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**DRAFT Basic Assessment Report
eKhamanzi Secondary Bulk Water Pipeline & Reservoir
uMgungundlovu Municipality
EIA Reference No. : DC22/0017/2017**



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

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Executive Summary

The uMgungundlovu District Municipality propose to construct the eKhamanzi Secondary Bulk Water Pipeline and Reservoir within Ward 3 of the uMshwathi Local Municipality. The new 160mm bulk pipeline will start at the existing Nadi Reservoir and feed the proposed new eKhamanzi Reservoir, located in the adjacent valley. The pipeline is 11.4km in length and the new concrete reservoir will have a capacity of 350KI.

The majority of the pipeline will run in existing road reserves and along an existing footpath for a short section. The pipeline crosses the Mtizane River (RC15), the Khamanzi River (RC14) and thirteen drainage lines associated with the Khamanzi River (RC1 – RC13). Cumulatively, the watercourse crossings will result in the excavation and deposition of material into watercourses, triggering a Basic Assessment process. At the crossing points, the pipeline will be encased in steel and will be run under the watercourse (detail engineering designs included in Appendix A). Gabion baskets and/or reno-mattresses will be constructed for additional protection at the river crossings, if required.

The following key impacts and mitigation measures were assessed:

- **Damage to watercourse banks, wetland areas and riparian zones from construction activity:** The watercourse crossings are to be treated as sensitive areas. No stockpiling is to occur directly adjacent and within 32m of watercourses and any excavation is to be carried out by hand, where possible to avoid vehicles travelling in the watercourse. The trench is to be kept to a minimum width to reduce the disturbance footprint.
- **Pipeline impeding or altering flow of the watercourses:** The pipes within the watercourse will be laid below the level of the river bed and encased in concrete. Concrete anchors will be used to keep the pipe in place during high flow events. Gabions and reno-mattresses will be placed just downstream of the pipe and will be below the level of the river bed in order to maintain the river bed profile.
- **Loss of riparian vegetation during excavation across watercourses:** Vegetation clearing is to be kept to a minimum due to the small size of the pipe and associated trench. The trench is to be dug by hand across the watercourse, where possible to prevent unnecessary clearance. The potential for erosion is to be monitored by the Contractor on an ongoing basis during clearing.
- **Encroachment of alien vegetation into areas disturbed during construction:** Disturbance associated with the construction, will result in an increase in alien invasive species in the area. These species, within the construction footprint, must not be allowed to encroach onto the site and adjacent areas. Alien vegetation must be continually removed during construction as per the EMPr.
- **Damage to surrounding properties & services:** The construction activity could disrupt access to existing services, residential properties and associated subsistence farming areas. All services must therefore be identified prior to construction and signboards erected notifying residents of the construction. The Contractor is to liaise with the affected community members prior to any crops being removed / damaged.
- **Improved services:** The new reservoir and pipelines will expand and improve service delivery to the area. This is a positive impact.

These impacts can be mitigated by following the recommendations in this report and Environmental Management Program (EMPr). Construction activities will be monitored on a monthly basis by an independent Environmental Control Officer (ECO) and controlled through the implementation of the attached EMPr.

Taking into consideration the above impacts and mitigation measures, it is the EAP's opinion that there are no significant environmental impacts associated with the proposal which cannot be mitigated. Therefore it is recommended that the preferred Layout Alternative 2, be authorised.

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Section 1: Scope of Work and Location of Activity

1.1 Project Title

eKhamanzi Secondary Bulk Water Pipeline and Reservoir within the uMshwathi Local Municipality.

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

The uMgungundlovu District Municipality propose to construct the eKhamanzi Secondary Bulk Water Pipeline and Reservoir within Ward 3 of the uMshwathi Local Municipality. The new 160mm bulk pipeline will start at the existing Nadi Reservoir and feed the proposed new eKhamanzi Reservoir, located in the adjacent valley. The pipeline will be 11.4km in length and the concrete reservoir will have a capacity of 350Kl.

The bulk pipeline will be placed in trenches approximately 1m wide and less than 1m deep. The pipeline will be encased with steel to prevent leaks and theft of the pipes during operation. Figures 1 and 2 illustrate the locality of the proposed pipeline route and maps showing details of the watercourse crossings are provided in Appendix A of the report.

As far as possible, the new pipeline has been aligned alongside existing and footpaths. A large section of the preferred pipeline route runs within the alignment of the recently authorised eKhamanzi Road (EIA reference: DC43/0044/2013; authorised on the 04th September 2013). Some sections of the pipeline will cross undisturbed land resulting in the clearance of indigenous vegetation. The pipeline crosses 15 watercourses in total. It crosses the Mtizane River (RC15) and the Khamanzi River (RC14) once. The remaining crossings are all drainage lines and tributaries associated with the Khamanzi River. Where the pipeline crosses a watercourse, it will be placed underground in a concrete pipe encasement. The pipeline will cross through wetland area associated with three of the watercourse crossings.

The watercourse crossings will result in the infilling / excavation of more than 5m³ of material within a watercourse. The Basic Assessment Report and Environmental Management Programme (EMPr) will therefore focus on these watercourse crossings. The construction of the new bulk line and reservoir will provide a reliable water source to the eKhamanzi community. The project will therefore have a positive impact on the community living in this area.

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

Site Alternatives

The aim of the project is to increase the reliable, potable water supply to the eKhamanzi Community and therefore there are no site alternatives. Different pipe materials were initially investigated however there is only one technology alternative as the pipe specifications and reservoir need to fall within the appropriate design standards. Two layout alternatives have been considered in the BAR and are discussed further below.

The initial layout alternative presented to the EAP, was purely based on engineering objectives. After consulting a number of maps and conducting a site visit as well as identifying drainage lines and existing footpaths and roads. Various sections of the pipeline route were therefore adjusted to follow existing footpaths and roads to avoid excavation in undisturbed areas.

Layout Alternative 1

The original pipeline route was a desktop engineering drawing that did not take into the location of an existing footpath used by the eKhamanzi Community to access the river. The alternative pipeline route has the same amount of watercourse crossings as the preferred alternative but allows for the trenches to be excavated in previously disturbed / areas which will be disturbed in the future by the proposed new eKhamanzi Road. The alternative route is drawn in red in Figure 1 below.

Layout Alternative 2 (Preferred)

Sections of the pipeline route near the eKhamanzi River were re-aligned to reduce the amount of disturbance during construction to previously disturbed / future disturbed areas (green in Figure 1).

- The section of pipeline from the proposed eKhamanzi Reservoir site to the eKhamanzi River was re-aligned to follow an existing footpath, which is used by the local community to access the eKhamanzi River. This is also the alignment for the proposed new eKhamanzi Road. The road was authorised by EDTEA on the 04th September 2013. The eKhamanzi pipeline will therefore lie within the proposed new eKhamanzi road reserve. The re-alignment of the pipeline will reduce the amount of disturbance to the vegetation in this area as construction of the new road will also follow this alignment.
- Approximately 1.3km of pipeline between the eKhamanzi River and the Mtizane River were re-aligned so that the pipeline lies within the existing and proposed new eKhamanzi Road reserve. The pipeline

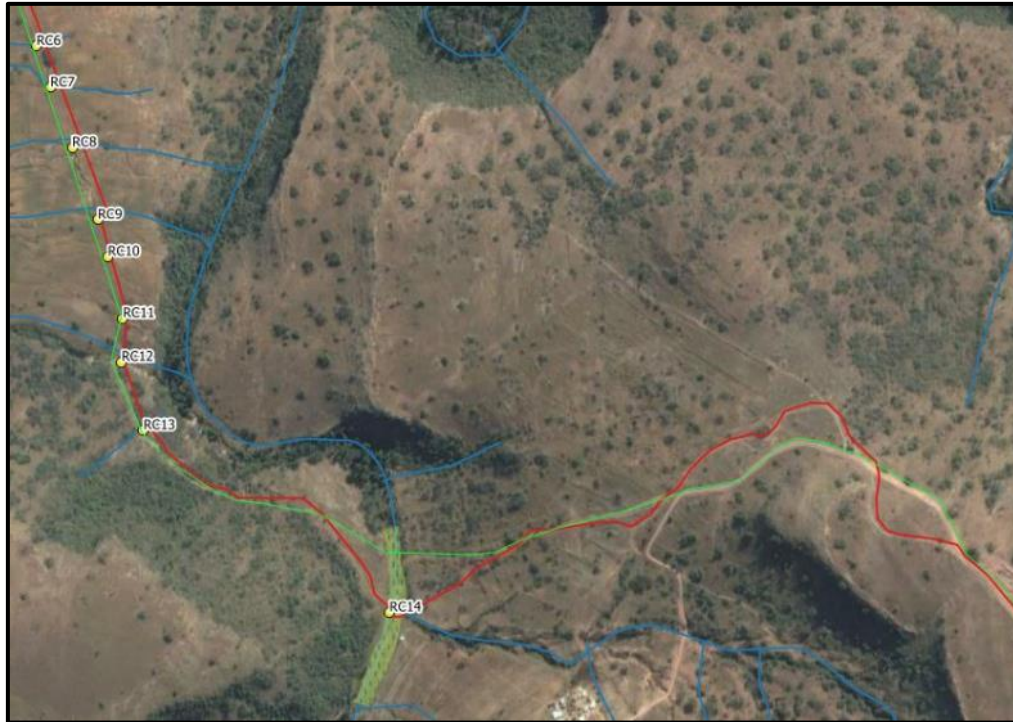
crosses the eKhamanzi River, just below the proposed new eKhamanzi Bridge (EIA ref DC43/0044/2013).

