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FINAL BASIC ASSESSMENT REPORT

**THE CONSTRUCTION OF A PIPELINE ACROSS THE THUKELA RIVER ASSOCIATED
WITH THE MTHEMBU WEST BULK WATER INFRASTRUCTURE UPGRADE**

MSINGA LOCAL MUNICIPALITY

UMZINYATHI DISTRICT MUNICIPALITY

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EVP1336



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

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Executive Summary

The Umzinyathi District Municipality propose to upgrade the Mthembu West Bulk Water Infrastructure, adjacent to the Thukela River, within Wards 3 and 6 of the Msinga Local Municipality. The upgrade of infrastructure will include a new 200mm pipeline (9.37 km long), a new 400mm pipeline (1.44km long) and a proposed 1.25ML Reservoir. The construction of the new water pipeline will require the infill of material within one (1) watercourse.

The start of the Mthembu West upgrade is located approximately 6.5km west of Tugela Ferry. The proposed Mthembu West Bulk Water Infrastructure will supply water to the Mthembu West area located south of the Thukela River. The proposed pipeline and reservoir will be installed adjacent to existing infrastructure. The existing infrastructure was found to be undersized, with an insufficient pressure rating, and insufficient capacity for the projected 2040 water demand. The new 200mm steel pipeline will cross the Thukela River and will require the infill of 72.01m³ of material within the Thukela River.

The Mthembu West Bulk Water Infrastructure upgrade will improve access to potable water in the project area which will ultimately improve the ability of the community to practice good hygiene and improve general sanitation. The proposed upgrade of the water supply scheme in the area will therefore ensure there is adequate supply to accommodate this additional household use. It is also a cost-effective mitigation measure as the infrastructure will provide on-going benefit to this community.

The following key impacts and mitigation measures were assessed:

- **Damage to the identified watercourse in the project area from construction activities:**
Construction of Watercourse Crossing (WC) 1 will result in the infill of 72.01m³ of material within the Thukela River. The installation of the proposed pipeline to the toe of the existing weir requires no excavation of the river and the pipeline will be attached to an existing 'man-made' structure, therefore will have less impact on the surrounding environment. Caution must be exercised when working near and within all watercourses. Construction materials must be stockpiled outside the recommended 10m watercourse buffer. Heavy vehicles must be kept at least 10m away from the watercourses except where needed for pipeline construction. The construction footprint within watercourses must not be widened more than is necessary for construction.
- **Encroachment into a sensitive area**
The 200mm pipeline at WC1 occurs within the Thukela River, which is considered a 'sensitive area' and the site is located within the vulnerable Thukela Valley Bushveld (SVs 1) vegetation type. The infrastructure upgrades are occurring adjacent to the existing infrastructure and within the existing servitudes. Vegetation clearing (if any is required) will be kept to a minimum due to the small size of the pipes. The potential for erosion is to be monitored by the Contractor on an ongoing basis during clearing.
- **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 in the watercourse**
The pipeline within the Thukela River will be attached the toe of the existing weir which requires no further excavation in the watercourse, and will be laid below the level of the river bed and encased in concrete. The crossing is along an existing concrete weir spanning a natural rock shelf. Dowel bars will be drilled and grouted into the bedrock or the existing weir flank wall, keeping the pipeline in place during high flow events.
- **Encroachment of alien vegetation into areas disturbed during the 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.
- **Improved services**
The water supply scheme will improve service delivery to the Mthembu West area and increase 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 EMP. Construction activities will be monitored and controlled through the implementation of the Environmental Management Programme (EMP).

The aim of the project is to improve the supply of potable water to the Mthembu West area with as little environmental and infrastructural disturbance/impact as possible. No additional site alternatives were considered as the preferred site is adjacent to the existing infrastructure and within the existing servitude, which is an existing pipeline. Therefore the surrounding area is already transformed and degraded from its original state. Realigning the pipeline and constructing the new pipeline crossing either upstream or downstream of the existing weir crossing point over the Thukela River would result in the transformation of previously undisturbed areas. Therefore, only one site alternative was considered in this application. Two design alternatives have been considered; the preferred design alternative is to construct the new watercourse crossing (WC1) for the 200mm pipeline at the location of the existing weir, which will allow the pipeline to toe into the existing weir and attach to the bedrock below the surface of the Thukela River. This crossing technique will have a smaller construction footprint and less impact on the surrounding environment. The pipe will not block or impede the flow of water in the watercourse due to existing weir.

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 preferred site and design alternative 1 be authorised for the construction of a pipeline across the Thukela River associated with the Mthembu West Bulk Water Infrastructure upgrade.

Please note:

Writing in red indicates amendments which were made to the Draft BAR.

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Section 1: Scope of Work and Location of Activity

1.1 Project Title

The Construction of a Pipeline Across the Thukela River Associated with the Mthembu West Bulk Water Infrastructure Upgrade.

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

The Umzinyathi District Municipality propose to upgrade the Mthembu West Bulk Water Infrastructure, adjacent to the Thukela River, within Wards 3 and 6 of the Msinga Local Municipality (Figure 1). The upgrade of infrastructure will include a new 200mm pipeline (9.37 km long), a new 400mm pipeline (1.44km long) and a proposed 1.25ML Reservoir (shown in green in Figure 2). The construction of the new pipeline will require the infill of material within one (1) watercourse.

The start of the Mthembu West upgrades is located approximately 6.5km west of Tugela Ferry. The proposed Mthembu West Bulk Water Infrastructure supply water to the Mthembu West area located south of the Thukela River. The proposed pipeline and reservoir will be installed adjacent to existing infrastructure.

The need for the infrastructure upgrades (Figures 2 - 4), as noted in the Sampofu Bulk Water Infrastructure Assessment¹ and Engineering Feasibility Report², are as follows:

- **Proposed new 200mm Ø Steel pipeline – Command Reservoir to Mthembu West**
 - The existing 90mm diameter uPVC pipeline from the Sampofu Command Reservoir to Mthembu West Reservoir (approximately 9.37 km long) was confirmed to be undersized and will have to be upgraded to a 200mm diameter steel pipe. Part of the pipeline was washed away at Thukela River and no water is supplied to Mthembu West.
- **Proposed new 400mm Ø Steel pipeline – Sampofu WTW to Command Reservoir**
 - The existing 250mm diameter uPVC pipeline from the Sampofu WTW to the Sampofu Command Reservoir has insufficient capacity for the projected 2040 demand, in addition, the modelled surge analysis also proved the existing pipeline has an insufficient pressure rating for the predicted maximum surge pressure.
 - Therefore, the engineer has recommended that a new 400mm diameter steel pipeline, approximately 1.44 km long, is installed from the Sampofu WTW to the Sampofu Command Reservoir.
- **Proposed New 1.25 Mℓ Sampofu Command Reservoir**
 - The Gross Annual Average Demand from the Sampofu Command Reservoir is 4.49 Mℓ/d (including 20% conveyance losses). A Command Reservoir with no reticulation demand must hold at least 12 hours of balancing storage, and therefore 2.25 Mℓ of storage capacity is required at the Sampofu Command Reservoir site.
 - There are currently two 500 kℓ reservoirs at the Sampofu Command Reservoir site, giving a total of 1 Mℓ of storage. Therefore an additional 1.25 Mℓ reservoir is required to be constructed in order to provide the required 12 hours of storage at this reservoir site.

The 200mm pipeline has multiple watercourse crossings which the engineer has confirmed that the amount of material infilled or removed will be less than 10m³, excluding where the 200mm pipeline will cross over the Thukela River. The 400mm pipeline does not cross any watercourses, however it is greater than 0.36m in diameter and more than 1000m in length. This pipeline will however be replacing an existing pipeline of insufficient capacity in the same servitude and is therefore considered to be a 'like for like' replacement. The proposed reservoir is the equivalent of 1 250 cubic metres and therefore falls below the 50 000 cubic metres threshold of this activity. The 200mm steel pipeline crossing the Thukela River will require the infill of more than 10m³ of material within the Thukela River, thus requiring Environmental Authorisation. All other crossings are below the threshold and therefore all other components of the Mthembu West Bulk Water Infrastructure Upgrade were found to not constitute activities and may proceed as per feedback from EDTEA. The EDTEA Enquiry response letter can be found in Appendix B. Therefore this report will focus on the 200mm pipeline crossing over the Thukela River (WC1) only (Figure 5).

¹ Civtech Engineers.2020. Sampofu Bulk Water Infrastructure Assessment – Umzinyathi District Municipality.

² Civtech Engineers.2020. Upgrade of the Water Supply Infrastructure for Mthembu West - Sampofu Bulk Water Infrastructure Assessment - Umzinyathi District Municipality – Feasibility Study Report.

The works associated with Watercourse Crossing (WC) 1 across the Thukela River will consist of the following (Figure 5 and Figure 6; Appendix A):

- WC1 will be a 200mm steel pipe encased in concrete:
 - The length of the pipeline within the watercourse is 163.5m
 - The specific widths and heights of the concrete encasing the pipe differ with varying sections of the pipeline in the watercourse, as depicted in Figure 6
 - The crossing is along an existing concrete weir spanning a natural rock shelf
 - Dowel bars will be drilled and grouted into the bedrock or the existing weir flank wall, depending on the section of the watercourse crossing, along the length of the crossing
- The total amount of infrastructure to be placed within the watercourse is as follows:
 - 81.75m²
- The total volume of material that will be infilled within the watercourse is as follows:
 - 72.01m³

The pipeline across the Thukela River (WC1) will have the following measurements:

Crossing	Type	Pipe Size	Length	Height	Area	Volume	Coordinates
WC1	Steel Pipe	200mm	163.5m	0.5m	81.75m ²	72.01m ³	Start: 28°44'13.85" S; 30°19'15.64" E End: 28°44'16.31" S; 30°19'10.75" E

The Mthembu West Bulk Water Infrastructure upgrade will improve access to potable water in the project area which will ultimately improve the ability of the community to practice good hygiene and improve general sanitation. The proposed upgrade of the water supply scheme in the area will therefore ensure there is adequate supply to accommodate this additional household use. It is also a cost-effective mitigation measure as the infrastructure will provide on-going benefit to this community.

1.2.1 Construction Methodology

The Environmental Impact Reduction Method Statement, received from the engineer, for the proposed 200mm steel pipeline is as follows:

- The pipeline will be constructed alongside existing pipelines, within existing servitudes. The excavation of the trenches will occur within the existing pipeline servitude,
- The vegetation has already been cleared for maintenance of the existing pipelines. The only vegetation found on the exiting servitude is grass,
- Construction of the pipeline in the existing servitude will minimise disturbance to the surrounding environment, including soils, aquatics, wetlands, native vegetation and wildlife.
- Local labour will be used to dig pipelines trenches where possible. Manual digging of pipeline trenches will therefore significantly reduce the impact on the environment as less machinery is required.
- Where machinery is required (i.e. in areas where large quantities of rock/boulders are present), a small bucket at the end of the excavator (TLB) will be used to excavate the pipeline trench in order to minimise the impact on the environment.

The construction method statements for the Mthembu West Bulk Water Infrastructure detail design are as follows:

- **Watercourse Crossing 1 over the Thukela River:**
 - The pipeline will be encased in concrete (with a minimum 300mm concrete cover), then pinned into the downstream toe of the existing weir.
 - The installation of the proposed pipeline to the toe of the existing weir requires no excavation of the river and the pipeline will be attached to an existing 'man-made' structure, therefore will have less impact on the surrounding environment.
 - The attachment of the pipeline to the toe of the weir will also provide additional stability to the existing weir.
- **Pipeline:** The methodology for the construction of the 200mm steel pipeline is as follows:
 - Site clearing;
 - Removal of topsoil where construction is to take place, and stockpile separately for later re-instatement;
 - Excavate pipe trench;
 - Install and compact pipe bedding;

- Install pipe sections by means of side booms (special cranes) and weld joints;
- Repair field joints, backfill and compact pipe trench in layers;
- Construct air and scour valve chambers. Air valves, which are usually positioned at high points along the route, release air from the pipeline as it fills, allows air into the pipeline when it is draining and 'bleeds' off air during normal operations. The scour valves serve to drain water from the pipeline (typically during maintenance), and are located at low points along the route for drainage purposes. A detailed hydraulic analysis for the positioning of the valves will be performed as part of the detailed design;
- Construct access chambers;
- Re-shape the impacted area to its original topography and replace stripped topsoil;
- Install pipeline markers at changes in direction and at regular intervals along the route;
- Rehabilitation.

1.3 Description of Feasible Alternatives as Per Section 3(h)(i)

"Alternatives" are defined as "different means of meeting the general purpose and requirements of the activity"³. Alternatives considered must be feasible and reasonable⁴. Alternatives considered must aim to address key significant impacts of the proposed activity by "maximising benefits and avoiding or minimising the negative impacts"⁵. Two design alternatives have therefore been assessed in this report and are attached under Appendix A.

1.3.1 Site Alternatives

1.3.1.1 Site Alternative 1 (Preferred Site Alternative)

The project entails the upgrade of the Mthembu West Bulk Water Infrastructure Upgrade which will include the construction of a portion of the 200mm pipeline over the Thukela River (WC1). The preferred site is to construct the pipeline adjacent to the current pipeline, within the existing servitudes. The preferred location of WC1 within the Thukela River is at location of an existing weir. This will allow the pipeline to toe into the existing weir which requires no additional excavation within the watercourse and provides additional stability to the pipeline. The pipeline servitudes are already transformed and degraded from its original state. Realigning the pipeline would result in the transformation of previously undisturbed areas. Therefore, only one site alternative was considered in this application.

1.3.2 Design Alternatives

1.3.2.1 Design Alternative 1 (Preferred Design Alternative)

The preferred design alternative is to construct the 200mm steel pipeline, encased in concrete, as recommended in the engineering reports^{1,2}. This alternative will place the new watercourse crossing (WC1) for the 200mm pipeline at the location of the existing weir, which will allow the pipeline to toe into the existing weir and attach to the bedrock below the surface of the Thukela River. This crossing technique will have a smaller construction footprint and less impact on the surrounding environment. The pipe will not further block or impede the flow of water in the watercourse as it will be attached to the existing weir. Please see Appendix A for design drawings.

1.3.2.2 Design Alternative 2

Alternative 2 is to construct a pipe bridge over the Thukela River at the location of the existing weir. This would entail building pier structures into the Thukela River beds to support the 200mm steel pipe above-ground as it crosses the watercourse. This approach will have a larger environmental and visual impact with the above-ground pipes being very visible. Constructing piers in the watercourse would potentially create long term water flow impedence if piers are located in the watercourse beds and banks. 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 Umzinyathi District Municipality and will threaten the consistent supply of potable water for all users in this area.

³ Environmental Impact Assessment Regulations, 2014 as amended published under Government Notice No. 326 in Gazette No. 40772 of 07 April 2017.

⁴ DEA & DP (2010) Guideline on Alternatives, EIA Guideline and Information Document Series. Western Cape Department of Environmental Affairs & Development Planning (DEA & DP).

⁵ DEA & DP (2010) Guideline on Alternatives, EIA Guideline and Information Document Series. Western Cape Department of Environmental Affairs & Development Planning (DEA & DP).

1.3.3 The No Go Alternative

The Mthembu West Bulk Water Infrastructure will remain in its current state where it cannot meet the water demands of Mthembu West. The new watercourse crossing (WC1) for the 200mm pipeline over the Thukela River will not be constructed. This will lead to insufficient water capacity for the projected 2040 demand.

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

Table 1: Listed Activities Being Applied for

GNR	Activity Number	Activity as per the legislation	Activity as it applies to the proposal
Listing Notice 1; 4 th December 2017 as amended	19	<p><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></p> <p><i>but excluding where such infilling, depositing, dredging, excavation, removal or moving—</i></p> <p><i>(a) will occur behind a development setback;</i></p> <p><i>(b) is for maintenance purposes undertaken in accordance with a maintenance management plan;</i></p> <p><i>(c) falls within the ambit of activity 21 in this Notice, in which case that activity applies;</i></p> <p><i>(d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.</i></p>	The construction of the new 200mm pipeline will result in 72.01m ³ of material being infilled within the Thukela River (WC1).

