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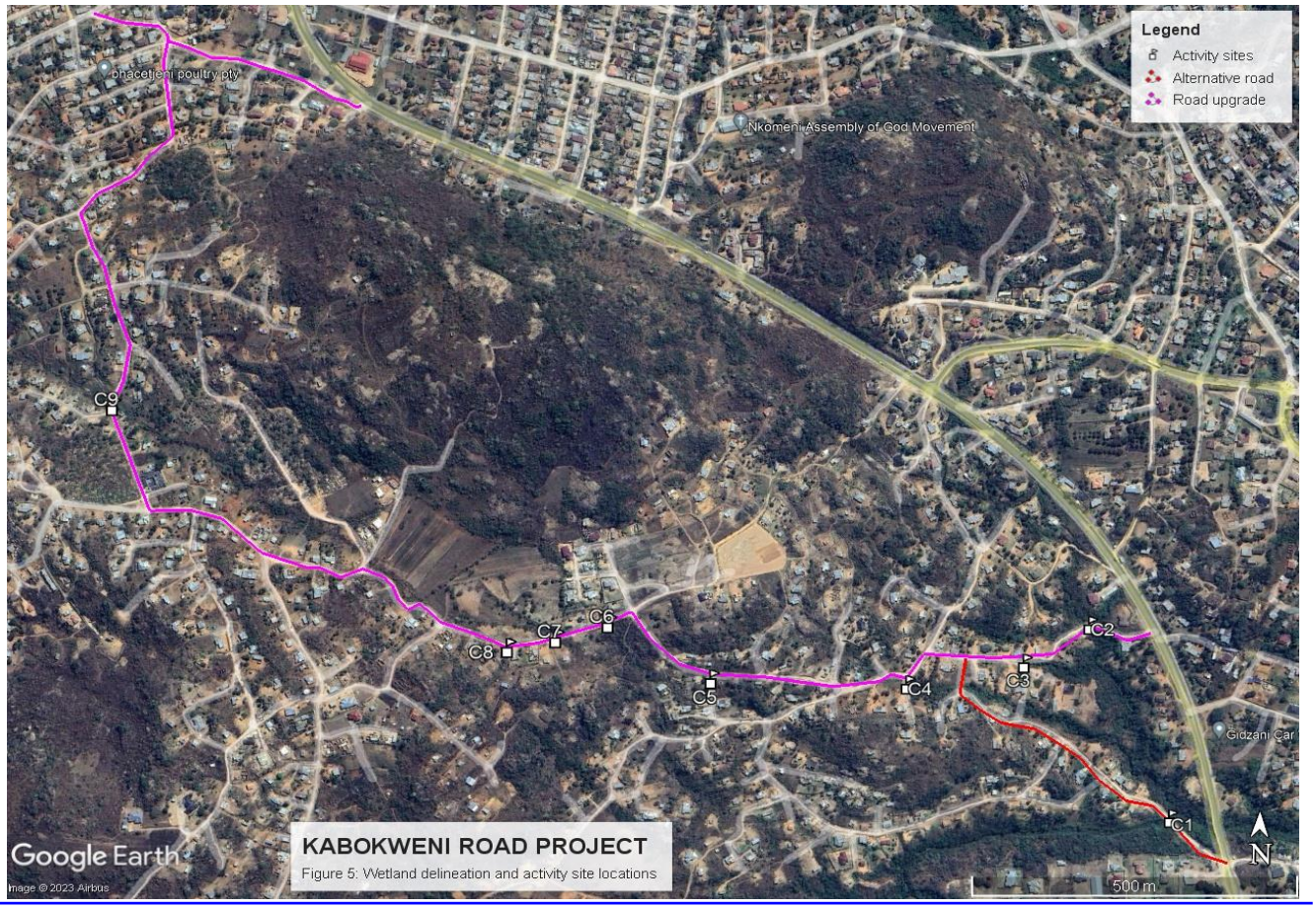
DRAFT BASIC ASSESSMENT REPORT FOR THE CONSTRUCTION OF CULVERT BRIDGES ON JOE SLOVE ROAD AT HLAWU -HLAWU WITHIN WARD 11 OF THE CITY OF MBOMBELA LOCAL MUNICIPALITY - PULANAGA PROVINCE