The preferred pipeline route is drawn in red in Figure 1 below. See Appendix A for layout drawings.

The No Go Alternative

The construction of the eKhamanzi bulk pipeline and 350Kl reservoir will not occur and there will continue to be no municipal water supply to this area. The community currently carries water from the rivers in the valley up to their houses. A new bulk supply and reservoir will still be required to meet current and future potable water demand as well as fulfilling the basic human right for every person to have access to clean water.

Figure 1: Aerial image showing the difference in alignment between the alternate (red) and preferred (green) eKhamanzi pipeline layouts (source: QGIS, 2017).



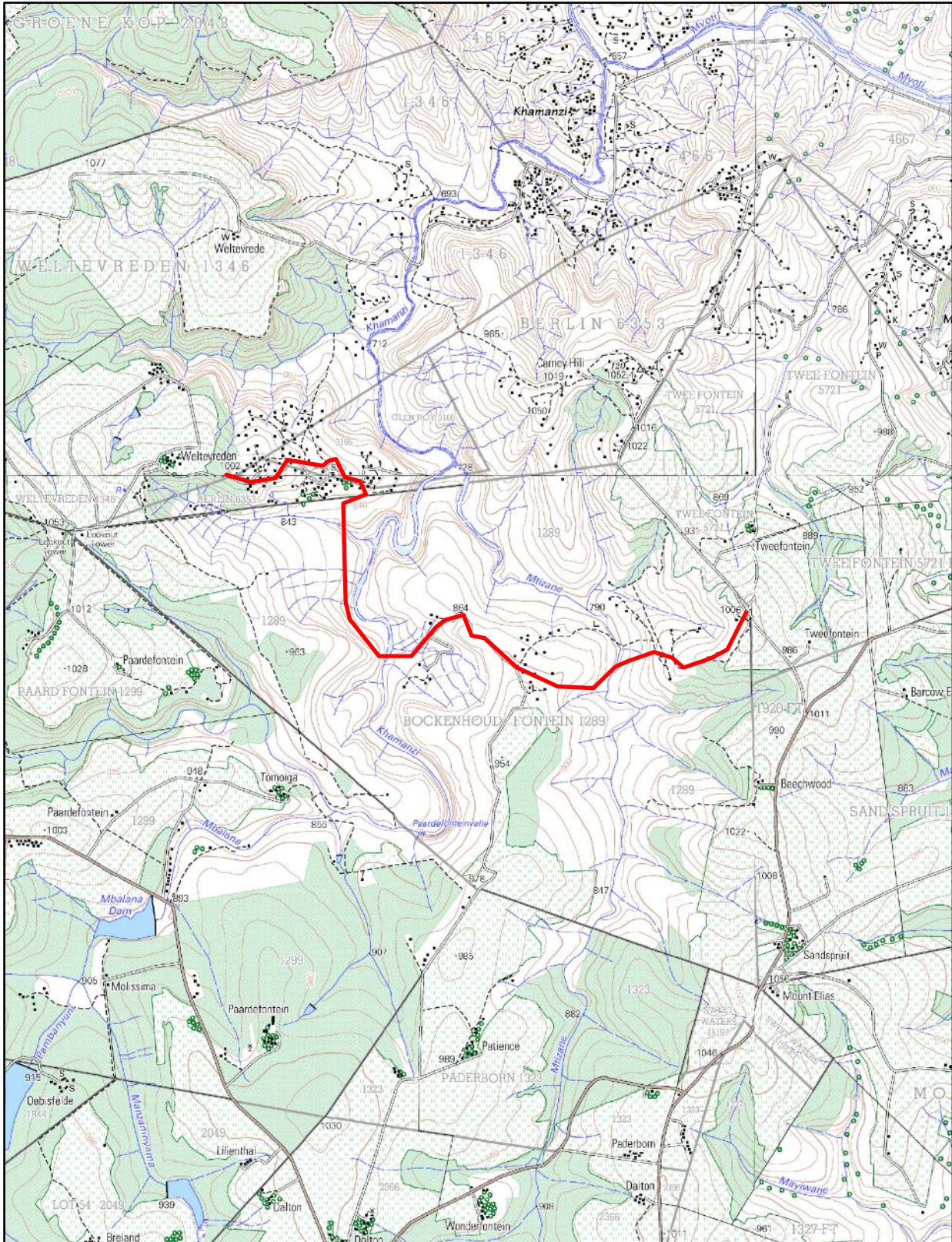
1.4 All Listed and Specific Activities to Be Triggered and Being Applied For As Per Section 3(d) (i)








GNR	Activity Number	Activity as per the legislation	Activity as it applies to the proposal
GNR 983 Listing Notice 1; 4th December 2014	12 (xii)(a) & (c)	<i>The development of – (xii) infrastructure or structures with a physical footprint of 100 square metres or more (a) within a watercourse; (c) if no development setback exists within 32 metres of watercourse, measured from the edge of a watercourse.</i>	Cumulatively, more than 100m ² of pipeline will be placed within 32m of various watercourses, including the Khamanzi and Mtizane Rivers.
GNR 983 Listing Notice 1; 04 th December 2014	19.	<i>(i):The infilling or depositing of any material of more than 5 cubic meters into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from - (i) A watercourse</i>	The pipeline crosses the Mtizane River and the Khamanzi River and tributaries of this river in fifteen locations (RC1- RC15). The pipes will be encased with steel and placed underground, underneath the watercourses. The excavations to allow pipes to be placed underground will result in more than 5m ³ of material being removed and deposited within the various watercourses.

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

District Municipality		uMgungundlovu District Municipality.	
Local Municipality		uMshwathi Local Municipality.	
Ward		3	
Area / Town / Village		Dalton	
Co-ordinates:		Latitude	Longitude
	Pipeline Start point :	29°15'48.59"S	30°44'57.31"E
	Pipeline End point:	29°14'59.50"S	30°41'38.05"E
	RC 1:	29°15'11.25"S	30°42'13.35"E
	RC 2:	29°15'11.69"S	30°42'12.15"E
	RC 3:	29°15'12.52"S	30°42'10.13"E
	RC 4:	29°15'13.80"S	30°42'7.54"E
	RC 5:	29°15'15.11"S	30°42'4.87"E
	RC 6:	29°15'27.00"S	30°42'11.93"E
	RC 7:	29°15'29.39"S	30°42'12.84"E
	RC 8:	29°15'32.82"S	30°42'14.28"E
	RC 9:	29°15'36.97"S	30°42'15.97"E
	RC 10:	29°15'39.09"S	30°42'16.63"E
	RC 11:	29°15'42.64"S	30°42'17.62"E
	RC 12:	29°15'45.14"S	30°42'17.53"E
	RC 13:	29°15'49.07"S	30°42'18.97"E
RC 14:	29°16'17.57"S	30°44'7.82"E	
RC 15:	29°15'59.52"S	30°42'35.17"E	
Property Description:		Parent Farm:	Farm Portion:
		Bockenhoud Fonteion 1289	REM of Portion 3
		Bockenhoud Fontein 1289	Portion 4
		Bockenhoud Fontein 1289	Portion 5
		Bockenhoud Fontein 1289	Portion 7
21 Digit Surveyor General's numbers:		NOFT00000000128900003	
		NOFT00000000128900004	
		NOFT00000000128900005	
		NOFT00000000128900007	

Figure 2: 1: 50 000 Topographical Map Showing the eKhamanzi Pipeline in Red (source: PlanetGIS, 2017)



Title	eKhamanzi Pipeline	Legend		 <p>Cell: 082 568 3687 E-mail: iosette@enviropro.co.za Cell: 082 887 4362 E-mail: iain@enviropro.co.za Phone: 031 765 2942 Fax: 086 549 0342</p>
Co-ordinates	30° 2'38.46"S ; 30°35'22.79"E		Watercourse	
Scale	1:50 000		Wetland	
Topographical Sheet No.	2930BC		Plantations	
Drawing No.	eKhamanzi #01		Contour	
Date Prepared	07 th March 2017		Pipeline	
Prepared By	Stephanie Denison		Rural Houses	

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

Information provided in this section has been extracted from the various specialist reports, which are attached under Appendix B of the BAR.