1.5 Location of Activity as per Section 3 (b)(i)-(iii)

Table 2: Location Information

District Municipality	Umzinyathi District Municipality																					
Local Municipality	Msinga Local Municipality																					
Wards	Ward 3 and 6																					
Area / Town / Village	Start of the upgrades: 7.3km west of Tugela Ferry Watercourse crossing: 13km west of Tugela Ferry																					
Co-ordinates:	Latitude								Longitude													
Start of 200mm pipeline:	28°44'5.14"S								30°23'24.50"E													
End of 200mm pipeline:	28°44'32.80"S								30°18'37.78"E													
Start of Thukela River crossing – WC1	28°44'13.87"S								30°19'15.61"E													
End of Thukela River crossing – WC1	28°44'16.52"S								30°19'10.03"E													
Property Description:	The Farm Mthembu No. 17484																					
21 Digit Surveyor General no.	N	0	G	U	0	0	0	0	0	0	0	0	1	7	4	8	4	0	0	0	0	0

Figure 1: 1:50 000 Map Showing the Location of the Mthembu Bulk Water Infrastructure Upgrade

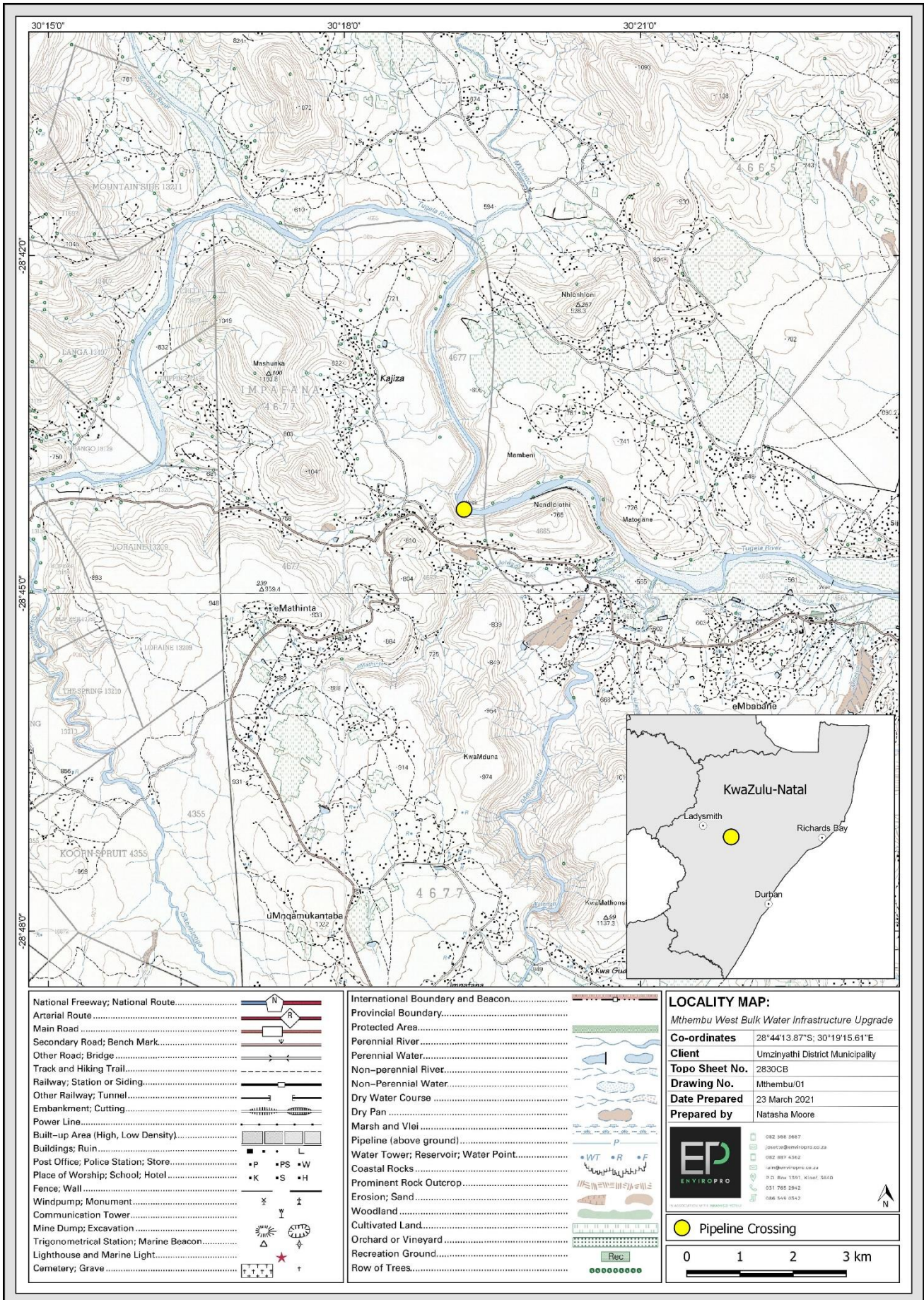


Figure 2: Aerial Photograph Showing the Proposed Mthembu West Bulk Water Infrastructure Upgrade (shown in green) and Existing Infrastructure. WC1 Over the Thukela River is Shown in Red. Source: Civtech Engineers, 2020

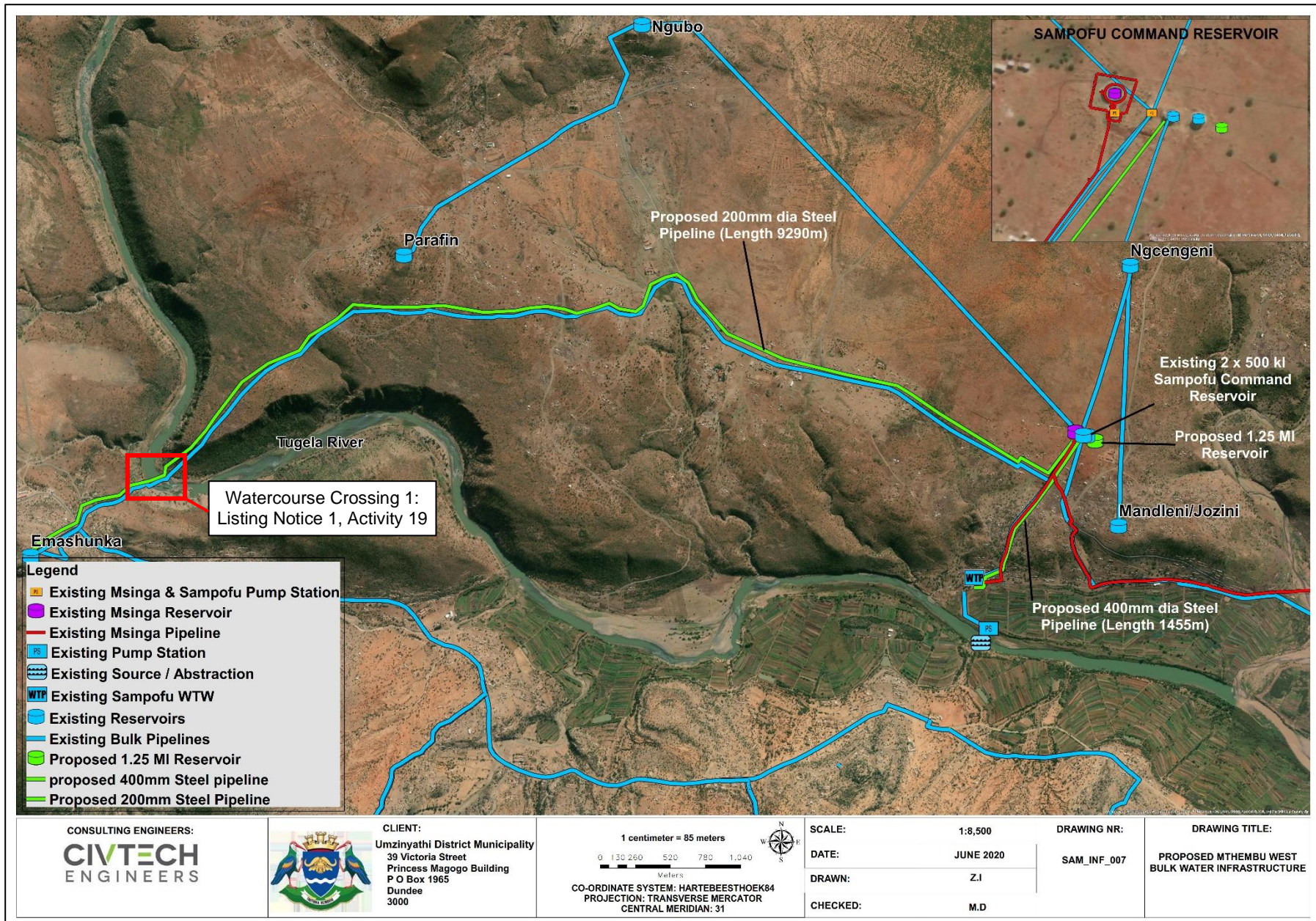


Figure 3: Aerial Photograph Showing the Eastern Section of the Mthembu West Bulk Water Infrastructure Upgrade Including the 200mm and 400m Steel Pipelines, and 1.25Mℓ Reservoir. Generated Using QGIS Desktop, Version 3.14.16.

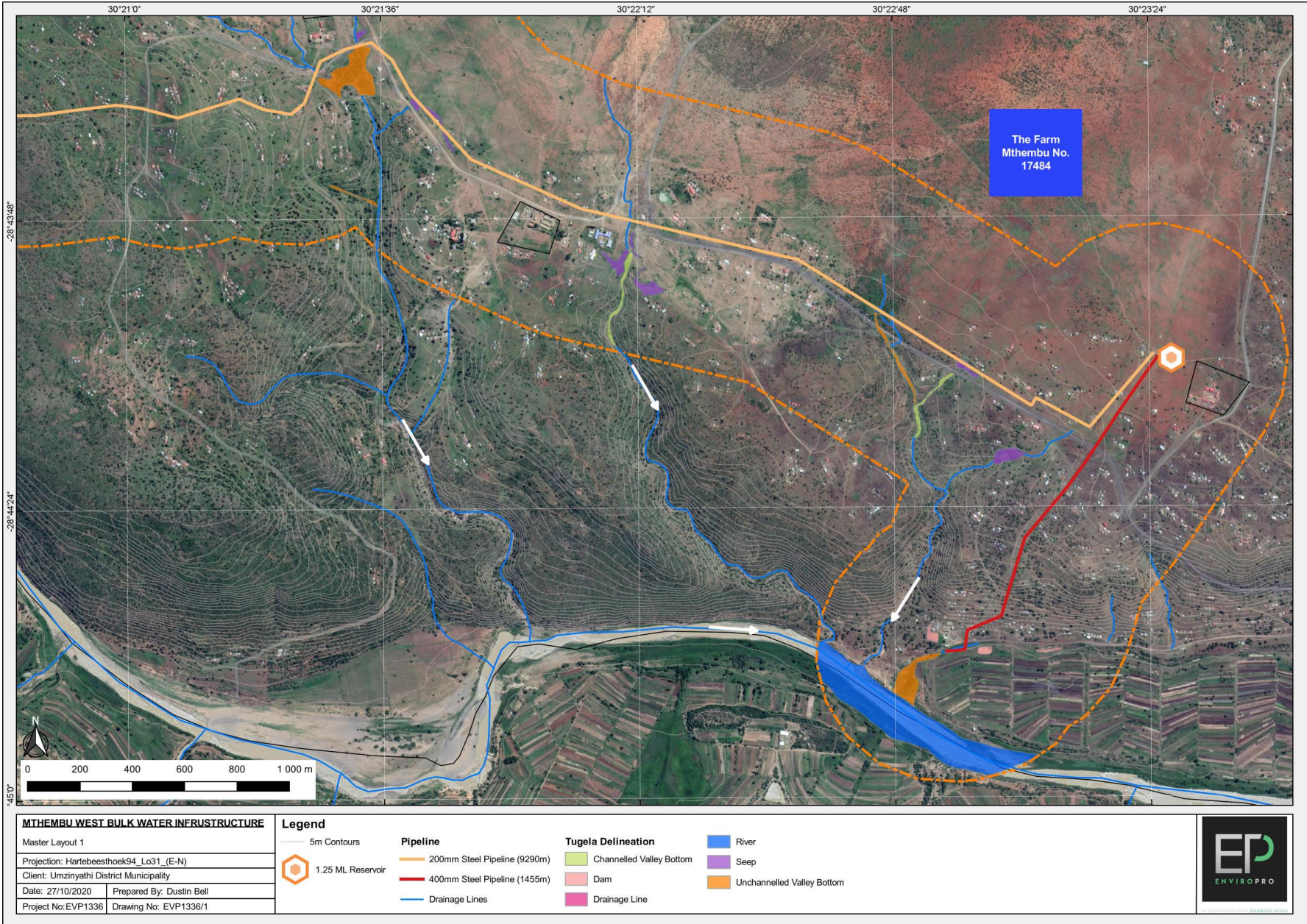


Figure 4: Aerial Photograph Showing the Western Section of the Mthembu West Bulk Water Infrastructure Upgrade Including the 200mm Steel Pipeline, and WC1 Across the Thukela River (Shown in Red), Generated Using QGIS Desktop, Version 3.14.16.

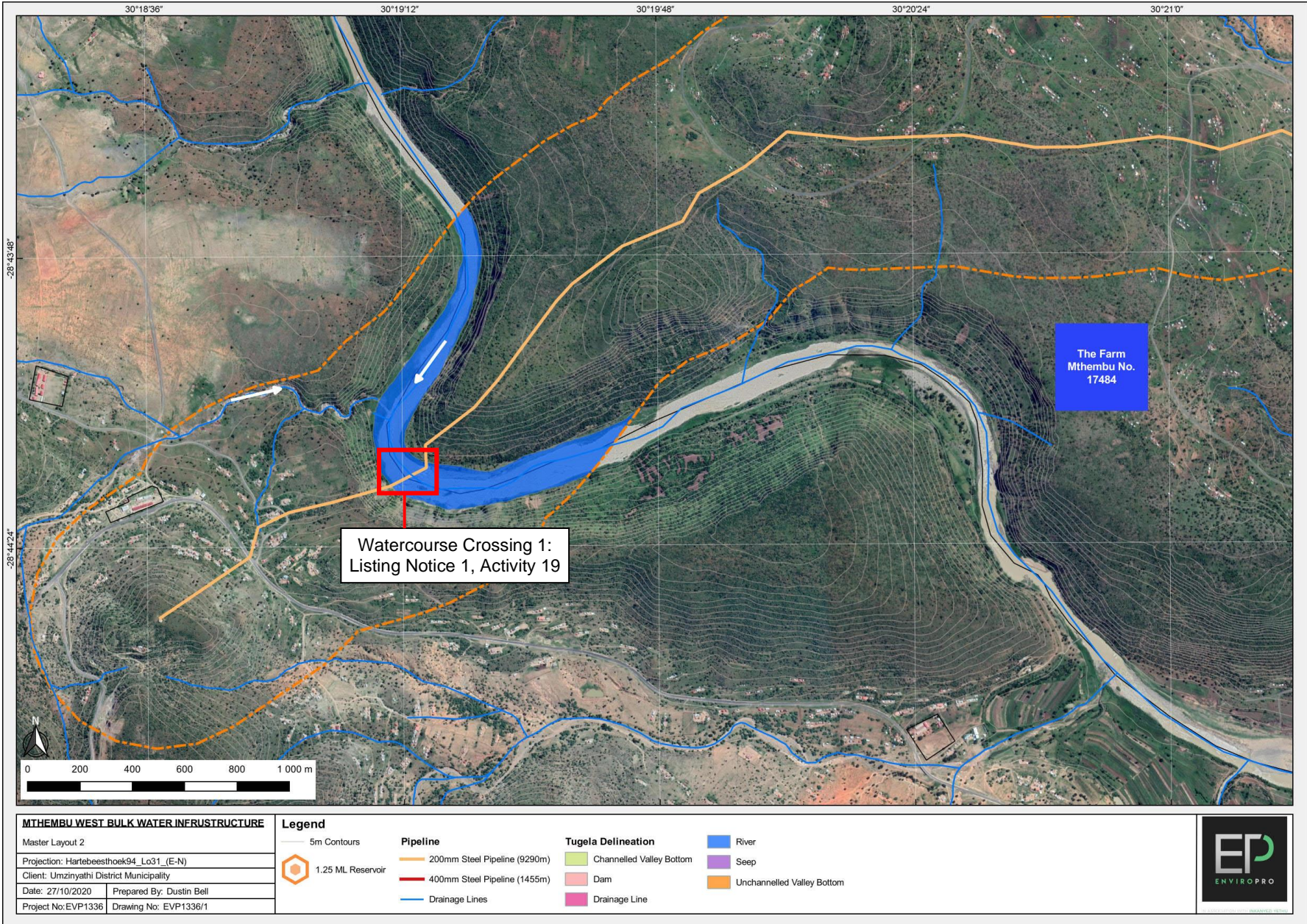


Figure 5: Aerial Photograph Showing the Section of the 200mm Steel Pipeline (WC1) Across the Thukela River. Generated Using QGIS Desktop, Version 3.14.16.

