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FINAL BASIC ASSESSMENT REPORT
EXTENSION OF BOMBAY ROAD
MSUNDUZI LOCAL MUNICIPALITY
EIA REF NO: DC22/0012/2018

EVP505

This report was prepared by EnviroPro Environmental Consulting in terms of Appendix 1 to GNR 327

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Executive Summary

The Msunduzi Local Municipality propose to extend Bombay Road within Ward 35 of the Msunduzi Local Municipality. This site is located in Rosedale, Pietermaritzburg at the following point locations; Start: 29°34'10.51"S; 30°24'20.20"E, End: 29°34'42.32"S; 30°24'29.83"E. The Msunduzi Local Municipality propose connecting the existing Bombay Road with Ohrtmand Road. The Bombay Road Extension will be a new virgin road running through municipal owned land. As per the above coordinates the start of the road will be at the intersection of Bombay Road and Chota Motala Road and the end of the road will be along Ohrtmand Road 267m from the intersection with the R33. There will be loss of wetland (HGM1) and as a result an offset has been proposed. The proposed offset can be undertaken at a relatively low cost and will result in a significant gain to the overall wetland integrity.

The following key impacts and mitigation measures were assessed:

- **Damage to adjacent watercourse banks, wetlands, and riparian zones from construction activity:** Caution must be exercised when working near the watercourses. Top soil must be stockpiled more than 32m from any watercourse. Heavy vehicles must be kept at least 32m away from the watercourses except where needed for road construction. The construction footprint near the watercourses must be kept to an absolute minimum.
- **Encroachment of alien vegetation into areas disturbed during construction:** Alien vegetation within the construction footprint must not be allowed to encroach onto the site and must be continually removed during construction.
- **Damage to surrounding properties, services, and businesses:** The construction activity could negatively impact on existing business and existing transportation routes in the area. All services must be identified prior to construction and all stakeholders must be notified prior to construction or any service disruptions. Temporary alternative access routes for affected properties must be created where required.
- **Improved access and connectivity:** The road upgrade and construction will improve access through the area for road users, especially during peak traffic periods. This is a positive impact.

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

Alternatives were considered for this project and have been discussed. The preferred site alternative is to align the Bombay Road extension (1.15 km) along a thin strip of municipal owned land which has been specially chosen. This has been done in order to alleviate congestion and maintain road safety standards and thus fulfil the Municipality's desired outcome. No other linear alignments were available. As there is a lack of space due to the area having been completely developed. Therefore, no other feasible alternatives were available to be considered. The technology alternatives considered were to either gravel the road or blacktop the road. Gravel roads cost less to construct than blacktop roads in terms of design and technical construction materials. However, the defining factor on deciding between a gravel and blacktop surface is dependent on the local land use and surrounding road network. Therefore, blacktopping the road is the more suitable option. In terms of the site alternative the only other option would be the No-Go option as no other linear alignments are available.

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 technology and site alternatives be authorised.

Contents

Appendices

Section 1: Scope of Work and Location of Activity

1.1 Project Title

Extension of Bombay Road located within the Msunduzi Local Municipality.

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

The Msunduzi Local Municipality propose to extend Bombay Road within Ward 35 of the Msunduzi Local Municipality. This site is located in Rosedale, Pietermaritzburg at the following point locations; Start: 29°34'10.51"S; 30°24'20.20"E, End: 29°34'42.32"S; 30°24'29.83"E. The Msunduzi Local Municipality propose connecting the existing Bombay Road with Ohrtmand Road. The Bombay Road Extension will be a new virgin road running through municipal owned land. As per the above coordinates the start of the road will be at the intersection of Bombay Road and Chota Motala Road and the end of the road will be along Ohrtmand Road 267m from the intersection with the R33.

The new road extension will be 1.15 km in length and 10m in width, which will include both lanes, sidewalks and associated embankments. The road will fall into properties owned by the Msunduzi Local Municipality. However, in order to accommodate the route, local businesses who have illegally extended their yards into municipal owned land will need to be relocated. Businesses who currently lease land from the Municipality will also have to relocate outside of the road reserve.

The extension will include the installation of stormwater infrastructure along the length of the road in the form of pipe crossings to facilitate the movement of storm water runoff and drainage from one side of the road to the other without damaging the structural integrity of the road itself. The proposed road will cross one drainage line, however this drainage line has previously been completely canalised. The road will also run directly through a seriously modified wetland (HGM1) and will run within 32m of another wetland (HGM2). Both wetlands have been classified as hillslope seepages. In order to meet road safety standards, the new road has to run directly through HGM1. The bend of the road had to be set at the prescribed angle for safety reasons and thus the wetland could not be avoided as the road is blocked by the existing buildings to the west and the Baynes's Spruit to the east. Therefore, the entire wetland (HGM1) will need to be removed in order to accommodate the new road. The only crossing structure that will need to be constructed will be that which will cross over the existing canal. This structure will be a simple reinforced concrete slab across the canal and there will be no structures placed within the canal. Figures 1-4 below (Section 1.5) illustrate the locality and provide an overview of the proposed development.

As there will be loss of wetland (HGM1) an offset has been proposed and has been indicated on Figure 5. The specialist calculated that the wetland that will be lost measures 0.16ha and has a functional rating of 30% (E-Seriously Modified). Therefore, taking the existing functional rating into account and using the Hectare Equivalents methodology (described in Section 2.5), which takes into account Functional Targets, Ecosystem Conservation Targets and Species Conservation Targets the offset needed was calculated to be 0.07 ha[1]. Please note since no Red Data species were recorded during field investigations, therefore the Species Conservation Targets was not deemed necessary. As a result, the 0.07 ha represents both the Functional Targets and Ecosystem Conservation Targets. Working through the Msunduzi Local Municipalities Environmental Management Unit, another wetland was located downstream from the site as a potential offset wetland i.e. the Sobantu wetland. The Sobantu wetland is approximately 14 ha with a functional value of 36% (E- Seriously Modified). Based on the calculation of by the specialist, it is envisioned that the overall functionality of the Sobantu wetland could be improved to a Largely Modified state (D) (47%). This would equate to an 11% increase in functionality of the existing Sobantu wetland. Using the Hectare Equivalents methodology described above the final hectare equivalent for the Functional Targets as a result of the improvements will be 1.02 ha and 4.90 ha for the Ecosystem Conservation Targets. This is a significant gain in both the wetlands functional and ecosystem status. The Sobantu wetland rehabilitation will require 4 main actions are required to improve the functional and ecological state of the wetland. The aspects are landscaping, removal of domestic and solid waste from the wetlands, alien vegetation control, and reconnection of floodplain to main channel.

The extension of Bombay Road will have a positive impact on local access in this area. The current situation is characterised by heavy congestion during peak traffic hours. The Msunduzi Local Municipality believes that the extension of the road will alleviate the current heavy congestion by providing another transportation route

[1] Department of Water Affairs and South African National Biodiversity Institute. 2013. Wetlands offsets: a best-practice guideline for South Africa. Pretoria. 100 pages.

through the area. This new route will also ensure that the local road network will be able to cope with the future demand due to increased road user numbers. The proposed road extension will ultimately be a public amenity.

Due to the proposed road route running directly through the wetland (HGM1), there will be the infilling of more than 10m^3 of material within a watercourse, the entire 0.16 ha wetland will be lost. The offset will also result in the removal of more than 10m^3 of material from a wetland during the rehabilitation of the offset. Both activities will require an environmental authorisation and water use licence. The entire road is also located in sensitive areas as identified in the Msunduzi Local Municipality's EMF which has been adopted by EDTEA and therefore falls under the following categories: High Wetland Constraint, High Biodiversity Constraint, and High Flood Potential. Development of a road within this area will also require an environmental authorisation. As a result, the report and EMPr focus on the entire length of the road.

1.3 Construction Methodology

The proposed construction methodology can be summarised as follows:

- Conventional construction methods will be used for the construction of the proposed road.
- The entire site will be surveyed and pegged out to determine the road reserve.
- Clearing of vegetation from the road reserve.
- Earthworks will take place along the route of the road. Depressions will be filled and excess material will be excavated.
- A concrete slab will be cast across the canal.
- Once the desired levels are met, gravel material of various grades will be brought onto site and layered onto the road using a grader.
- Curbs and V-drains will be installed adjacent to the road surface.
- The final black top bituminous material will be laid and compacted to form the road surface.
- Backfilled soil and disturbed areas will be shaped to resemble the surrounding topography and riverbanks (riverbanks are to be shaped to avoid erosion).
- Rehabilitation / re-vegetation of all areas affected by the construction activities using intensive grass sod planting or hydro seeding with a suitable indigenous grass seed mix and riparian/wetland vegetation. Special attention will be paid to the areas within the watercourse and along the watercourse banks.
- The proposed construction methodology has been developed in an attempt to minimise both the environmental impact as well as the social impact of the project is minimised.

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

Site Alternatives

Alternative 1 (Preferred Alternative)

The preferred site alternative is to align the Bombay Road extension (1.15 km) along a thin strip of municipal owned land. No other linear alignments are available if the upgrade is to relieve congestion and improve road safety at this location. Existing development and buildings have constrained the space available for the upgrade therefore no other feasible alternatives are available for consideration.

In terms of the wetland offset, only 0.07 ha of wetland is required to be offset as part of the Hectare Equivalents methodology, although this does not necessarily imply that rehabilitation should be limited to this area. Wetlands are complex, interlinking systems, therefore it is advisable to rehabilitate a greater area in order to show improved functionality. The recommended mitigation measures will also support the improvement of the wetland functionality. Therefore, taking the above into considerations and as well as communication with Msunduzi Local Municipalities Environmental Management Unit, the Sobantu wetland was selected to be used as the offset.

Technology Alternatives

Alternative 1 (Preferred Alternative)

The preferred technology alternative for the road is to surface the Bombay Road extension with a blacktop-wearing course and to implement the necessary storm water infrastructure.

The preferred technology alternative for the offset is to implement the 4-point plan i.e. landscaping, removal of domestic and solid waste from the wetlands, alien vegetation control, and reconnection of floodplain to main channel. No other technology alternatives were considered for the offset as this was the best approach as developed by the specialist.

Alternative 2

The preferred alternative is to surface the Bombay Road extension with a gravel-wearing course and to implement the necessary storm water infrastructure.

The No Go Alternative
The existing Bombay Road will not be extended. The current situation in the area which is characterised by heavy congestion during peak traffic hours will remain. This congestion will subsequently become more sever as the number of road users increases in the future. There will also be no loss of wetland but also no offset and improvement in functionality of the Sobantu wetland.

See Appendix A for Engineering Drawings.