2.1 Topography and Physical Characteristics of Site

The areas associated with the new bulk pipeline and reservoir consists of disturbed grassland as a result of local agricultural and livestock activities. The pipeline is located within existing roads and along fence lines. It passes through two open valleys associated with the Khamanzi and Mtizane Rivers. Photographs taken within the study area that show the surrounding topography are included in Figure 3.

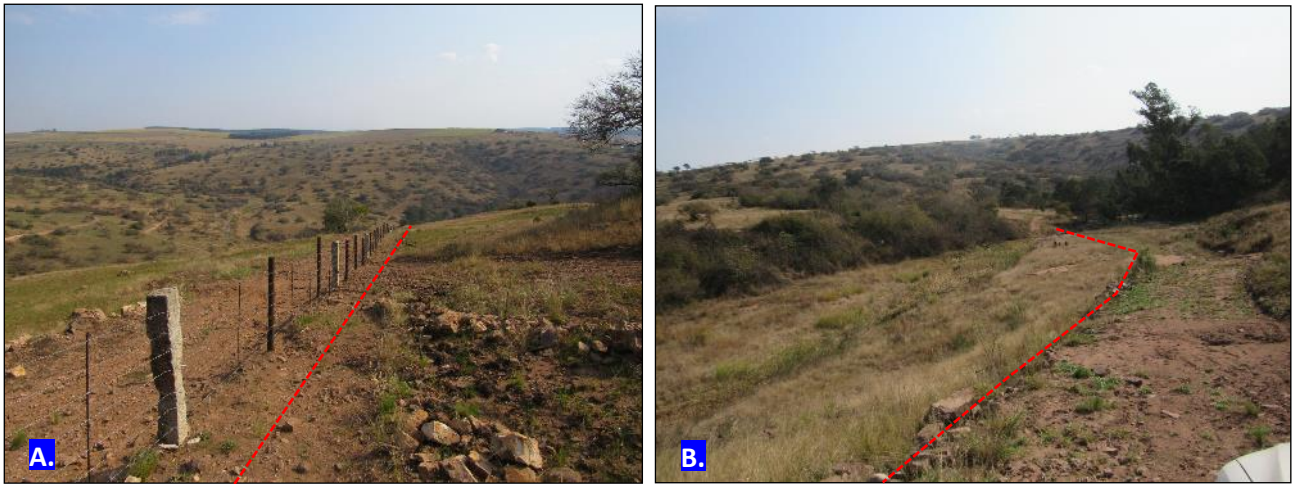
The gradient of the site is as follows:

Gradient	Description
Flat	
1:50 – 1:20	
1:20 – 1:15	
1:15 – 1:10	Sections of the pipeline run through along the side of a hill near the eKhamanzi Community
1:10 – 1:7,5	Where the pipeline bisects the Khamanzi and Mtizane Rivers, the gradient increases.
1:7,5 – 1:5	N/A
Steeper than 1:5	N/A

The topographical features and landforms of the site and surrounding area are as follows (Fig 4(b)):

Topographical Feature	Description
Ridgeline	N/A
Plateau	N/A
Side slope of hill/mountain	The western section of the pipeline passes down the side slope of a hill before reaching the Khamanzi River in the valley below.
Closed valley	N/A
Open valley	The pipeline passes through 2 open valleys associated with the Khamanzi & Mtizane Rivers.
Plain	N/A
Undulating plain/low hills	N/A
Dune	N/A
Sea-front	N/A

Figure 3: Photographs Showing the Topography and Characteristics of the Study Area.



(a) Photograph showing the gradient of the eastern portion of the pipeline running along a fence line; **(b)** Photograph of the western section of the study area where the pipeline rises up from the Khamanzi River towards the eKhamanzi Community.

2.2 Surface Water and Ground Water

The eKhamanzi pipeline is located within the U40C Quaternary Drainage Region within the Mvoti to uMzimkhulu Water Management Area (WMA 11). The region has a mean annual precipitation rate 800 of 1 500mm and is considered humid. The activities in the area and local land uses have had impacts to the aquatic system and visible disturbances are significant (section 3.1 of the Aquatic Assessment). Due to these activities the system is regarded as largely natural (Class B) by the aquatic specialist (Appendix B).

The pipeline crosses two rivers, the Khamanzi River at RC14 (29°15'59.52"S; 30°42'35.17"E) and the Mtizane River at RC15 (29°16'17.57"S; 30°44'7.82"E). The Mtizane River is a tributary of the Khamanzi River. The aquatic ecosystem of the rivers associated with the river crossings is described by the aquatic specialists in Table 1 of the Aquatic Assessment. The Khamanzi River is characterised by slow flow dominated by bedrock, and isolated areas of gravel, sand and mud present. The Mtizane River was dry at the time of assessment. The system is ephemeral, and is characterized by bedrock which will create pools and runs for the reach (section 3.1 of Aquatic Assessment in Appendix B).

The pipeline crosses thirteen smaller drainage lines which are all first order streams and flow in an easterly direction into the Khamanzi River. The drainage lines only flow after rainfall has been experienced in the area and have limited riparian vegetation. The drainage lines have become incised over time with soil having been displaced. Photographs showing the condition of the watercourses at RC1 – RC15 are provided in Figure 4 below with aerial maps of the watercourse crossings included in Appendix A.

The pipeline will be placed underground, with the majority falling within the road reserve of the recently authorised eKhamanzi Road. An engineering drawing showing a typical cross section of the pipeline through a watercourse crossing is included in Appendix A. The pipeline will be encased in concrete and will extend a minimum of 2 metres beyond the edge of the watercourse. Two concrete blocks will be placed on either side of the river bed to anchor the pipe and prevent damage to the steel sleeve during the high rainfall events.

Figure 4: Photographs Showing the Conditions at the Various Watercourse Crossings



Figure 4 (a): Photographer facing north. Image shows conditions upstream of RC1 **(b):** Photographer facing north. Conditions upstream of RC2 **(c):** Conditions downstream of RC3, photographer facing south; **(d):** General conditions downstream of RC4, photographer facing east. **(e):** Conditions upstream of RC5, photographer facing west. **(f):** Photographer facing west. Conditions upstream of RC6.



Figure 4 (g): Photographer facing southeast. Conditions immediately upstream of RC7. **(h):** Conditions downstream of RC8. Photographer facing east **(i):** Conditions downstream of RC9. Photographer facing southeast; **(j):** Photographer facing east. Conditions downstream of RC10. **(k):** Photographer facing south east. Conditions downstream of RC11. **(l):** Conditions downstream of RC12. Photographer facing southeast; **(m):** Photographer facing east. Conditions downstream of RC13. **(n):** Photographer facing south. Conditions downstream of RC14. **(o):** Conditions upstream of RC15. Photographer facing south.