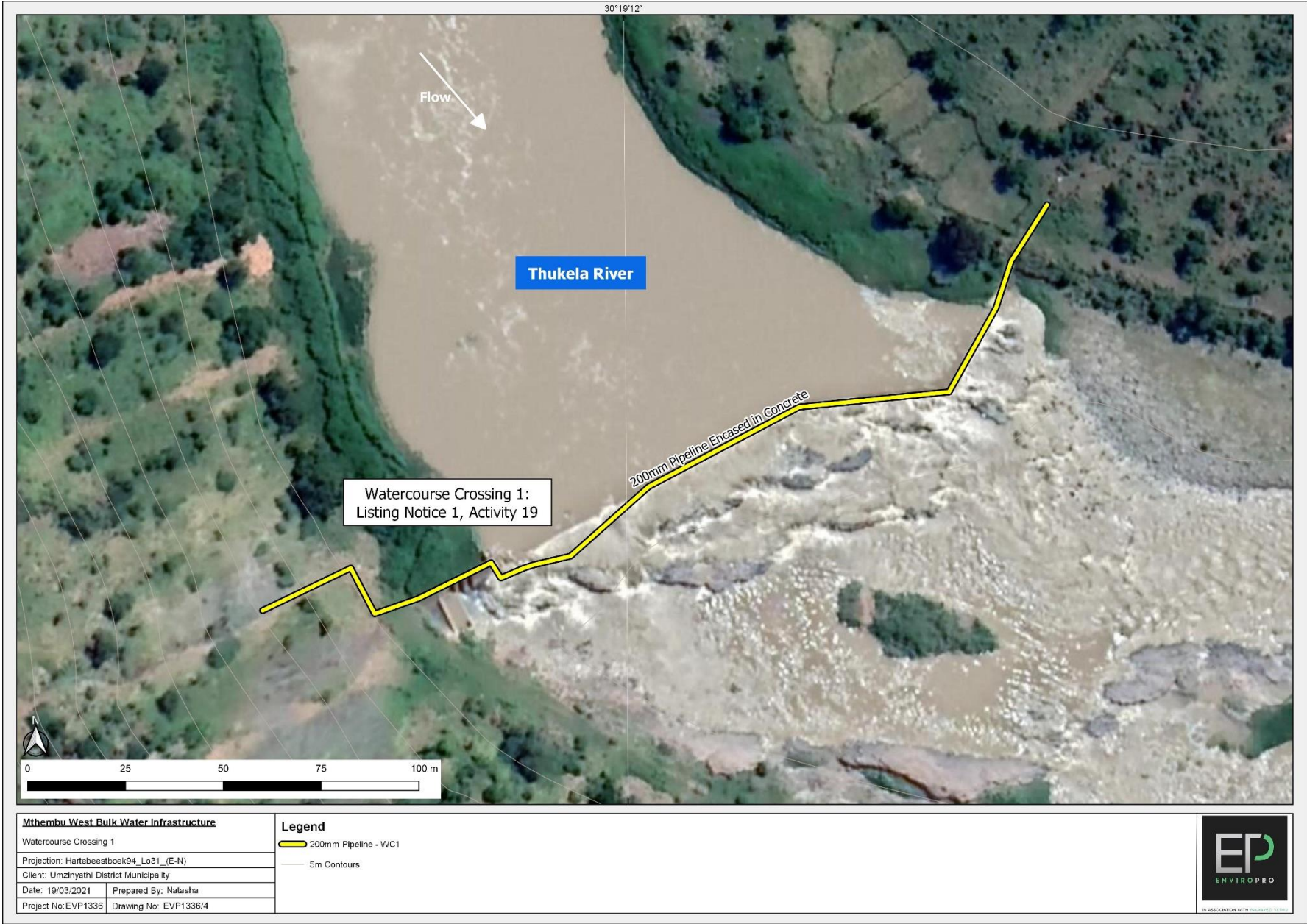
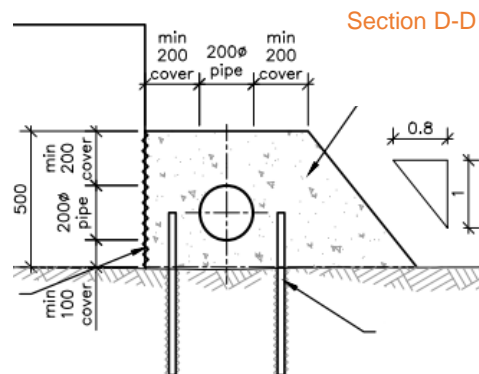
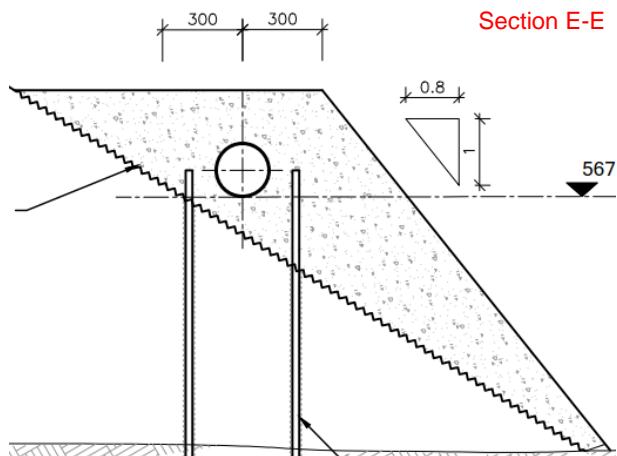
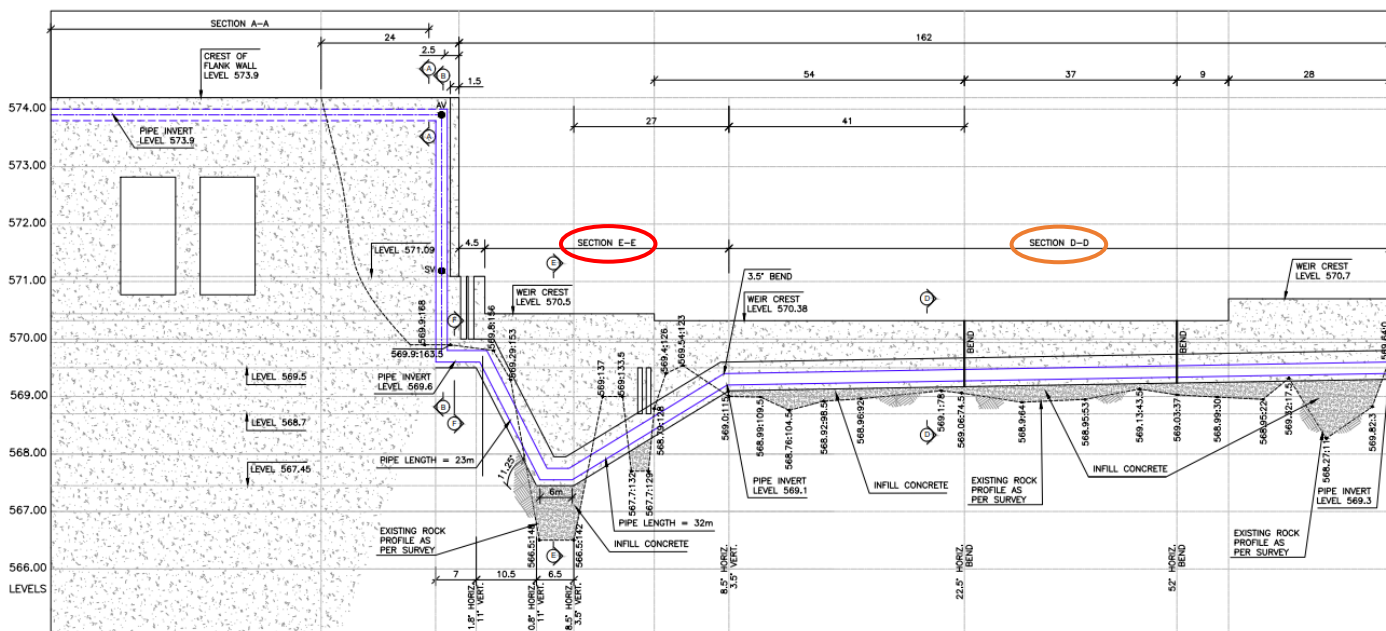


Figure 6: Engineers Drawing Showing the 200mm Pipeline Crossing Over the Thukela River (WC1), Highlighting the Sections of Pipeline Occurring Within the Watercourse. See Appendix A for the Full Design. Source: Civitech Engineers, 2020.



Section 2: 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). This details potential specialist reports that may be required based on a desktop level assessment conducted by the screening tool. Table 3 below summarises the screening tool recommendations. It indicates whether they are applicable to the specifics of the project and site and shows 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 3: National Screening Tool Specialist Requirements and Comments

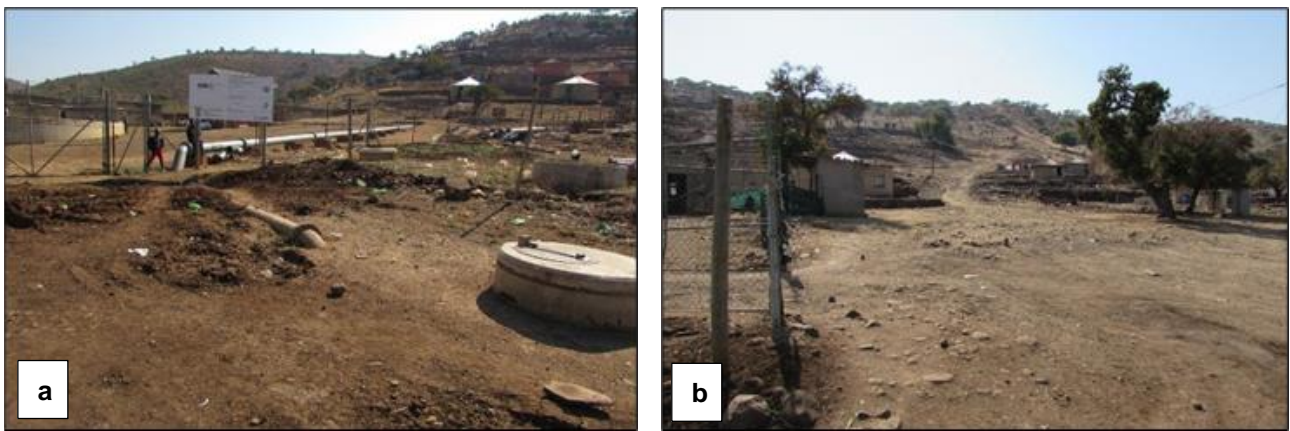
Specialist Assessment	Conducted	Reason
Agricultural Assessment	No	No agricultural areas will be negatively impacted by the construction of the 200mm pipeline across the Thukela River at WC1.
Landscape / Visual Impact Assessment	No	The new pipeline crossing (WC1) will be below the surface of the Thukela River, therefore will have no new visual impacts in this area.
Archaeological and Cultural Assessment	No	No aspects of archaeological or cultural significance were observed near the WC1 footprint. However, provisions have been made in the EMPr should any aspect of cultural significance be discovered during construction. A phase one desktop Heritage Impact Assessment study was conducted for the Tugela Ferry Irrigation Scheme near Msinga, KwaZulu-Natal which is located on the southern side of the Thukela River in comparison to the Mthembu West upgrade. The project has been included in Appendix B.
Palaeontology Impact Assessment	No	According to the SAHRIS PaleoSensitivity Map, WC1 for the falls within an area of "Zero / Insignificant" Palaeontology Sensitivity. Therefore, no study is required. A Chance Find Protocol has been included in the EMPr.
Terrestrial Biodiversity Assessment	No	The pipeline crossing is occurring within a watercourse, therefore there is no terrestrial impact. The triggered Listed Activity relates to the identified watercourse and not clearance of terrestrial vegetation.
Aquatic Biodiversity Assessment	Yes	The DEFF screening report referred to WC1 as a very high sensitivity due to being a Critical Biodiversity Area and within a Freshwater ecosystem priority area quinary catchment. This is due to the pipeline crossing occurring within the Thukela River. The pipeline crossing (WC1) is replacing existing infrastructure and is being tied to the existing weir. A Water Resource Assessment was conducted for WC1 and included a section on expected fish species. Please refer to the specialist <i>Water Resource Assessment</i> report in Appendix B and <i>Surface Water and Ground Water</i> under Section 2.4 of this report.
Noise Impact Assessment	No	The noise anticipated from both the construction activity and the operational activity did not warrant additional impact assessment.
Traffic Impact Assessment	No	The Mthembu West upgrade will not impact on roads in the area, therefore the need for a Traffic Impact Assessment was not deemed necessary.
Geotechnical Assessment	Yes	Please refer to the specialist Geotechnical Investigation Report in Appendix B and <i>Topography and Physical Characteristics of Site</i> under Section 2.3 of this report.
Socio-Economic Assessment	No	The upgrade of the Mthembu West Bulk Water Infrastructure and WC1 will have a positive impact by improving water supply within the area. As this is an upgrade of an existing infrastructure, a Socio-Economic Assessment was not deemed necessary for this site.
Ambient Air Quality Impact Assessment	No	The ambient air quality is not anticipated to be impacted on by construction of WC1, therefore no specialist assessment was required.
Plant Species Assessment	No	The construction of WC1 will occur within the Thukela River. No vegetation is expected to be cleared for the construction of

		WC1. A specific vegetation specialist assessment was not deemed necessary. However, the <i>Water Resources Assessment</i> specialist report (Appendix B) discusses the vegetation component associated with the watercourse on site.
Animal Species Assessment	No	The pipeline crossing (WC1) is replacing existing infrastructure and is being tied to the existing weir. A Water Resource Assessment was conducted for WC1 and includes a section on expected fish species. Please refer to the specialist <i>Water Resource Assessment</i> report in Appendix B and <i>Fauna</i> under <i>Section 2.6</i> of this report

2.2 Surrounding Environment

Photographs of the Mthembu West Bulk Water Infrastructure Upgrade and surrounding environment taken on the 24th July 2020 and 17th November 2020 are shown in Figure 7 below.

Figure 7: Photographs of the Site Taken on the 24th July 2020 and 17th November 2020



(a) Overview of the area where the 400mm pipe will connect to the Sampofu WTW; **(b)** Hillside where the 400mm pipeline will traverse towards the Sampofu Command Reservoir.



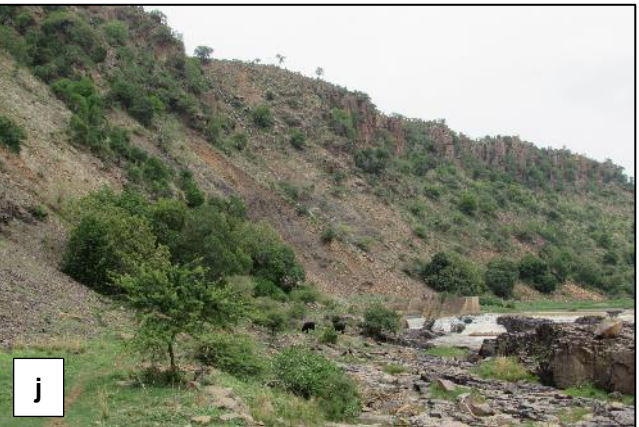
(c) Sampofu WTW water reservoir; **(d)** Existing servitude that the 200mm pipeline will traverse.



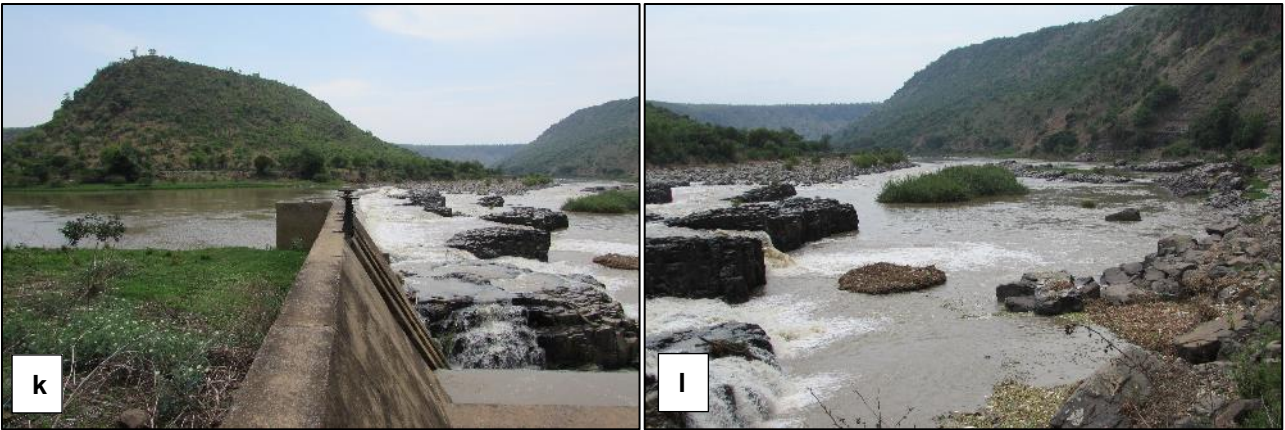
(e) Example of a watercourse that will be crossed on the pipeline route; **(f)** Additional example of a watercourse that will be traversed by the pipeline.



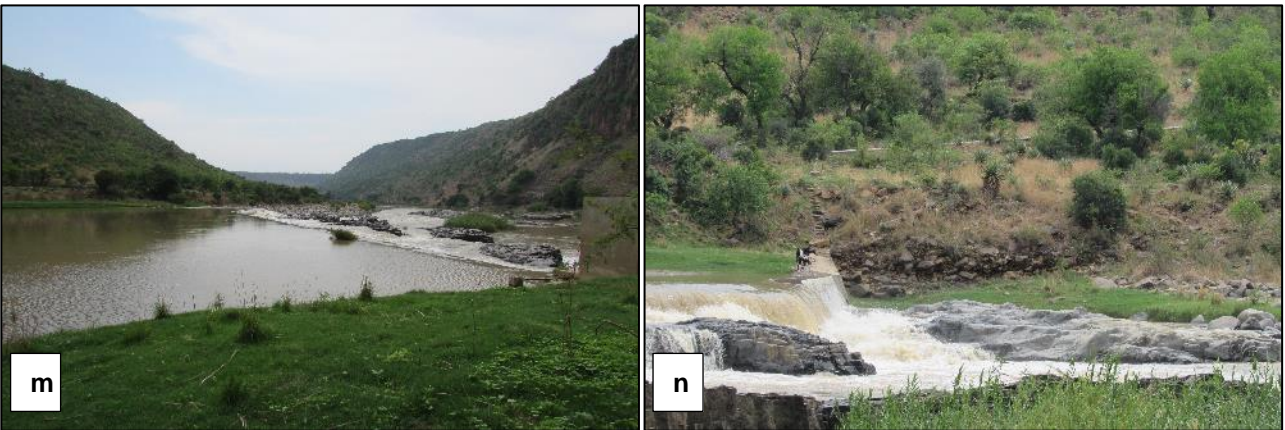
(g) Overview of the area where the existing reservoirs are located, the new reservoir will be installed to the right of the existing reservoirs; **(h)** View of the Thukela River where the existing weir is located and the 200mm pipeline crossing will be located at WC1, looking in a north-easterly direction.



(i) View of the existing weir on the western side of the Thukela River at WC1 where the 200mm pipeline will toe into, looking north; **(j)** The existing pipeline located on a steep slope on the western side of the Thukela River after WC1, looking north west.



(k) View of across the Thukela River at WC1 from the western bank to the eastern bank, where the existing pipeline is located; **(l)** Downstream of existing weir at WC1 on the Thukela River, looking south east.



(m) Upstream of the existing weir at WC1 on the Thukela River, looking south east; **(n)** View of the existing pipeline on the eastern bank of the Thukela River at WC1, with goats present at the crossing.

2.3 Topography and Physical Characteristics of Site

The following applies to the area surrounding the site as per the Figures 2-6 above. The gradient of the site is described as follows (Table 4; Figure 8):

Table 4: Gradient of The Site

Gradient	Description
Flat	The gradient at WC1 over the Thukela River can be described as flat.
1:50 – 1:20	N/A
1:20 – 1:15	N/A
1:15 – 1:10	N/A
1:10 – 1:7,5	N/A
1:7,5 – 1:5	N/A
Steeper than 1:5	The 200mm pipeline before and after WC1 can be described as steep.

The Geotechnical Investigation Report⁶ described the site as follows: The proposed pipe route traverses elevated spurs on either side of the Thukela River, but predominantly on its northern side, the spur tops of which are characterized by relatively gentle, rolling topography, whilst the Thukela River (WC1) itself is contained in a canyon incision, with very steep rocky slopes and scarps on either side (Table 4; Figure 8). The spur tops in the area are characterized by abundant boulder accumulations and some rock outcrops at surface. The lead-in to this crossing comprises very steep rock slopes, with elevation difference approximately 150m between the spur tops and the valley bottom, as seen in Figure 8 and 9.

⁶ Drennan Maud (PTY) LTD. 2020. Geotechnical Investigation Report – Upgrade of Water Supply Infrastructure for Mthembu West Water Supply.

Figure 8: Google Earth Image Showing a Terrain Profile of the 200mm Pipeline over the Thukela River at WC1.
 Source: Google Earth Pro, 2020.

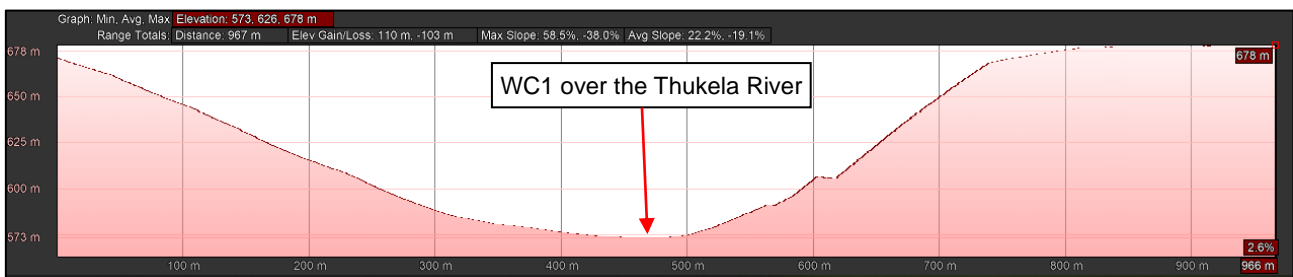


The topographical features and landforms of the site and surrounding area are as follows (Table 5; Figure 9):

Table 5: Topographical Features and Landforms of The Site

Topographical Feature	Description
Ridgeline	N/A
Plateau	N/A
Side slope of hill/mountain	The 200mm pipeline is oriented perpendicular to very steep slopes on either side of the Thukela River at WC1.
Closed valley	N/A
Open valley	WC1 over the Thukela River is located in valley.
Plain	N/A
Undulating plain/low hills	N/A
Dune	N/A
Sea-front	N/A

Figure 9: Elevation Profile for the WC1 Section of the 200mm Pipeline taken from East to West (Source: Google Earth Pro, 2020).



2.3.1 Soils and Geology

The Water Resource Assessment compiled by The Biodiversity Company (2020)⁷ found the Mthembu West Bulk Water Infrastructure crosses the following land types: Ae177, Ea110, Fb292, Fc305, Fc308, and Fc310. WC1 falls within Fb292. Fb292 is dominated by mid-slope landscape positions with Mispah, Glenrosa, and Shortlands Soils. The valley bottoms consist of Oakleaf and Dundee Soils.

The bedrock geology along the pipe route varies frequently between the Vryheid Formation, which comprises shale and sandstone, and intrusive Karoo dolerite⁶. The hard rock shelf in the Thukela River, below the existing weir (WC1) is dolerite⁶. The geology of the Fb292 Land Type is mainly sandstone of the Vryheid Formation, Ecca Group, with dolerite⁷.

2.4 Surface Water and Ground Water

The following information has been obtained from the Water Resources Assessment for the Proposed Mthembu West Bulk Water Infrastructure compiled by The Biodiversity Company (2020)⁷. The project is situated within the V60G and V60H quaternary catchments, within the North Eastern Uplands Aquatic Ecoregion, which forms part of the Pongola – Mtamvuna Water Management Areas (WMA 4). The proposed Mthembu West Bulk Water Infrastructure has the potential to directly impact on the V60G – 03247 Sub Quaternary Reach (SQR) and associated tributaries as well as the tributaries of the V60G - 03385 SQR or Thukela River reach, as these watercourses will be crossed by the pipeline requiring associated infrastructure. According to Nel *et al.* (2011), the Mthembu West Bulk Water Infrastructure project area falls predominantly within the 3247 and 3385 Sub-quaternary catchments along the V60G – 03247 and V60G – 03385 Sub-Quaternary Reach's. These two catchments are considered as River FEPA's as well as Fish Sanctuaries for *Enteromius anoplus*. The river ecosystem type is permanent/seasonal - North Eastern Uplands - Lower foothills. This indicates the watercourses within the project area are sensitive and precautions must be taken during construction.

The WC1 falls within V60G-03247 SQR, which spans 13.2km. This system at a desktop level has a Present Ecological Status (PES) of largely natural (Class B) by the Department of Human Settlements, Water and Sanitation (DHSWS; 2020; Table 6)⁸. 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 physio-chemical conditions (water quality). This changes downstream due to the influence of extensive cultivation in the floodplains, among other things of the Thukela River. The ecological importance and sensitivity (EIS) and default ecological category of the V60G-03247 are 'High' and classed as 'B' respectively (Table 6).

Table 6: Summary of the Status of Sub-Quaternary Reach V60G - 03247

SQR Importance and Sensitivity	Score
River Name	Thukela
Reach Length	13.2
Stream Order	5
Present Ecological Status	Largely Natural (class B)
Ecological Importance	High
Ecological Sensitivity	High
Default Ecological Category	B

2.4.1 Habitat Integrity Assessment

The Water Resource Assessment by the Biodiversity Company⁷ included a Habitat Integrity Assessment (IHIA) for the Thukela River, see Appendix B for the full report. The results of the instream and riparian habitat assessment in the associated Thukela River reach indicates a moderately modified state (class C). This indicates a loss and change of natural habitat and biota has occurred, but the basic ecosystem functions are still predominantly unchanged. Sources of modification within the system include a mixture of small-scale subsistence farming to extensive cultivation in floodplain further downstream. This along with sediments from upstream and erosion from small tributaries results in bed modification. The sources of flow and channel modification are from instream weirs (for

⁷ The Biodiversity Company, 2020. Water Resource Assessment for the proposed Mthembu West Bulk Water Infrastructure, Mbabane, KwaZulu-Natal.

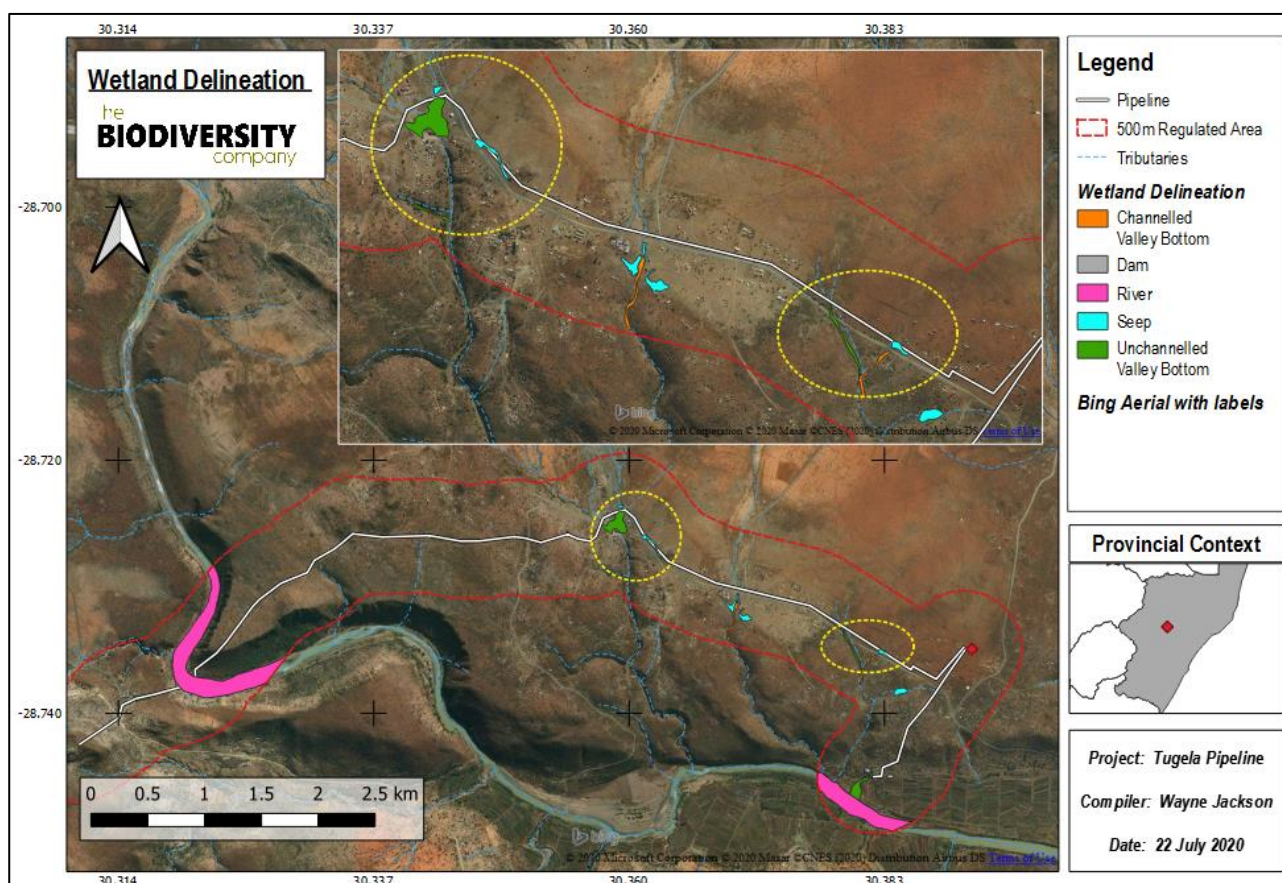
⁸ DWS (Department of Water and Sanitation). 2020. A Desktop Assessment of the Present Ecological State, Ecological Importance and Ecological Sensitivity per Sub Quaternary Reaches for Secondary Catchments in South Africa. Draft. Compiled by RQS-RDM.

example the weir located at WC1 where the 200mm pipe is being constructed) and gauging stations as well as road crossings and bridges. Instream abstraction occurs from rural communities and villages for domestic use and subsistence farming.

2.4.2 Wetlands

The Thukela River which is crossed by the 200mm pipeline at WC1, has steep banks with phragmites growing on the edges. However, the river was not classified as a wetland and no health assessment was conducted for WC1⁷. Figure 10 below shows the wetland delineation for the whole Mthembu West Bulk Infrastructure Upgrade.

Figure 10: Map Illustrating Wetland Delineations within the 500m Regulated Area. Source: The Biodiversity Company, 2020.



2.5 Flora

2.5.1 Vegetation Type⁹

Vegetation Type: Thukela Valley Bushveld (SVs 1) vegetation type

- **Conservation**
Vulnerable. Target 25%. 15% statutorily conserved in the Greater St Lucia Wetland Park as well as in Sileza, Enseleni and Amathikulu Nature Reserves. More than 30% transformed for plantations and cultivation and by urban sprawl. Aliens include scattered populations of *Chromolaena odorata* and *Lantana camara*. Erosion is mostly very low. This vegetation type has a relatively high number of plant taxa at the southernmost and northernmost limits of their distribution range—the occurrence of widely disjunct or outlier populations increases the conservation value of this vegetation type.
- **Distribution**

⁹ Mucina, L. & Rutherford, M.C. (eds) 2006. The vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.

KwaZulu-Natal Province (and continuing also in southern Mozambique): Up to 35 km broad strip along the coast of the Indian Ocean stretching from the Mozambique border in the north to Mtunzini in the south. Altitude varies from about 20–120 m.