1.5 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
Listing Notice 1; 4th December 2014 as amended	19	*The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;* *but excluding where such infilling, depositing, dredging, excavation, removal or moving—* *(a) will occur behind a development setback;* *(b) is for maintenance purposes undertaken in accordance with a maintenance management plan;* *(c) falls within the ambit of activity 21 in this Notice, in which case that activity applies;* *(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.*	The applicant proposes to extend the existing Bombay Road. This activity will result in the complete infill of HGM1 by more than 10m^3 of material. The applicant also proposes to implement an offset strategy in the Sobantu wetland. This activity will result in more than 10m^3 of material being removed from the wetland as part of the overburden removal program.
Listing Notice 3; 4th December 2014 as amended	4 (d) (xi) (xiii) (aa)	*The development of a road wider than 4 metres with a reserve less than 13,5 metres.* *(d) In KwaZulu-Natal* *xi. Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;* *xiii. In urban areas:* *(aa) Areas zoned for use as public open space*	The applicant proposes to extend the existing Bombay Road. The section of the road will be 1.15km in length and 10m wide but the road reserve will be less than 13.5m. The road will be located within a sensitive area identified as part of the Msunduzi Environmental Management Framework (High Wetland Constraint, High Biodiversity Constraint, and High Flood Potential). This EMF has been adopted by the competent authority. A portion of the road will also be with an area zoned as public open space as per the Msunduzi ESP.
Listing Notice 3; 4th December 2014 as amended	14 (d) (viii) (xi) (aa)	*The development of-* *(i) canals exceeding 10 square metres in size;* *(ii) channels exceeding 10 square metres in size;* *(iii) bridges exceeding 10 square metres in size;*	The applicant proposes to extend the existing Bombay Road. The portion of road within 32m of the watercourse on site will be in excess of 10m^2 within a sensitive area identified as part of the Msunduzi Environmental Management Framework (High

		(iv) dams, where the dam, including infrastructure and water surface area exceeds 10 square metres in size; *(v) weirs, where the weir, including infrastructure and water surface area exceeds 10 square metres in size;* *(vi) bulk storm water outlet structures exceeding 10 square metres in size;* *(vii) marinas exceeding 10 square metres in size;* *(viii) jetties exceeding 10 square metres in size;* *(ix) slipways exceeding 10 square metres in size;* *(x) buildings exceeding 10 square metres in size;* *(xi) boardwalks exceeding 10 square metres in size; or* *(xii) infrastructure or structures with a physical footprint of 10 square metres or more;* *Where such development occurs-* *(i) a watercourse;* *(ii) in front of a development setback; or* *(iii) if no development setback has been adopted, within 32 metres of a watercourse measured from the edge of a watercourse.* *Excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour.* *(d) In KwaZulu-Natal* *viii. Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;* *xi. In urban areas:* *(aa) Areas zoned for use as public open space*	Wetland Constraint, High Biodiversity Constraint, and High Flood Potential). This EMF has been adopted by the competent authority. A portion of the road within 32m of the watercourse will also be with an area zoned as public open space as per the Msunduzi ESP.

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

District Municipality		Umgungundlovu District Municipality.	
Local Municipality		Msunduzi Local Municipality.	
Ward		35	
Area / Town / Village		Rosedale, Pietermaritzburg	
Co-ordinates:		**Latitude**	**Longitude**
	Starting Point:	29°34'10.51"S	30°24'20.20"E
	End Point:	29°34'42.32"S	30°24'29.83"E
	Wetland Offset Mid-Point	29°35'34.85"S	30°25'45.94"E

Property Description:	Portion 18 of Erf 132 Pietermaritzburg
	Portion 11 of Erf 132 Pietermaritzburg
	Portion 17 of Erf 131 Pietermaritzburg
	Portion 18 of Erf 1671 Pietermaritzburg
	Portion 1 of Erf 1326 Pietermaritzburg
	Portion 12 of Erf 132 Pietermaritzburg
	Portion 16 of Erf 132 Pietermaritzburg
	Portion 14 of Erf 132 Pietermaritzburg
	Portion 6 of Erf 132 Pietermaritzburg
	Portion 7 of Erf 132 Pietermaritzburg
	Remainder of Erf 4347 Pietermaritzburg
	Portion 80 of Erf 75 Pietermaritzburg
	Portion 68 of Erf 75 Pietermaritzburg
	Remainder of Pietermaritzburg
21 Digit Surveyor General's numbers:	N0FT02580000167100018
	N0FT02580000013200011
	N0FT02580000013100017
	N0FT02580000167100018
	N0FT02580000132600001
	N0FT02580000013200012
	N0FT02580000013200016
	N0FT02580000013200014
	N0FT02580000013200006
	N0FT02580000013200007
	N0FT02580000434700000
	N0FT02580000007500080
	N0FT02580000007500068
	N0FT02580000000000000

Figure 1: 1:50 000 Map Indicating the Location of the Bombay Road Ext.

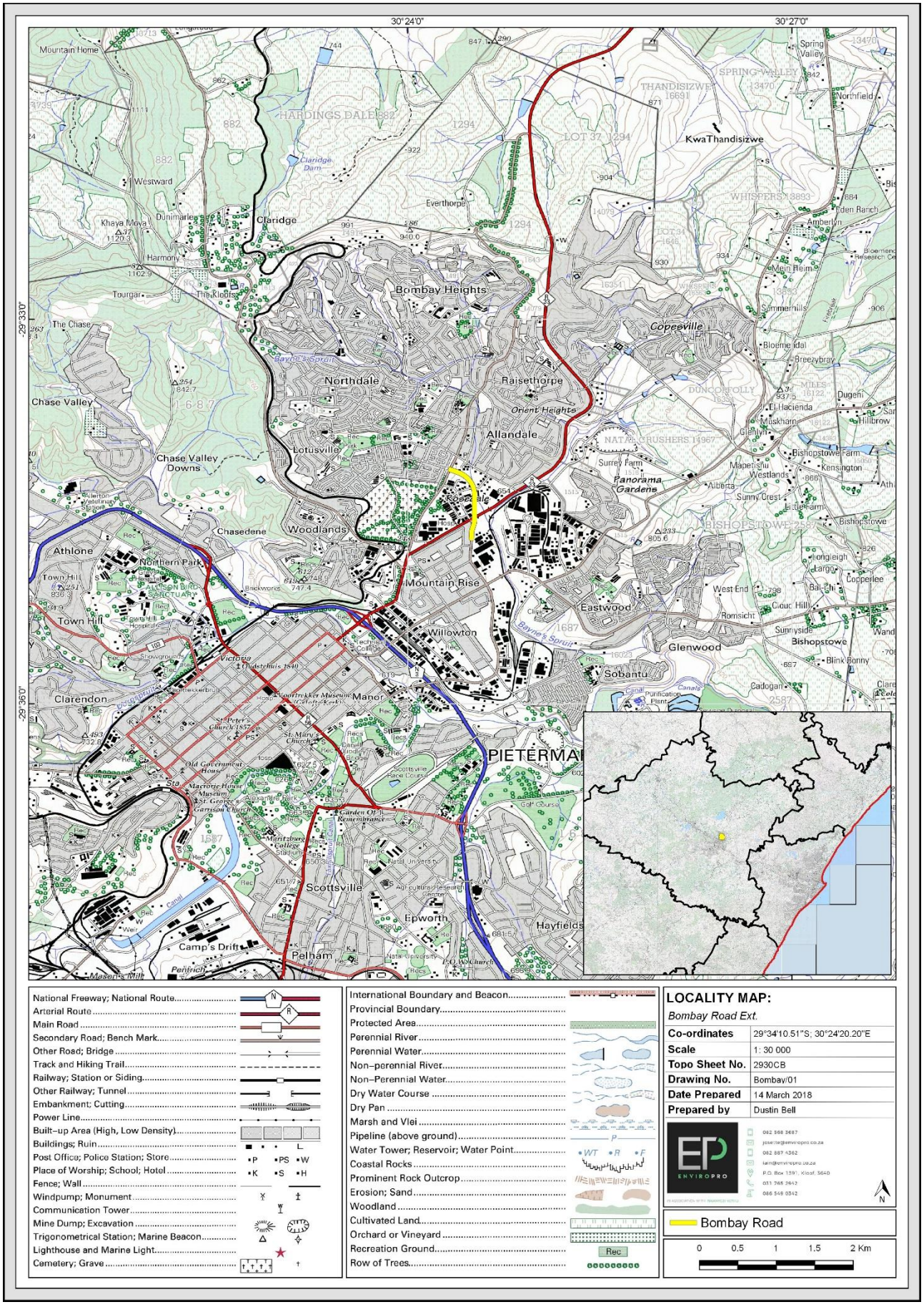


Figure 2: Aerial Photograph Showing an Overview of the Land Use and Locality of the Bombay Road Ext. Google Earth Image, 2018.

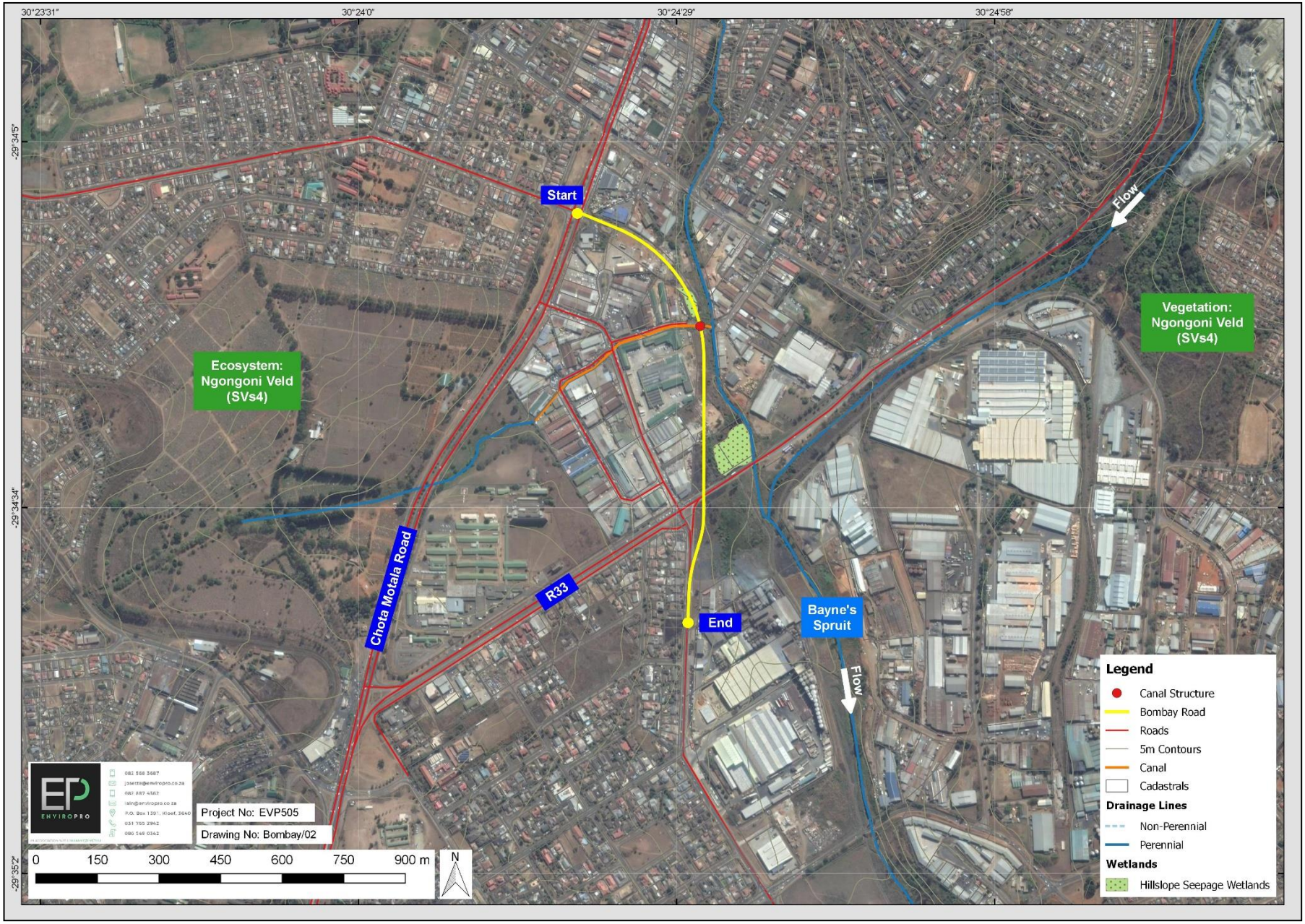


Figure 3: Aerial Photograph Showing a Close Up of the Land Use and Locality of the Bombay Road Ext. Google Earth Image, 2018.

Figure 4: Aerial Photograph Showing a Close Up of the Land Use and Locality of the Bombay Road Ext. Google Earth Image, 2018.

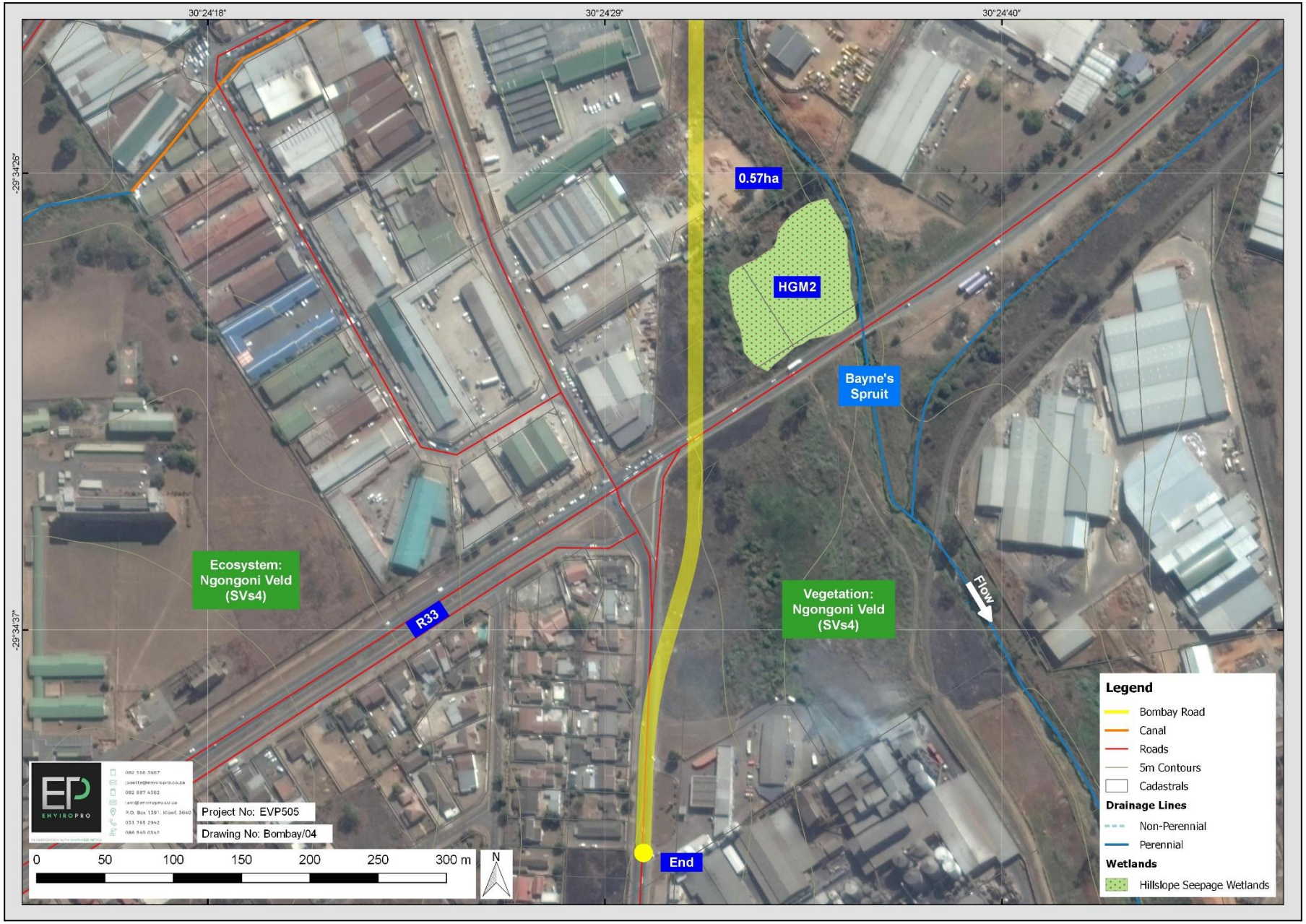


Figure 5: Aerial Photograph Showing the location of the offset wetland. Google Earth Image, 2018.

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

2.1 Topography and Physical Characteristics of Site

The Bombay Road Extension will be a virgin road which will be utilised by the general public in the area (Figure 7-10).

The following applies to the 1.15km length of Bombay Road Extension as per Figures 1- 4 above.

The gradient of the site is as follows:

Gradient	Description
Flat	N/A
1:50 – 1:20	The entire length of the road can be described as having a relatively gentle gradient.
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	N/A

The topographical features and landforms of the site and surrounding area are as follows (Figure 6-9):

Topographical Feature	Description
Ridgeline	NA
Plateau	NA
Side slope of hill/mountain	N/A
Closed valley	N/A
Open valley	The surrounding topography of the site is an open valley.
Plain	N/A
Undulating plain/low hills	NA
Dune	N/A
Sea-front	N/A

2.2 Surface Water and Ground Water

The Bombay Road Extension is located within the U20J Quaternary Drainage Region. The main river in this drainage region is the uMnsunduze River. The area adjacent to the site is drained by a perennial tributary of the uMnsunduze River, the Bayne's Spruit, please note the aquatic report at times refers to the Bayne's Spruit as the tributary of the uMnsunduze River. The Bayne's Spruit flows into the uMnsunduze River 3km southeast from the site.

The Bombay Road Extension route is located within 32m of two Hillslope Seepage Wetlands.

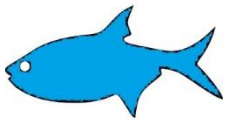
2.3 Drainage Lines

The road is within 32m of the two watercourses (Bayne's Spruit and the canal). The road extension does not cross the Bayne's Spruit however it does cross the canal and thus can potentially impact the watercourses. The most significant points along the road with regards to impacting the watercourses are between KM0.27 and KM0.62 (Figure 7-10). The following information has been extracted from the aquatic report indicating the conditions of the Bayne's Spruit:

- The *in-situ* water quality measured as modified[2];
- Based on the IHAS results, habitat availability for aquatic macroinvertebrates was poor in the Bayne's Spruit. The available habitat on site was dominated by stones and mud with limited gravel and sand. There was adequate marginal vegetation present in the Bayne's Spruit[1];
- Based on the SASS results, biotic integrity in the Bayne's Spruit was severely impaired (PES Class E/F). This can be attributed to limited habitat availability and modified water quality[1];
- The observed fish assemblage represented only 23% of the expected fish assemblage. This can be attributed to limited habitat availability and modified water quality in Bayne's Spruit[1]; and

[2] The Biodiversity Company. (2016). Baseline Assessment of the Aquatic Ecosystems associated with proposed Bombay Road Extension (Appendix B).

- Urban activities have resulted in the modification of instream and riparian habitats in this section of the Bayne's Spruit. Such modifications have resulted in an impaired biotic integrity with poor fish communities of low diversity[3].
- The current state of the project area associated with the proposed Bombay Road extension is in a seriously modified state[2].
- Below is a summation of the aquatic specialist's findings[2]:

In Situ Water Quality	IHAS	Biotic Integrity (SASS5)	Fish
			
Modified	**Poor**	**Poor (E/F)**	**Poor (E/F)**

According to the DWS Risk assessment, the risk rating for each of the aspects were determined to be low. The proposed construction may provide opportunities to improve the current impacts on instream habitat, and dumping occurring at the site[2]. These opportunities, if taken should have a positive influence on the drainage lines and the greater catchment at large. The construction activity should have no significant negative impact or influence on the drainage lines in this area provided the mitigation measures provided in this report and EMPr be followed.

2.4 Wetlands

As per the specialist report, NFEPA wetland units were identified to be within 500m of the project area, namely channelled and unchannelled valley bottom wetlands. The NFEPA dataset suggests the proposed road alignment will traverse the wetland areas. The presence of these desktop wetland units was assessed during the survey. The location of onsite wetland was confirmed and delineated as the below.

The Bombay Road Extension route is located within one wetland (HGM1) and within 32m of another wetland (HGM2). The wetlands have been described as Hillslope Seepage Wetlands:

- The wetland systems are in a seriously modified (Category E) state, suggesting the change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural habitat features are still recognizable[4]. A summary for the respective modules is as follows:
  - The change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural habitat features are still recognizable[3].
  - The change in geomorphic processes is great but some features are still recognizable[3].
  - Vegetation composition has been substantially altered but some characteristic species remain, although the vegetation consists mainly of introduced, alien, and/or ruderal species[3].
- Below is a Summary of the scores for the wetland Present Ecological Status (PES)[3]:

Wetland	Hydrology		Geomorphology		Vegetation	
	Rating	Description	Rating	Description	Rating	Description
Hillslope seepage wetlands	E	Seriously Modified	E	Seriously Modified	E	Seriously Modified
Overall PES Class					E: Seriously Modified	

The proposed extension will result in the loss of the entire wetland area HGM1, further impacting on the downstream systems. As per the specialist findings there are a number of aspects that are curreblty impacting on the status of the wetland and thus its ecological services, these include:

- Services and access routes transect wetland areas, impeding flow and altering the hydro-dynamics of the systems;
- The development in the area, i.e. yards and structures encroaching into wetland areas resulting in the loss of vegetation and altered catchment areas;
- The development of the area has also resulted in increased hardened surface areas, reducing infiltration for the catchment, resulting in increased run-off volumes and velocities down the catchment;

[3] The Biodiversity Company. (2016). Baseline Assessment of the Aquatic Ecosystems associated with proposed Bombay Road Extension (Appendix B).
[4] The Biodiversity Company. (2016). Wetland Assessment for the proposed Bombay Road Extension (Appendix B).

- Local disturbances have resulted in the encroachment of alien vegetation into the area, dominating endemic and wetland plant species;
- Attempts to manage and divert stormwater and run-off have also altered the hydro-dynamics of the catchment, resulting in altered flows and flow velocities;
- The development of the area and the associated landscaping have also altered the structure and geomorphology of the catchment; and
- Dumping and solid waste storage and disposal have also altered the status of the wetland systems, this is as a result of introduced pollutants.

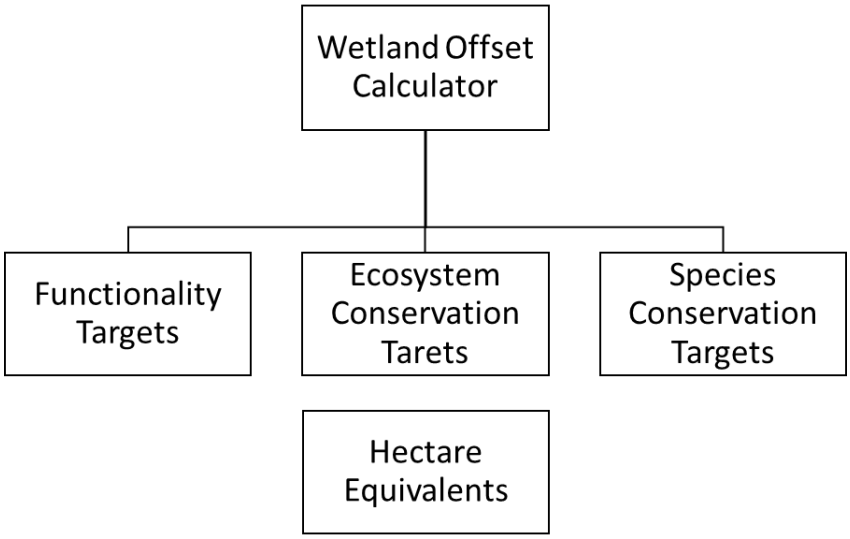
The loss of this wetland cannot be mitigated therefore it must be offset. A potential offset has been proposed and has been indicated on Figure 5. The area of the wetland to be lost is 0.16 ha and the total area proposed for the offset will be 14 ha. The proposed offset fulfils the required 1:5 offset ratio as stipulated by the Msunduzi Local Municipality. The proposed offset can be undertaken at a relatively low cost and will result in a significant gain to the overall wetland integrity. Therefore, there will be no net loss of wetland in the local catchment. Please refer to Section 2.5 below for a detailed description of the offset strategy.

2.5 Offset Strategy

According to DEA[5] wetland offset plans should be considered in an event that wetland areas will be lost due to a proposed development, resulting in the unavoidable loss of the wetland area, or part thereof, it must be noted, the offset of wetland loss is considered to be the last resort with regards to the mitigation hierarchy.

To allow for the quantification of a suitable offset, it is important to establish a common unit that will allow residual losses (due to the proposed development) and gains (due to the proposed offset) to be consistently measured and compared. The wetland hectare equivalent[6] concept uses a refined unit that incorporates a measure of ecological function, quality and/or integrity. The basic hectare equivalents of intact wetlands are a combination of extent of the wetland impacted, and the change in condition or functionality. They are used as a substitute for measuring lasting loss and have been adopted by the specialist as the primary unit for evaluating suitability of the offset strategy. Wetland hectare equivalents are determined using three wetland calculators as represented in Figure 6 below. The hectare equivalents for the Functionality Targets and Ecosystem Conservation Targets were calculated for this offset strategy. Please note since no Red Data species were recorded during field investigations, therefore the Species Conservation Targets was not deemed necessary.

Figure 6: Wetland calculator components. The Biodiversity Company, 2017.



[5] Department of Environmental Affairs, Department Of Mineral Resources, Chamber Of Mines, South African Mining And Biodiversity Forum, And South African National Biodiversity Institute (2013) Mining and Biodiversity Guideline: Mainstreaming biodiversity into the mining sector. Pretoria, South Africa. 100 pp.

[6] Department of Water Affairs and South African National Biodiversity Institute. 2013. Wetlands offsets: a best-practice guideline for South Africa. Pretoria. 100 pages.

Working through the Msunduzi Local Municipalities Environmental Management Unit the chosen wetland to be included in the offset strategy is the Sobantu wetland. The Sobantu wetland as indicated in Figure 5 is located along the Bayne's Spruit downstream from the Bombay Road extension site. The wetland consists of 3 HGM types, namely[7];

- Channelled Valley Bottom;
- Floodplain; and
- Hillslope Seep.

The PES for the assessed Sobantu wetland system was determined to be in a seriously modified (Category E) state. The wetland unit has an overall Intermediate level of service. The Ecological and Hydrological Importance for the impacted wetland was rate to be Moderately important (C), with the direct human benefits being rated as a having a Low Importance (D).[4]

Taking the above methodology into consideration. The specialist calculated that the wetland that will be lost measures 0.16ha and has a functional rating of 30% (E-Seriously Modified). Therefore, taking the existing functional rating into account and using the Hectare Equivalents methodology, the offset needed was calculated to be 0.07 ha[8] for both the Functional Targets and Ecosystem Conservation Targets. The Sobantu wetland is approximately 14 ha with a functional value of 36% (E- Seriously Modified). Based on the calculation of by the specialist, it is envisioned that the overall functionality of the Sobantu wetland could be improved to a Largely Modified state (D) (47%). This would equate to an 11% increase in functionality of the existing Sobantu wetland. Using the Hectare Equivalents methodology described above the final hectare equivalent for the Functional Targets as a result of the improvements will be 1.02 ha and 4.90 ha for the Ecosystem Conservation Targets. This is results in 1:14 and 1:70 offset ratios for Functional Targets and Ecosystem Conservation Targets respectively. This is a significant gain in both the wetlands functional and ecosystem status.

The Sobantu wetland rehabilitation will require 4 main aspects to improve the functional and ecological state of the wetland.[4] The aspects are;

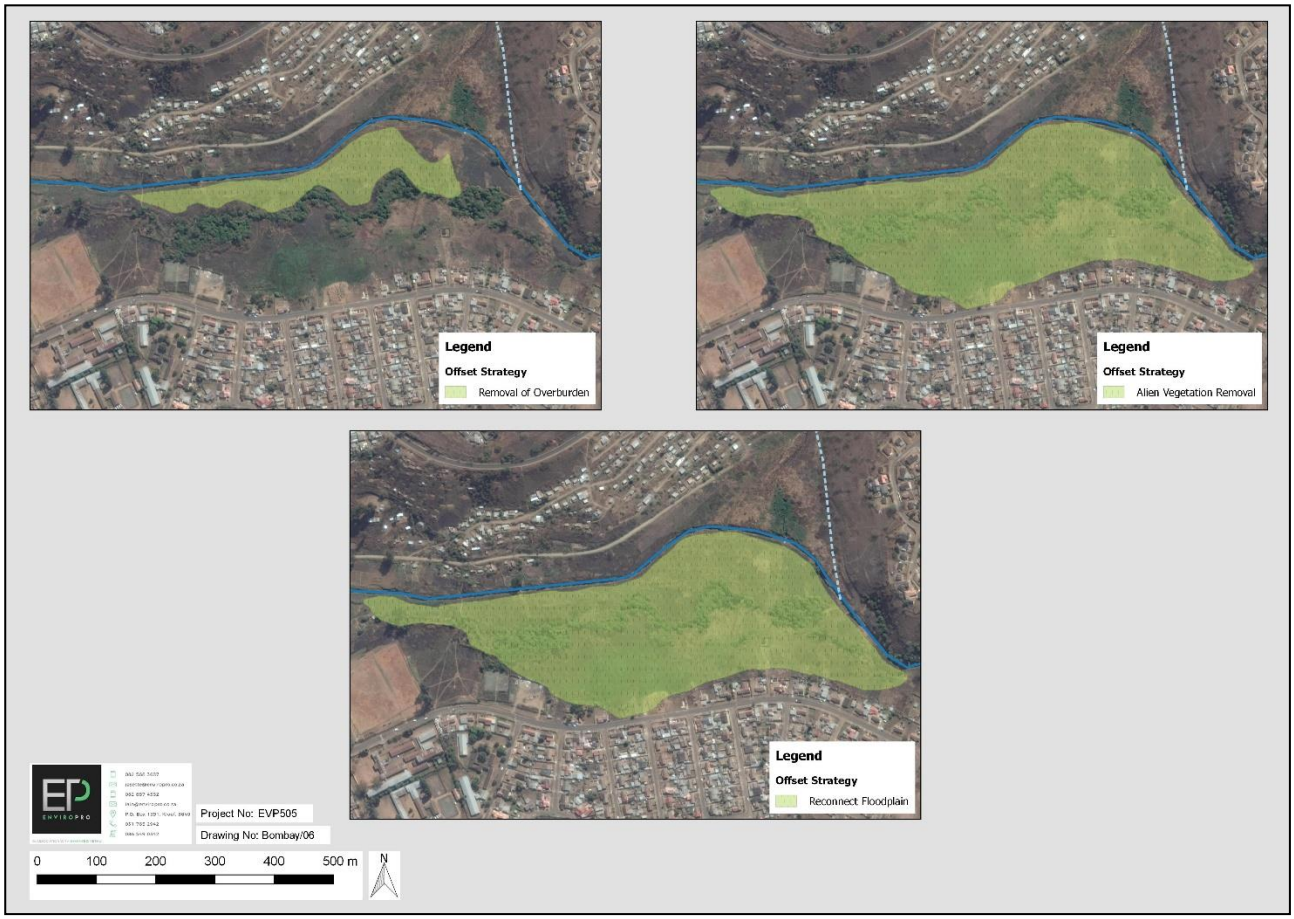
- Landscaping (the removal of overburden from the floodplain);
- Removal of domestic and solid waste from the wetlands;
- Alien vegetation control; and
- Reconnection of floodplain to main channel.

Please refer to table below for a detailed description of the proposed offset strategy. Figure 7 also provides a visual representation of where the individual aspects are to take place. Please note waste removal will take place throughout the wetland. Photographs of the Sobantu wetland have also been provided in Figure 11.

Aspect[4]	Measures
Landscaping	• Removal of all over burden from the floodplain area. The overburden can be reused as a berm to protect the housing development to the south. • Compaction must be avoided during this process and the final landscaped area must be ripped and re-seeded with suitable wetland plants species.
Waste Disposal	• All domestic and solid waste to be removed and disposed of at a licensed disposal site
Alien vegetation management	• All alien vegetation must be removed and disposed of at a licensed disposal site. • Once removed the area is to be re-seeded with wetland plants. • All domestic and urban waste to be removed.
Reconnection of floodplain to main channel	• The floodplain must be reconnected or opened to allow for water to re-enter the system at the western edge of the floodplain.

[7] The Biodiversity Company. (2017). Wetland Offset Strategy for the Bombay Road Project (Appendix B).
[8] Department of Water Affairs and South African National Biodiversity Institute. 2013. Wetlands offsets: a best-practice guideline for South Africa. Pretoria. 100 pages.

Figure 7: Aerial Photograph Showing an Overview of the Land Use and Locality of the Bombay Road Ext. The Biodiversity Company, 2017.



2.6 Fauna and Flora

The site is located within an urban area. The fauna and flora found within the area surrounding Bombay Road Extension is described as follows:

- Ecosystem Type: Ngongoni Veld (SVs4):
  - This ecosystem type is 'vulnerable'.
- Vegetation Type: 'Ngongoni Veld (SVs4)[9]:
  - Distribution KwaZulu-Natal and Eastern Cape Provinces: From Melmoth in the north to near Libode in the former Transkei (including Eshowe, New Hanover, Camperdown, Eston, Richmond, Dumisa, Harding, Lusikisiki and the Libode area). Altitude 400–900 m.
  - Vegetation & Landscape Features Dense, tall grassland overwhelmingly dominated by unpalatable, wiry Ngongoni grass (*Aristida junciformis*), with this monodominance associated with low species diversity. Wooded areas (thornveld) are found in valleys at lower altitudes, where this vegetation unit grades into SVs 3 KwaZulu-Natal Hinterland Thornveld and SVs 7 Bhisho Thornveld. Termitaria support bush clumps with *Acacia* species, *Cussonia spicata*, *Ziziphus mucronata, Coddia rudis, Ehretia rigida* etc.
  - Geology & Soils Acid, leached, heavy soils are derived from Karoo Supergroup sediments (including significant Dwyka tillites) and intrusive Karoo dolerites. Also, Glenrosa and Mispah soils occur. Land types Fa, Ab, Ac and Aa.
  - Conservation Vulnerable. Target 25%. Only less than 1% of the unit is statutorily conserved in the Ophathe and Vernon Crookes Nature Reserves. Some 39% has been transformed for cultivation, plantations and urban development.
- Vegetation noted on site:
  - Historically would have represented the Ngongoni Veld vegetation type, however the current vegetation along the proposed route is in a transformed state due to previous urban activities. Activities include: clearing of vegetation, compaction of soils, dumping/storage of waste, removal of vegetation, landscaping and levelling of areas.

[9] Mucina & Rutherford (2006) National vegetation types from Vegetation map for South Africa, Lesotho and Swaziland

  - Large numbers of alien vegetation species were noted on site, especially along the banks of the watercourses most notable was Bugweed (*Solanum mauritianum*).
- No fauna other than fish were noted within the Bayne's Spruit. Please see below for the results from the aquatic report[10]:

Scientific name	Common name	IUCN status	Site	Sensitivity	
			BOM1	No-flow	Phys-chem
Clarias gariepinus	Sharptooth Catfish	LC	1	1.7	1.0
Labeobarbus natalensis	Natal Yellowfish	LC	43	3.5	3.0
Oreochromis mossambicus	Mozambique Tilapia	NT	31	0.9	1.3

There will be the need to clear vegetation along the length of the proposed road. The vegetation to be cleared will be restricted to the construction footprint of the road. A minimal number of trees will be cleared however none of these trees are protected species. Numerous alien invasive plant species will be removed during the construction of the road such that the clearing will have a positive impact on the area. Therefore, due to the severely disturbed and transformed state of the current vegetation on site, impacts associated with the loss of vegetation are deemed low.

2.7 Heritage and Cultural Aspects

No significant archaeological or heritage aspects were noted near this site.

2.8 Socio Economic Environment

The site is located in a highly developed urban area. The proposed road will provide improved access within the area to alleviate congestion. However, in order to accommodate the route, local businesses that have extended their yards into municipal owned land will need to be relocated. The Msunduzi Local Municipality will negotiate any such relocations with land users prior to any construction. Should there be a need for the relocation of infrastructure, an agreement must be made with the contractor and relevant stakeholder. Ultimately, the public will have improved vehicle access as a result of the proposed road construction.

2.9 Surrounding Environment and Land Uses

The environment and land uses surrounding the Bombay Road Extension are as follows:

- Located within an urban area.
- The land surrounding the road consists of:
  - Warehouses and commercial/industrial buildings;
  - Residential housing;
  - Scattered clumps of indigenous vegetation,
  - Patches of alien invasive plants and
  - Roads and infrastructure.

The surrounding environment and land use is not expected to be significantly affected by the road construction as the proposed route is highly disturbed and transformed.

The figures below provide photographs of the site taken in April 2016.

Figure 8: (a): Photographer facing east from the start showing the beginning of the Bombay Road Ext. **(b):** Photographer facing southeast further along route Bombay Road Ext. **(c):** Photographer facing southeast further along route Bombay Road Ext showing existing fences which will be required to be removed in order to accommodate the road.

[10] The Biodiversity Company. (2016). Baseline Assessment of the Aquatic Ecosystems associated with proposed Bombay Road Extension (Appendix B).

Figure 9: (a): Photographer facing southeast showing the first wetland (HGM1) adjacent to the road which will be lost. **(b):** A close up of the wetland adjacent to the road. **(c):** View of the Bayne's Spruit near the site.

Figure 10: (a): Photographer facing south showing an area along the route where vegetation has been previously cleared. **(b):** An existing stormwater cannel which the road will need to cross. **(c):** Adjacent businesses using the area along the route to store material.

Figure 11: (a): The southern wetland near the route of the road. **(b):** Photograph showing the location of the intersection of the Bombay Road Ext. and Bhambatha Road. **(c):** Photograph showing the portion of Ohrtmand Road will be realigned.

Figure 12: (a): The overburden to be removed from the floodplain area of the Sobantu wetland. **(b):** Alien invasive vegetation within the Sobantu wetland. **(c):** Domestic and solid waste which is to be removed and disposed of at a licensed disposal site as part of the offset strategy.

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 Bombay Road Extension Therefore, this application is in line with the requirements of NEMA.
National Water Act 1998	The construction will be within 500m of two wetlands and will be crossing the canal, therefore a water use authorisation will be required as per Section 21 c and i of the National Water Act. The applicant has been made aware of this requirement.
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. It is unlikely that any activities carried out by the development will 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. This site does not fall within a threatened ecosystem type therefore does not require environmental authorisation to clear more than 300m^2 of vegetation for this road.
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.
Mineral & Petroleum Resources Development 28 of 2002	To provide for the sustainable development of the nation's mineral and petroleum resources which includes activities carried out for the winning of any mineral on, in or under the earth (i.e. the use of borrow pits). Material used in the construction of the road must be obtained from a licensed borrow pit.
The Polluters Pay Principle	The 'polluters pays' principle is the commonly accepted practice that those who produce pollution should bear the costs of managing it to prevent damage to human health or the environment. The contractor and applicant will be responsible for any pollution on site.

Section 28 of the National Environmental Management Act, Act 107 of 1998 Duty of Care and remediation of the environmental damage	Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment. The contractor and applicant will be responsible for any pollution on site and must manage the site in a environmentally acceptable manor.
Municipal Planning Framework	
Draft Msunduzi Municipality IDP 2017-2022	This project falls in line with the Msunduzi Municipality's goal to promote sustainable development in the local municipality.
Msunduzi Municipalities EMF, C Plan and ESP	The project does not disregard the objectives of the Municipalities EMF, C Plan and ESP.

Section 4: Motivation, Need and Desirability

4.1 Need and Desirability as Per Section 3(F)

The Municipality has expressed the following motivation for the road to be upgraded:

- The road has been identified by the Municipality as a key road requiring construction as it will act as an important access route through the area;
- The current situation in the area is characterised by heavy congestion during peak traffic hours;
- The Municipality believes that the extension of the road will alleviate the current heavy congestion by providing another transportation route through the area;
- The Municipality also believes that this new route will also ensure that the local road network will be able to cope with the demand due to increased road users. The proposed road extension will ultimately be a public amenity.
- The proposed section of road is a public facility and will improve the road infrastructure in this area;
- There may be temporary employment opportunities during the construction period of this road.

4.2 Motivation for Preferred Site, Activity and Technology Alternative

The Bombay Road Extension Site Alternative 1:

- The preferred site alternative is to align the Bombay Road extension (1.15 km) along a thin strip of municipal owned land. No other linear alignments are available if the upgrade is to relieve congestion and improve road safety at this location. Existing development and buildings have constrained the space available for the upgrade therefore no other feasible alternatives are available for consideration.
- In terms of the wetland offset, a 0.07 ha section of wetland is required to be offset as part of the Hectare Equivalents methodology. Wetlands are complex, interlinking systems, therefore it is advisable to rehabilitate a greater area in order to show improved functionality. The recommended mitigation measures will also support the improvement of the wetland functionality. Therefore, taking the above into considerations and as well as communication with Msunduzi Local Municipalities Environmental Management Unit, the Sobantu wetland was selected to be used as the offset.

The Bombay Road Extension Technology Alternative 1:

- For a road of this nature within this area a blacktop road (preferred technology alternative 1) is considered more suitable than a gravel road (technology alternative 2);
- Gravel roads cost less to construct than blacktop roads in terms of design and technical construction materials. However, the defining factor on deciding between a gravel and blacktop is dependent on the local land use and surrounding road network.
- Stormwater runoff from a blacktop road will contain less dust and sediment when compared with that of a gravel road;
- There is generally more material loss and dust raised from a gravel road than from a tarred road, this becomes problematic under heavy traffic conditions;
- A gravel road will require more maintenance during operation as it is more likely to degrade.
- The preferred technology alternative for the offset is to implement the 4-point plan i.e. landscaping, removal of domestic and solid waste from the wetlands, alien vegetation control, and reconnection of floodplain to main channel. No other technology alternative was considered for the offset as this was the best approach developed by the specialist.

It is the opinion of the EAP that there are no significant environmental impacts that cannot be mitigated against and that the preferred alternative A1 (blacktop and proposed route) be authorized.

Section 5: Public Participation

5.1 Notification of Interested and Affected Parties

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

A noticeboard (in isiZulu and English) was placed at the start of the road on the 25th April 2016 and a second updated noticeboard (in isiZulu and English) was placed at the start of the road on the 19th April 2018. The noticeboard detailed the Municipality's proposed plan to construct the road, 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 meeting was held with the Ward Councilor on site on the 23rd May 2016
- The Ward Councilor indicated a willingness to engage with the community, agreeing that this was the best procedure for notification.
- Door to door notifications for all adjacent business was conducted on the 5th April 2016.
- A Zulu advert was placed in the iLanga newspaper on the 30th October 2016 and an English advert was placed in the Maritzburg Fever on the 2nd November 2016.
- A second updated Zulu advert was placed in the iLanga newspaper on the 15th April 2017 and an updated English advert was placed in the Public Eye newspaper on the 18th April 2018.
- A signboard detailing the construction was erected at the start of the road on the 25th April 2016.
- A second updated signboard detailing the construction was erected at the start of the road on the 19th April 2018.
- The Ward Councilor was provided with pamphlets for distribution within the community on the 23rd May 2016, which provide detail about the proposed project.
- The Ward Councilor will be given opportunity to review complete copies of the Basic Assessment report and relay information back to the community.
- A notification to all I&APs was sent on the 9th November 2016.
- A second notification to all I&APs was sent on the 20th April 2018.
- With regards to authority communications, all relevant authorities have been notified of the application and have been provided with copies of this BAR.
- Following on from concerns raised by the SASOL Garage a meeting was held on the 27th June 2018 between the Msunduzi Municipality (Applicant), MSA (Engineers), EnviroPro (EAP) and SASOL (I&AP).

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;*

- Notifications to all I&APs were sent out on the 09th November 2016 and the 20th April 2018.
- The Draft BAR will be placed in the Northdale local library, proof will be provided in the Final BAR.
- All adjacent landowner will be notified as to the placement of Draft BAR in the Northdale library.

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*

A Zulu advert was placed in the iLanga newspaper on the 30th October 2016 and an English advert was placed in the Maritzburg Fever on the 2nd November 2016. A second updated Zulu advert was placed in the iLanga newspaper on the 15th April 2018 and an updated English advert was placed in the Public Eye newspaper on the 18th April 2018. Both adverts provided details as to the proposed project, Basic Assessment process and provided 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 C&R table. This report has been provided to the Msunduzi Local Municipality and uMgungundlovu District Municipality for comment. See Appendix G – Comments and Response table and Comments Received.

Section 6: Impact Assessment

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

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

Whether or not the impact can be mitigated and the extent to which it can be avoided, managed, mitigated or reversed is assessed i.e. the probability of occurrence after mitigation has been applied. This also takes into

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

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

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

6.2 Preferred Site and Technology Alternative

Site Specific Impacts

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

No.	Nature and Consequences of impact	Sig. rating of impacts[11]:	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
Construction				
Direct Impacts				
1.	There is the potential for erosion to take place as a result of construction of the Bombay Road Ext and implementation of the offset strategy which will result in downstream sedimentation that will affect the Bayne's Spruit and the associated wetland.	7 (Medium)	The following measures must be carried out to mitigate against erosion during construction of the Bombay Road Ext and implementing the offset strategy: • The areas of the Bayne's Spruit and the associated wetland that are not within the direct project footprint must be demarcated as 'no-go' areas.	5 (Low)

[11] See Appendix H for more details.

No.	Nature and Consequences of impact	Sig. rating of impacts[11]:	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
			• All construction activities occurring near Bayne's Spruit and the associated wetland must be carried out with extreme care to avoid any erosion taking place in the watercourses. • 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. • Areas exposed to erosion must be protected through the use of sand bags, berms and efficient construction processes i.e.: limiting the extent (footprint) and duration period that areas are exposed. • The contractor must limit in-stream work to minimize streambank and bed disturbance. • Construct the Bombay Road Ext in the dry season. • No excavated, bedding or fill material may be stored within 32m of the Bayne's Spruit and the associated wetland.	
2.	There is the potential for erosion to take place along the route of the Bombay Road Ext within 32m of the Bayne's Spruit and the associated wetland due to earthworks and clearing resulting in downslope sedimentation.	7 (Medium)	The following measures must be carried out to mitigate against erosion along the Bombay Road Ext: • Areas that are not within the direct project footprint of the road must be demarcated as 'no-go' areas. • All construction activities associated with the road construction must be carried out with extreme care to avoid any erosion taking place. • Areas exposed or susceptible to erosion must be protected through the use of sand bags, berms and efficient construction processes i.e.: limiting the extent (footprint) and duration period that areas are exposed. • The contractor must limit ground disturbance and only clear areas prior to construction activities commencing with in the particular location. • No excavated material or fill material may be on slopes all material must be stockpile on flat stable areas of the site.	5 (Low)
3.	The habitat for fauna living within the construction footprint will be completely destroyed most notably HGM1 due to the clearing and grubbing of the site and construction activities taking place along route of the road.	8 (Medium)	The following measures must be carried out to mitigate against excessive and unnecessary habitat destruction for the Bombay Road Ext 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;	10 (Medium)

No.	Nature and Consequences of impact	Sig. rating of impacts[11]:	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
			• The project footprint must be kept as small as possible; • Direct impacts to Bayne's Spruit and the associated wetland must be avoided by ensuring the Bayne's Spruit and the associated wetland is demarcated as a 'no go' zone during construction. • Heavy machinery must not be permitted to move beyond the demarcated footprint; • Sand and aggregate for concrete must not be obtained from within the riverbed or riparian zone but must be sourced from a permitted source; • A spill containment plan is required to be in place prior to construction to minimize the potential impacts of spills or leaks of hazardous substances; • Contamination of the river system with unset cement must be prevented as it is detrimental to aquatic biota.	
4.	Clearing of the site resulting in the loss of vegetation within the Ngongoni Veld (SVs4) vegetation type. There will be clearing vegetation for the construction of Bombay Road Ext.	8 (Medium)	The following measures must be carried out to mitigate against excessive vegetation clearing on the Bombay Road Ext site: • This impact cannot be fully mitigated as it will result in the loss of indigenous vegetation found within the Ngongoni Weld (SVs4) vegetation type. • The vegetation that will be cleared must be restricted to the construction footprint of the road. No vegetation may be cleared outside the construction footprint other than that required for access to the site. • 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.	10 (Medium)
5.	Removal of alien invasive vegetation found along the construction site.	0 (Positive)	This is a positive impact.	0 (Positive)
6.	Careless operation by the contractor near the Bayne's Spruit resulting in damage to the Bayne's Spruit i.e. the riverbed, banks and riparian zones within the construction footprint and adjacent areas	6 (Medium)	The following measures must be carried out to mitigate against potential damage to the Bayne's Spruit during construction: • Areas of the Bayne's Spruit outside the construction footprint must be demarcated as no-go areas; • Heavy vehicles must not enter the Bayne's Spruit; • A 32m buffer must be imposed on the Bayne's Spruit with no traffic, vehicles or storage permitted within this buffer zone; • Vehicles may not cross the Bayne's Spruit at any point; • Non-essential equipment and vehicles are to remain at least	2 (low)

No.	Nature and Consequences of impact	Sig. rating of impacts[11]:	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
			32m from the Bayne's Spruit at all times.	
7.	Careless operation by the contractor near the wetland resulting in damage and/or loss to the wetlands within the construction footprint and adjacent areas	6 (Medium)	The following measures must be carried out to mitigate against potential damage to the wetlands during construction: • Areas of the wetland outside the construction footprint must be demarcated as no-go areas; • Heavy vehicles must not enter the wetland; • A 32m buffer must be imposed on the wetland with no traffic, vehicles or storage permitted within this buffer zone; • Vehicles may not cross the wetland at any point; • Non-essential equipment and vehicles are to remain at least 32m from the wetland at all times.	2 (Low)
8.	Construction activities resulting in the encroachment of alien vegetation into disturbed areas.	6 (Medium)	There is currently alien vegetation located within the surrounding area. • Alien vegetation must not be allowed to encroach onto the site and must be continually removed during construction. • Construction must not promote further alien plant disturbances in the surrounding area	2 (Low)
Indirect Impacts				
1.	Positive impacts for the community include potential for local employment.	0 (Positive)	This is a positive impact.	0 (Positive)
Operation				
Direct Impacts				
1.	An increase in hardened surfaces due to the construction of the Bombay Road Ext may increase stormwater runoff resulting in increased erosion of nearby areas and impacting on nearby the Bayne's Spruit River and the associated wetland.	10 (Medium)	The following stormwater management measures must be implemented to prevent erosion: • Stone pitching stormwater drains must be constructed to direct stormwater flow away from the road; • Gabion mattresses must be used for slope stabilization; • Kerb and channel drains may be required along steep sections of the approach roads.	8 (Medium)
2.	Infill of the wetland resulting in the loss of approximately 0.16 ha of wetland and its associated services.	8 (High)	As there will be loss of wetland (HGM1) an offset has been proposed. The specialist calculated that the wetland that will be lost measures 0.16ha and has a functional rating of 30% (E-Seriously Modified). Therefore, taking the existing functional rating into account and using the Hectare Equivalents methodology, which takes into account Functional Targets, Ecosystem Conservation Targets and Species Conservation Targets the offset needed was calculated to be 0.07 ha. Please note since no Red Data species were recorded during field investigations, therefore the Species Conservation Targets was not deemed necessary. As a result, the 0.07 ha represents both the Functional Targets and Ecosystem Conservation Targets. Working through the Msunduzi Local Municipalities Environmental Management Unit, another wetland was located downstream from the site as a potential offset wetland i.e. the Sobantu	3 (Low)

No.	Nature and Consequences of impact	Sig. rating of impacts[11]:	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
			wetland. The Sobantu wetland is approximately 14 ha with a functional value of 36% (E- Seriously Modified). Based on the calculation of by the specialist, it is envisioned that the overall functionality of the Sobantu wetland could be improved to a Largely Modified state (D) (47%). This would equate to an 11% increase in functionality of the existing Sobantu wetland. Using the Hectare Equivalents methodology described above the final hectare equivalent for the Functional Targets as a result of the improvements will be 1.02 ha and 4.90 ha for the Ecosystem Conservation Targets. This is a significant gain in both the wetlands functional and ecosystem status.	
3.	Loss of land which has been identified as a sensitive area as part of the Msunduzi Environmental Management Framework.	10 (High)	The entire road is also located in a sensitive area as identified in the Msunduzi Local Municipality's EMF under the following categories: High Wetland Constraint, High Biodiversity Constraint, High Flood Potential, High Water Quality Constraint, High Air Quality Constraint, and Very High Service Provision. There are no mitigation measures to this loss of land however as per the following: • High Wetland Constraint – Using the Hectare Equivalents methodology described above the final hectare equivalent for the Functional Targets as a result of the improvements will be 1.02 ha and 4.90 ha for the Ecosystem Conservation Targets. • High Biodiversity Constraint – due to the transformed nature of the site the loss of land due to the road is not seen as significant. • High Flood Potential - The road has been designed taking into consideration the floodlines of the adjacent rivers. The offset area will allow the wetland to perform a flood attenuation service. • High Water Quality Constraint – The road will not contribute to any form of significant pollution in the area. • High Air Quality Constraint – The proposed road will contribute to local air quality due to vehicle emissions however this will not be significant. The road won't increase the amount of road users in the area however it will rather reduce congestion. • Very High Service Provision - The road will aid in improving service provisions in the area.	5 (low)
4.	Loss of land which has been identified as irreplaceable as part of the Msunduzi Conservation Plan (C-Plan).	10 (High)	Although this impact cannot be avoided on site investigation by both the specialist and consultant has concluded that the alignment of the road is on mostly highly disturbed land due to the activities in the area. It must be noted there will be the complete loss of HGM1 however the offset strategy will have improvements in both functionality and ecosystem targets. However, the following mitigations can	5 (low)

No.	Nature and Consequences of impact	Sig. rating of impacts[11]:	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
			be implemented on site to limit the impact the road has on the local environment: • The contractor must build the road as per the layout plan, - 2016 06_PP_01/A • Conduct regular inspections and maintenance on the road when required. • Erosion protection features must be installed. • Implementation of the offset strategy.	
5.	Permanent access issues due to poor design of the intersections	11 (High)	Due to the redesign of the intersection at the start of the road there may be access issues the adjacent businesses. The engineer must ensure that the road is designed so that the access to adjacent businesses is not compromised.	6 (Medium)
6.	There will be an increase in both the Wetland Functionality Targets and Ecosystem Conservation Targets as a result of the offset strategy.	0 (Positive)	This is a positive impact.	0 (Positive)
7.	The road construction will improve access in the area for and will alleviate congestion.	0 (Positive)	This is a positive impact.	0 (Positive)
Indirect Impacts				
No specific indirect impacts				
Cumulative				
1.	Maintenance will be required for the road, meaning vehicles entering the area to work on roads more regularly.	6 (Low)	The maintenance of the road will only be conducted when required and for short periods of time to improve the road quality. The conditions of the EMPr must be adhered too.	4 (Low)
2.	Improved access through the area therefore reducing congestion at other intersection in the area.	0 (Positive)	This is a positive impact.	0 (Positive)

Standard Construction Impacts

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

No.	Nature and Consequences of impact	Sig. rating of impacts[12]:	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
Construction				
Direct Impacts				
No generic direct impacts				
Indirect Impacts				
1.	The increased risk to pedestrians and livestock due to construction activities.	6 (Medium)	The construction activity will pose an increased risk to pedestrians. • 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.	1 (Low)
2.	On site erosion due to improper management of stormwater by the contractor during construction.	5 (Low)	Areas exposed to erosion must be protected. The following apply to erosion control on site:	1 (Low)

[12] See Appendix H for more details.

No.	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:
			• Sand bags, berms, stone pitching must be used to control erosion from forming during construction. • No excavated material or fill material may be stored within the watercourses or within 32m of the watercourses. • Bedding material that will be re-worked may not be stored within 32m of the watercourses before it is used. • Temporary stormwater measures should be implemented to ensure that material does not wash off the surface into any watercourse during construction.	
3.	Dusty conditions generated during the construction of the Bombay Road Ext and the implementation of offset due to construction vehicles travelling over cleared areas.	5 (Low)	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: • 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.	1 (Low)
4.	Increase in heavy truck traffic along the existing roads as construction vehicles travel to the site for construction activities, impacting existing traffic conditions and pedestrians.	6 (Medium)	This cannot be avoided as traffic will increase during the construction phase temporarily (for a few months) until construction is completed. • All drivers associated with the construction must operate within the speed limits and due caution must be exercised especially when pedestrians are on the road. • All drivers must be appropriately licenced and trained.	1 (Low)
5.	Impact on any unidentified existing services on site.	8 (Medium)	No services identified on the site that will be impacted on: • As a standard construction practice the engineer and contractor must identify any potential existing services that may be affected prior to construction. • Any infrastructure that is removed must be replaced and any damage caused by construction must be repaired. • Should any new power lines be placed on site prior to construction, a 10m buffer must be placed between the existing power lines and the road.	4 (Low)
6.	Emissions from construction vehicles associated with the Bombay Road Ext and the implementation of offset.	7 (Medium)	The construction phase of the project will see the increase in vehicles moving through the area which will result in the increase of emissions into the atmosphere. • All construction vehicles operating on the site must be	5 (Low)

No.	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:
			fitted with the appropriate silencers and exhausts in order to reduce the emissions and noise into the atmosphere.	
7.	Temporary increase in waste and litter due to the construction process associated with the construction of the Bombay Road Ext and the implementation of offset.	7 (Medium)	The construction phase of the project will see an increase in construction staff on site and therefore an increase in waste on site. • Littering will not be permitted on site; • Designated waste storage areas with appropriate waste receptacles must be set up within the construction site camp; • Waste must 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.	2 (Low)
8.	Insufficient number of toilet facilities on site.	9 (Medium)	The increase in construction personnel during the construction phase will require an appropriate number of toilet facilities for the site. • Appropriate and sufficient toilet facilities (1 toilet per 15 employees) must be provided by the contractor; • All toilet facilities must be checked on a daily basis; • All toilet facilities must be emptied and cleaned on a weekly basis.	4 (Low)
9.	Inappropriate disposal of toilet waste resulting in the contamination of the environment.	6 (Medium)	The following mitigation measures must be adhered to: • All toilet facilities on site utilised by the construction personnel must be checked on a daily basis and emptied on a weekly basis by the contactor. • A registered waste removal contractor must remove sewage waste from site or sewage waste must be disposed of at a permitted Waste Water Treatment Site; • Safe disposal slips for the disposal of effluent waste must be obtained and kept on site as proof of safe disposal.	1 (Low)
10.	Generation of noise associated with the construction.	6 (Medium)	The construction phase of the project will see the increase in vehicles moving through the area which will result in the increase of noise. • All construction vehicles operating on site must be fitted with standard silencers to reduce the noise levels produced.	1 (Low)
11.	Damage to property and fences during construction.	7 (Medium)	The following mitigation measures must be adhered to: • All services must be identified prior to construction through notifying surrounding stakeholders prior to any potential traffic congestion; • The contractor must create alternative access routes to the properties where required; • The contractor must be aware of the stakeholders' movements and where possible, disruptive	3 (Low)

No.	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:
			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.	
12.	Unsustainable sourcing of raw materials such as gravel, sand, water etc. which could result in the promotion of illegal mining operations which can cause significant damage to the environment.	10 (Medium)	The construction of the Bombay Road Ext will require raw materials to be sourced and brought to site. • Contractors must provide proof of sustainable sourcing of materials i.e. permits for quarries and sand winning operations from which stone and sand have been obtained.	5 (Low)
13.	Positive impacts due to potential for local employment.	0 (Positive)	This is a positive impact.	0 (Positive)
Operation				
Direct Impacts				
No generic direct impacts				
Indirect Impacts				
No generic direct impacts				
Cumulative				
No generic direct impacts				

6.3 Technology Alternative 2

See Appendix H for the full impacts scoring matrix, which assesses the impacts on the above system. The construction impacts relating to the Alternative 1 and Alterative 2 are very similar. Therefore, the impacts below are the ones which differentiate the most between the two alternatives.

No.	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				
Direct Impacts				
1.	The construction of a gravel surface for the Bombay Road Ext will have a smaller construction footprint compared to a tar surface as less machinery will be required in the construction phase therefore there will be a smaller impact on the surrounding fauna and flora.	7 (Medium)	The following measures must be carried out to mitigate against excessive environmental disturbance associated with the Bombay Road Ext: • 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; • Direct impacts to Bayne's Spruit and the associated wetland must be avoided by ensuring the Bayne's Spruit and the associated wetland is demarcated as a 'no go' zone during construction. • Heavy machinery must not be permitted to move beyond the demarcated footprint;	5 (Low)

[13] See Appendix H for more details.

No.	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:
			• Sand and aggregate for concrete must not be obtained from within the riverbed or riparian zone but must be sourced from a permitted source; • A spill containment plan is required to be in place prior to construction to minimize the potential impacts of spills or leaks of hazardous substances; • Contamination of the river system with unset cement must be prevented as it is detrimental to aquatic biota.	
Indirect Impacts				
Indirect Impacts will remain as per Alternative 1				
Operation				
Direct Impacts				
1.	Release of dust during operation, impacting on surrounding neighbours.	10 (Medium)	There will be dust generated during operation when the road is in use. • The applicant must comply with the National Dust Regulations (Government Notice R827, 2013) with regards to dust levels produced on site. • If necessary water carts must be used on site should dust levels elevate to a nuisance level.	1 (Medium)
2.	Compared to a blacktop surface a gravel road will have less hardened surfaces i.e. gravel may increase stormwater runoff resulting in sedimentation of watercourses.	9 (Medium)	The following stormwater management measures should be implemented as part of the storm water management plan on a gravel road: • Stormwater pipes with inlets and headwalls, • Gabion mattresses for slope stabilization where necessary, • Cement grouting and stone pitching on steep slopes to prevent erosion, • Earth berms to direct stormwater flow off the road, • Subsoil drains where necessary, and • Kerb and channel drains along steep sections of the road. These measures would manage stormwater and ensure that: • The speed and direction of flow is reduced and controlled to prevent erosion, flooding and damage to nearby watercourses and the road infrastructure itself, • The gravel road will be properly cambered to allow stormwater runoff and prevent stormwater pooling on the road surface, • Stormwater will then enter the formal drainage system where it will be slowed and released in a controlled manner. • This impact can be managed and mitigated.	7 (Medium)
3.	Lifespan of the road.	7 (Medium)	Gravel roads are not designed for heavier traffic loads and are more appropriate for use in a less dense areas when compared to blacktop roads as they are less durable and hard wearing. This impact cannot be avoided.	5 (Low)
Indirect Impacts				
Indirect Impacts will remain as per Alternative 1				

No.	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:
Cumulative				
1.	Cost implications.	0 (Positive)	Gravel roads are less costly to construct then the blacktop roads.	0 (Positive)

Standard Construction Impacts
Generic impacts for both alternatives will be same for both alternatives.

6.4 Environmental Impact Statement as per section (l)

A number of key impacts associated with the road construction relate to those during the construction period. Issues such as damaging watercourses and the management of erosion need to be addressed. This can be best managed by minimising the clearing of vegetation to the construction footprint, treating all watercourses outside the construction footprint as sensitive no-go areas and by implementing effective stormwater measures. All construction activity is to be confined to the existing road footprint area. Should a large tree or section of dense indigenous vegetation require clearing, the ECO must be consulted before clearing takes place. All vehicles must use the existing road and operate within the existing route. No ad hoc roads/ turning circles may be used. Wetland HGM1 is expected to be completely removed. An offset strategy has been proposed and taking into account the gain in functionality the final hectare equivalent will be 1.02 ha for Functionality Targets and 4.90 ha for Ecosystem Conservation Targets. This is a 1:14 improvement in functionality of the wetland (HGM1). The contributions to ecosystem targets over the 14 ha Sobantu area has been calculated to be 4.90 ha, the hectare equivalent requirement was 0.07 ha. This is results in 1:14 and 1:70 offset ratios for Functional Targets and Ecosystem Conservation Targets respectively. This is a significant gain in both the wetlands functional and ecosystem status. The Sobantu wetland rehabilitation will require 4 main aspects to improve the functional and ecological state of the wetland. The aspects are landscaping, removal of domestic and solid waste from the wetlands, alien vegetation control, and reconnection of floodplain to main channel. Therefore, once construction is complete there should be no significant impacts related to the operation of the road as depicted in Figure 12 and 13 below.

Taking into consideration the above impacts and mitigation measures, it is the EAP's opinion that the construction of the Bombay Road Extension and the offset strategy be authorised.

Figure 13: Aerial Photograph Showing a Close Up of the Land Use and Locality of the Bombay Road Ext. Google Earth Image, 2018.

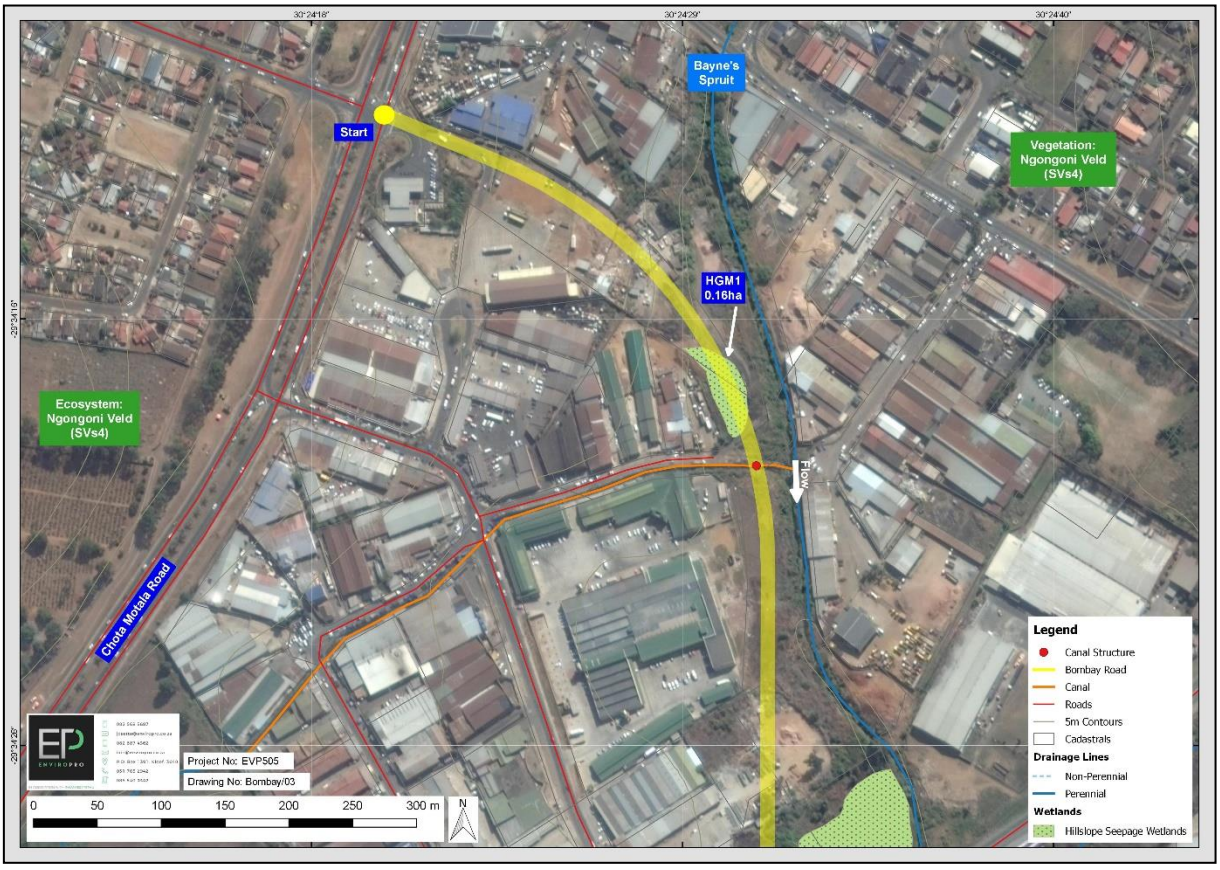
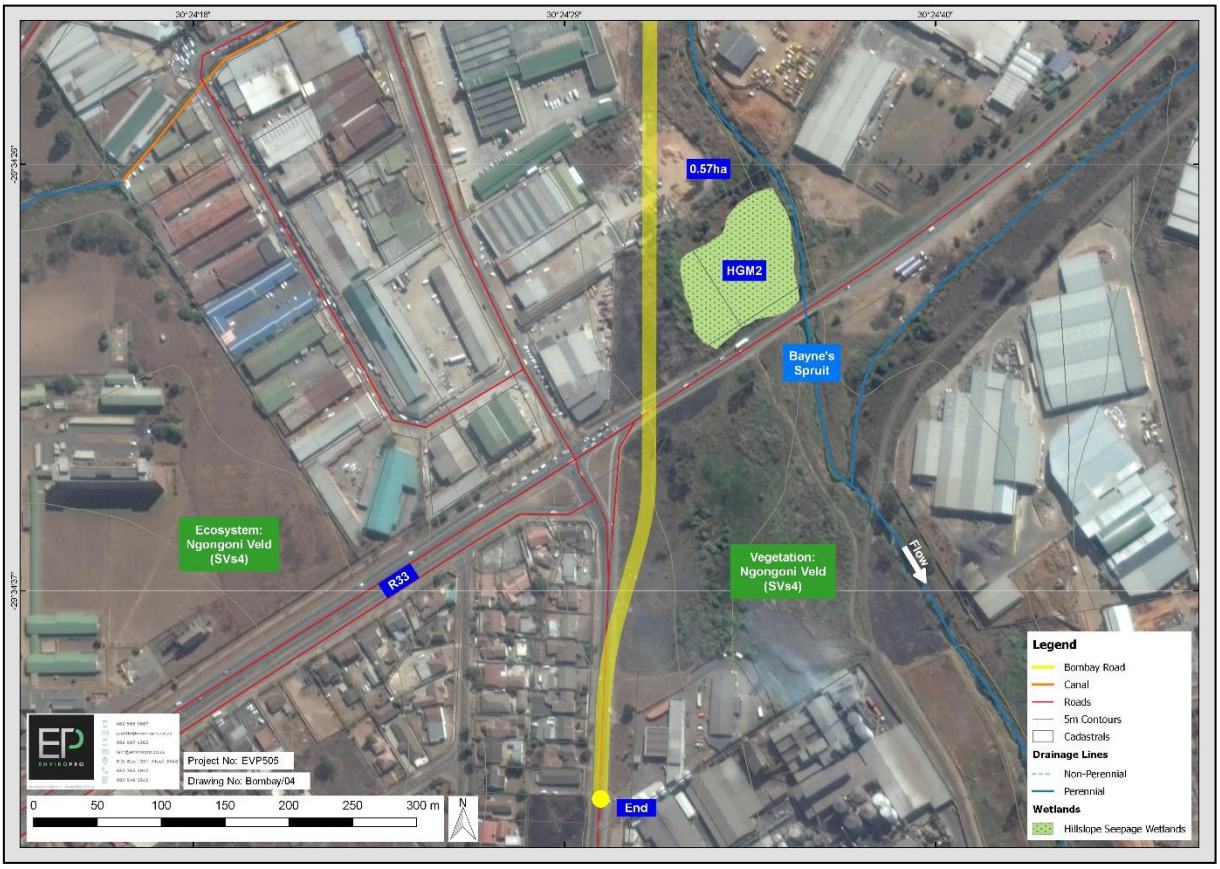


Figure 14: Aerial Photograph Showing a Close Up of the Land Use and Locality of the Bombay Road Ext. Google Earth Image, 2018.



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 with regards to the loss of the wetland (HGM1).
  - 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)

No specialist studies have been conducted on site to inform this assessment with regards to the ecological state of the vegetation species surrounding the road. Given the minimal clearing of vegetation required, the temporary nature and disturbed nature of the site, specialist input with regards to the vegetation was not deemed necessary for this assessment.

6.7 Period For Which Authorization Is Required, Proposed Monitoring and Auditing and Post Construction Requirement

Environmental authorisation is required for the construction of the road either within the 2018 or 2019 business plan for the Msunduzi Local Municipality, therefore the authorization would need to be valid for a period of five years, within which time construction would need to commence.

The offset strategy will be implemented at the same time as the construction related to the Bombay Road Ext. The offset strategy is the responsibility of the applicant i.e. Msunduzi Local Municipality and not the contractor appointed to undertake the strategy. Once the offset strategy has been implemented on-going maintenance

of the wetland will be the mandate of the Msunduzi Municipalities Parks Department. This will ensure that benefits as a result of the offset strategy are maintained going forward.

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 and for the implementation of the offset strategy. One post construction audit should be conducted once construction is complete.

Rehabilitation of the site must be undertaken by the appointed contractor and must be concluded one week prior to the contractor vacating the site. This will ensure that any outstanding items identified by the ECO and/or Engineer can be suitable addressed.

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)

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

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

With respect to the alternatives, it is recommended that preferred alternative 1, which is to blacktop the road and construct the road along the proposed route as well as the implementation of the offset strategy, be authorised. Impacts associated with the project are considered 'low' if all mitigation measure in this report are adhered to.

6.10 Summary of Recommendations for the construction of the Bombay Road Extension:

Stakeholders, Properties & Services

- As standard construction practice the engineer and contractor should identify all existing services that may be affected prior to construction.
- The contractor should liaise with local road users regarding restriction of access during construction.
- Where fences or structures have encroached into the road reserve, property owners will be notified and these may need to be removed. This will however be negotiated before any activity occurs. The contractor will work with the local representatives to ensure that landowners are aware of where their fence lines encroach into the road reserve.
- It is suggested that any structures that need to be removed, should be replaced and any damage repaired.

Traffic & Construction Vehicles

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

Housekeeping, waste management, storage, and materials handling

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

Dust and erosion control

- A water cart should be used to dampen dusty surfaces and suppress dust.
- Exposed areas should be rehabilitated and re-vegetated as soon as possible during construction.

- Areas exposed to erosion must be protected through the use of sand bags, berms and efficient construction processes i.e.: limiting the extent (footprint) and duration period that areas are exposed. The contractor must ensure that any blockages created during construction are resolved.

Stormwater management and protection of watercourses

- The engineer/contractor must ensure that only clean 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 within 32m of any watercourse.
- Only the area directly in the path of construction may be cleared and excavated. The remainder of the watercourses must be demarcated as a 'no-go' area.
- Heavy vehicles should avoid working near the watercourses as much as possible.
- Stormwater structures to be implemented to ensure that water does not erode the road surface leading to loss of material, which will enter waterways.
- Stormwater may 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, requires that operations that expose archaeological or historical remains should cease immediately, pending evaluation by the provincial heritage agency.

Specific conditions – Bombay Road Extension

- Vehicles must only use the designated crossing points.
- Heavy vehicles must remain at least 32m away from the watercourse unless required for construction purposes.
- No storage may occur within 32m of the watercourse.
- Stormwater outlets must be fitted with erosion protection measures.
- To ensure impacts due to the loss of the wetland are addressed offset area must cleared, reshaped, and vegetated whereby encouraging the formation of a wetland in an area which have been previously transformed due to development in the area.

Appendix A: Drawings & Maps

Appendix B: Specialist Reports

Appendix C: Noticeboard

Appendix D: Notification

Appendix E: Adverts

Appendix F: Registered I&APs

Appendix G: Comments and Responses

Appendix H: Impacts Scoring Matrix

Appendix I: EAP Declaration

Appendix J: Environmental Management Programme