KABOKWENI ROAD PROJECT
Figure 5: Wetland delineation and activity site locations

DRAFT BASIC ASSESSMENT REPORT FOR CONSTRUCTION OF CULVERTS DURING THE PAVING OF JOE SLOVO STREET AT HLAWU-HLAWU WITHIN THE CITY OF MBOMBELA LOCAL MUNICIPALITY IN MPUMALANGA PROVINCE

THIS BASIC ASSESSMENT REPORT IS CPILE IN SUPPORT OF TERMS OF THE:

- NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998), AS AMENDED,

PREPARED BY

1. : Themba Mthethwa

Signature

2. : Ndivhuwo Khansthsi

Signature

DATE...2013/02/06

REVIEWD BY

APPROVED BY RESPONSIBLE EAP:

Danie van der Walt

DATE 2022/02/13

Signature: 

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1. BACKGROUND

On behalf of the City of Mbombela Local Municipality, Dlombe Lekhuleni appointed NEDA, which is in strategic partnership with AEB, to undertake the environmental services required for the construction of bridge culverts during the road upgrade from gravel to pave of Joe Slovo Street at Clawu-Clawu in Ward 11 within the City of Mbombela Local Municipality in the Mpumalanga Province.

The proponent seeks to maintain the existing road alignment and intends to remain within the existing footprint of the road. This road upgrade does not trigger any listed activity since it does not widen any part of the road by four meters or lengthen the road by one kilometer. However, upgrade work within the regulated area of the water course will trigger Activity 19 of GN R 387 of June 2017 as per NEMA 107 of 1998 as amended.

As such, a Basic Assessment will be required as well as a general authorization for water uses in terms of Section *21(c) for impeding or diverting the flow of water in a watercourse and (i) altering the bed, banks, course, or characteristics of a watercourse, or within the regulated area of a watercourse* as defined in the National Water Act 36 of 1998 for abstraction and the construction of culverts, headwalls, and scour protection.

2. LEGAL REQUIREMENTS APPLICABLE TO THIS PROJECT

2.1. National environmental management act (act no. 107 of 1998)

The proponent is required to undertake a Basic Assessment (BA) in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) as amended and the Environmental Impact Assessment Regulations (2014) as published in the Government Gazette 3822, Notice No. GNR 982 amended by GNR 326. This Basic Assessment Report (BAR) has been prepared to satisfy these requirements. Activities to be carried out during the proposed development that triggers the requirement of a Basic Assessment Report are found in the Listing.

Table 1: Notice 1 (GNR 983 amended by GNR 327) and are: -

Government Listing Notice	Activity No.	Description as per the regulations	Description as per the project description

Listing Notice 1	12	The development of - (iii) culverts exceeding 100 square meters in size; (v) weirs, where the weir, including infrastructure and water surface area, exceeds 100 square meters in size; (xii) infrastructure or structures with a physical footprint of 100 square meters or more; Where such development occurs – (b) within a watercourse; (d) If no development setback exists, within 32 meters of a watercourse, measured from the edge of a watercourse. Excluding – (dd) where such development occurs within an urban area; or (ee) Where such development occurs within existing roads and road reserves.	The construction of the culverts will be occurring within a watercourse. .
	19	The infilling or depositing of any material or more than 10 cubic meters into, or the dredging, excavation, removal, or moving of soil, sand, shell grit, pebbles, or rock of more than 10 cubic meters from: (i) A watercourse.	During the construction of the culverts at the Affected watercourse crossing, material, soil, and rock may be removed and construction material will be deposited within a watercourse.

2.2. National water act (act no. 36 of 1998)

The proposed road realignment requires a water use license authorization in terms of Section 21(a), (c), and (i), following the provisions of the National Water Act of 1998 (Act No. 36 of 1998).