- **Vegetation & Landscape Features**

Flat coastal plain originally probably densely forested in places with a wide range of interspersed non-forest plant communities including dry grass-lands (which include palm veld where special conditions prevail), hygrophilous grasslands and thicket groups. Today the vegetation landscape is composed of pockets of various forest types (separated into different vegetation units), thickets, primary and secondary grasslands, extensive timber plantations and cane fields. The belt of the IOCB immediately inland (only a few kilometres wide) and parallel to the line of Northern Coastal Forest has a characteristic appearance of very irregular dunes with generally open vegetation and *Syzygium cordatum* dotted prominently on the dunes, with many irregular dune slacks interspersed. There is little to suggest that this part of the vegetation, e.g. between Lake Sibaya and Kosi Lake, is secondary. The peculiar CB 2 Maputaland Wooded Grassland—still another vegetation unit embedded within the geographical extent of the Maputaland Coastal Belt—is treated as a separate vegetation unit.

- **Geology & Soils**

Up to about 18 000 yrs old Quaternary sediments of marine origin—mainly yellowish and argillaceous redistributed sands (Berea and Muzi Formations of the Maputaland Group, respectively). Soils nutritionally very poor and well leached, except in the interdune depressions where organic-rich soils are sometimes found. The dominant land types include Hb and Ha, with some contribution of Db land type. The area is situated almost entirely on Letaba Formation basalts of the Karoo Supergroup. Soils are mainly black with a high (35–55%) clay content and depth in the range 200–300 mm. Land types mainly Ea with some Fb and Dc.

2.5.2 Placement of Site Camp and Site Access

The location of the site camp must be approved by both the engineer and the ECO and must be on land that is previously disturbed or within the construction footprint. All vegetation clearing will take place under the supervision of the ECO and Engineer. Access to site must make use of the existing access track. Heavy vehicles and construction equipment must not impact on the functioning of the existing irrigation scheme.

2.6 Fauna

No terrestrial fauna of conservation significance was evident around the site, which is most likely due to the disturbed nature of the surrounding area associated with the households and foot traffic in this area. Only domestic livestock were noted along the site.

The Water Resources Assessment by the Biodiversity Company⁷ included a section on Expected Fish Species for the Thukela River within their report (Appendix B). The expected species list was generated from DHSWS (2020)⁸ and Skelton (2011)¹⁰. A total of 14 fish species are expected to occur in the Thukela River reach. The occurrence of all species in the system is unlikely as different species are specialists of different habitats which are present along a reach. The Thukela River reach does however have a great diversity of habitat and therefore a wide range of fish species are expected. This includes one Near Threatened (NT) species and two Vulnerable (VU) species. The Near Threatened species expected in the reach is *Anguilla bengalensis* (Indian Mottled Eel). The two identified vulnerable species expected in the reach are *Labeo rubromaculatus* (Tugela Labeo) and *Oreochromis mossambicus* (*Mozambique Tilapia*). Due to the potential of vulnerable fish species, construction activities need to make impacts minimal and consider fish migrations (fish ways) when building bridge crossings for the associated pipeline, especially for *Anguilla species* and *Labeo rubromaculatus*. The results indicate that fish expected in the Thukela River reach are moderately tolerant to flow and physicochemical modifications, respectively, which applies as an average of the whole class and not each individual species.

It is important to note that WC1 over the Thukela River will be attached to the toe of an existing structure (weir) to facilitate crossing over the Thukela River, this activity will therefore not result in significant additional impact. There will be no bridge crossings or new structures built in the Thukela River. An existing structure is being modified to accommodate the new pipeline.

¹⁰ Skelton, P.H. 2001. A complete guide to the freshwater fishes of southern Africa. Struik Publishers, South Africa.

2.7 Heritage and Cultural Aspects

No items of archaeology were noted within the immediate site associated with the Mthembu West Bulk Water Infrastructure upgrade. The 200mm steel pipeline at WC1 will be constructed on an existing weir, therefore no further excavation in the watercourse will occur. A phase one desktop Heritage Impact Assessment (Appendix B) study was conducted for the Tugela Ferry Irrigation Scheme near Msinga, KwaZulu-Natal¹¹. The Tugela Ferry Irrigation Scheme is located on the southern side of the Thukela River in comparison to the Mthembu West upgrade. The siphon from the irrigation scheme is located 3.3km south west of WC1 of the Mthembu West upgrade. The Heritage Impact Assessment¹¹ could not find any heritage sites or features on any of the two features (i.e. Pump Station and Siphon) surveyed for the irrigation scheme. This conclusion was supported by the ground survey of the irrigation scheme project area as no heritage features or sites were evident on the footprint. The footprint is not part of any known cultural landscape. As per the above mentioned specialist there was no evidence for any 'living heritage site' on the Tugela Ferry Irrigation Scheme footprint. Due to the close proximity of the Mthembu West upgrade and the project being an upgrade of existing infrastructure, no further Heritage Impact Assessment was conducted.

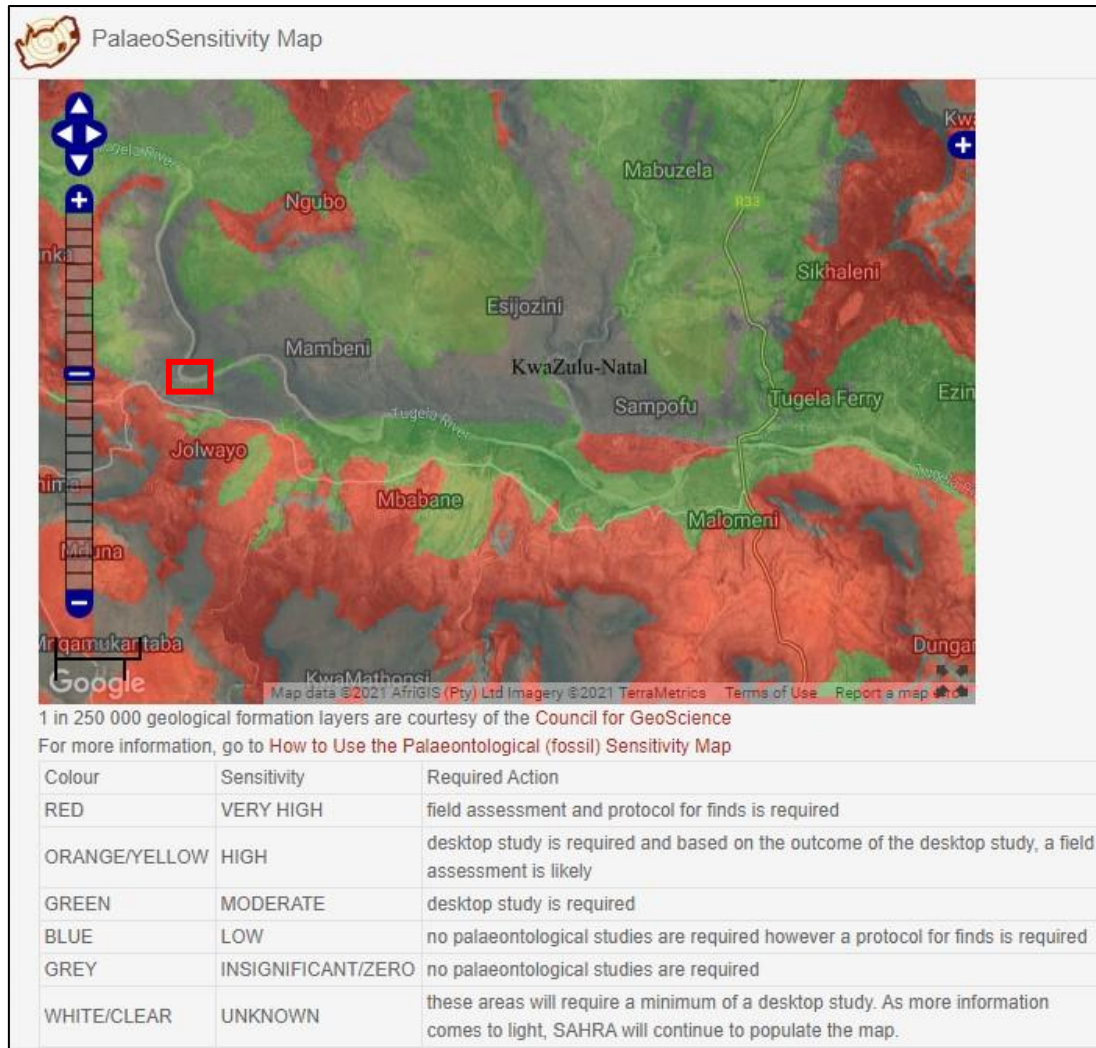
Construction workers will be cautioned to operate with care on the site and should any unidentified archaeologically or culturally sensitive aspects be discovered on site, construction activities are to stop immediately and the issue assessed and the authorities (AMAFA) notified if need be.

2.8 Palaeontology Environmental

The Mthembu West Bulk Water Infrastructure Upgrade is the upgrade of existing infrastructure. No disturbance to the palaeontology environment is expected. According to the SAHRIS PaleoSensitivity Map, WC1 (shown with a red rectangle in Figure 11) falls within an area of "Zero / Insignificant" Palaeontology Sensitivity. Therefore, a Palaeontological Assessment is not required by SAHRIS. No aspects of archaeological or cultural significance were observed near the WC1 footprint during the site survey conducted by the EAP. Provisions and protocol have been provided in the EMPr should any aspect of cultural or paleontological significant aspects be discovered during construction. Construction workers will be cautioned to operate with care on the site and should any unidentified archaeologically or culturally sensitive aspects be discovered on site, construction activities are to stop immediately and the issue assessed and the authorities (AMAFA) notified if need be.

¹¹ Frans Prins, Active Heritage cc. 2019. Phase One Heritage Impact Assessment of the Proposed Tugela Ferry Irrigation Scheme Upgrade, Msinga Local and Mzinyathi Regional Municipalities, KZN.

Figure 11: Desktop SAHRIS Database Palaeo Sensitivity Map of the Project Area (Source: SAHRIS, 2020).



2.9 Surrounding Environment and Land Uses

The area surrounding the proposed project site, as described in the Water Resource Assessment report⁷, consists of irrigated agricultural and livestock activities as well as large open natural areas. Densely populated residential areas surround the agriculture in the towns of Mbabane, Tugela Ferry, Solway, Sampofu to mention a few. These towns are accessed from the R33 which crosses the Thukela River. The rural nature of the area and high density of the settlements have resulted in the overgrazing of the immediate landscape and modification of many natural areas. Considering the modified nature of the catchments, erosion and water quality modifications were observed and anticipated as was discussed in the Water Resources Assessment report⁷.

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)

Table 7: Legislation Table

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 is 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 ongoing 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)	<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 (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.</p> <p>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.</p> <p>The construction of the 200mm steel pipeline over the Thukela River (WC1) triggers Activity 19 of Listing Notice 1. The proposed development thus requires EA in the form of a BA process. The associated EMPr includes mitigation measures as recommended by specialists, that must be implemented to ensure that environmental resources are protected.</p>
National Water Act (Act 36 of 1998)	<p>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.</p> <p>The site is located within 500m of wetlands and the Thukela River and there will be the alterations to the bed and banks of a watercourse. Therefore, a water use authorisation will be required as per Section 21 (c) and (i) of the National Water Act.</p>
National Environmental Management: Waste Act (Act 59 of 2008)	<p>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.</p> <p>It is unlikely that any activities carried out by the development will trigger a Waste Management Activity.</p>
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

	<p>by all spheres of government; for specific air quality measures; and for matters incidental thereto.</p> <p>It is unlikely that any activities carried out by the development will impact on the local and regional air quality.</p>
National Environmental Management: Protected Areas Act (Act 57 of 2003)	<p>The National Environmental Management: Protected Areas Act 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.</p> <p>The proposed development will not have an impact on any protected areas.</p>
National Environmental Management: Integrated Coastal Management Act (Act 24 of 2008)	<p>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.</p> <p>The proposed development will not have an impact on any coastal areas.</p>
National Forest Act (Act 84 of 1998)	<p>To reform the law on forests as the 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, 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.</p> <p>The proposed development will not have an impact on any forest areas.</p>
Environmental Conservation Act (Act 43 of 1996)	<p>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.</p>
National Environmental Management: Biodiversity Act (Act 10 of 2004)	<p>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.</p> <p>The site is not located within an endangered or critically endangered vegetation type.</p>
National Heritage Resources Act (Act 25 of 1999) KwaZulu-Natal Heritage Act (Act 4 of 2008)	<p>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.</p> <p>No significant archaeological artefacts will be disturbed during this project; therefore; no permits will be required from the provincial heritage authority, AMAFA.</p>
Mineral & Petroleum Resources Development (Act 28 of 2002)	<p>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).</p>

	The material used to construct the pipeline must be obtained from licensed sources.
Occupational Health and Safety Act (Act 181 of 1993)	<p>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.</p> <p>During both the construction phase of this development all the requirements of Occupational Health and Safety Act 1993 will need to be adhered to.</p>
Hazardous Substances Act (Act No. 15 of 1973)	<p>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.</p> <p>A Spill Contingency Plan will be compiled for managing spills during the construction of the proposed development.</p>
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)	This guideline has been considered in determining the need and desirability of the proposed development.
Municipal Planning Framework	
Msinga Local Municipality Integrated Development Plan 2020 - 2021.	This project falls in line with the Msinga Local Municipality's mission to " <i>strive to provide good health, human development, sustainable environment through the provision of adequate infrastructure in partnership with Traditional Leadership and other stakeholders</i> ". This project will contribute to water service delivery and infrastructure within the municipal area.
Umzinyathi District Municipality Integrated Development Plan 2020/21	<p>This project falls in line with the Umzinyathi District Municipality's goal of "Championing an economically viable district which strives to promote sustainable development by 2035" by providing better services in the district and sustainable water delivery.</p> <p>The Umzinyathi District Municipality is the Water Services Authority for the whole district. The Mthembu West Bulk Infrastructure Upgrade is in line with the municipality's water and sanitation strategy to address water backlogs.</p>

Section 4: Motivation, Need and Desirability

4.1 Need and Desirability as Per Section 3(F)

The following table (Table 10) has been prepared as per the 2017 Integrated Environmental Management Guideline: Guideline on Need and Desirability compiled by the Department of Environmental Affairs.

Table 8: Need and Desirability as per the 2017 Guideline on Need and Desirability

“Securing ecological sustainable development and use of natural resources”	
<p><i>How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?</i></p>	<p>The construction of a new watercourse crossing (WC1) will require digging works, soil stockpile management and operation of equipment and machinery. It will also result in the infill of 72.01m³ of material into the watercourse at WC1 where the 200mm pipeline is required to cross the Thukela River in order to supply water to various homesteads. However, as the infrastructure is existing, the impact on the ecological integrity of the area has been rated as low during both the construction and operational phases. The route with the least impact (location of the existing weir) was selected and mitigation measures to reduce any impact have been put in place.</p>
<p><i>How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity?</i></p> <p><i>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?</i></p> <p><i>What measures were explored to enhance positive impacts?</i></p>	<p>The construction of the watercourse crossing (WC1) will result in the infill of 72.01m³ material within the Thukela River at WC1. The proposed development will result in some clearance and disturbance of the landscape and vegetation, however, the upgrade is occurring adjacent and within the existing servitude, therefore additional disturbance will be limited.</p> <p>No alternative routes were assessed as the existing route is already transformed.</p> <p>The upgrading of the bulk water infrastructure doesn't offer much opportunity to enhance biological diversity but the proposed route does seek to avoid areas where construction would have the highest impact. Due to the fact that the bulk infrastructure is existing, a number of impacts are already existing.</p>
<p><i>How will this development pollute and/or degrade the biophysical environment?</i></p> <p><i>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?</i></p> <p><i>What measures were explored to enhance positive impacts?</i></p>	<p>Apart from risk of spills etc. during construction which can be managed and mitigated, the development and watercourse crossing will not pollute and/or degrade the biophysical environment during operation.</p> <p>The EMPr details measures to manage hazardous materials and fuels used on site during construction and details measures to put in place to ensure that pollution is prevented. Any potential leakages from the pipeline during operation will only result in clean water entering the environment.</p> <p>By providing households with access to potable drinking water at their homes, the project could reduce the pedestrian traffic in and around watercourses and also reduce the need for people to wash clothing, vehicles and dishes in the watercourses, thereby reducing impacts on water quality.</p>
<p><i>What waste will be generated by this development?</i></p> <p><i>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?</i></p> <p><i>What measures have been explored to safely treat and/or dispose of unavoidable waste?</i></p>	<p>Small volumes of general waste and a small amount of hazardous waste, such as oil spills, will be generated during construction. This will be temporary.</p> <p>No waste will be generated during operation.</p> <p>An EMPr has been provided to ensure waste is properly stored and managed site and the appropriate disposal of waste is also addressed. Measures for the separation and recycling of waste are addressed in the EMPr.</p>
<p><i>How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage?</i></p>	<p>There are no negative or positive impacts on any cultural heritage sites.</p>

<p><i>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?</i></p> <p><i>What measures were explored to enhance positive impacts?</i></p>	<p>No heritage studies were carried out as the bulk water infrastructure is existing and the upgrade will be adjacent to the existing route.</p> <p>The pipeline doesn't offer much opportunity to enhance cultural diversity but does not negatively impact it any way.</p>
<p><i>How will this development use and/or impact non-renewable natural resources?</i></p> <p><i>What measures were explored to ensure responsible and equitable use of the resources?</i></p> <p><i>How have the consequences of the depletion of the non-renewable natural resources been considered?</i></p> <p><i>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?</i></p> <p><i>What measures were explored to enhance positive impacts?</i></p>	<p>The construction process will make use of quarried materials to produce cement and fuels to operate the vehicles.</p> <p>The EMPr addresses the responsible sourcing of materials and use of permitted sites only.</p> <p>The project will not significantly deplete non-renewable natural resources.</p> <p>These impacts cannot be completely avoided but the EMPr addresses appropriate measures to ensure sustainable sourcing.</p> <p>The pipeline doesn't offer much opportunity to enhance positive impacts related to non-renewable resources.</p>
<p><i>How will this development use and/or impact renewable natural resources and the ecosystem of which they are part?</i></p> <p><i>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?</i></p> <p><i>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?</i></p> <ul style="list-style-type: none"> • <i>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. dematerialised 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)</i> • <i>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)?</i> • <i>Do the proposed location, type and scale of development promote a reduced dependency on resources?</i> 	<p>The development is not expected to impact on any renewable natural resources on site. The project will however, increase the demand for potable water in the region.</p> <p>Water supply is a basic human need and therefore use of the resource cannot be avoided, however implementation of a formal scheme does allow proper management and monitoring of water use and can ensure that impacts are mitigated through formal management as opposed to the impacts caused by local communities accessing local water resources in an informal and uncontrolled manner.</p>
<p><i>How was a risk-averse and cautious approach applied in terms of ecological impacts?</i></p> <ul style="list-style-type: none"> • <i>What are the limits of current knowledge? (note: the gaps, uncertainties and assumptions must be clearly stated)</i> • <i>What is the level of risk associated with the limits of current knowledge?</i> • <i>Based on the limits of knowledge and the level of risk, how and to what extent was a risk-</i> 	<p>The existing route which has the least impact on the environment was selected. Therefore, unnecessary impacts on vegetated areas have been avoided.</p> <p>There are very few if any gaps in knowledge.</p> <p>A risk averse and cautious approach has been followed by avoiding previously undisturbed areas where possible. The impact on the ecological integrity of the area has therefore</p>

<p><i>averse and cautious approach applied to the development?</i></p>	<p>been rated as low during the construction phase. During operation, there will be very little impact.</p>
<p><i>How will the ecological impacts resulting from this development impact on people's environmental right in terms following</i></p> <ul style="list-style-type: none"> • <i>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?</i> • <i>Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?</i> 	<p>The proposed development will have very little negative impact on the community's environmental rights. There may be some nuisance and disturbance and access constraints during construction as well as associated noise and dust.</p> <p>The long-term impacts will be positive as the Mthembu West Bulk Water Infrastructure Upgrade will improve access to potable water which is a natural resource and will allow better management and monitoring of water use.</p>
<p><i>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.)</i></p>	<p>As this is a rural area the local community relies on the open spaces around them for a number of services including grazing for cattle and goats; subsistence agriculture; in some cases, wood gathering for fires and cooking and where water access is limited the community use the local watercourses for water provision and cleaning.</p> <p>The proposed development will have a limited ecological impact and will have a positive impact on the community by providing a long-term potable water supply. This supply of potable water will also aid in the provision of other basic services such as waterborne sanitation. The development will have limited to no impact on the other ecological services provided during construction and no impact during operation.</p>
<p><i>Based on all of the above, how will this development positively or negatively impact ecological integrity objectives/targets/considerations of the area?</i></p>	<p>The development should have no significant negative impact on ecological integrity based on the understanding that the Municipality will construct and operate the bulk infrastructure as per the conditions of the EMPr.</p>
<p><i>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.</i></p>	<p>Due to the nature of the development, no other feasible site alternatives could be considered, please refer to Section 1.3 and 4.2. In terms of design alternatives, the preferred alternative will have a smaller construction impact on the watercourse in terms of construction work in the bed and banks but will have less impact in the long term, post-construction (less sedimentation of the downstream watercourse). Due to post-construction impacts being permanent this design is seen as much more favourable when considering ecological impacts.</p>
<p><i>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.</i></p>	<p>The construction of the new pipeline watercourse crossing (WC1) will increase sedimentation and disturbance within the catchment during construction. This will ultimately impact on downstream users. It can however be mitigated by following the measures indicated in the EMPr. Due to the nature of the project, there are no identified positive cumulative ecological/biophysical impacts.</p>
<p>"Promoting justifiable economic and social development"</p>	
<p><i>What is the socio-economic context of the area based on, amongst other considerations, the following considerations:</i></p> <ul style="list-style-type: none"> • <i>The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks of policies applicable to the area?</i> • <i>Spatial priorities and desired spatial patterns (e.g. need for integrated or segregated communities, need to upgrade informal settlements, need for densification, etc.)?</i> 	<p>The project is located in a rural area characterised by agriculture, lower income and informal residences and road infrastructure. The area is therefore targeted for development and provision of services in order to improve quality of life, health and access to services.</p>

<ul style="list-style-type: none"> • <i>Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.)? and</i> • <i>Municipal Economic Development Strategy ("LED Strategy")?</i> 	
<p><i>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?</i></p>	<p>The identified positive socio-economic impacts are as follows:</p> <ul style="list-style-type: none"> • Improved access to a potable water supply to the Mthembu West community • Infrastructure that will serve to satisfy the increasing water demand within the project area. • Provision of an economically efficient solution to the water supply problem. • Reduced water services backlog and uplifted standards of living in Mthembu West • Provision of employment for local labour.
<p><i>How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?</i></p>	<p>The new Bulk Water infrastructure will aid in improving potable water supply for the community of Mthembu West. This will have a direct positive impact on sanitation and health.</p>
<p><i>Will the development result in inequitable (intra- and inter-generational) impact distribution, in the short- and long-term?</i></p>	<p>No, as the proposed development is a municipal infrastructure project, it will benefit the public in general and will not result in inequitable (intra- and inter-generational) impact distribution.</p>
<p><i>Will the impact be socially and economically sustainable in the short- and long-term?</i></p>	<p>Yes, the development will be socially and economically sustainable as there have not been any significant negative socio-economic impacts identified. The Bulk Infrastructure will have a positive long-term social impact on all residents in the Mthembu West areas.</p>
<p><i>In terms of location, describe how the placement of the proposed development will:</i></p> <ul style="list-style-type: none"> • <i>result in the creation of residential and employment opportunities in close proximity to or integrated with each other</i> • <i>reduce the need for transport of people and goods</i> • <i>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?)</i> • <i>compliment other uses in the area</i> • <i>be in line with the planning for the area</i> • <i>for urban related development, make use of underutilised land available within the urban edge</i> • <i>optimise the use of existing resources and infrastructure</i> • <i>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)</i> • <i>discourage "urban sprawl" and contribute to compaction/densification</i> <ul style="list-style-type: none"> ▪ <i>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</i> ▪ <i>encourage environmentally sustainable land development practices and processes</i> ▪ <i>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.)</i> 	<p>The upgrade of the proposed development and construction of the watercourse crossing will result in a small number of employment activities during the construction phase. With the increased access to potable water supply to the Mthembu West community, additional employment and housing opportunities will be created. The increase in the potable water supply will allow these communities to grow, providing further economic development to the area.</p>

<ul style="list-style-type: none"> ▪ <i>the investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential)</i> ▪ <i>impact the sense of history, sense of place and heritage of the area and the socio-cultural and</i> ▪ <i>cultural-historic characteristics and sensitivities of the area, and</i> ▪ <i>in terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement</i> 	
<p><i>How were a risk-averse and cautious approach applied in terms of socio-economic impacts?</i></p> <ul style="list-style-type: none"> • <i>What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?</i> • <i>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?</i> • <i>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?</i> 	<p>As the project is for the provision of basic services i.e. water supply, there are no negative socio-economic risks associated with the proposed development. Therefore, a risk-averse and cautious approach was not required.</p>
<p><i>How will the socio-economic impacts resulting from this development impact on people's environmental right in terms following:</i></p> <ul style="list-style-type: none"> • <i>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?</i> • <i>Positive impacts. What measures were taken to enhance positive impacts?</i> 	<p>The proposed development will not negatively impact on people's environmental rights. In fact, the development will have a positive impact, the improved supply of potable water to households and will aid in improving the standard of living for all in the project area.</p>
<p><i>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.)</i></p>	<p>As this is a rural area, the local community relies on access to services, such as transport, electricity and running water.</p> <p>The proposed development will have a limited ecological impact and will have a positive impact on the community by providing a long-term potable water supply. The development will have limited to no impact on the other ecological services provided during construction and no impact during operation. There will be an unavoidable increase in use of water from the supply catchment.</p>
<p><i>What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?</i></p>	<p>As the development is for the improved provision of potable water, no other alternatives were considered from a socio-economic point of view. The proposal of constructing the Bulk Infrastructure Upgrade is the "best practicable environmental option".</p>
<p><i>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?</i></p>	<p>There have been no identified impacts which will adversely affect vulnerable and/or disadvantaged persons. The project will in fact have a positive impact by addressing the lack of basic services in the Mthembu West community.</p>
<p><i>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?</i></p>	<p>Yes, the best practicable environmental option is selected.</p>
<p><i>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?</i></p>	<p>The development will not impact on anyone's access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing. It will, in fact, improve water supply into the area.</p>

<p><i>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?</i></p>	<p>The EMPr includes conditions which have been developed to manage operational impacts. Upon receipt of the EA, the EMPr will become legally binding. Therefore, the Umzinyathi Municipality will be bound to the conditions of the EMPr throughout the life cycle of the Bulk Infrastructure.</p>
<p><i>What measures were taken to:</i></p> <ul style="list-style-type: none"> • <i>ensure the participation of all interested and affected parties?</i> • <i>provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation?</i> • <i>ensure participation by vulnerable and disadvantaged persons?</i> • <i>promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means?</i> • <i>ensure openness and transparency, and access to information in terms of the process?</i> • <i>ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition was given to all forms of knowledge, including traditional and ordinary knowledge?</i> • <i>ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein would be promoted?</i> 	<p>The following steps were followed during the public participation process:</p> <ul style="list-style-type: none"> • A noticeboard detailing the project was erected along the site on the 17th November 2020. • An English and IsiZulu advertisement was published in the Ilanga newspaper on the 29th November 2020. • All relevant authorities were notified via email of the application on the 13th January 2021 and 19th April 2021. • A community meeting was held with the Ward Councillors and local traditional council at the Mthembu Traditional Court on the 17th November 2020. <p>All relevant authorities and registered I&APs were given the opportunity to review complete copies of the Draft BAR. The Draft BAR was circulated for a legislated 30-day comment period from 23rd April 2021 to 24th May 2021.</p> <p>Please refer to <i>Section 5</i> describing the public participation carried out for the project. Appendices C – D provide proof of the public participation process.</p>
<p><i>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).</i></p>	<p>As the proposed development is a municipal water supply project, it will benefit the public in general and will not result in inequitable impact distribution.</p>
<p><i>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?</i></p>	<p>During construction and operation, a full health, safety and environmental induction will be conducted with 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.</p>
<p><i>Describe how the development will impact job creation in terms of, amongst other aspects:</i></p> <ul style="list-style-type: none"> • <i>the number of temporary versus permanent jobs that will be created</i> • <i>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?)</i> • <i>the distance from where labourers will have to travel</i> • <i>the location of jobs opportunities versus the location of impacts (i.e. equitable distribution of costs and benefits) and</i> • <i>the opportunity costs in terms of job creation (e.g. a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.).</i> 	<p>There will be the provision of temporary jobs during construction. However, there will only be a limited amount of new employment opportunities created during the operational phase. This is due to the nature of the development being a water supply scheme road with only general maintenance required over its life cycle.</p>
<p><i>What measures were taken to ensure:</i></p> <ul style="list-style-type: none"> • <i>that there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment?</i> • <i>that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?</i> 	<p>The proposed project falls under the jurisdiction of the Umzinyathi District Municipality and as such there was no inter-governmental coordination required.</p>

<i>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?</i>	The proposed development is to take place on a public owned land; however, it will not negatively impact on people's common heritage with respect to the environment.
<i>Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?</i>	All of the mitigations proposed by the EAP and specialists are realistic and practical.
<i>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?</i>	The EMPr will designate responsibility for all conditions. This document will be legally binding and as such any non-compliances with the conditions of the EMPr will effectively be breaking the law, therefore, the Umzinyathi District Municipality will prioritise these items.
<i>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.</i>	Due to the nature of the development, no other feasible site alternatives could be considered, please refer to <i>Section 1.3 and 4.2</i> . In terms of design alternatives, the preferred alternative will have a smaller construction impact on the watercourse in terms of construction work in the bed and banks and will have less impact in the long term, post-construction. Due to post-construction impacts being permanent this design is seen as more favourable when considering ecological impacts.
<i>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.</i>	The proposed project will have a positive cumulative socio-economic impact. An improved road network will ultimately allow safer access to households and better emergency medical treatment within the project area.

4.2 Motivation for Preferred Site, Activity and Design Alternative

4.2.1 Site Alternatives

4.2.1.1 Site Alternative 1 (Preferred Site Alternative)

The project entails the upgrade of the Mthembu West Bulk Water Infrastructure Upgrade which will include the construction of a portion of the 200mm pipeline over the Thukela River (WC1). The preferred site is to construct the pipeline adjacent to the current pipeline, within the existing servitudes. The preferred location of WC1 within the Thukela River is at location of the existing pipeline and weir. This will allow the pipeline to toe into the existing weir which requires no additional excavation within the watercourse and provides additional stability to the pipeline. The pipeline servitudes are already transformed and degraded from its original state. Realigning the pipeline would result in the transformation of previously undisturbed areas. Therefore, only one site alternative was considered in this application.

4.2.2 Design Alternatives

4.2.2.1 Design Alternative 1 (Preferred Design Alternative)

The preferred design alternative is to construct the 200mm steel pipeline, encased in concrete, as recommended in the engineering reports^{1,2}. This alternative will place the new watercourse crossing (WC1) for the 200mm pipeline at the location of the existing weir, which will allow the pipeline to toe into the existing weir and attach to the bedrock below the surface of the Thukela River. This crossing technique will have a smaller construction footprint and less impact on the surrounding environment. The pipe will not further block or impede the flow of water in the watercourse due to the existing weir. Please see Appendix A for design drawings.

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*

A noticeboard (isiZulu and English) was placed along the road on the 17th November 2020. The noticeboard detailed the Umzinyathi District Municipality's proposed plan to attach the 200mm water pipeline to the existing weir across the Thukela River, subject to a basic assessment. 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 following steps were followed during the public participation process:

- A noticeboard detailing the project was erected along the site on the 17th November 2020.
- An English and IsiZulu advertisement was published in the Ilanga newspaper on the 29th November 2020.
- All relevant authorities were notified via email of the application on the 13th January 2021 and 19th April 2021.
- A community meeting was held with the Ward Councillors and local traditional council at the Mthembu Traditional Court on the 17th November 2020.

All relevant authorities and registered I&APs were given the opportunity to review complete copies of the Draft BAR. The Draft BAR was circulated for a legislated 30-day comment period from 23rd April 2021 to 24th May 2021.

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;*

E-mail notifications were sent out to all I&APs on the 13th January 2021. 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)*

An English and IsiZulu advertisement was placed in the Ilanga newspaper on the 29th November 2020 detailing the proposed project, Basic Assessment requirements and to prove contact details of EnviroPro should anyone wish to register as an I&AP. See Appendix D – 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 who have registered have been provided in the Registered I&AP list in Appendix E.

5.3 Comments

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

- 5) 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.*
- 6) 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 included together with the C&R table. This report has been provided to the Msinga Local Municipality and Umzinyathi District Municipality for comment. See Appendix F – 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 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 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 effect 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 G.

Table 9: Scoring of Impacts

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 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.
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 Impact Assessment of the Site and Design Alternatives

See Appendix G for the full impacts scoring matrix, which assesses the impacts on the below identified sensitive environmental aspects. The specific activities and associated impacts identified in Table 10 below are site-specific and relate to the Preferred Site and Design Alternatives.

Table 10: Specific Impacts Associated with Design Alternative 1 (Preferred Design Alternative)

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				
A. Clearing and earthworks within the watercourse	1) Direct Impact: The construction of the 200mm pipeline watercourse crossing (WC1) will result in 72.01m ³ of material being infilled within the Thukela River.	9 (Medium)	<p>This impact is unavoidable. However, as the pipeline is going to toe into an existing weir across the Thukela River, the watercourse has been previously disturbed and the pipeline will not require further excavation the Thukela River, limiting the added disturbance to the watercourse. The following measures must be carried out to mitigate the disturbance of watercourse area:</p> <ul style="list-style-type: none"> • Construction work within the watercourse area areas must be strictly limited to the construction footprint only. • No areas may be excavated outside of the project footprint. • Any stockpiles within 32m of a watercourse area must have sufficient erosion protection measures to ensure sediment is not dislodged into the Thukela River. • The areas outside of the watercourse areas must be demarcated as no go areas with snow netting. • The watercourse area must be rehabilitated as soon as the pipeline have been completed. • A dry work area is required for the installation of the pipe and pouring of the concrete. Minor diversions will be required within the macro channel of the river system. Water will be diverted around the current work area. it is recommended that large sand bags are used for the diversion. This enables the contractor to shift the work as construction progresses. 	7 (Medium)
	2) Cumulative Impact: Potential for cumulative impact on the system as a whole due to the disturbance in the Thukela River system.	9 (Medium)	<p>It is expected that the disturbance to the Thukela River system will be limited and temporary due to the proposed methodology of attaching the pipe to the existing weir and the small size of the pipeline. The following measures must be carried out to mitigate the disturbance of watercourse area:</p> <ul style="list-style-type: none"> • Construction work within the watercourse area areas must be strictly limited to the construction footprint only. • No areas may be excavated outside of the project footprint. • The areas outside of the watercourse areas must be demarcated as no go areas with snow netting. • The watercourse area areas must be rehabilitated as soon as the pipeline have been completed. 	6 (Medium)

¹² See Appendix G 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:
	<p>3) Direct Impact: Increase in sediment inputs and turbidity in the watercourse.</p>	9 (Medium)	<p>The following measures must be carried out to mitigate against erosion, siltation and turbidity within the Thukela River:</p> <ul style="list-style-type: none"> The areas not within the direct project footprint must be demarcated as 'no-go' areas. The recommended buffer of 10m must be established prior to construction. Earth berms or sand bag barriers must be used as storm water and soil barriers below the cut and toe slopes to prevent eroded material from entering the surrounding watercourse areas. When erosion, siltation and turbidity is observed within the watercourse areas, effort must be made to prevent further erosion in that area. Sand bags and pack rock may be used within these areas to limit the duration period that areas are exposed. All areas upstream and downstream of the construction footprint must be demarcated as a 'no-go' zone for the duration of the construction process. No site staff are permitted to enter these areas. The recommended buffer of 10m must be implemented. No excavated material or fill material may be stored within 10m of the watercourse. Sandbags or pack rock must be placed below the soil stockpiles as berms should erosion start to occur from these areas. Bedding material that will be used must not be stored within 10m of the watercourse before it is used. The recommended buffer of 10m must be implemented. An approved storm water plan (by the ECO) must be adhered to during construction. <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>	6 (Medium)
	<p>4) Direct impact: Erosion in the watercourse and loss of material leading to sedimentation and deposition of material downstream of the affected watercourse.</p>	9 (Medium)		6 (Medium)
<p>B. Placement of the new pipeline in the watercourse.</p>	<p>5) Temporary loss of watercourse areas during the placement of the pipeline and encasement in concrete.</p>	9 (Medium)	<p>The following measures must be carried out to avoid potential alteration of flow dynamics within the watercourse:</p> <ul style="list-style-type: none"> The contractor must build the pipeline crossing as per the approved design, as it has been designed to ensure the least disturbance to the watercourse occurs. <p>Due to the size of the pipe as well as the placement of the pipeline to the existing weir, the pipeline crossing is not anticipated to impact the flow regime of the Thukela river during operation.</p>	5 (Low)
	<p>6) Direct Impact: Incorrect placement of the pipeline could alter the flow dynamics of the watercourse.</p>	11 (High)		6 (Medium)
<p>C. Operation of construction vehicles and undertaking construction</p>	<p>7) Disturbance in the watercourse could result in direct and cumulative damage to the watercourse.</p>	7 (Medium)	<p>The following measures must be carried out to mitigate against potential damage to the watercourse area during construction of the pipeline:</p>	3 (Low)

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:
<p>activities within the watercourse and surrounding areas during the pipeline construction.</p>			<ul style="list-style-type: none"> • There will be work within the watercourse area as per the layout, however areas of the watercourse not within the construction footprint must be demarcated as no-go areas; • Heavy vehicles must avoid working near the watercourse areas as far as possible. Where heavy vehicles are required to work in the watercourse during the construction of the pipeline, these vehicles must remain in the authorised road footprint. There must be no haphazard entry into / exit from the watercourse along the route. i.e. construction plant and vehicles may only travel along existing access routes, and may only use a single point of entry into and out of the wetland. • The contractor must limit in-stream work to minimize streambank and bed disturbance. • Construct the pipeline in the watercourse in the dry season (between early May and late September) where possible when water levels will be lowest and the risk of erosion and downstream siltation is lowest. • Any disturbed areas 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 watercourse must be strictly according to the prescribed engineering designs and approved drawings. • The pipeline must be constructed according to approved engineer gradients to allow for the free flow of water over the pipeline. • Reno-mattresses or large aggregate must be used for energy dissipation in the channel downstream of the pipeline to reduce the likelihood of scouring the watercourse bed and prevent downstream sedimentation of the catchment. It is preferable that larger aggregate be used to avoid flows removing aggregate material from the site. • 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. • Any stockpiles within 32m of a watercourse area must have sufficient erosion protection measures to ensure sediment is not dislodged into the Thukela River 	
	<p>8) Damage to the surrounding Tugela Ferry Irrigation Scheme and community farming projects (e.g. Isizalo Somsele irrigation project as noted in the Community Meeting), such as the irrigation canals</p>	<p>10 (Medium)</p>	<ul style="list-style-type: none"> • Access to site must make use of the existing access track. • Heavy vehicles and construction equipment must not impact on the functioning of the existing irrigation scheme. • The locations of the infrastructure (e.g. canals) involved in the farming projects must be noted prior to construction. • All construction activity must avoid areas associated with the farming projects irrigation infrastructure. • Construction vehicles must only use existing tracks to access the watercourse crossing location. 	<p>6 (Medium)</p>

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:
			<ul style="list-style-type: none"> If damage occurs to the irrigation scheme and farming projects, remediation must occur immediately. 	
D. Draining excavated areas during construction.	9) Direct Impact: Draining the excavated areas can cause major siltation of the downstream watercourse.	8 (Medium)	<p>The draining of the excavated areas during construction is essential in order for construction activity to take place for the foundations of the structure within the watercourse (such as pouring concrete). The following mitigation measures must be carried out:</p> <ul style="list-style-type: none"> Where possible, all excavated areas must be drained into a temporary settling pond before releasing the water into the downstream watercourse area, Where this is not possible or practical, the pumped water must be released onto renomattresses or pack rock to prevent the scouring and resultant downstream erosion from the pumped pipe outflow. Silt screen can also be used to prevent sediment laden water entering the river. 	5 (Low)
E. Clearing of vegetation for the construction on the pipeline.	10) Direct Impact: This will result in the loss of vegetation within the Thukela Valley Bushveld (SVs 1) vegetation type.	6 (Medium)	<p>During the construction of the new pipeline crossing, vegetation clearing will be restricted to the areas adjacent to the existing weir. The impact of vegetation clearing associated with the pipeline crossing is therefore low.</p> <p>The following measures must be carried out to mitigate against excessive vegetation clearing along the pipeline's construction footprint on either side of the Thukela River:</p> <ul style="list-style-type: none"> The vegetation that will be cleared must be restricted to the construction footprint of the pipelines. No vegetation may be cleared other than that is required for access to the site or for the construction activities associated with the construction of the Mthembu West Bulk Water Infrastructure upgrade. 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. 	4 (Low)
	11) Direct Impact: Removal of alien invasive vegetation found along the pipeline.	0 (Positive)	This is a positive impact.	0 (Positive)
F. Construction activity in areas with no vegetated cover.	12) Direct Impact: Erosion on exposed banks and areas resulting in scouring and the siltation of the watercourse.	8 (Medium)	<p>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:</p> <ul style="list-style-type: none"> Exposed banks that are susceptible to erosion within 32m of the edge of any watercourse 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 watercourse must be removed by spade and shovel (by hand). Exposed cut and fill slopes near the watercourse area areas must be top soiled, hydro seeded or have grass sods planted within 4 weeks of being cut. 	5 (Low)

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:
<p>G. Upgrading the pipeline through areas of natural habitat.</p>	<p>13) The habitat for fauna living within the construction footprint will be modified due to the construction activities taking place within the watercourse.</p>	<p>10 (Medium)</p>	<p>The following measures must be carried out to mitigate against excessive habitat destruction on the Mthembu West upgrade site:</p> <ul style="list-style-type: none"> • The areas outside of the project footprint must be managed as no go areas for the duration of construction. • Any animal found within the project construction area must be removed unharmed from the site. • 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; • Heavy machinery must not be permitted to move beyond the demarcated footprint. The recommended buffer of 10m must be implemented. • Sand and aggregate for concrete must not be obtained from any watercourse but must be sourced from a permitted source; • Contamination of the river system with unset cement must be prevented as it is detrimental to aquatic biota. <p>Due to the potential of vulnerable fish species, construction activities need to make impacts minimal and consider fish migrations (fish ways) when building bridge crossings and the associated pipeline, especially for <i>Anguilla species and Labeo rubromaculatus</i>, as noted in the specialist report⁷. The proposed pipeline crossing will not result in the creation of an additional fish migration barriers as the pipeline will be attached to the existing weir.</p> <p>It is important to note that WC1 over the Thukela River will be attached to the toe of an existing structure (weir) to facilitate crossing over the Thukela River, this activity will therefore not result in significant additional impact. There will be no bridge crossings or new structures built in the Thukela River. An existing structure is being modified to accommodate the new pipeline.</p>	<p>8 (Medium)</p>
<p>H. The construction period of the Bulk Infrastructure Upgrade.</p>	<p>14) Indirect impact: This is a positive impact for the community through the potential creation of local employment.</p>	<p>0 (Positive)</p>	<p>This is a positive impact.</p>	<p>0 (Positive)</p>
<p>Operation</p>				
<p>I. Operation of the pipeline.</p>	<p>15) Direct Impact: Alteration of the flow dynamics within the watercourse systems due to poor maintenance of the pipeline.</p>	<p>9 (Medium)</p>	<p>The following measures must be carried out to avoid ongoing issues with the operation of the pipeline crossing:</p> <ul style="list-style-type: none"> • Conduct bi-annual inspections on the pipeline crossing to ensure no damages have occurred. • Conduct quarterly inspections of the whole pipeline, as suggested in the specialist report⁷, for any signs of failure, damage, or leaks. 	<p>4 (Low)</p>

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:
			<ul style="list-style-type: none"> During maintenance the working area must be cordoned off to prevent unnecessary intrusion into the watercourse and spill contingency measures applied. 	
J. Operation of the upgraded Bulk Water Infrastructure Upgrade.	16) Direct Impact: Improved supply of potable water and service delivery into the Mthembu West community.	0 (Positive)	This is a positive impact.	0 (Positive)
	17) Cumulative Impact: Constructing the pipeline will be a positive operational impact. The community will benefit from the supply of potable water.	0 (Positive)	This is a positive impact.	0 (Positive)
	18) Indirect Impact: Failure of the water pipeline leading to localised flooding and erosion.	9 (Medium)	<p>Various measures to ensure pipe integrity must be implemented including:</p> <ul style="list-style-type: none"> 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. 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. Air valves will be installed at all local high points and at 600m maximum spacing along flat pipe runs in bulk mains. Pressure Reducing Valves (PRV's) will be situated where the pressure in the reticulation mains exceeds 7.5 bar. 	4 (Low)
	19) Indirect Impact: Illegal connections (as mentioned as a concern in the Community meeting) leading to damage to the pipework, flooding, erosion and loss of water supply.	9 (Medium)	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 and WC1 will be incased in concrete across the Thukela River. The water service provider must monitor the pipeline through routine inspections with any leaks being repaired as soon as they are reported.	4 (Low)
	20) Cumulative Impact: Increased water demand putting pressure on water resources in the Thukela River catchment.	8 (Medium)	The project will increase the demand for potable water in the region. The project is taking into account to water demand predicted for 2040.	5 (Low)

See Appendix G for the full impacts scoring matrix, which assesses the impacts on the above system. The impacts relating to the Design Alternative 1 (Preferred Design Alternative) and Design Alternative 2 are very similar, therefore the impacts below (Table 11) include the impacts which differentiate the most between the two Design Alternatives.

Table 11: Site Specific Impacts Associated with Design Alternative 2

Aspect	Nature and Consequences of impact	Sig. rating of impacts ¹³ :	Proposed mitigation and Extent to which impact can be reversed/avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
Construction				
K. Larger construction footprint associated with pier bridge construction	21) Direct Impact: Greater infill and removal of material in the watercourse due to pier construction and excavation required.	10 (Medium)	The following measures must be carried out to mitigate the disturbance of watercourse area: <ul style="list-style-type: none"> • Construction work within the watercourse area areas must be strictly limited to the construction footprint only. • No areas may be excavated outside of the project footprint. • Any stockpiles within 32m of a watercourse area must have sufficient erosion protection measures to ensure sediment is not dislodged into the Thukela River. • The areas outside of the watercourse areas must be demarcated as no go areas with snow netting. • The watercourse area must be rehabilitated as soon as the pipeline have been completed. • A dry work area is required for the installation of the bridge crossings and pouring of the concrete. Minor diversions will be required within the macro channel of the river system. Water will be diverted around the current work area. it is recommended that large sand bags are used for the diversion. This enables the contractor to shift the work as construction progresses. • When erosion, siltation and turbidity is observed within the watercourse and wetland areas, effort must be made to prevent further erosion in that area. Sand bags and pack rock may be used within these areas to limit the duration period that areas are exposed. • All areas upstream and downstream of the construction footprint must be demarcated as a 'no-go' zone for the duration of the construction process. No site staff are permitted to enter these areas. The recommended buffer of 10m must be implemented. • No excavated material or fill material may be stored within 10m of the watercourse. Sandbags or pack rock must be placed below the soil stockpiles as berms should erosion start to occur from these areas. • Bedding material that will be used must not be stored within 10m 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. 	8 (Medium)

¹³ See Appendix G for more details.

Aspect	Nature and Consequences of impact	Sig. rating of impacts ¹³ :	Proposed mitigation and Extent to which impact can be reversed/avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
	<p>22) Indirect Impact: Increased construction costs due to the pier bridge construction methodology which will increase strain on the Municipality</p>	10 (Medium)	This impact cannot be mitigated	10 (Medium)
Operation				
<p>L. Operation of the bridge crossing pipeline.</p>	<p>23) Direct Impact: Larger habitat for fauna living within the construction footprint will be modified due to the construction activities taking place within the watercourse.</p>	10 (Medium)	<p>The following measures must be carried out to mitigate against excessive habitat destruction on the Mthembu West upgrade site:</p> <ul style="list-style-type: none"> • The areas outside of the project footprint must be managed as no go areas for the duration of construction. • Any animal found within the project construction area must be removed unharmed from the site. • 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; • Heavy machinery must not be permitted to move beyond the demarcated footprint. The recommended buffer of 10m must be implemented. • Sand and aggregate for concrete must not be obtained from any watercourse but must be sourced from a permitted source; • Contamination of the river system with unset cement must be prevented as it is detrimental to aquatic biota. <p>Due to the potential of vulnerable fish species, construction activities need to make impacts minimal and consider fish migrations (fish ways) when building bridge crossings and the associated pipeline, especially for <i>Anguilla species</i> and <i>Labeo rubromaculatus</i>, as noted in the specialist report⁷.</p>	8 (Medium)
	<p>24) Direct Impact: Improper placement of piers to support the pipe across the watercourse causing permanent impact on the flow regime of the watercourse.</p>	11 (High)	<p>The following must be implemented to mitigate against any permanent impact on the flow regime:</p> <ul style="list-style-type: none"> • The contractor must build the pipeline crossing as per the approved design, as it has been designed to ensure that the natural flow of the system is not interrupted and the least disturbance to the watercourse occurs. • The number of concrete piers located in the watercourse must be limited. • Piers must be placed outside of preferential flow paths with the least number of pier structures used as possible 	7 (Medium)

Aspect	Nature and Consequences of impact	Sig. rating of impacts ¹³ :	Proposed mitigation and Extent to which impact can be reversed/avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
	<p>25) Indirect Impact: Exposure to flood damage and consequential ongoing maintenance and service disruption</p>	9 (Medium)	<ul style="list-style-type: none"> • Where possible the pipeline should span across the entire width of the watercourse, therefore, negating the need for any piers in the watercourse. <p>The following must be implemented to mitigate against any damage from flood events:</p> <ul style="list-style-type: none"> • The pipeline must be raised above the 1:100-year flood line level to avoid flood damage. • The raised pipe must include additional reinforcement for protection from weathering. 	5 (Low)

See Appendix G for the full impacts scoring matrix, which assesses the generic impacts associated with the project (Table 12) and to all site and design alternatives.

Table 12: Standard Construction Impacts Associated with Site Alternative 1 (Preferred) and Design Alternative 1 (Preferred) and Design Alternative 2

Aspect	Nature and Consequences of impact	Sig. rating of impacts ¹⁴ :	Proposed mitigation and Extent to which impact can be reversed/avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
Construction				
M. Exposure of soils as a result of the construction activity.	26) Direct Impact: On site erosion due to improper management of storm water by the contractor during construction.	7 (Medium)	<p>Areas exposed to erosion must be protected. The following apply to erosion control on site:</p> <ul style="list-style-type: none"> 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 watercourse or within 10m of the watercourse. Bedding material that will be re-worked may not be stored within 10m of the watercourse 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)
N. Sourcing of material.	27) Indirect Impact: Sourcing material from unlicensed borrow pits and sand mines in an illegal and unplanned manner can be dangerous to the surrounding community and detrimental to the local environment at the site of the operation.	9 (Medium)	<p>Bedding material is often sourced from local borrow pits of sand mines. The following criteria must be adhered to:</p> <ul style="list-style-type: none"> Any local borrow pit or sand mine used must be a permitted source through DMR. 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. 	5 (Low)
O. Operation of construction vehicles and plants in and around the construction area; i.e. heavy trucks, cement mixers, bulldozers, TLBs, generators, drills etc.	28) Direct Impact: Generation of dusty conditions impacting on air quality affecting community members and fauna along the construction route.	8 (Medium)	<p>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:</p> <ul style="list-style-type: none"> 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. 	4 (Low)
	29) Direct Impact: Creating a nuisance to the surrounding residents.	8 (Medium)	<ul style="list-style-type: none"> 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. 	4 (Low)

¹⁴ See Appendix G for more details.

Aspect	Nature and Consequences of impact	Sig. rating of impacts ¹⁴ :	Proposed mitigation and Extent to which impact can be reversed/avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
			<ul style="list-style-type: none"> This impact can be avoided and managed. 	
	30) Direct Impact: Impacting existing traffic conditions and pedestrians.	7 (Medium)	<p>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.</p> <ul style="list-style-type: none"> 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)
	31) Indirect Impact: Emissions from construction vehicles associated with the construction of the Mthembu West Bulk Water Infrastructure.	6 (Medium)	<p>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.</p> <p>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.</p>	4 (Low)
	32) Direct Impact: Excessive noise pollution on site.	8 (Medium)	<p>The construction phase of the project will see the increase in vehicles moving through the area which will result in the increase of noise.</p> <ul style="list-style-type: none"> All construction vehicles operating on site must be fitted with standard silencers to reduce the noise levels produced. 	5 (Low)
	33) Direct Impact: Hydrocarbon spills can occur through careless management of fuel operated machinery such as pumps and generators.	7 (Medium)	<ul style="list-style-type: none"> All fuel storage areas must be located on hard surfaced areas and banded to 110% capacity of the containers stored therein. Drip trays must be used under all fuel operated machinery at all times. 	3 (Low)
P. Clearing and excavations required for pipeline construction.	34) Direct Impact: Unidentified existing services (i.e. powerlines, water pipes etc.) being impacted on site.	7 (Medium)	<p>Services have been identified on the site; however, any unidentified services that will be impacted on must follow:</p> <ul style="list-style-type: none"> 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. 	3 (Low)
Q. Generation, storage and disposal of waste during construction.	35) Direct Impact: Improper storage of waste on site resulting in littering and impact on environment on site affecting surrounding community.	8 (Medium)	<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"> 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 management will be controlled through the implementation of the EMP. This impact can be managed and mitigated. 	3 (Low)

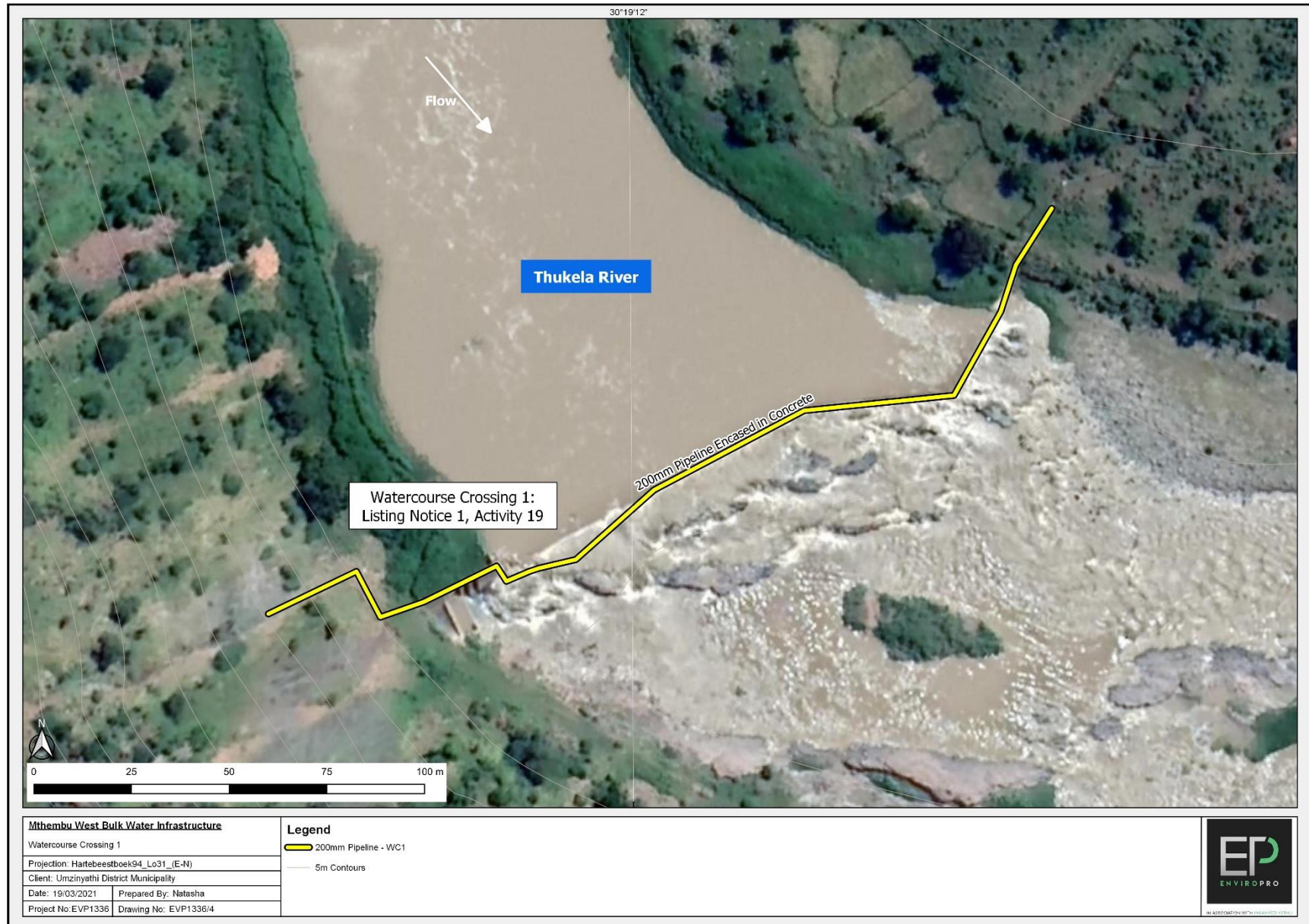
Aspect	Nature and Consequences of impact	Sig. rating of impacts ¹⁴ :	Proposed mitigation and Extent to which impact can be reversed/avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
	36) Direct Impact: Incorrect disposal of waste leading to pollution at the dump site or at sites where waste may be illegally disposed of.	7 (Medium)	<ul style="list-style-type: none"> • 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. • 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)
R. Construction staff working on site	37) Direct Impact: Construction staff making use of the surrounding areas for ablutions, resulting in contamination of the environment.	9 (Medium)	<p>The increase in construction personnel during the construction phase will require an appropriate number of toilet facilities for the site.</p> <ul style="list-style-type: none"> • 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. • 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 contractor. 	5 (Low)
S. Construction work impacting properties outside the construction footprint.	38) Direct Impact: Damage to adjacent properties during construction.	7 (Medium)	<p>The following mitigation measures must be adhered to:</p> <ul style="list-style-type: none"> • 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 Environmental Impact Statement as per section (I)

The critical impacts associated with the Mthembu West Bulk Water Infrastructure upgrade relate to those during the construction period, specifically the construction of the 163.5m long and 200mm diameter steel pipeline over the Thukela River at WC1. There are very few negative operational impacts anticipated for WC1 as the 200mm pipeline is attached to the toe of the existing weir, and in-cased in concrete across the Thukela River. This design alternative requires no further excavation in the Thukela river during construction. Potential issues can be best managed by treating the Thukela River and other associated watercourses as sensitive no-go areas, implementing effective stormwater management measures and limiting the clearing of vegetation to the construction footprint. A positive impact resulting from the upgrade of the Mthembu West Bulk Water Infrastructure is the provision of improved service delivery and potable water to the Mthembu West community. All construction activities must be confined to the proposed construction footprint areas. All vehicles must use the existing road and operate within the existing routes. All identified impacts can only be mitigated if all conditions stipulated in the EMP are adhered to during both the construction and operational phases. Once construction is complete there should be no significant impacts related to the operation of Mthembu West Bulk Water Infrastructure upgrade and watercourse crossing over the Thukela River, as depicted in Figure 12 below.

Taking into consideration the above impacts and mitigation measures, it is the EAP's opinion that the upgrade of the Mthembu West Bulk Water Infrastructure can be authorised.

Figure 12: Aerial Photograph Showing the Section of the 200mm Steel Pipeline (WC1) Across the Thukela River. Generated Using QGIS Desktop, Version 3.14.16.



6.4 Impact Management Objectives and Outcomes for the Development for Inclusion in the EMPr 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 Thukela River.
 - 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.

6.5 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 of the Water Resource Assessment and Engineers Feasibility Report. The design drawings have been provided to the EAP by the engineer. A site visit has been conducted by the EAP. No vegetation studies have been conducted on site to inform this assessment of the vegetation species surrounding the site. Given the minimal clearing of vegetation required for the project, the temporary nature and small-scale construction planned, specialist input with regards to vegetation was not deemed necessary for this assessment.

6.6 Period for Which Authorization Is Required, Proposed Monitoring and Auditing and Post Construction Requirements

Environmental authorisation is required for the Mthembu West Bulk Water Infrastructure upgrade within the 2021/2023 business plan for the Umzinyathi District Municipality; therefore, the authorisation would need to be valid for a period of ten years, within which time construction would need to be completed. **If the proposed activity is not completed within the validity period, the authorisation will lapse.**

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.

6.7 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.

6.8 EAP Opinion on Whether Or Not to Authorise Activity and Recommendations and Conditions for Authorisation as Per Section 3(n) and (p)

With respect to the design alternatives, it is recommended that preferred design alternative 1 be authorised. The significance of the impacts associated with the project are considered to be 'low'.

6.9 Summary of Additional Recommendations To Be included As Part of the Amended Environmental Authorisation:

Stakeholders, Properties & Services

- As standard construction practices, the engineer and contractor must identify all existing services that may be affected before construction.
- The contractor must liaise with local community members regarding restriction of access during construction.

Traffic & Construction Pedestrians

- The contractor must take into consideration the potential movements of the surrounding stakeholders.
- Appropriate signage and barriers 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.

Housekeeping, waste management, storage, and materials handling

- Littering must not be permitted on site.
- All hazardous materials and substances must 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 stormwater runoff.
- Contractors must 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 watercourse.

Dust and erosion control

- A water cart must be used to dampen dusty surfaces and suppress dust.
- Exposed areas must be rehabilitated and revegetated as soon as possible during construction.
- 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. The contractor must ensure that any blockages created during construction are resolved.

Stormwater management and protection of the watercourse

- The engineer/contractor must ensure that only clean stormwater runoff enters the environment. Any contaminated runoff must be collected and disposed of at an appropriate waste facility.
- All watercourses must be identified and demarcated at the start of construction.
- No excavated material or fill material may be stored within the drainage line or 32m of any watercourse.
- Only the area directly in the path of construction may be cleared and excavated. The remainder of the watercourse must be demarcated as a 'no-go' area.
- Heavy vehicles must avoid working near the watercourse as much as possible.
- Stormwater must not be channelled directly into any water body without the flow velocity being slowed. Channelled flows must be diffused.

Protection of Heritage Resources

- 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 require that operations that expose archaeological or historical remains should cease immediately, pending evaluation by the provincial heritage agency.

Specific conditions

- The construction footprint must be demarcated, whereby the recommended 16m buffer must be implemented
- Ensure that the construction activities do not interrupt flow even during low flow periods
- Vehicles must only use the designated crossing points
- Heavy vehicles must remain outside the 10m recommended buffer unless required for construction purposes
- No storage may occur within the 10m recommended buffer and
- Any additional stormwater outlets must be fitted with erosion protection features to diffuse flow

Appendix A: Drawings and Maps

Appendix B: Specialist Reports

No.	Prepared By	Authors	Professional Registrations	Title of Report	Date of Report
1	CivTech Engineers (Pty) Ltd	Unknown	Unknown	Sampofu Bulk Water Infrastructure Assessment	April 2020
2	CivTech Engineers (Pty) Ltd	Unknown	Unknown	Upgrade of Water Supply Infrastructure for Mthembu West Area – Sampofu Regional Bulk Infrastructure Assessment – Feasibility Report	May 2020
3	N/A	N/A	N/A	DEFF Screening Report for an Environmental Authorisation or for a Part Two Amendment of an Environmental Authorisation as Required by the 2014 EIA Regulations – Proposed Site Environmental Sensitivity	March 2021
4	Drennan Maud (Pty) Ltd	Unknown	Unknown	Geotechnical Investigation Report: Upgrade of Water Supply Infrastructure for Mthembu West Supply	July 2020
5	The Biodiversity Company	Wayne Jackson Michael Ryan Andrew Husted (reviewer)	Cert.Sci.Nat: 119037; Soils Scientist and Hydrologist Cand.Sci.Nat: 125128; Aquatic Ecologist and Hydrologist Pr.Sci.Nat: 100313/11; Ecological Science, Environmental Science and Aquatic Science	Water Resource Assessment for the proposed Mthembu West Bulk Water Infrastructure	July 2020
6	Active Heritage cc.	Frans Prins	MA (Archaeology)	Phase One Heritage Impact Assessment of the Proposed Tugela Ferry Irrigation Scheme Upgrade, Msinga Local and Mzinyathi Regional Municipalities, KZN.	April 2019
7.	EDTEA	Gerald Willis-Smith	N/A	EDTEA Query Response Letter EIA/Listed Activity: The Proposed Mthembu West Bulk Water Infrastructure Upgrade, Situated in Sampofu, Ezijozini, Ngubo and Mambeni Areas, Msinga Local Municipality	September 2020

Appendix C: Noticeboard

Appendix D: Notification

Notification Register
Proof of Notification
Adverts

Appendix E: Registered I&APs

I&APs Register

Appendix F: Comments and Responses

Comments and Response Table
Comments

Appendix G: Impacts Scoring Matrix

Appendix H: EAP Declaration

EAP Declaration
CVs

Appendix I: Environmental Management Programme

EMPr
Spill Contingency Plan
Stormwater Management Plan