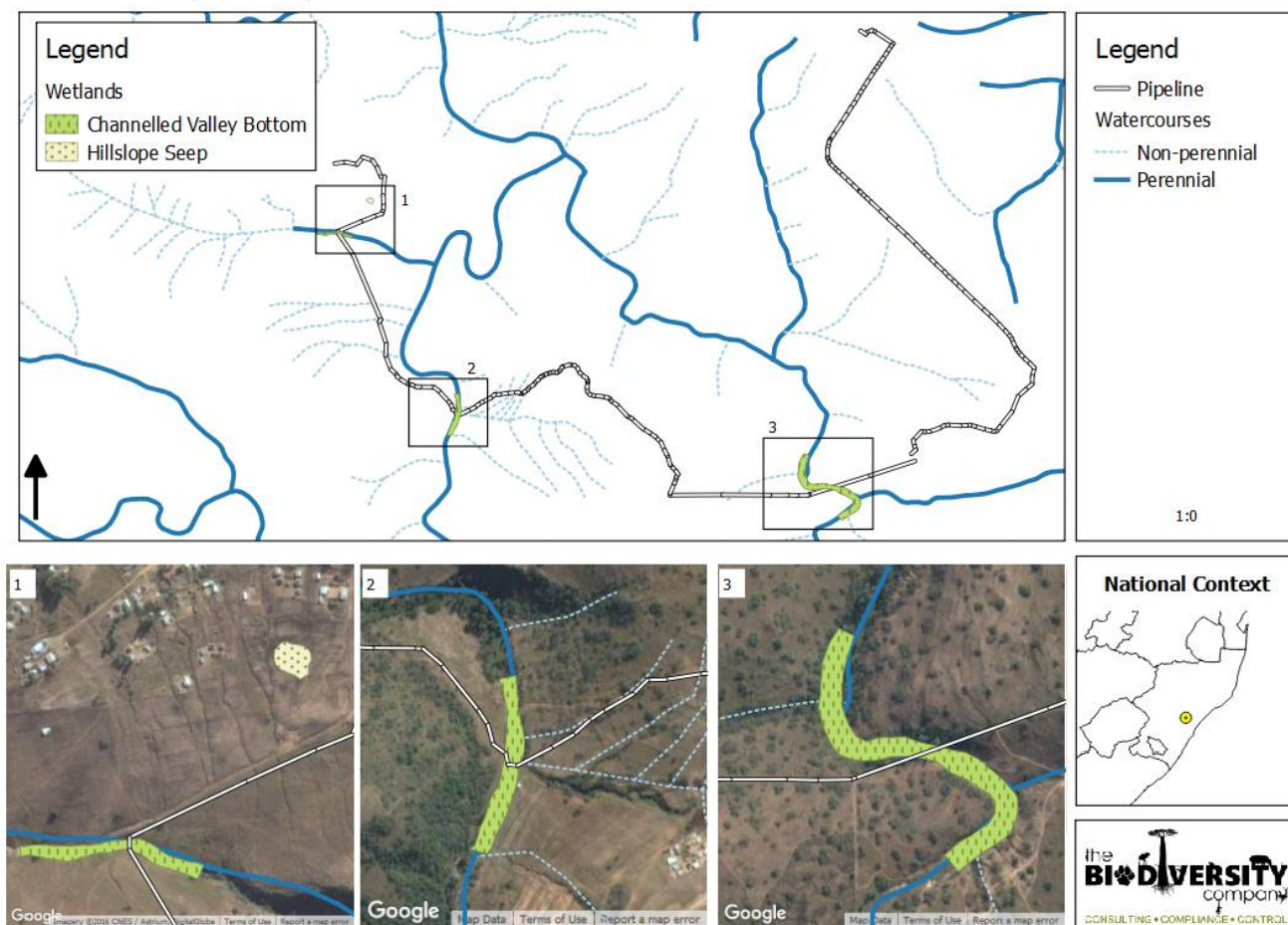
2.3 Wetlands

The Wetland Assessment carried out by the Biodiversity Company November 2016, found that there were no National Freshwater Ecosystem Priority Areas (NFEPA) within 500m of the pipeline. However, during the site visit, channelled valley-bottom wetland was found to be associated with three watercourse crossings (RC5, RC14 & RC15; wetlands shaded in green in Figure 5). A hillslope seepage wetland was delineated in the north-western section of the study area but it is located above the pipeline and will therefore not be impacted on.

The wetlands identified are in a largely natural state with a Present Ecological Status (PES) Score of “Class B” (section 6.3 of the Wetland Assessment). According to the wetland specialist, this suggests a slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place. Modifications to the wetland vegetation is evident due to the presence of alien vegetation such as *Lantana camara* and *Solanum mauritianum*. Since the project is for the construction of a water pipeline, the operational phase of the project is unlikely to change the PES of the wetlands.

Provided that the mitigation measures provided by the wetland specialist and included the EMPr (Appendix J) are followed during construction, the project proposal should not have any negative impact or influence on the wetlands associated with the site. Taking into account that this project is for potable water, the significance of any impacts resulting from pipeline leaks and spillages is considered low (Section 7 of the Wetland Assessment in Appendix B). The pipeline will be placed in a single trench with porous bedding and therefore the functionality of the wetland will not change.

Figure 5: Map Showing the Valley Bottom Wetland Areas that will be Traversed by the Proposed Pipeline (source: The Biodiversity Company, 2017)



2.4 Fauna and Flora

The eastern section of the proposed pipeline passes through sugarcane and timber plantations which are considered 100% transformed. The western section of the study area is located within the rural eKhamanzi area which is populated by homesteads and subsistence farming. This area is therefore highly disturbed. The remainder of the study area is considered indigenous, natural vegetation (see photographs of the vegetation in Figure 7).

The flora found within the area surrounding the eKhamani pipeline can be described as follows:

- Ecosystem Type 1: Ngongoni Veld (SVs4).
 - This ecosystem has been identified by the South African National Biodiversity Institute (SANBI) as “vulnerable”
 - Dense, tall grassland overwhelmingly dominated by unpalatable, wiry Ngongoni grass (*Aristida junciformis*), with this monodominance associated with low species diversity.
 - Only 1% of the unit is statutorily conserved in the Opathe and Vernon Crookes Nature Reserves. Some 39% has been transformed for cultivation, plantations and urban development.
- Ecosystem Type 2: Midlands Misbelt Grassland (Gs 9).
 - This ecosystem type has been identified by SANBI as ‘vulnerable’.
 - Hilly rolling landscape mainly associated with a discontinuous east facing scarp formed by dolerite intrusions.
 - Dominated by forb-rich, tall, sour *Themeda triandra* grasslands transformed by the invasion of native ‘Ngongoni grass (*Aristida junciformis* subsp. *Junciformis*). Only a few patches of the original species-rich grasslands remain.

Apart from a few species of small, individual antelopes as well as community livestock, no other fauna was noted on site. The pipeline falls outside of the KZN Wildlife Conservation Plan (C-Plan). The pipeline follows a private fence line, existing road, proposed road and an existing footpath in this central section, to avoid excessive clearance of the indigenous vegetation. The small size of the trench (approximately 1m wide) means

that little vegetation will need to be cleared. The contractor must ensure that invasive species do not gain a foothold along the cleared route until the planted indigenous vegetation has time to re-establish.

Figure 6: Google Earth Image Showing the SANBI Threatened Ecosystem Overlay (Google Earth Pro, 2017).

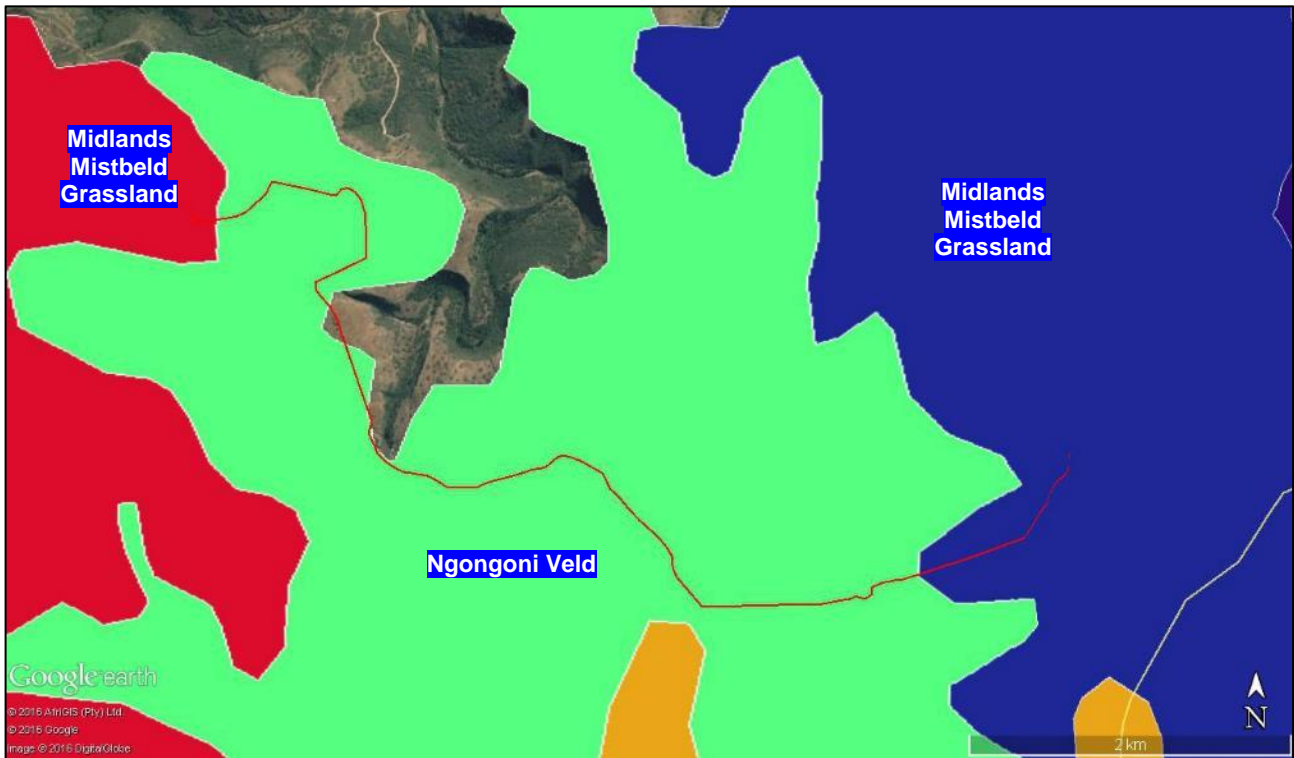


Figure 7: Photographs showing the vegetation on site. The approximate location of the pipeline is shown with the red line.

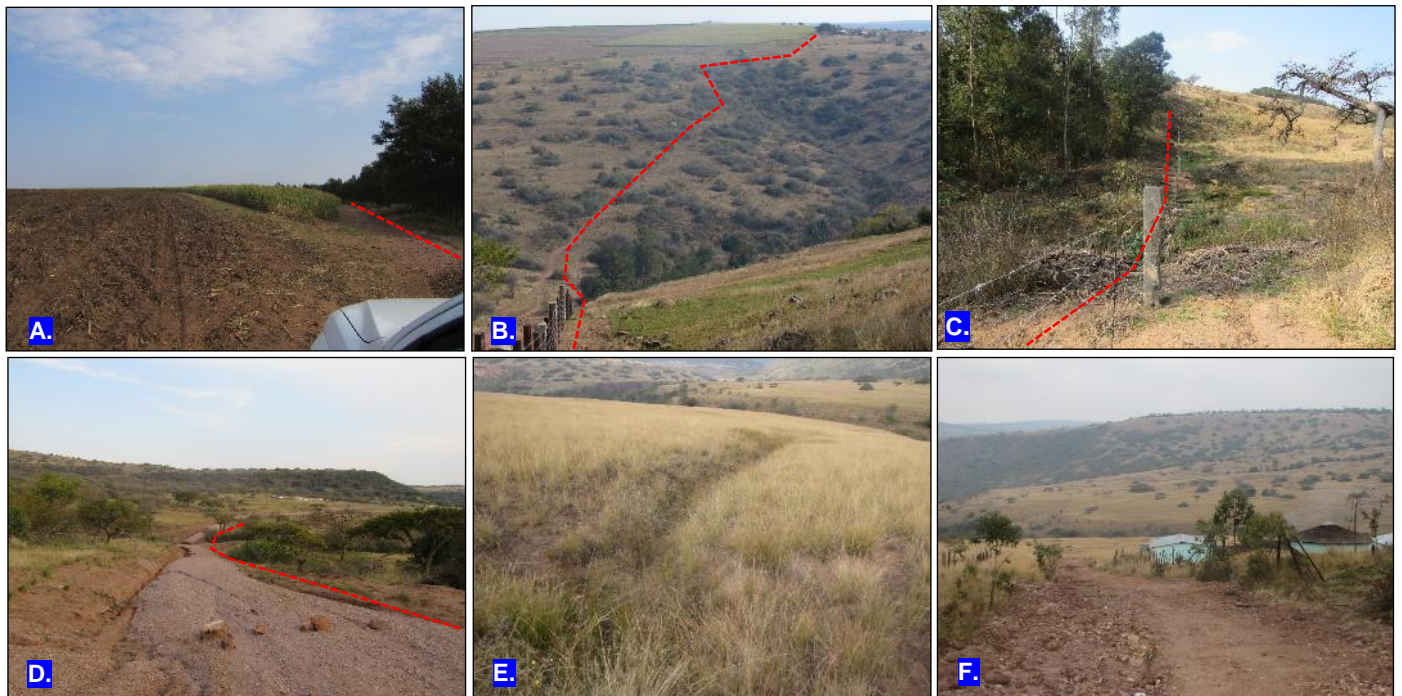


Figure 7(a): Completely transformed agricultural area in the eastern section of the study area. **(b):** Valley shot showing the natural vegetation associated with the Mtizane Valley **(c):** Riparian vegetation associated with RC15 **(d):** Disturbed vegetation associated with existing road down to the Khamanzi River **(e):** Grassland associated with the eastern section of the study area; and **(f):** eKhamanzi Community in the western section of the study area.

2.5 Heritage and Cultural Aspects

A Heritage Impact Assessment was carried out to determine if there were any significant heritage or cultural aspects associated with the pipeline route (attaches under Appendix B). The specialist concluded that “the proposed pipeline development may proceed from an archaeological point of view as no heritage sites or features are in danger of being destroyed or altered. It should, however, be pointed out that the KZN Heritage Act requires that operations exposing archaeological and historical residues should cease immediately pending an evaluation by the heritage authorities”. Construction workers will therefore be cautioned to operate with care on site and should a culturally sensitive aspect be discovered on site that has not been previously identified, construction activities stop temporarily and the issue assessed and the authorities (AMAFA) notified if need be.

2.6 Socio Economic Environment

The project area is located in the uMshwathi Local Municipality, approximately 54km east of Pietermaritzburg. The surrounding land uses include the small rural homesteads associated with the eKhamanzi Community, in the western section of the study area with large scale sugarcane farming being carried out east and south of the study area. All residential dwellings in the area are located outside the road reserves where construction activity will be taking place. The new bulk water pipeline is a strategic development to facilitate community development within the local area and will therefore have a positive impact on the socio-economic environment.

2.7 Surrounding Environment and Land Uses

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

- Located within a rural, farming area;
- The houses within the area are fairly sparse and positioned apart from one another;
- The western section of the pipeline route is predominantly used as grazing land for livestock; and
- The eastern section is largely natural and privately fenced off. The pipeline will run along this fence line.

The surrounding environment and land use will not be negatively affected by the construction of the pipeline since the construction footprint is negligible and will follow the same alignment as existing roads and footpaths. The pipeline will be located underground and will therefore not deter from the aesthetics of the area during the long-term, operational phase.

Section 3: Policy and Legislative Context

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

Legislation	Compliance of Activity
National Environmental Management Act 1998	The National Environmental Management Act (Act 107 of 1998) (NEMA) is South Africa's overarching environmental legislation. It includes a set of principles that govern environmental management and against which all Environmental Management Programmes (EMPs) and actions are measured. These principles include and relate to sustainable development, protection of the natural environment, waste minimisation, public consultation, the right to an environment that is not harmful to one's health or wellbeing, and a general duty of care. The Environmental Impact Assessment (EIA) Regulations, 2014: GN R.982, R.983, and R.985 under Section 24 of the NEMA define the activities that require Environmental Authorisation and the processes to be followed to assess environmental impacts and obtain Environmental Authorisation. Environmental authorisation is required for the construction of the bulk water pipeline across the various watercourses. Therefore this application is in line with the requirements of NEMA.
National Water Act 1998	The construction of the pipeline will result in alternations to the bed and banks of a watercourses. The specialist has delineated wetland associated with the watercourses and therefore a Water Use Authorisation (WUA) will be required under Section 21 c and i of the

	National Water Act. The WUA application is running concurrently with the EIA process.
National Waste Management Act 2008	Reforms the law regulating waste management to prevent pollution and ecological degradation. 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. The proposal will not trigger a Waste Management Activity.
Environmental Conservation Act 1996	Makes provisions for the application of general environmental principles for the protection of ecological processes, promotion of sustainable development and the protection of the environment. This Act has mostly been repealed by NEMA.
National Environmental Management Biodiversity Act 2004	To provide the framework, norms, and standards for the conservation, sustainable use and equitable benefit-sharing of South Africa's biological resources. Section 52 allows for the publication of a list of threatened ecosystems in need of protection. The list was published in Government Gazette No. 34809 Notice No. 1002 dated 9 December 2011. The site falls within the Ngongoni Veld and Midlands Misbelt Grasslands, listed as "vulnerable" ecosystems and therefore the project does not trigger this legislation.
National Heritage Resources Act 25 of 1999	For the protection of South African Heritage to nurture and conserve communities legacy. No archaeological significant artefacts will be disturbed during this project therefore no permits will be required from the provincial heritage authority, AMAFA.
Municipal Planning Framework	
Umgungundlovu Municipality Integrated Development Framework 2015/2016	This project falls in line with the uMgungundlovu Municipality's development outcome, which is to provide potable water to all communities within the municipality. This forms part of the Municipality's 5 year plan.

Section 4: Motivation, Need and Desirability

4.1 Need and Desirability as Per Section 3(F)

The eKhamanzi Secondary Bulk Water Pipeline and Reservoir site is part of the Umshwathi Bulk Water Scheme (Phase 2). The bulk pipeline will supply the proposed eKhamanzi reservoir with potable water, for distribution to the eKhamanzi Community. The project objectives are summarized as follows:

- To provide the community with adequate, safe, reliable and sustainable water service resulting in an improved quality of life.
- To improve the health and hygiene situation in the area.
- To create local job opportunities during the implementation phase and during the operation and maintenance phase.
- To build capacity and empower the local community in taking charge of their own affairs, through sound and accountable institutional structures.
- To establish and promote good, accountable governance along national guidelines;
- To build awareness for the environment and the value of water as a scarce resource.

4.2 Motivation for Preferred Site, Activity and Technology Alternative

The aim of the project is to increase the reliable, potable water supply to the eKhamanzi Community and therefore there are no site alternatives. Different pipe materials were initially investigated however there is only one technology alternative as the pipe specifications and reservoir need to fall within the appropriate design standards.

The watercourse crossings cannot be avoided however sections of the pipeline route near the eKhamanzi River were re-aligned in the preferred layout to reduce the amount of disturbance during construction to previously disturbed / future disturbed areas. Considering the mitigation measures provided by the specialist and include in the attached EMPr (Appendix J), it is the opinion of the EAP that there are no significant environmental impacts that cannot be mitigated against and that the preferred eKhamanzi pipeline route (Layout Alternative 2) be authorised.

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;*

Noticeboards (in isiZulu and English) was placed along the pipeline route on the 31st January 2017. The noticeboard detailed uMgungundlovu Municipality's proposed plan to construct the bulk water pipeline and reservoir, 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.

- An email notifying all authorities, including the local municipality, was sent on the 30th January 2017.
- The Ward Councilor, Mr Nzama, was contacted telephonically on the 27th January 2017 to discuss the project.
- A meeting was held with the Ward Councilor on the 31st January 2017. The meeting minutes and signed register are attached under Appendix D.
- The Ward Councilor agreed to distribute pamphlets to community members as well as the local Inkosi in the area.
- A map showing the landowners is included under Appendix D. Landowners were notified electronically, via email and notices hand delivered depending on the contact information available from the Deeds Office. Where no email addresses or telephone numbers were available, registered letters with project details and maps were sent to the landowners. Proof of this notification is included under Appendix D.
- Signboards detailing the project were placed in the eKhamanzi Community and along D2051 Road notifying local residents and businesses of the project.
- All relevant authorities and registered I & APs have been notified of the application and copies of the BAR provided.
- The Draft BAR was circulated for a legislated 30 day comment period.
- All comments received within the comment period have been included in Appendix G of the Final BAR.

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;*
 - A map showing adjacent landowners is included under Appendix D. Adjacent landowners were notified electronically, via email and notices hand delivered depending on the contact information available from the Deeds Office. Where no email addresses or telephone numbers were available, registered letters with project details and maps were sent to the landowners.
 - Signboards detailing the project were placed in the eKhamanzi Community and along D2051 Road notifying local residents and businesses of the project.
 - The Ward Councilor agreed to distribute pamphlets to community members as well as the local Inkosi in the area.

See Appendix D – Proof of Notification.

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

An advert was placed in the Ilanga local newspaper on the 05th February 2017 detailing the proposed project, Basic Assessment process and providing contact details of EnviroPro should anyone wish to register as an I&AP. See Appendix E – Proof of Advert Placement.

5.2 Registered Interested and Affected Parties

42. *A proponent or applicant must ensure the opening and maintenance of a register of interested and affected parties and submit such a register to the competent authority, which register must contain the names, contact details and addresses of-*
- (a) *all persons who, as a consequence of the public participation process conducted in respect of that application, have submitted written comments or attended meetings with the proponent, applicant or EAP;*
 - (b) *all persons who have requested the proponent or applicant, in writing, for their names to be placed on the register; and*
 - (c) *all organs of state which have jurisdiction in respect of the activity to which the application relates.*

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

5.3 Comments

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

- 1) *The applicant must ensure that the comments of interested and affected parties are recorded in reports and plans and that such written comments, including responses to such comments and records of meetings, are attached to the reports and plans that are submitted to the competent authority in terms of these Regulations.*
- 2) *Where a person desires but is unable to access written comments as contemplated in subregulation (1) due to-*
 - i. *a lack of skills to read or write;*
 - ii. *disability; or*
 - iii. *any other disadvantage;*
 - iv. *reasonable alternative methods of recording comments must be provided for.*

All comments received from I & APs have been recorded in the comments and response table. The original comments provided have been provided together with the Comments and Response Table. This report has been provided to the uMshwathi Local Municipality, uMgungundlovu District Municipality, the Department of Water & Sanitation and KZN Wildlife for comment.

See Appendix G – Comments and Response table and Comments Received.

Section 6: Impact Assessment

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

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

Whether or not the impact can be mitigated and the extent to which it can be avoided, managed, mitigated or reversed is assessed i.e. the probability of occurrence after mitigation has been applied. This also takes into account likelihood of human error based on construction and operational auditing experience i.e. even though

spills can be completely mitigated against and prevented, there is always a small chance that spills will still occur (residual risk). Based on all of these factors, the impact is then rated to determine its significance. For example an impact can have a regional affect with severe environmental implications, however the probability of it occurring is very low and the implementation of the proposed mitigation measures means that the ultimate rating is medium or low.

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

Scoring of Impacts	
Duration / Frequency of activity likely to cause impact	0 = No impact 1 = short term / once off 2 = medium term / during operation 3 = long term / permanent
Geographical Extent	0 = No impact 1 = point of impact / restricted to site 2 = local / surrounding area 3 = regional
Severity (level of damage caused) if impact were to occur	0 = No impact 1 = minor 3 = medium 5 = major
Probability of impact without mitigation	1 - 5 = low. 6 -10 = medium. 11 -14 = high.
Significance before application of Mitigation Measures	A score of between 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 Preferred Site and Layout Alternative

See Appendix H for the full impacts scoring matrix which assesses the environmental impact of the eKhamanzi Bulk Pipeline and Reservoir.

Table 1: Impacts and mitigation measures associated with the preferred layout

Nature and Consequences of impact	Significance rating of impacts ¹ :	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Significance rating of impacts after mitigation:
Construction			
1. Dusty conditions generated during construction and by construction vehicles.	4 (low)	There will be dust generated during the construction phase; however this will be temporary i.e. the site will be worked continuously for a few months until construction is completed. Further to this: <ul style="list-style-type: none"> Water carts must be used on site should dust levels elevate to a nuisance level. 	2 (low)

¹ See Appendix H for more details.

Nature and Consequences of impact	Significance rating of impacts ¹ :	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Significance rating of impacts after mitigation:
		<ul style="list-style-type: none"> • Water cart will be utilised to dampen dusty surfaces and suppress dust from the road surface. • Shade cloth is to be utilised for stockpiled materials where required. <p>This impact can be managed and mitigated to a large degree with the implementation of the EMPr. The applicant must comply with the National Dust Regulations (Government Notice R827, 2013) with regards to dust levels produced on site.</p>	
2. Generation of emissions from construction vehicles.	5 (low)	Due to the rural location of the study site and the small scale of the project emissions generated from construction vehicles will be negligible and are not expected to significantly affect the surrounding environment. Measures to reduce emissions have however been incorporated into the EMPr. All construction vehicles will however be fitted with the appropriate silencers and exhausts. This impact can be managed and mitigation.	0 (low)
3. Impact on existing services i.e. power lines, water pipes, infrastructure, etc.	5 (low)	As standard construction practice the engineer and contractor will identify all existing services that may be affected along the route prior to construction. Any infrastructure that is removed must be replaced and any damage caused from construction must be repaired. This impact can be managed and mitigated.	1 (low)
4. Damage to properties, fencing and subsistence farming plots during laying of pipework.	5 (low)	For the most part the pipeline will be laid within road reserves however if any properties or crops are likely to be affected, the contractor will liaise with the landowner prior to clearing being carried out. The pipeline trenches will be approximately 1m and 1m deep, thereby limiting the area of the excavation and damage that could be caused by large vehicles. This impact can be avoided and mitigated.	2 (low)
5. Erosion of exposed soil prior to the rehabilitation of the construction area.	6 (med)	Erosion gullies were noted within the study area and therefore erosion is to be tightly managed during the construction phase. Exposed soil is very susceptible to erosion and therefore erosion control is critical, especially around the watercourse crossings. Exposed areas will be rehabilitated and re-vegetated as soon as possible during construction. Cleared areas may not be left exposed for long periods of time and should be re-vegetated in stages on completion of a section of the pipework. Small inspection holes may be left open along the route but the rest of the trench must be closed once the pipe has been laid. In certain steeper sections, additional precautions to manage erosion will be required (e.g. sand bags or gabions).	2 (low)

Nature and Consequences of impact	Significance rating of impacts ¹ :	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Significance rating of impacts after mitigation:
		This impact is to be monitored during construction and can be mitigated.	
6. Excavation of trenches resulting in large areas of land being cleared and at risk of erosion.	6 (med)	Only the minimum area required for the trench may be cleared. Trench size should not need to be more than 2m wide at most, therefore the most suitably sized equipment must be used to excavate the trench. It is recommended that the trenches be dug by hand to reduce unnecessary clearance and disturbance. As stated above, trenches are may not be left exposed for long periods of time and should be re-vegetated in stages on completion of a section of the pipework. This impact can be managed and mitigated.	2 (low)
7. Trenches remaining open for long periods of time, causing them to collapse, creating an erosion and safety hazard.	7 (med)	Trenches must not remain open indefinitely. Trench work must be completed in sections and then closed once the pipe has been laid in that section. Small inspection holes may be left open along the route but the rest of the trench must be closed. Cleared areas may not be left exposed for long periods of time and must be re-vegetated as each stage of pipework is completed. Trenches must not remain open during building shut down periods i.e. over Christmas and Easter. Trench work must be planned so that trenches are closed before these shut down periods as there is a risk that the trenches will either collapse or fill with water if left unattended and this can create a hazard for children and animals. Trenches must be demarcated. This impact can be avoided.	2 (low)
8. Incorrect filling of trenches on completion creating points of erosion, especially on slopes and near watercourses.	6 (med)	Care must be taken to ensure that when closing trenches, soil is compacted sufficiently and left so that the level of the trench is slightly higher than the surrounding land, to allow settling. Should soil settle below the level of the surrounding land, it will leave a depression along which water will travel and this could create a focal point for erosion. This can be especially problematic on sloped sections where water will follow the depression along the pipeline route, building up speed down steeper sections and creating furrows. If this occurs near watercourses, it will erode the river banks and cause them to collapse. Rehabilitation through replanting of indigenous grass species soon after closure will aid in stabilising soil and preventing erosion and will also assist in dust control. This impact can be avoided and mitigated.	4 (low)
9. Deposition of eroded material into water bodies when laying pipes across the watercourses impacting	7 (med)	Caution needs to be exercised when working near the river crossings (RC1 – RC15). The following mitigation measures	3 (low)

Nature and Consequences of impact	Significance rating of impacts ¹ :	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Significance rating of impacts after mitigation:
<p>water quality (increased turbidity, reduction of dissolved oxygen).</p>		<p>will be carried out and are included in the EMPr:</p> <ul style="list-style-type: none"> • All construction activities occurring within the watercourses must be with extreme care to avoid damage to the watercourse and associated wetland areas. • A single pipe (with no connections) should be placed in areas crossing riverine areas. • Pipelines should be buried at a sufficient depth below ground level such that the pipelines do not interfere with surface water movement or create obstructions, where flows can cause erosion. • No heavy vehicles will be permitted to work in any watercourse unless exceptionally hard material is to be encountered and the trench cannot be dug by hand. Pipework around these sensitive areas should be laid by hand. • The construction vehicles and machinery must make use of existing access routes as much as possible, before adjacent areas are considered for access. • No storage of materials will be permitted within these areas or within 15m of these areas, which will be agreed on and demarcated before construction begins on each section. • Where stream crossings are required, the pipe will be encased in concrete to prevent movement during high flow events. The pipeline will be laid below the level of the river bed and gabions / reno-matresses will be used to prevent scouring of the river bed and exposure of the pipe. The gabions will be placed just downstream of the pipe and will be below the level of the river bed in order to maintain the river bed profile (see typical section through the river crossing attached under Appendix A). • The contractor will ensure that stream bed work is carried out in the dry season when flow rates are low to non-existent (i.e. June – August). • It is unlikely that any stream will need to be temporarily diverted however if this is the case, a suitably qualified contractor will be appointed to handle the temporary stream diversion work to ensure that the flow rate and stream morphology are taken into account. 	

Nature and Consequences of impact	Significance rating of impacts ¹ :	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Significance rating of impacts after mitigation:
		<ul style="list-style-type: none"> In order to prevent long-term deposition of material into the watercourses, areas exposed to erosion must be protected through the use of sand bags, berms and efficient construction processes i.e.: limiting the extent (footprint) and duration period that areas are exposed. This impact can be managed and mitigated to a degree. 	
10. Physical damage to wetland areas associated with RC5, RC14 & RC15 during excavation.	8 (med)	<p>Construction activities are to be restricted to the pipeline route and construction camp area. The rest of the surrounding area must be demarcated as 'no-go areas' to prevent workers from unintentionally encroaching into wet areas. Furthermore:</p> <ul style="list-style-type: none"> The pipeline is to run as close to all existing roads and footpaths as possible, to reduce the disturbance footprint. No storage of material, vehicles or equipment is permitted within the wetland areas; Ensure careful separation of soil types/strata as identified for the removal of soil. The soils must be removed in such a way that they can be easily reinstated in the reverse order for backfilling. To ensure correct backfilling, the soil that is removed from the trench at its deepest point must be laid closest to the trench. The first layer of topsoil must be laid furthest away from the trench. <p>This impact can be managed during construction through the implementation of the EMPr.</p>	5 (low)
11. Clearing of indigenous vegetation during the laying of the pipeline and temporary access points.	5 (low)	<p>The majority of the pipeline will be placed in road reserves and along footpaths which means that the area has been previously disturbed. The pipeline does traverse large natural areas of vegetation and therefore the following mitigation measures are included in the EMPr:</p> <ul style="list-style-type: none"> The relatively small trench size should result in the loss of only a narrow strip of vegetated area, which must then be revegetated on completion. Clearing of vegetation and excavating of the trench in close proximity to the watercourses will need to be done by hand, where possible. Vehicle access will be restricted as there is a higher risk of damage and disturbance to surrounding vegetation. Due to previous disturbance, the areas near the road / footpath tend to be more disturbed and invaded by alien species. Therefore where 	3 (low)

Nature and Consequences of impact	Significance rating of impacts ¹ :	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Significance rating of impacts after mitigation:
		<p>possible, the route will follow close to the road / footpaths.</p> <ul style="list-style-type: none"> The contractor must ensure that invasive species do not gain a foothold along the cleared route until the indigenous vegetation has had time to re-establish. <p>This impact can be managed and mitigated.</p>	
12. Encroachment of alien vegetation into disturbed areas during construction.	5 (low)	<p>Large densities of alien invasive plants were noted by the aquatic specialist (<i>Lantana camara</i> and <i>Solanum mauritianum</i>) within the riparian areas. Very little alien vegetation is however associated with the grassland areas and therefore alien vegetation encroachment is to be regulated during construction.</p> <ul style="list-style-type: none"> Alien vegetation within the construction footprint must not be allowed to encroach onto the site and must be continually removed during construction. <p>This impact can be managed and mitigated.</p>	3 (low)
13. Loss of riparian vegetation during excavation for pipework crossings in watercourses, leading to erosion and damage to stream banks.	5 (low)	<p>There is limited / no riparian vegetation associated with the tributaries of the Khamanzi River however riparian vegetation will need to be cleared from the main river crossings (RC14 & RC15). Where clearing of riparian vegetation is required, it will be kept to a minimum due to the small size of the pipe and associated trench (1m width). The key impact that requires attention is the potential for erosion, which is to be monitored by the Contractor on an ongoing basis. Erosion can be reduced by keeping any vegetation associated with the watercourses intact.</p> <p>This impact can be avoided and managed.</p>	3 (low)
14. Temporary increase in waste and litter due to the construction process.	6 (med)	<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 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. <p>Waste management will be controlled through the implementation of the EMP. This impact can be managed and mitigated.</p>	2 (low)

Nature and Consequences of impact	Significance rating of impacts ¹ :	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Significance rating of impacts after mitigation:
15. Insufficient number of toilet facilities on site resulting in the contamination of the environment.	6 (med)	<p>The increase of construction personnel during the construction phase will require an appropriate number of toilet facilities for the site.</p> <ul style="list-style-type: none"> • 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. • A registered waste removal contractor must remove effluent waste from site or effluent 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. <p>This impact can be managed and mitigated.</p>	2 (low)
16. Contamination of the receiving environment due to inappropriate storage and usage of hazardous materials and substances (cement, fuel etc.)	6 (med)	<p>It is unlikely that there will be many hazardous materials used during construction however any potentially hazardous substances (including cement and paint) will be stored within a secured area in the construction camp. No storage of material is to occur within 32m of any watercourse. The storage area will be a hard surfaced, bunded and covered area. Cement mixing must be done on a hard surface that is protected from stormwater runoff.</p> <p>This impact can be prevented by managing the storage.</p>	2 (low)
Operation			
17. Upgrading of the bulk water supply to the local area.	0	This is a positive impact.	0
18. Erosion around watercourses and damage to watercourse banks where pipe crossings have been placed.	8 (med)	<p>Since the pipeline will be placed under the bed of the watercourses, it is unlikely to cause a long-term erosion impact. Where watercourses have been crossed, a concrete block will be constructed in the river bank to anchor the pipeline in place during high flow conditions. Gabions / reno mattresses may be included in the design to stabilize the banks and prevent erosion of the banks during high flow events. It must also be ensured that trench rehabilitation has been effectively carried out before contractors leave the site. Soil in the trenches must be compacted effectively to the same level or slightly higher than the surrounding land to prevent settling which could create depressions for water to travel along, creating erosion funnels and exposing the pipeline. It must be ensured that indigenous vegetation is planted after the soil has been compacted and that this</p>	4 (low)

Nature and Consequences of impact	Significance rating of impacts ¹ :	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Significance rating of impacts after mitigation:
		vegetation has taken successfully before contractors leave the site. This impact can be avoided during the construction phase.	
19. Placement of pipes in the beds of watercourses impacting the flow regime of the Mtizane River, Khamanzi River and associated tributaries.	6 (med)	Due to the small size of the pipes and tributaries as well as the placement of the pipeline underneath the bed of the watercourses, the construction will not impact the flow regime of the Mtizane River, Khamanzi River and tributaries. Please refer to design drawing in Appendix A. This impact can be prevented during the construction phase.	2 (low)
20. Water pipes bursting resulting in localised flooding and erosion.	6 (med)	The design criteria was developed using guidelines from "The Red Book – The Human Settlement, Planning and Design". Various measures to ensure pipe integrity will be implemented including: <ul style="list-style-type: none"> • Scour valves to control the supply of water. They are used to stop supply when any repairs are carried out on a section of pipeline. • Non-Return Valves (spring loaded) 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 (over and above the mandatory placing at pump stations). Double purpose (RBX) air valves would be installed either side of the valve. • Vacuum Breaker / Air Release Valves designed to accommodate air intake and release during normal operation and in the event that the pump trips or the line is being filled or scoured. These valves will be installed at apexes along the pipelines at distances of not more than 600m and also before and after isolation valves and non-return valves. This impact can be prevented and mitigated.	1 (low)
21. Illegal connections resulting in damage to pipework, flooding, erosion and loss of water supply.	6 (med)	The pipeline will be laid in such a way so as to deter illegal connections. The bulk pipelines will be encased in a steel layer to make it difficult to puncture. This impact can be prevented and managed.	3 (low)
Decommissioning			
22. Rubble, soil and material left on site and in close proximity to the river.	5 (low)	It is unlikely that the pipeline and reservoir will be decommissioned however should this be required, all rubble and pipework area to be removed from the site and disposed of at a registered landfill site. Where the pipe is removed from the	1 (low)

Nature and Consequences of impact	Significance rating of impacts ¹ :	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Significance rating of impacts after mitigation:
		watercourses, the trench is to be filled with stones and rehabilitated to its current condition to prevent polling in this section. This impact can be managed and mitigated.	
Cumulative			
23. General pollution and sedimentation within the catchment.	6 (med)	Provided that the Contractor is compliant with the measures include in the attached EMP, waste management and erosion control will be sufficiently managed to prevent this cumulative.	2 (low)
24. Improved service delivery to the local area.	0	This is a positive impact.	0

6.3 Layout Alternative 1

See Appendix H for the full impacts scoring matrix which assesses the environmental impact of the alternative layout for the eKhamanzi Bulk Pipeline and Reservoir.

Table 2: Impacts and mitigation associated with the *alternative* layout.

Nature and Consequences of impact	Significance rating of impacts ² :	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Significance rating of impacts after mitigation:
Construction			
1. Construction impacts 1-10 remain the same as those discussed in the preferred Layout Alternative.	-	Mitigation measures for construction impacts 1-10 remain the same as the preferred alternative.	-
2. Clearing of indigenous vegetation during the laying of the pipeline and temporary access points.	7 (med)	The alternate pipeline route does not follow the existing footpath identified during the site visit. The preferred pipeline layout follows this footpath, where disturbance has taken place. The alternative pipeline route will therefore result in a greater level of disturbance to this natural grassland area, increasing the significance of this impact.	5 (low)
3. Construction impacts 12 – 17 remain the same as those discussed in the preferred Layout Alternative.	-	Mitigation measures for construction impacts 12 - 17 remain the same as the preferred alternative.	-
Operation			
4. Operational impacts will be the same as those discussed in the previous section for Layout Alternative.	-	Mitigation measures will be the same as those discussed in the previous section for Layout Alternative.	-
Decommissioning			
5. Impacts remain the same as those listed in the previous section for the preferred Layout.	-	Mitigation measures will be the same as those discussed in the previous section.	-
Cumulative			
6. Impacts remain the same as those listed in the previous section for the preferred layout.	-	Mitigation measures remain the same as per the previous section.	-

² See Appendix H for more details.

6.4 Environmental Impact Statement as per section (l)

The key impacts associated with the eKhamanzi Secondary Bulk Water Pipeline and Reservoir relate to those during the construction period. Issues such as indigenous vegetation clearing, physical damage to the watercourses and wetlands and managing erosion need to be addressed by the contractor. This can be best managed by demarcating the area requiring clearing (i.e. width of the trench) and treating the watercourses (including wetlands) as sensitive areas. No vehicles are allowed to excavate near the watercourse and effective erosion control measures at the watercourse crossings are to be implemented (i.e. gabions or renomatresses). All construction activity is to be confined to the side of existing roads and footpaths, where possible. All vehicles must use the existing roads and operate within the existing route. No ad hoc roads/turning circles may be used.

Once construction is complete there should be no significant impacts related to the operation of the water pipeline. Taking into consideration the above impacts and mitigation measures, it is the EAP's opinion that the preferred layout for the eKhamanzi Secondary Bulk Water Pipeline and Reservoir be authorised, as per the preferred layout drawing in Appendix A.

6.5 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 watercourse.
 - To practice responsible construction, 'best practice' with regards to housekeeping on site during construction (outlined within the EMPr) and enforce the polluter pays principle. The applicant / contractor must be responsible for their actions on site during construction and the rehabilitation of the site post construction.
- Outcomes:
 - To promote sustainable development. Create infrastructure and an environment that is healthy and sustainable for future generations to come.

6.6 Assumptions, Uncertainties and Gaps in Knowledge Relating To the Assessment and Mitigation Measures Proposed as Per Section 3(o)

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

6.7 Period for Which Authorization Is Required, Proposed Monitoring and Auditing and Post Construction Requirement's

Environmental authorisation is required for the construction of the pipeline and reservoir prior to the end of 2017. It is therefore recommended that the authorisation be valid for a period of five years, within which time construction would need to commence.

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.

6.8 Financial Provisions as Per Section 3(s)

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

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

Impacts associate with the construction and operation of the pipeline have been rated as 'low' after mitigation (See table 1) however the following conditions are recommended for inclusion in the authorisation.

6.10 Summary of Recommendations for the construction of the proposed eKhamanzi Pipeline:

Stakeholders, Properties & Services

- As standard construction practice the engineer and contractor should identify all existing services that may be affected prior to construction.
- It is suggested that any structures that need to be removed, should be replaced and any damage repaired.
- The route should run adjacent to existing roads, fencelines and footpaths wherever feasible.

Traffic & Construction Vehicles

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

Housekeeping, waste management, storage and materials handling

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

Dust and erosion control

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

Stormwater management and protection of watercourses (including wetlands)

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

Trenching

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

- Indigenous grasses must be replanted after the soil has been compacted and that this vegetation has taken successfully before contractors leave the site.
- Trench rehabilitation must be effectively carried out before contractors leave the site, especially where approaching the watercourse crossings and on steeper hills.

Watercourse / Wetland Crossing

- Work in stream beds should preferably be carried out during winter when flow rates are lower.
- Erosion protection features must be installed at the watercourse crossings if there are no existing structures.
- Pipework must be laid in the river bed flush with the bedrock or the stream bed so as not to create a point for erosion.

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

Appendix A: Engineering Drawings & Maps

Appendix B: Specialist Reports

Appendix C: Proof of Placement of Notice Board

Appendix D: Proof of Notification

Appendix E: Advert

Appendix F: Registered I & Aps

Appendix G: Comments and Reponses

Appendix H: Impacts Scoring Matrix

Appendix I: EAP declaration and Curriculum Vitae

Appendix J: Environmental Management Program