Table 2: National Water Act (Act NO. 36 of 1998)

Activity Number	Water Use	Description
Section 21 (a) of NWA, 1998	Taking of water	Taking of any water from a watercourse, i.e., to be used for cement mixing, wetting of roads (dust suppression), and road compaction.
Section 21 (c) of NWA of 1998	Impeding or diverting the flow of water in a watercourse	Impeding flow means the temporary or permanent obstruction or hindrance to the flow of water into a watercourse by structures built either fully or partially in or across a watercourse. Diverting flows means a temporary or permanent structure causing the flow of water to be re-routed in a watercourse for any purpose.
Section (i) of NWA of 1998	Altering the bed and banks of a watercourse or characteristics of a watercourse	Altering the bed and banks means any change affecting the resource quality of the watercourse (they are within the riparian habitat or 1:100-year flood line, whichever is greatest).

2.3. National forests act (act no. 84 of 1998)

The National Forests Act (Act No. 84 of 1998) (as amended) provides the most comprehensive legislation and mandate for the protection of all natural forests in South Africa. Section 7 of the Act prohibits the cutting, disturbance, destruction, or removal of any indigenous living or dead tree in a forest without a license, while Section 15 places a similar prohibition on protected tree species listed under the Act.

According to this Act, the Minister may declare a tree, group of trees, woodland, or a species of tree as protected (forest). The prohibitions provide that "*no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a license granted by the Minister."*

Any disturbance, removal, pruning, or transplanting of this species would require a license from the administrators of the National Forests Act, who are an extension of the Department of Agriculture, Forestry and Fisheries (DAFF). When the road is marked out, any vegetation that needs to be removed, transplanted, or disturbed must be identified and the appropriate permit applied for. A botanist must be available during the marking of the route to identify these species.

2.4. National environmental management: biodiversity act (act no. 10 of 2004)

In terms of the Biodiversity Act, the developer has responsibility for:

- The conservation of endangered ecosystems and restriction of the activities according to the categorization of the area (not just by listed activity as specified in the EIA regulations).
- Promote the application of appropriate environmental management tools to ensure integrated environmental management of activities, thereby ensuring that all development within the area is in line with ecologically sustainable development and the protection of biodiversity.
- Limit further loss of biodiversity and conserve endangered ecosystems.

This act, together with the Conservation of Agricultural Resources Act (Act No. 43 of 1983), must be adhered to eradicate and control alien invasive vegetation found within the proposed road reserve.

2.5. conservation of agricultural resources act (act no. 43 of 1983) as amended in 2001

Declared Weeds and Invaders in South Africa are categorized according to one of the following categories:

- Category 1 *plants are prohibited and must be controlled.*
- Category 2 *plants (commercially used plants) may be grown in demarcated areas if there is a permit and steps are taken to prevent their spread.*
- Category 3 *plants (ornamentally used plants) may no longer be planted; existing plants may remain, if all reasonable steps are taken to prevent their spreading, except within the flood line of watercourses and watercourses.*

2.6. Permit/license requirements

In terms of the National Forests Act, 1998 (Act No. 84 of 1998) and Government Notice 1339 of August 6, 1976 (promulgated under the Forest Act, 1984 (Act No. 122 of 1984) for protected tree species), the removal, relocation, or pruning of any protected plant or three or more indigenous trees will require a Department of Agriculture, Fisheries, and Forestry (DAFF) license.

Table 3: **Additional Applicable Legislation Policies and or Guidelines**

Title of legislation, policy, or guideline	Administering authority
South Africa's Constitution (Act 108 of 1996), specifically the Bill of Rights (Chapter 2, Section 24)	The State
Hazardous Substances Act (Act 15 of 1973)	Department of Health (DoH)
The Occupational Health and Safety Act (Act 85 of 1998)	Department of Health (DoH)
National Environmental Management: Waste Act (Act 59 of 2008)	National or Provincial Department Responsible for Environmental

3. REQUIRED AUTHORISATION

This Basic Assessment Report is being compiled following EIA Regulations' Appendix 1 of GNR 324 of June 2017 for Listing Notice 1 Activity 19 of GNR 327 of 2017. The Mpumalanga Department of Agriculture Rural Development, Land and Environment Land Affairs is the competent Authority. A water use license application will be lodged with the Inkomati Usuthu Catchment Management Agency (IUCMA) as well in terms of Section 21(a), (c), and (i) of the National Water Management Act 36 of 1998.

Furthermore, according to the NEMA amended 2014 EIA Regulations (2017), any borrow pit requires a Basic Assessment (BA) Process to be undertaken as borrow pits will clear indigenous vegetation. The Department of Mineral Resources and Energy is the authority responsible for ensuring compliance by the entities and persons that are undertaking borrow pit activities. It is however imperative to highlight that, following the delisting of activities exempted in terms of Section 106 of the MPRDA, in 2017, the activities that are currently undertaken by the exempted state-owned entities are excluded from this compliance monitoring.

Should the proposed activity exceed the threshold as per GN R982 of the EIA Regulations, 2014, a Basic Assessment (BA) Process must be undertaken in such a manner that the environmental outcomes, impacts, and residual risks of the proposed listed activities being applied for are noted in the BA Report and assessed accordingly by the Environmental Assessment Practitioner (EAP).

4.NEDA COMPTENCY

4.1. DANIE VAN DER WALTT

Personal information	Name: Danie van der Walt Nationality: South African Identification number: 6805305147080
Relevant Tertiary Education & Courses	**Tertiary education:** • M.Sc. (Zoology) cum laude, 1993. Title of script: An evaluation of the allozyme variation as well as the effect of cryopreservation of semen on the genetic selection of the African catfish (*Clarias gariepinus*). **Accredited Courses** • Implementing integrated management systems (SHEQ): ISO9001, ISO14001 and OHSAS18001. Centre for Environmental Management, North-west University, Potchefstroom, October 30 – November 4, 2005. • Wetland Training: Delineation, Functions and Rehabilitation of Wetlands. University of Pretoria, Rietvlei Nature Reserve, May, 2006. • Environmental Impact Assessment (NEMA Regulations). Centre for Environmental Management, Northwest University, Potchefstroom, May, 2007. • OHS Act and Regulations (Act 85 of 1993). Department of Labour, Gauteng, September, 2010.

	Short Courses and Practical Workshops • Fish Index Validation: Field Testing. DWAF Guidelines. Waterval-Boven. 2006. • Short Course: Soil Classification and Wetland Delineation. Terrasoil Science. Nelspruit. February 2009. • DWAF: Directorate: Water Abstraction and In-stream Use: Training course for section 21 (c) and (i) water use authorization. Pretoria, November 2010.
Professional Affiliation/s	• Professional Natural Scientist, SA Council for Natural Scientific Professions Reg No: 129707 • EAPASA Reg No: 2021/3917.
Employment Record	Employed since 2003 as a free-lance Environmental Scientist as individual or as subcontractor to larger firms.
Relevant Experience	Graduated with Botany and Zoology as main subjects. Post graduate subjects include freshwater ecology, terrestrial ecology and field assessments. 20 Years of experience in the field of vegetation, animal and biodiversity assessments and report writing for EIA purposes. 20 Years of experience in Environmental Management: Including EIA applications as well as Water Use License Applications.
Specialist subjects	Aquatic Ecologist: Aquatic ecological assessments and bio-monitoring, wetland delineations and assessments; Biodiversity Specialist; Biodiversity assessments; Botany & Terrestrial Ecologist: Vegetation and terrestrial ecological assessments.

4.2 DOCTOR MTHETHWA

Personal information	Name: Doctor Johannes Mthethwa Nationality: South African Identification number: 6706235272081

Relevant Tertiary Education & Courses	**Tertiary education:** • Post Grad Cert Environmental Law • Post Graduate Certificate in Water Law **Accredited Courses** • US EPA 1997 Principles of Solid Waste Management • Wits Graduate School of Governance 1998 Executive certificate Management of Mining and Mineral Policy • Wits Graduate School of Governance) 1989 Executive certificate Environmental Policy and Management in Mining and Minerals
Professional Affiliation/s	• INTERNATIONA ASSOCIATION OF IMPACT ASSESSMENT (IAIA)
Employment Record	Started NEDA in 2006 till today
Relevant Experience	Setting up Community Based Natural Resources Management, Minerals and Mining Plans. Compilation of Environmental Due Diligence Processes, Environmental Compliance Auditing, Environmental Risk Assessments and Environmental Financial Provisioning and Closure Planning.
Specialist subjects	Environmental Crimes Intellectual Property and Corporate Law International Trade and Environmental Justice

5. LOCATION OF THE ACTIVITY

The proposed project is situated on Farm Mbuyane (960-JU) within the Mbombela Local Municipality, Mpumalanga Province.

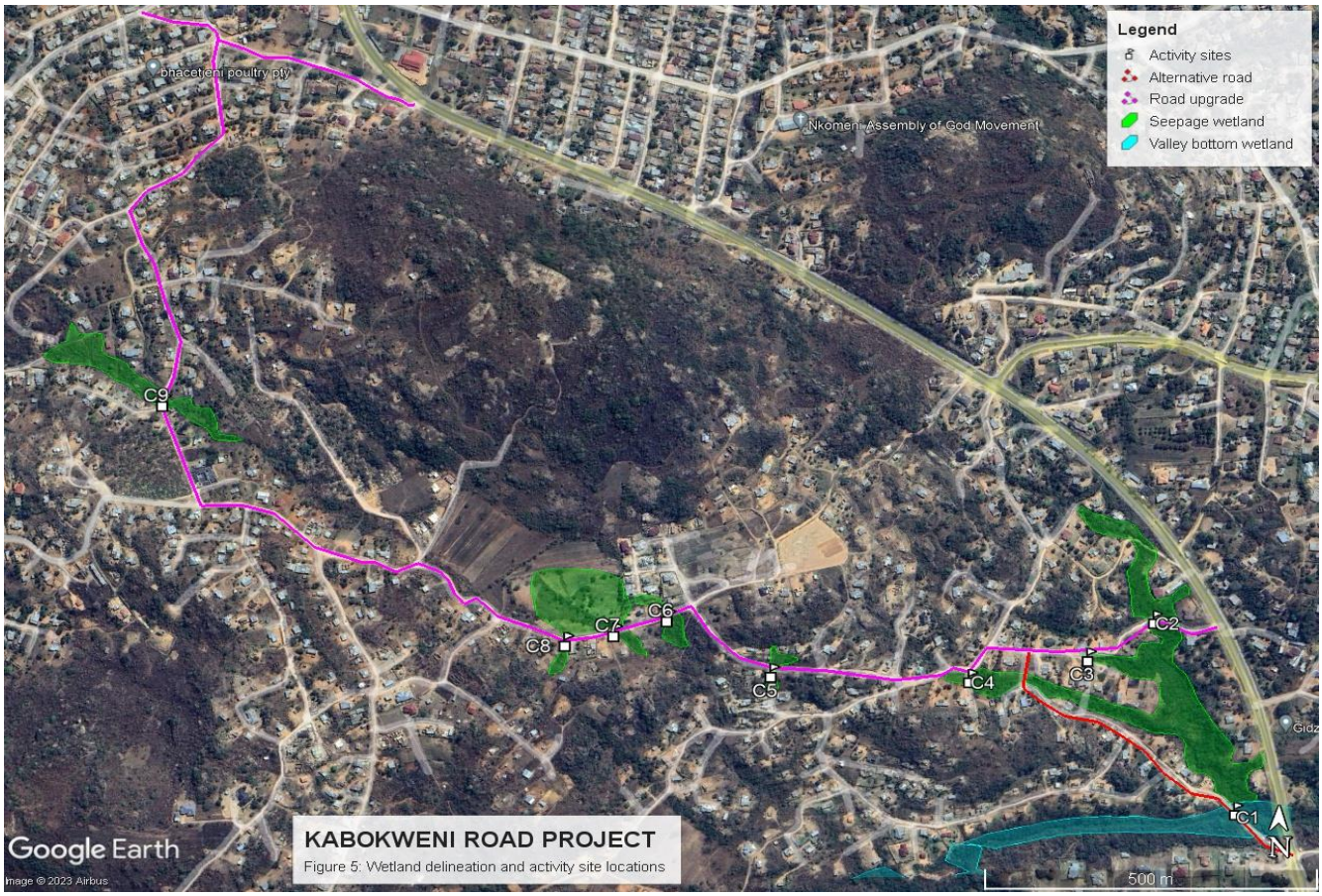

Figure 1: LOCALITY MAP OF THE PROPOSED ACTIVITYSHOWING ALL THE PROPOSED CULVERT

6. NEEDS AND DESIRABILITY

6.1. The need

It is widely recognized that apartheid was the ultimate form of structural violence that forced hundreds of thousands of black South Africans into informal settlements with no services and roads that were unpaved, dangerous with potholes, and due to heavy rains, hardly navigable because of mudslides.

It is common knowledge that bad roads adversely affect people in countless ways and thus make them poorer. Poor road networks affect the delivery of services to the community. The poor state of rural road networks affects not only the transport of goods and services but also economic growth. Having a poor road system makes it more difficult for children to go to school and more expensive for residents to bring their local produce to the markets.

Sustainable Development Goal (SDG) number 9 emphasizes physical access through the improvement of rural roads, industry, innovation, and infrastructure (UNDP, 2015). This is one of the major drivers for achieving some of the other SDGs, such as ending poverty in all its forms. Therefore, the importance of rural roads extends to all aspects of the economic and social development of communities and the entire country.

6.2. Desirability

A good road network with its associated culvert bridges is a critical component of a nation's infrastructure, making it possible to ship raw materials and finished goods to factories, warehouses, suppliers, distributors, stores, and end-consumers. Culvert bridges also facilitate travel, so consumers can purchase goods and services in their communities and beyond. When a culvert bridge collapses, economic activity slows or grinds to a complete halt.

6.2.1. Employment benefits

Wages earned by culvert construction and maintenance workers have a positive economic impact when used to buy things in the local area. An investment in wages and the related consumer spending that result from it is proven to pay off many times over. Culvert bridges increase cash flow when they serve roads that join two places that complement each other economically. It can have a powerful impact when an area that has a large money supply is connected to one that has goods or services to sell or people who need work. The same is true when a community that has raw materials gains easy access to another that has factories able to convert them into saleable goods. It is obvious from the information provided above that the competencies sought in this basic assessment are important and therefore desirable.

6.2.2. Conformance with IDP

The city of Mbombela has been hard at work through its Intergrade Development Planning (IDP) to redress the ills of the past. One of these efforts is the currently proposed upgrade of Joe Solve Road. By building the culverts applied for in this EIA during the construction and upgrade of the Joe Solve Road, the City of Mbombela aspires to make a powerful impact on people's lives in Hlawu-Hlawu.

Additionally, this road development will bring social, cultural, and economic changes in the lives of the people in terms of providing connectivity between people and places and thus helping to reduce poverty by enabling direct market access to the rural producers. It is a fact that if roads in an area are well-developed and properly maintained, travel time is reduced and access to local markets, workplaces, educational institutions, and medical and health services is increased.

6.2.3. Benefit to society

Societal Benefits from improved road connectivity are delineated point-wise in the following:

- Safe, paved roads with appropriate drainage systems using culvert bridges that can be used in all weather conditions mean that people who once suffered at home or died in transit can now reach modern medical care;
- Women would have better access to pre-natal and post-natal health care. Also, other facilities like access to education would enhance the social status of women.
- Health workers will also be able to achieve a 100% immunization rate in many villages that can be reached by modern roads;
- Lives will be saved, as the ambulances can reach the villages where there was no road in the past;
- The improved roads enabled people, particularly women, to find jobs, commute to work and school, and go to clinics and hospitals more quickly and safely;
- An improvement in the employment situation in terms of more job opportunities, avenues for self-employment, and so on, will be generated;
- More people will be going to nearby towns and villages for odd jobs like selling wood, vegetables, dairy products, and locally made items like pickles, and so on, which in turn will generate employment opportunities;
- Also, the cottage industries, handicrafts, and agroindustry will flourish from improved road connectivity;
- Good road connectivity will result in increased school enrolment and school attendance, especially, in the number of girls and boys going to school. Parents will be more confident about sending their daughters to schools unescorted;
- Road connectivity will improve the quality of life as access to cultural and religious places is also improved.
- Small and petty village traders may tap the bigger markets, transport the agriculture produces and crops fast, and get higher profit margins instead of depending solely on local markets and the middleman;
- Better road connectivity will increase sources of income and increased income will help in reducing debts and increase the buying power of the people, thus improving overall standards of living;

Finally, it is concluded that the effectiveness and impact of the culverts applied for in this Basic Assessment are core aspects of the road paving projects that will connect poor, vulnerable, and

isolated communities to schools, services, and markets, which is key to socioeconomic development. It is imperative to understand that road infrastructure, such as culverts and bridges, plays a profound role in reducing poverty.

7. ALTERNATIVES CONSIDERED

7.1. Site Alternative

The preferred site alternatives are located where unsafe makeshift means of crossing are being used to cross the water course on the existing road. The proponent seeks to upgrade these existing, unsafe road structure, which is sometimes made of logs or loose stones on the existing road. No deviations or alternative roads and associated culverts are considered from the existing footprint, and this is a sound solution that takes due account of landowner requirements, financial considerations, engineering challenges, heritage concerns, and environmental considerations.

There are no other existing stream crossings or culverts along the road that can be upgraded to achieve the level of service that the households in the affected community require. Maintaining and upgrading the existing infrastructure is the only feasible means of providing basic services to the affected community. Therefore, no other site alternatives have been investigated. In summary, the proposed culverts construction considers items of ecological importance and is acceptable to the community. This site alternative is therefore considered the preferred site alternative.

7.2. Design alternative

When considering the type of activity to be used for stream crossing both culverts and bridges were considered since they shared common functionalities. However, bridges differ from culverts because bridges tend to be big and self-supporting. Therefore, bridges must have a stable and deep foundation along the span length. The components of a bridge largely break down into three parts: the superstructure, the substructure, and the foundation. Superstructure: Deck and Girders Substructure: Abutments, Pier, Pile Cap Foundation—Pile Bridges allow for the natural flow of water, limiting their impact as compared to a culvert.

Bridges are typically designed with their low chord above the 100-year elevation. A bridge design always recommends a set minimum above the 100-year flood elevation. This element of bridge design

helps to increase flood flow area, provide debris clearance, and reduce the overall risk of adverse impacts during flood events.

Bridges were not ideal for the Joe Slovo Road because of the size of the watercourses to be crossed. The affected waterways are too small for a bridge. Furthermore, bridges tend to cost more than culverts by comparison.

On the other hand, culverts are simpler structures and designs that require less time and labor and are ideal for low-lying stream crossings. A wide variety of structural shapes were considered. These are closed conduits and open-bottom culverts. The most common shapes of closed conduit culverts are circular, rectangular, pipe arch, and elliptical. The components of a culvert consist of pipes or boxes, a top and bottom slab, and supporting walls, like wing walls. Since the pipes and boxes only go as far as the bottom of the stream, culverts do not require deep foundations. Spread footing or pile footing provides sufficient stability. Culverts are manufactured in different sizes, cross-sectional shapes, and materials depending on design criteria and site conditions. Various cross-sectional shapes and culvert sizes are often used to meet specific hydraulic requirements. Also, culverts are manufactured with various materials depending on the required structural strength as well as environmental conditions (corrosion, chemical attack, and abrasion). Culverts were selected for use in the Joe Solve Road upgrade as they are deemed fit for the size of the water courses to be channeled.

7.3. Technology to be used in the activity.

Thedeveloper have chosen to continue to maintain box culverts for this proposed watercourse crossings. Box culverts are manufactured as rectangular structures and have the same material used along their entire cross-section. The selection of the shape was based on several factors, including hydraulic capacity, headwater depth, road and embankment cover depth, type of aquatic habitat that may use the culvert for migration, minimum embedment depth, and abrasion control (i.e., scour effects).

The chosen culverts are open-bottom culverts, which use the basin of the flow stream as the bottom of the culvert and require lining with gravel, or mortar for scour protection purposes. Consideration was taken into account that steel and aluminum have higher ductility and tensile strength which makes them suitable for a wider variety of culvert shapes and sizes. Metal culverts are prone to a series of defects such as corrosion, permanent deformation, cracking, and loose connections therefore were not a preference for this project.

7.4. Operational aspects of the preferred activity

The box culvert was chosen after determining the amount of flow that can be expected to reach the culvert. