Description and Surrounding Land Use as per section 3(h)(iv) and (k)**

**2.1 Topography And Physical Characteristics Of Site**

The project area is dominated by large areas of undeveloped bushveld. The topography within the project area is predominantly comprised of plateaus and ridge lines, with steep hillsides descending into the valleys. The area consists of a large number of scattered rural settlements of varying sizes with moderate road infrastructure in place. The Mpungose Water Supply Scheme (WSS) is located between Empangeni and Eshowe, running east from Habeni towards the villages of Ngodini, Khabingwe and Mkhuphulan Gwenya, KwaZulu-Natal.

The Mpungose Water Supply Scheme will be located, where possible, within the road servitudes and along footpaths (Figure 2). The following description applies to the full length of the pipeline. The area associated with the new pipeline and the four new reservoirs consists predominantly of residential households, subsistence farming and informal grazing areas.

Four new reservoirs will be constructed for the Mpungose WSS, which will be connected through a network of main pipes. The reticulation network will supply water to the majority of households within the area. Due to the sheer length of the pipeline route, the pipeline will be distributed over terrain that ranges from plateau tops to steep sided valleys. Photographs taken within the study area that show the surrounding topography are included in Figure 10 - 14.

The gradient of the site is as follows:

Gradient	Description
Flat	N/A
1:50 – 1:20	N/A
<b>1:20 – 1:15</b>	Majority of the water pipeline will be constructed on a gradient that varies between 1:5 – 1:20.
<b>1:15 – 1:10</b>	
<b>1:10 – 1:7,5</b>	
<b>1:7,5 – 1:5</b>	
Steeper than 1:5	N/A

The topographical features and landforms of the site and surrounding area are as follows (Fig 10 - 26):

Topographical Feature	Description
<b>Ridgeline</b>	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.
<b>Plateau</b>	
<b>Side slope of hill/mountain</b>	
<b>Open valley</b>	Only a small portion of the water pipeline is constructed within the open valley. The pump station as well as the borehole is located here.
Closed valley	N/A
Plain	N/A
Undulating plain/low hills	NA
Dune	N/A
Sea-front	N/A

**2.2 Surface Water and Ground Water**

The project area falls within the sub-quaternary catchments W12E-3530 (Mateku) and W12D-3375 (Mhlatuze), within the Pongola to Mtamvuna Water Management Area (WMA 4). It is noted that the WMA was previously known as the Thukela WMA, which was amalgamated into the larger Pongola to Mtamvuna WMA (NWA, 2016).

The main rivers in these drainage regions are the Mhlatuze and Mhtatuzana River systems, which flow in a south easterly direction. The pipeline route crosses 63 watercourses (WC1-63) and is located within 500m of 5 (five) wetland systems.

**2.2.1 Watercourses**

The new pipeline will cross 63 watercourses, including the Kwagazambhana River (WC1 & 4), Sancinza River (WC2), Matshitsho River (WC24 & 25), Ndongande River (WC27), Nhlunywana River (WC34), Mholweni River (WC57 & 60), and Msunduzi River (WC61). The pipe will be buried below the watercourses and encased with

concrete. A reno mattress will be laid above the encasement, and will be supported by gabion baskets for erosion protection where required on the steeper banks.

## 2.2.2 Aquatic Assessment

The aquatic assessment majority of the watercourses were expected to be non-perennial, and as a result of this, these ephemeral systems were assessed at a desktop level only<sup>1</sup>. A comprehensive aquatic assessment was conducted for the perennial watercourses namely the Mhlatuze (MLT - 28°44'58.07"S, 31°44'42.71"E) and Mateku (MTK - 28°48'17.04"S, 31°39'46.75"E) Rivers.

## 2.2.3 In situ water quality

*In situ* water quality analysis of the Mateku and Mhlatuze rivers indicated adequate conditions during the high flow survey. Both watercourses had adequate pH, Dissolved Oxygen (DO) and water temperatures, falling within the TWQR. During the survey, the water within the Mateku and Mhlatuze rivers was considered adequate to sustain aquatic biota and ecosystem function.

**Table 2. In situ water quality analysis of the Tugela and Nsuzi rivers**

Site	pH	Conductivity (µS/cm)	DO (mg/l)	Temperature (°C)
TWQR*	6.5-9.0	<700**	>5.00	5-30
MTK	7.54	-	7.94	26.9
MLT	7.34	-	6.75	24.8

## 2.2.4 Intermediate Habitat Integrity Assessment (IHIA)

According to the IHIA assessment, the instream and riparian habitat integrity of the Mateku River Reach was categorized as Category a (Natural) and (Largely Natural), respectively, whereas the instream and riparian habitat integrity has been categorized as B (Natural) and B (Largely natural), respectively, for the Mhlatuze River Reach (see Section 6.7.2. of the Water Resource Assessment<sup>1</sup>).

## 2.2.5 Aquatic Macroinvertebrate Assessment

The macroinvertebrate habitat assessment, in accordance with Tate and Husted (2015), scored a rating of Class F for the Mateku River, indicating a low diversity of biotopes within the system, and that habitat availability would limit the macroinvertebrate assemblage diversity or abundances. Whereas the Mhlatuze River was scored a rating of Class D, indicating a moderate diversity of biotopes within the system, and that habitat availability would not limit the macroinvertebrate assemblage diversity or abundances. Moreover, the Mateku River was categorized as largely modified (Category D), whereas the Mhlatuze River was categorized as natural (Category A). See the following table.

**Table 3. Macroinvertebrate assessment relative to the South African Scoring System (SASS). Note, ASPT: Average Score Per Taxa.**

Site	Mateku River	Mhlatuze River
SASS Score	77	145
No. of Taxa	15	24
ASPT*	5.1	6.0
Category (Dallas, 2007) **	D	A

Of the twenty-five (25) fish species expected within the SQR, a total of 8 fish species were observed in the Mateku River, while 15 fish species were observed in the Mhlatuze River (Table 4).

**Table 4. List of fish collected during the sampling of the Mateku River (MTK) and the Mhlatuze River (MLT). Note, LC = Least Concern).**

Scientific name	Common name	IUCN* Status	Observed	
			MTK	MLT
<i>Clarias gariepinus</i>	Sharptooth Catfish	LC	No	Yes
<i>Coptodon rendalli</i>	Redbreast Tilapia	LC	Yes	Yes
<i>Eleotris melanosoma</i>	Broadhead Sleeper	LC	No	Yes
<i>Enteromius paludinosus</i>	Straightfin Barb	LC	Yes	Yes
<i>Enteromius trimaculatus</i>	Three spotted Barb	LC	Yes	Yes
<i>Enteromius viviparus</i>	Bowstripe Barb	LC	Yes	No
<i>Glossogobius callidus</i>	River Goby	LC	Yes	Yes
<i>Labeo molybdinus</i>	Leaden Labeo	LC	No	Yes
<i>Labeobarbus natalensis</i>	Natal Yellowfish	LC	No	Yes
<i>Marcusenius pongolensis</i>	Southern Bulldog	DD	No	Yes
<i>Micropanchax johnstoni</i>	Johnston's Topminnow	LC	No	Yes
<i>Micropanchax myaposaе</i>	Natal Topminnow	NT	No	Yes
<i>Oreochromis mossambicus</i>	Mozambique Tilapia	NT	Yes	Yes
<i>Pseudocrenilabrus philander</i>	Southern Mouthbrooder	LC	Yes	Yes
<i>Tilapia sparrmanii</i>	Banded Tilapia	LC	Yes	Yes
<b>Total number of fish</b>		<b>25</b>	<b>8</b>	<b>15</b>

**Table 5: Photographs of fish species collected during the survey**



*Clarias gariepinus*



*Coptodon rendalli*



*Eleotris melanosoma*



*Enteromius paludinosus*



*Enteromius trimaculatus*



*Enteromius viviparus*



*Glossogobius callidus*



*Labeo molybdinus*



*Labeobarbus natalensis*



*Marcusenius pongolensis*



*Micropanchax johnstoni*



*Micropanchax myaposae*



*Oreochromis mossambicus*



*Pseudocrenilabrus philander*



*Tilapia sparrmanii*

### 2.2.6 Riverine Present Ecological Status

The results of the PES assessment derived moderately modified (class C) conditions for the river reaches considered in this assessment. The modified conditions were largely attributed to statuses associated with the biotic communities, specifically the macroinvertebrates and the fish populations.

**Table 61: Present Ecological Status of the assessed river reaches**

Aspect Assessed	Mateku	Mhlatuze
Instream Ecological Category	94.8	88.8
Riparian Ecological Category	89.2	86.0
Aquatic Invertebrate Ecological Category	41.0	60.9
Fish Ecological Category	50.1	69.4
<b>Ecstatus</b>	<b>Class C/D</b>	<b>Class C</b>

### 2.2.7 Wetlands<sup>1</sup>

A total of 101 wetland units were identified within the project area, with five (5) wetland types being classified; namely, channelled valley bottom, unchannelled valley bottom, flat, hillslope seep and depression (artificial dam) wetlands. Of the 5 wetland types identified, the depression (artificial dam) was not analysed for functionality and health (artificial system).

The Present Ecological State (PES) of the wetland systems varied from moderately modified (class C) to largely modified (class D) (Table 7):

**Table 7. Present Ecological State (PES) of the sampled wetlands present within 500m of the proposed Mpungose WSS.**

Wetland	Hydrology		Geomorphology		Vegetation	
	Rating	Description	Rating	Description	Rating	Description
Small channelled valley bottom	D	Largely Modified	D	Largely Modified	D	Largely Modified
Overall PES Class					D: Largely Modified	
Large channelled valley bottom	D	Largely Modified	D	Largely Modified	C	Moderately Modified
Overall PES Class					D: Largely Modified	
Unchannelled valley bottom	D	Largely Modified	C	Moderately Modified	D	Largely Modified
Overall PES Class					D: Largely Modified	
Wetland flat	D	Largely Modified	C	Moderately Modified	D	Largely Modified
Overall PES Class					D: Largely Modified	
Hillslope seep	C	Moderately Modified	C	Moderately Modified	D	Largely Modified
Overall PES Class					C: Moderately Modified	




The EIS for the wetland types were calculated to have a moderate (class C) level of importance with the exception of the large channelled valley bottom systems which have a high (class B) level of importance. The Hydrological Functionality for the two wetland types were determined to have a moderate (class C) level of importance. The flood attenuation and streamflow regulation offered by the wetland contributes to the protection of the local area from flooding and drought. The Direct Human Benefits were calculated to have a marginal / low (class D) level of importance.





**Table 8. Ecological Importance & Sensitivity (PES) of the sampled wetlands present within 500m of the proposed Mpungose WSS.**

Wetland Importance and Sensitivity	Channelled Valley bottom (small)	Channelled Valley bottom (large)	Unchannelled Valley bottom	Bench flat	Hillslope seep
Ecological Importance & Sensitivity	C	B	C	C	C
Hydrological/Functional Importance	C	C	C	C	C
Direct Human Benefits	D	D	D	D	D

<sup>1</sup> Water Resource Assessment for the proposed Mpungose Water Supply Scheme – Empangeni, KwaZulu-Natal. The Biodiversity Company, 2019.

**Table 5: Summary of the wetlands intercepted by the pipeline**





Wetland Number	Wetland HGM Type	GPS Coordinates	Image
WC 8	Dam	28°44'50.64"S, 31°38'44.39"E	
WC 20	Channelled Valley Bottom	28°43'31.22"S, 31°39'7.73"E	
WC 27	Channelled Valley Bottom	28°44'9.50"S, 31°40'56.99"E	




<p>WC 32</p>	<p>Channelled Valley Bottom</p>	<p>28°47'18.01"S, 31°40'26.90"E</p>	
<p>WC 33</p>	<p>Channelled Valley Bottom</p>	<p>28°47'17.13"S, 31°40'27.54"E</p>	
<p>WC 34</p>	<p>Channelled Valley Bottom</p>	<p>28°47'11.89"S, 31°40'44.44"E</p>	
<p>WC 35</p>	<p>Channelled Valley Bottom</p>	<p>28°46'21.88"S, 31°41'9.00"E</p>	



<p>WC 36</p>	<p>Unchannelled Valley Bottom</p>	<p>28°46'22.16"S, 31°41'21.84"E</p>	
<p>WC 37</p>	<p>Channelled Valley Bottom</p>	<p>28°46'9.35"S, 31°41'18.06"E</p>	
<p>WC 38</p>	<p>Channelled Valley Bottom</p>	<p>28°46'1.43"S, 31°41'37.57"E</p>	
<p>WC 39</p>	<p>Channelled Valley Bottom</p>	<p>28°46'3.59"S, 31°41'37.56"E</p>	



<p>WC 40</p>	<p>Channelled Valley Bottom</p>	<p>28°46'13.51"S, 31°41'39.29"E</p>	
<p>WC 41</p>	<p>Channelled Valley Bottom</p>	<p>28°46'33.59"S, 31°41'46.75"E</p>	
<p>WC 42</p>	<p>Channelled Valley Bottom</p>	<p>28°46'34.14"S, 31°41'53.17"E</p>	
<p>WC 43</p>	<p>Channelled Valley Bottom</p>	<p>28°46'18.04"S, 31°42'6.93"E</p>	

<p>WC 44</p>	<p>Unchannelled Valley Bottom</p>	<p>28°46'11.83"S, 31°42'20.36"E</p>	
<p>WC 45</p>	<p>Channelled Valley Bottom</p>	<p>28°46'11.47"S, 31°42'23.43"E</p>	
<p>WC 52</p>	<p>Channelled Valley Bottom</p>	<p>28°44'33.18"S, 31°43'41.51"E</p>	
<p>WC 53</p>	<p>Unchannelled Valley Bottom</p>	<p>28°44'22.08"S, 31°44'14.30"E</p>	

<p>WC 57</p>	<p>Channelled Valley Bottom</p>	<p>28°44'52.76"S, 31°44'35.96"E</p>	
<p>WC 58 &amp; WC 59</p>	<p>Hillslope Seep</p>	<p>28°44'53.64"S, 31°44'29.57"E; &amp; 28°44'53.48"S, 31°44'28.94"E</p>	
<p>WC 60</p>	<p>Channelled Valley Bottom</p>	<p>28°44'58.11"S, 31°44'28.33"E</p>	

WC 61	Channelled Valley Bottom	28°46'16.90"S, 31°44'5.87"E	
WC 62	Channelled Valley Bottom	28°45'57.43"S, 31°44'52.19"E	

The construction of the new pipe crossings (WC1-63) will formalise the watercourse and wetland 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.

### 2.3 Fauna and Flora

The project area is located within the Zululand Lowveld (SVI 23) and Eastern Valley Bushveld (SVs 6) vegetation units.

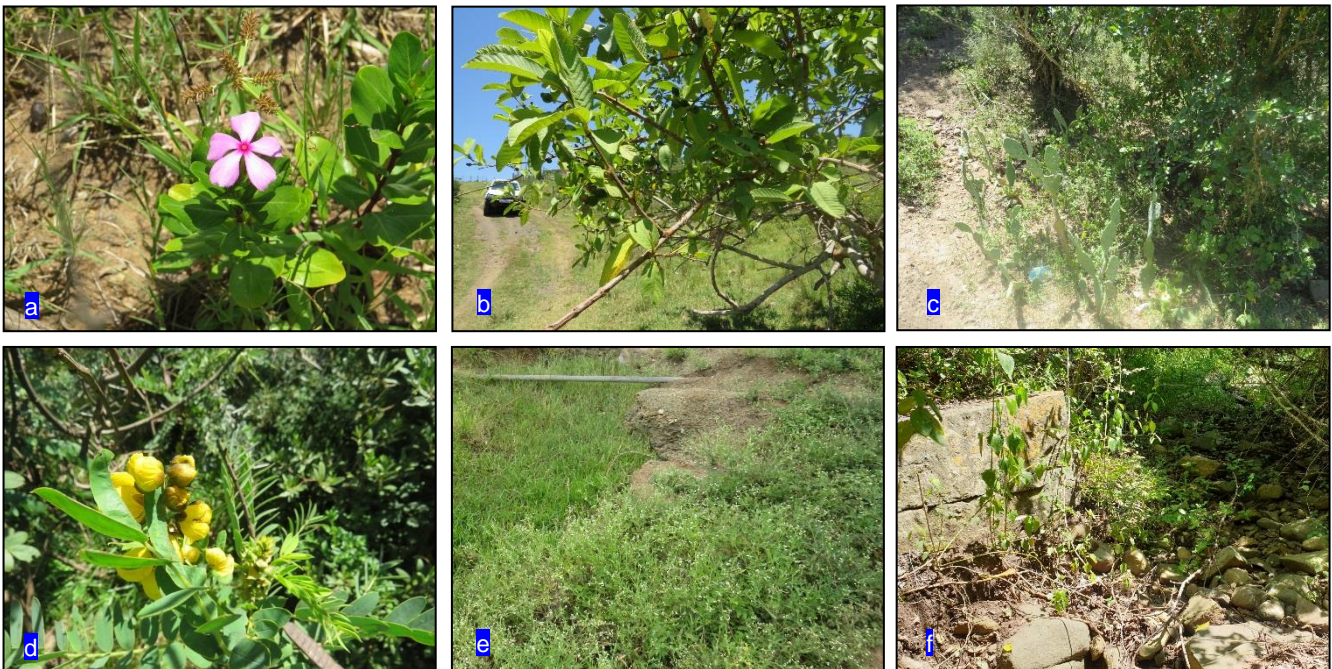
**Zululand Lowveld** (Vulnerable) is described as slightly undulating landscapes supporting complex of various bushveld units ranging from dense thickets of *Dichrostachys cinerea* and *Acacia* species, through park-like savanna with flat-topped *A. tortilis* to tree-dominated woodland with broadleaved open bushveld with *Sclerocarya birrea* subsp. *caffra* and *A. nigrescens*. Tall grassveld types with sparsely scattered solitary trees and shrubs form a mosaic with the typical savanna thornveld, bushveld and thicket patches.

**Eastern Valley Bushveld** (Least Threatened) is described as being semideciduous savanna woodlands with pockets of thickets in a mosaic pattern, often succulent and dominated by *Euphorbia* and *Aloes*. 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 insolation adding to xerophilous. The Endemic taxa include the tall shrub *Bauhinia natalensis* and the succulent herb *Huernia pendula*.

The pipeline route passes through a rural area with dispersed households. The fauna and flora found within the area surrounding the pipeline route is described as follows:

- Ecosystem Type: The pipeline is not located within a threatened ecosystem type.
- Vegetation noted on site:
  - The vegetation noted throughout the Mpungose WSS varies between over grazed grasslands/lowveld, to dense bushveld vegetation. The vegetation associated with the proposed pipeline footprint comprises of both indigenous and alien invasive plant species.

- The predominant indigenous trees seen on site were *Vechelia tortilis* and *Dichrostachys cinerea*, with numerous *Aloe marlothii* and *Euphorbia tirucalli* individuals scattered throughout the site.
- Numerous *A. marlothii* individuals were located along the proposed pipeline. These Aloe plants are protected under the Kwa-Zulu Natal Nature Conservation Ordinance No. 15 of 1974 (provides special protection to a range of indigenous plant species including trees and herbs within KZN). Therefore, if any Aloe individual should be disturbed, damaged, removed or destroyed, a permit from Ezemvelo KZN Wildlife will be required prior to disturbing, removing, destroying and/or relocating any Aloe species.
- Most of the vegetation noted along the proposed pipeline route is highly disturbed, most likely from previous construction activity. 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), *Tithonia diversifolia* (Mexican sunflower), *Catharanthus roseus* (Madagascar periwinkle), *Psidium guineense* (Brazilian guava), *Opuntia* Spp. (Prickly pear), *Chromolaena odorata* (Triffid weed), and *Parthenium hysterophorus* (Famine weed). All these invasive species fall under Category 1b invaders.
- The four new reservoirs have been positioned in locations with very sparse vegetation which has previously been disturbed.
- Therefore, very little vegetation would require clearing for the construction of the water supply scheme.



**Figure 8.** Alien invasive plant species; (a) *Catharanthus roseus* (Madagascar periwinkle); (b) *Psidium guineense* (Brazilian guava); and (c) *Opuntia* Spp. (Prickly pear), (d) *Senna didymobotrya* (Peanut butter cassia); (e) *Parthenium hysterophorus* (Famine weed); and (f) *Chromolaena odorata* (Triffid weed)

#### 2.4 Heritage And Cultural Aspects

Due to the large project area, numerous heritage and cultural items were identified. Four Shembe worship sites, two Shembe Households, four grave sites, two royal houses, the Cowards Bush Monument and the KwaBuluwayo Cultural Centre was observed adjacent to the pipeline (Figure 9). These sites are not directly in the path of the proposed pipeline route and will not be affected by the construction of the pipeline. No other items of archaeological or cultural significance were noted in the immediate area. As the proposed pipeline route will follow existing roads and foot paths, it is unlikely that other archaeological or culturally significant aspects are present within the pipeline route. Construction workers must be cautioned to operate with care on site and should a culturally sensitive aspect be discovered on site, construction activities must stop temporarily and the authorities (AMAFA) notified.

#### 2.5 Socio Economic Environment

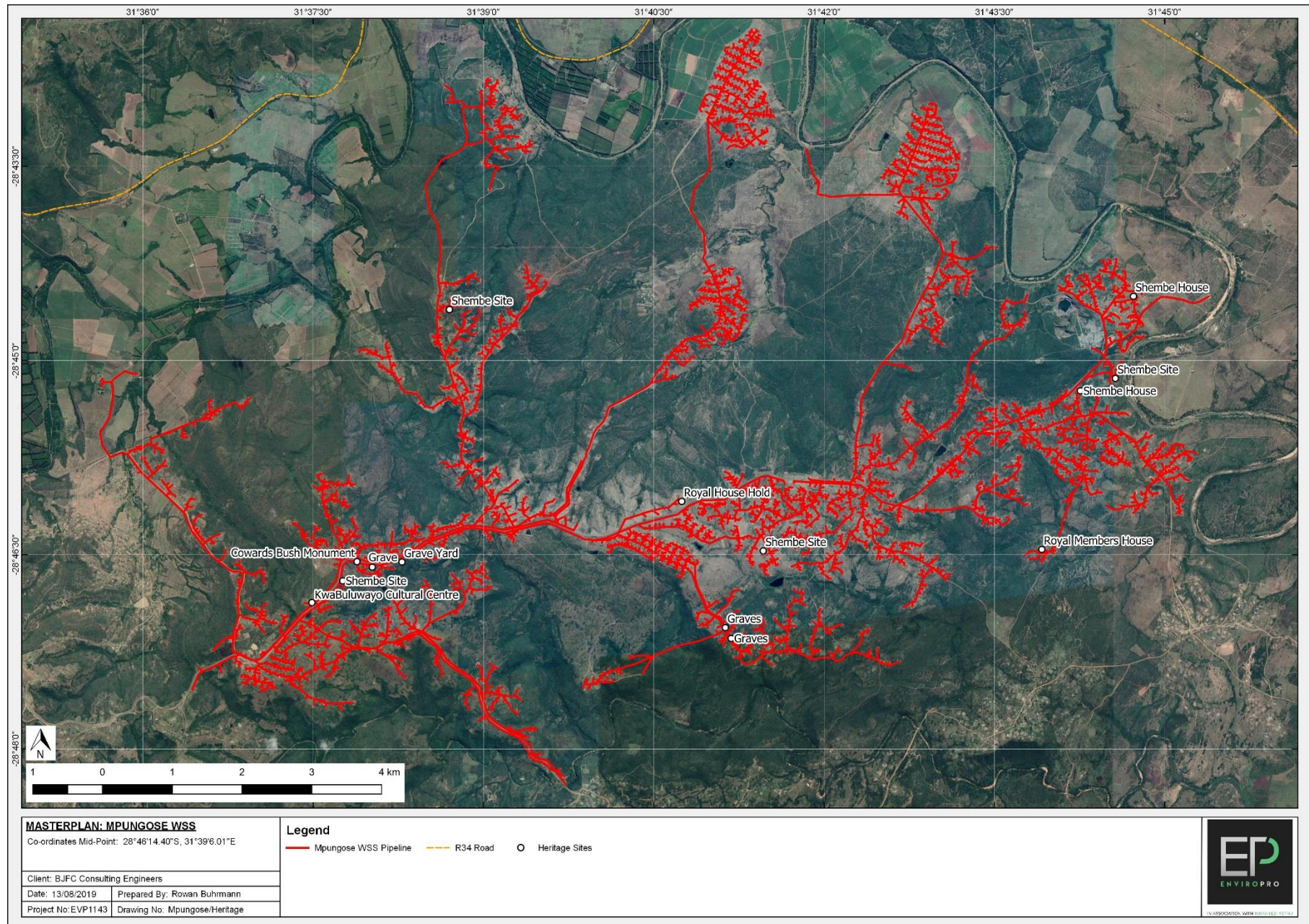
The environment and surrounding land uses within and adjacent to the pipeline are described as follows:

- Located within a rural area west of Empangeni (Figure 1).

- 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 proposed water supply scheme will provide a number of rural households in this area access to clean, potable water. The majority of homesteads along the route appear to be outside the planned pipeline route and will therefore not be directly impacted on by the proposed activity. Few 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. Ultimately, residents will have an improved quality of life as a result of the proposed pipeline upgrade.

**Figure 9:** Aerial Photograph showing the location of the identified heritage and cultural site along the Mpungose Water Supply Scheme. Generated using QGIS, version 3.6.1.



## 2.6 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 bushveld;
  - Subsistence farming;
  - Grazing land; and
  - Residential.
- The area the pipeline will run through is predominantly used for residential housing.

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, foot paths and pipeline servitudes. The pipeline will be located underground and will therefore not detract from the aesthetics of the area during the operational phase.

Figure 10 - 14 below provides photographs of the site taken on the 22<sup>nd</sup> January, 19<sup>th</sup> February, and 6<sup>th</sup> March 2019.



**Figure 10: (a):** Existing reservoir located to the west of the project area; **(b):** Watercourse at WC2 that the reticulation pipe will cross; **(c):** Old, non-functional water pipeline one site.



**Figure 11: (a):** View of the watercourse at WC18; **(b):** Numerous *Aloe marlothii* individuals noted within close proximity to the pipeline route near WC15 and WC16; **(c):** Erosion was noted along numerous watercourses. Image of erosion at WC30.





**Figure 12:** (a): Large culvert that crosses the watercourse where the water pipeline will cross at WC27. (b): Road crossing a watercourse at the same location as the pipe crossing WC43; (c): Heavy rains have caused the old culverts to start eroding.



**Figure 13:** (a): Overgrown path that the pipeline route will follow; (b): The pipeline route will predominantly follow the existing road reserve throughout the project area; (c): Footpath that the pipeline will be laid along.



**Figure 14:** (a): Dense vegetation surrounds a path leading towards WC4; (b): Overview of the Matshitsho river's wide river bed, where the pipeline will cross at WC24 and WC25; (c): Hardrock was noted along portions of the water pipeline.

### 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
National Environmental Management Act 1998	<p>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 (EMPs) 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.</p> <p>The Environmental Impact Assessment (EIA) Regulations, 2014: GN R.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.</p> <p>Environmental authorisation is required for the construction of the reservoirs and pipe crossings at WC1-63. Therefore this application is in line with the requirements of NEMA.</p>
National Water Act 1998	<p>The construction will result in alterations to the bed and banks of a watercourse and wetland, therefore a water use authorisation will be required as per Section 21 c and i of the National Water Act.</p>
National Waste Management Act 2008	<p>Reforms the law regulating waste management to prevent pollution and ecological degradation.</p> <p>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.</p>
Environmental Conservation Act 1996	<p>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.</p>
National Environmental Management Biodiversity Act 2004	<p>To provide the framework, norms, and standards for the conservation, sustainable use and equitable benefit-sharing of South Africa's biological resources. Section 52 allows for the publication of a list of threatened ecosystems in need of protection. The list was published in Government Gazette No. 34809 Notice No. 1002 dated 9 December 2011.</p> <p>This site does not fall within any threatened ecosystem type.</p>
National Heritage Resources Act 25 of 1999	<p>For the protection of South African Heritage to nurture and conserve communities legacy. No archaeological significant artefacts will be disturbed during this project therefore no permits will be required from the provincial heritage authority, AMAFA.</p>
<b>Municipal Planning Framework</b>	
uMlalazi Local Municipality Integrated Development Plan 2018/19	<p>This project falls in line with the uMlalazi Local Municipality's goal to promote sustainable development and provide better services.</p>

## Section 4: Motivation, Need and Desirability

### 4.1 Need And Desirability As Per Section 3(F)

The Mpungose Water Supply Scheme aims to provide a reliable and clean supply of water to a large rural residential area west of Empangeni, in the uMlalazi Local Municipality. The pipeline will supply safe and reliable potable water to residential households in the immediate area. The community currently receives an erratic and insufficient water supply via communal standpipes, and there are numerous households that receive no supply whatsoever. Additionally, the current water supply scheme is inadequate to supply the increasing demand for potable water in this growing area, and is not functioning in certain sections within the project footprint.

The proposed pipeline has been designed to take into consideration the future population growth, future increase in water supply demand and terrain in the area. 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 pipeline construction footprint will follow the same alignment as existing roads, foot paths and pipeline servitudes, therefore no alternative routing has been considered. The way in which the pipe will cross the watercourses has been discussed and considered in this assessment.

#### 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 watercourse. The pipeline will be below the ground, attached to the bedrock, below the water surface. The pipe will not block or impede the flow of water in the watercourses WC1-63. This crossing technique will have a larger construction impact on the watercourses in terms of construction work in the bed and banks of WC1-63 but will have less impact in the long term, post construction.

#### 4.2.2 Technology Alternative 2 – Pipe Bridges

The alternative water 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 WC1-63. Constructing pier bridges across the watercourses would potentially create long term water flow impedance as a result of the piers located in the watercourse beds and banks. The above-ground pipes will be very visible at each crossing WC1-63. 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 uMlalazi Local Municipality and will threaten the consistent supply of potable water 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 WC1-63) 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;*

Three noticeboards (in isiZulu and English) were placed at prominent locations within the Mpungose area on the 22<sup>nd</sup> January and 19<sup>th</sup> February 2019. The noticeboards detailed the Municipality's plan to construct the Mpungose Water Supply Scheme, 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 within the same alignment as existing roads, foot paths and pipeline servitudes, and therefore the uMlalazi 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 tribal land, managed by the local Traditional Councils, owned by the Ingonyama Trust Board. The following steps were followed during the public participation process.

- An email notifying all authorities, including the local municipality, was sent.
- The project falls on ITB land and some privately-owned land. A land owner notification letter was signed by the iNkhosis' in charge of the land. Proof of notification is included under Appendix D.
- Signboards detailing the project were placed along the pipeline route in three different locations.
- All relevant authorities and registered I&APs have been notified of the application and copies of the BAR will be provided.
- A number of stakeholders were provided with information via email.
- The Draft BAR will be circulated for a legislated 30-day comment period.
- All comments received within the comment period will be included in Appendix G of the Final BAR; and,
- All affected land owners were notified about the environmental authorisation process (Appendix D).

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. 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 advert will be placed in the Ilanga local newspaper 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.

This report will be provided to the uMlalazi Local Municipality and the King Cetshwayo 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 1 and 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**

See Appendix H for the full impacts scoring matrix which assesses the impacts on the above system. The below impacts relate to the site location and preferred technology alternative 1 (concrete cased pipe in the watercourse beds).

Nature and Consequences of impact	Significance rating of impacts <sup>2</sup> :	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Significance rating of impacts after mitigation:
<b>Construction</b>			
<b>General Construction</b>			
1. Dusty conditions generated during construction and by construction vehicles.	5 (low)	<p>Since the pipeline will be placed adjacent to dirt roads, there is likely to be dust generated by construction vehicles accessing the area. The dust generation will however be a temporary impact i.e. the site will be worked continuously for a few months until construction is completed. Further to this:</p> <ul style="list-style-type: none"> <li>• Water carts must be used on site should dust levels elevate to a nuisance level.</li> <li>• Water cart will be utilised to dampen dusty surfaces and suppress dust from road surfaces.</li> <li>• Shade cloth is to be utilised for stockpiled materials where required.</li> </ul> <p>This impact can be managed and mitigated to a large degree with the implementation of the EMP. The applicant must comply with the National Dust Regulations (Government Notice R827, 2013) with regards to dust levels produced on site.</p>	3 (low)
2. Construction vehicles and personnel creating a nuisance to the surrounding area and businesses.	6 (med)	<p>Sections of the pipeline will run close to residential households. The work area is to be designated to prevent trespassing onto adjacent farms / properties. Speed limits must be obeyed and enforced by the contractor. A complaints register must be kept on site in the environmental file.</p> <p>This impact can be avoided and managed.</p>	4 (low)
3. Impact on existing services i.e. power lines, water pipes, infrastructure, etc.	7 (med)	<p>As a standard construction practice the engineer and contractor must identify all existing services that may be affected along the route prior to</p>	4 (low)

<sup>2</sup> See Appendix H for more details.

		<p>construction. Any infrastructure that is removed must be replaced and any damage caused from construction must be repaired. This impact can be managed and mitigated.</p>	
<p>4. Damage to properties, fencing and subsistence farming plots during laying of pipework.</p>	<p>8 (med)</p>	<p>For the most part the pipeline will be laid within the road reserves however if any properties are affected, the contractor must liaise with the landowner. The pipeline trenches will be approximately 1m wide and 1.2m deep, thereby limiting the area of the excavation and damage that could be caused by construction work. This impact can be avoided and mitigated.</p>	<p>5 (low)</p>
<p>5. Deposition of eroded material into water bodies when laying pipe across the 63 watercourses impacting water quality (increased turbidity, reduction of dissolved oxygen).</p>	<p>8 (med)</p>	<p>Caution needs to be exercised when working near the watercourse crossings. The following mitigation measures must be carried out and are included in the EMPr:</p> <ul style="list-style-type: none"> <li>• All construction activities occurring within the watercourses must be done with extreme care to avoid damage to the watercourse and associated wetland area.</li> <li>• No heavy vehicles will be permitted to work in any watercourse unless exceptionally hard material is encountered and the trench cannot be dug by hand. Pipework around these sensitive areas should be laid by hand.</li> <li>• No storage of materials will be permitted within these areas or within 32m of these areas, which must be agreed on and demarcated before construction begins on each section.</li> <li>• Where larger river crossings are required, the type of in-situ material will be confirmed. In places where bed-rock is to be crossed, the rock will need to be blasted to allow placement of the water pipe within the bed-rock and below the level of the bed of the watercourse. The pipe will be encased in concrete and the top of the encasement will be at the same level as that of the undisturbed river bed. Where pipes are laid within river beds composed of soft material, gabions will be placed downstream of the pipe to reduce erosion of the river bed. See typical section through the</li> </ul>	<p>4 (low)</p>

		<p>river crossing attached under Appendix A</p> <ul style="list-style-type: none"> <li>The contractor must ensure that stream bed work is carried out in the dry season when flow rates are low to non-existent (i.e. June – August).</li> <li>It is unlikely that any of the small streams will need to be temporarily diverted however if this is the case, a suitably qualified contractor will be appointed to handle the temporary stream diversion work to ensure that the flow rate and stream morphology are taken into account (Kwagazambhana River (WC1 &amp; 4), Sancinza River (WC2), Matshitsho River (WC24 &amp; 25), Ndongande River (WC27), Nhlunywana River (WC34), Mholweni River (WC57 &amp; 60), and Msunduzi River (WC61). Only half of the river will be diverted, allowing the remainder to flow. Once construction has been completed, the impedance will be removed.</li> <li>In order to prevent long-term deposition of material into the watercourses, areas exposed to erosion must be protected through the use of sand bags, gabions, berms and efficient construction processes i.e.: limiting the extent (footprint) and duration period that areas are exposed.</li> </ul> <p>This impact can be managed and mitigated.</p>	
<p>6. Physical damage to wetland areas associated with the rivers and tributaries during excavation.</p>	<p>9 (med)</p>	<p>Construction activities are to be restricted strictly to the pipeline route across the wetlands (i.e. no wider than 1.2m and 2m deep). A maximum construction servitude width of 5m must be adhered to when working within the wetlands.</p> <p>The surrounding area must be demarcated as ‘no-go areas’ to prevent workers from unintentionally encroaching into wet areas. Furthermore:</p> <ul style="list-style-type: none"> <li>The pipeline is to run as close to all existing pipelines as possible to reduce the disturbance footprint.</li> <li>The pipe must be tied to existing structures at the watercourse, where feasible to reduce the</li> </ul>	<p>5 (Low)</p>



		<p>amount of construction activities within the watercourse.</p> <ul style="list-style-type: none"> <li>• No storage of material, vehicles or equipment is permitted within the wetland areas;</li> <li>• Apart from where the pipeline crosses the wetlands, a buffer of 15m is to be maintained around wetland areas;</li> <li>• The trenches within the watercourses and wetland must not stay open for longer than 7 days.</li> <li>• No heavy vehicles will be permitted to work in the wetland areas unless exceptionally hard material is encountered and the trench cannot be dug by hand. Pipework around these sensitive areas should be laid by hand.</li> <li>• 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.</li> <li>• Designated stockpile storage areas must be established outside of the wetland areas.</li> </ul> <p>This impact can be managed during construction through the implementation of the EMPr.</p>	
<p>7. Temporary increase in waste and litter due to the construction process.</p>	<p>6 (med)</p>	<p>The construction phase of the project will see an increase in workers on site and therefore an increase in waste in the area.</p> <ul style="list-style-type: none"> <li>• Littering must not be permitted in the study area;</li> <li>• Designated waste storage areas with appropriate waste receptacles must be set up within the construction site camp;</li> <li>• Waste must be removed from site and disposed of at a registered waste disposal site;</li> <li>• Safe disposal slips for the disposal of all waste must be obtained and kept on site as proof of safe disposal.</li> </ul> <p>Waste management must be controlled through the implementation of the EMPr. This impact can be managed and mitigated.</p>	<p>4 (low)</p>
<p>8. Insufficient number of toilet facilities on site resulting in the contamination of the environment.</p>	<p>8 (med)</p>	<p>The increase of construction personnel during the construction phase will require an appropriate number of toilet facilities for the site.</p> <ul style="list-style-type: none"> <li>• Appropriate and sufficient toilet facilities (1 toilet per 15</li> </ul>	<p>4 (low)</p>

		<p>employees) must be provided by the contractor;</p> <ul style="list-style-type: none"> <li>• Toilet facilities are to be placed at regular intervals across the project areas;</li> <li>• All toilet facilities must be checked on a daily basis;</li> <li>• All toilet facilities must be emptied and cleaned on a weekly basis.</li> <li>• 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;</li> <li>• Safe disposal slips for the disposal of sewage waste must be obtained and kept on site as proof of safe disposal.</li> </ul> <p>This impact can be managed and mitigated.</p>	
<p>9. Contamination of the receiving environment due to inappropriate storage and usage of hazardous materials and substances (cement, fuel etc.).</p>	<p>7 (med)</p>	<p>It is unlikely that there will be many hazardous materials used during construction however any potentially hazardous substances (including cement and paint) must be stored within a secured area in the construction camp. No storage of material is to occur within 32m of any watercourse. The storage area must be a hard surfaced, bunded and covered area. Cement mixing must be done on a hard surface that is protected from stormwater runoff. This impact can be prevented by managing the storage.</p>	<p>4 (low)</p>
<p>10. Erosion of exposed soil prior to the rehabilitation of the construction area (i.e. trenches).</p>	<p>10 (med)</p>	<p>Exposed soil is very susceptible to erosion and therefore erosion control is critical, especially around the watercourse crossings.</p> <ul style="list-style-type: none"> <li>• Exposed areas must be rehabilitated and re-vegetated as soon as possible during construction.</li> <li>• Cleared areas may not be left exposed for long periods of time and should be re-vegetated in stages on completion of a section of the pipework.</li> <li>• Small inspection holes may be left open along the route but the rest of the trench must be closed once the pipe has been laid.</li> <li>• In certain steeper sections additional precautions to manage erosion will be required (e.g. sand bags or gabions).</li> <li>• During the excavation of trenches, flows must be diverted around</li> </ul>	<p>7 (med)</p>

		<p>the active work areas to prevent channelled flow.</p> <ul style="list-style-type: none"> <li>• Temporary stormwater channels and preferential flow paths must be filled with aggregate and/or logs (branches included) to dissipate and slow flows thereby limiting erosion.</li> </ul> <p>This impact is to be monitored during construction and can be mitigated.</p>	
11. Trenches remaining open for long periods of time, causing them to collapse, creating an erosion and safety hazard.	7 (med)	<p>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. Small inspection holes may be left open along the route but the rest of the trench must be closed. Cleared areas may not be left exposed for long periods of time and must be re-vegetated as each stage of pipework is completed. Trenches must not remain open during building shut down periods i.e. over Christmas and Easter. Trench work must be planned so that trenches are closed before these shut down periods as there is a risk that the trenches will either collapse or fill with water if left unattended and this can create a hazard for children and animals. Trenches must be demarcated.</p> <p>This impact can be avoided.</p>	3 (low)
12. Incorrect filling of trenches on completion creating points of erosion, especially on slopes and near watercourses.	8 (med)	<p>Care must be taken to ensure that when closing trenches, soil is compacted sufficiently and left so that the level of the trench is slightly higher than the surrounding land, to allow settling. Should soil settle below the level of the surrounding land, it will leave a depression along which water will travel and this could create a focal point for erosion. This can occur on sloped sections where water will follow the depression along the pipeline route, building up speed down steeper sections and creating furrows. If this occurs near watercourses, it will erode the river banks and cause them to collapse. Rehabilitation through replanting of indigenous grass species soon after closure will aid in stabilising soil and preventing erosion and will also assist in dust control.</p> <p>This impact can be avoided and mitigated.</p>	5 (low)
13. Excavations within the community impacting on features with heritage and	6 (med)	<p>Since the pipeline will be placed in areas previously disturbed by roads, footpaths and current pipeline routes, it is not anticipated that any of</p>	1 (low)

<p>cultural value (i.e. graves, Shembe site, monuments).</p>		<p>the identified heritage or cultural significant aspects associated with the project area will be impacted upon. A 20m buffer will be maintained around the graves and other culturally significant items (i.e. Monuments). Construction workers will however be cautioned to operate with care on site and should a culturally sensitive aspect be discovered on site that has not been previously identified, construction activities stop temporarily and the issue assessed and the authorities (AMAFA) notified if need be.</p>	
<p>14. Clearing of indigenous vegetation during the laying of the pipeline and temporary access points.</p>	<p>8 (med)</p>	<p>The majority of the pipeline will be placed in road reserves and adjacent to existing road and pipeline servitudes which means that the vegetation has been previously disturbed. In order to minimise the amount of vegetation cleared, the following measures have been included in the EMPr:</p> <ul style="list-style-type: none"> <li>• The relatively small trench size (1m) should result in the loss of only a narrow strip of vegetated area, which must then be re-vegetated on completion of construction.</li> <li>• Clearing of vegetation and excavating of the trench in close proximity to the watercourses will need to be done by hand, where possible. Vehicle access will be restricted as there is a higher risk of damage and disturbance to surrounding vegetation.</li> <li>• All access routes are to follow the existing roads / access tracks.</li> <li>• 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.</li> </ul> <p>This impact can be managed and minimised.</p>	<p>5 (low)</p>

<b>Fauna &amp; Flora</b>			
<p>15. Encroachment of alien vegetation into disturbed areas during construction.</p>	<p>8 (med)</p>	<p>Alien vegetation and weeds were noted near some of the watercourse crossings due to previous disturbance associated with construction of roads, and pipeline infrastructure. The Contractor is to ensure that the alien vegetation does not further establish within the disturbed areas associated with the exaction of the trench.</p> <ul style="list-style-type: none"> <li>• Alien vegetation within the construction footprint must not be allowed to encroach onto the site and must be continually removed during construction.</li> </ul> <p>This impact can be managed and mitigated.</p>	<p>5 (low)</p>
<p>16. Loss of riparian vegetation during excavation for pipework crossings on watercourses, leading to erosion and damage to stream banks.</p>	<p>8 (med)</p>	<p>Some of the watercourses are already crossed by roads and pipes, and so have been previously disturbed and transformed. The riparian habitat at these points has also been previously cleared and disturbed. Furthermore, the drainage lines have very little to no riparian vegetation present due to the non-perennial nature of the watercourses and frequent disturbance by foot traffic and grazing. Where clearing of riparian vegetation is required, it will be kept to a minimum due to the small size of the pipe and associated trench (1mx1.2m). The key impact that requires attention is the potential for erosion, which is to be monitored by the Contractor on an ongoing basis. Erosion can be reduced by keeping any vegetation associated with the banks of the watercourses intact. This impact can be avoided and managed.</p>	<p>5 (low)</p>
<p>17. Clearance of vegetation from within the pipeline footprint area</p>	<p>6 (med)</p>	<p>The pipe has been aligned to follow existing roads and pipeline routes within areas that have been previously disturbed.</p> <p>No clearing may take place outside of the project footprint.</p> <p>The ECO must sign off the site camp locations prior to site establishment.</p>	<p>2 (low)</p>
<b>Operation</b>			
<p>18. Upgrading and constructing the water supply to the local area.</p>	<p>0</p>	<p>This is a positive impact.</p>	<p>0</p>
<p>19. Long-term erosion around watercourses and damage to watercourse banks where pipe crossings have been placed.</p>	<p>8 (med)</p>	<p>Since the pipeline will be placed below the bed of the watercourses, it is unlikely to cause a long-term erosion impact. Where</p>	<p>5 (low)</p>

		<p>watercourses have been crossed, a concrete block or gabion basket will be constructed in the river bank to anchor the pipeline in place during high flow conditions. Gabions / reno mattresses may be included in the design to stabilize the banks and prevent erosion of the banks during high flow events. It must also be ensured that trench rehabilitation has been effectively carried out before contractors leave the site. Soil in the trenches must be compacted effectively to the same level or slightly higher than the surrounding land to prevent settling which could create depressions for water to travel along, creating erosion funnels and exposing the pipeline. It must be ensured that indigenous vegetation is planted after the soil has been compacted and that this vegetation has taken successfully before contractors leave the site.</p> <p>This impact can be avoided during the construction phase.</p>	
20.Placement of pipes in the beds of watercourses impacting the flow regime of the rivers.	7 (med)	<p>Due to the small size of the pipes and tributaries as well as the placement of the pipeline underneath the bed of the watercourses, the pipelines will not impact the flow regime of the rivers during operation. The pipes will be tied to existing structures where possible, or placed underneath the stream bed.</p> <p>This impact can be prevented during the construction phase.</p>	4 (low)
21.Water pipes bursting resulting in localised flooding and erosion.	8 (med)	<p>Various measures to ensure pipe integrity will be implemented including:</p> <ul style="list-style-type: none"> <li>• Scour valves will be used to control the supply of water. These are used to stop supply when any repairs are carried out on a section of pipeline.</li> <li>• Isolating Valves will be placed along the pipeline length which effectively break the line into smaller sections thereby decreasing the overpressures. These valves have been designed for placement on long pump mains.</li> <li>• Vacuum Breaker / Air Release Valves designed to accommodate air intake and release during normal operation and in the event that the pump trips or the line is being filled or scoured.</li> </ul> <p>This impact can be prevented and mitigated.</p>	5 (low)

<p>22. Illegal connections resulting in damage to pipework, flooding, erosion and loss of water supply.</p>	<p>6 (med)</p>	<p>Since most of the households in the area will have easy access to water, there are unlikely to be illegal connections however the pipeline will be laid in trenches 1.2m deep. The water service provider is to monitor the pipeline, through routine inspections with any leaks being repaired as soon as they are reported. This impact can be prevented and managed.</p>	<p>1 (low)</p>
<p><b>Decommissioning</b></p>			
<p>23. Rubble, soil and material left on site and in close proximity to the watercourses.</p>	<p>7 (med)</p>	<p>It is unlikely that the pipeline and reservoir will be decommissioned however should this be required, all rubble and pipework to be removed from the site and disposed of at a registered landfill site. Where the pipe is removed from the watercourses, the trench is to be filled with stones and rehabilitated to its pre-construction condition to prevent pooling and erosion in this section. This impact can be managed and mitigated.</p>	<p>2 (low)</p>
<p><b>Cumulative</b></p>			
<p>24. General pollution and sedimentation within the catchment.</p>	<p>7 (med)</p>	<p>Provided that the Contractor is compliant with the measures included in the attached EMP, waste management and erosion control will be sufficiently managed to prevent this cumulative impact.</p>	<p>4 (low)</p>
<p>25. Pressure on water resources in the Mpungose area.</p>	<p>9 (med)</p>	<p>This project is part of the King Cetshwayo District Municipalities plan to continually improve basic services in district. Water will be supplied to these communities from existing infrastructure previously constructed. This impact has been avoided.</p>	<p>5 (low)</p>
<p>26. Improved service delivery to the local area.</p>	<p>0 (Positive)</p>	<p>This is a positive impact.</p>	<p>0 (Positive)</p>

**6.3 Technology Alternative 2 (Pipe Pier Bridges across the watercourses)**

The below impacts relate to the technology 2 (crossing the watercourses on raised pier bridges).

Nature and Consequences of impact	Significance rating of impacts <sup>3</sup> :	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Significance rating of impacts after mitigation:
<b>Construction</b>			
<b>General Construction</b>			
1. All general construction related impacts remain the same for the preferred and alternative technology alternatives. The operational impacts relating to watercourse crossings may differ between the two alternative crossing techniques.	-	Mitigation measures for impacts 1 – 17 remain the same for the preferred and alternative options for the pipe crossings.	-
<b>Operation</b>			
<b>Watercourses</b>			
2. Impact No.5 and 6 remains the same for both technology alternatives however the significance of the risk to the watercourse is slightly higher with the pipe pier bridge since there is more risk of the piers obstructing flow than that of the preferred alternative (laying the pipe under the bed).	11 (high)	Mitigation measures for impact No.5 and 6 largely remain the same for the preferred and alternative technique. Additionally: <ul style="list-style-type: none"> <li>The concrete piers must be located outside of the watercourse beds and wetlands to prevent unnecessary long-term flow obstruction.</li> </ul>	8 (med)
3. Having a raised pipe above the surface level would expose the pipe to flood damage and consequential ongoing maintenance and service disruption.	11 (high)	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.	9 (med)
<b>Decommissioning</b>			
4. Decommissioning impacts remain the same for both the preferred and alternate crossing techniques.	-	Mitigation measures remain the same for the preferred and alternate crossing techniques.	-
<b>Cumulative</b>			
5. Cumulative impacts remain the same for both the preferred and alternate layouts.	-	Mitigation measures remain the same for the preferred and alternate layouts.	-

**6.4 Environmental Impact Statement as per section (I)**

The key impacts associated with the construction of the water supply scheme relate to those during the construction period. Issues such as clearing indigenous vegetation, damaging watercourses, and the management of erosion needs to be addressed. This can be best managed by minimising the clearing of vegetation to strictly the project footprint, treating the watercourses (WC1-63) and 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

<sup>3</sup> See Appendix H for more details.



existing route. Once construction is complete there should be no significant impacts related to the operation of the water supply scheme as long as the mitigation measures are adhered to during construction.

Taking into consideration the above impacts and mitigation measures, it is the EAP's opinion that the construction of the Mpungose Water Supply Scheme be authorised.

### **6.5 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.
  - To practice responsible construction, 'best practice' with regards to housekeeping on site during construction (outlined within the EMP) 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.

### **6.6 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 water resource assessment by The Biodiversity Company. 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.

### **6.7 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 upgrade within the 2020 or 2021 business plan for the King Cetshwayo District Municipality, therefore 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 will be split into phases.

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

### **6.8 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.

### **6.9 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 upgrade are considered 'low'.

### **6.10 Summary of Recommendations for the construction of the Mpungose Water Supply Scheme:**

#### **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 must 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 are to be stored within a secured area in the construction camp. The storage area must 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 are 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 is to be used to dampen dusty surfaces and suppress dust.
- Exposed areas must 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 are to 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 excavation 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 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 32m is to be maintained around the watercourses (excluding the actual crossings).

**Protection of Heritage Resources**

- A buffer of 20m is to be maintained around any graves and other heritage and culturally significant items (i.e. Monuments) 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**

**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**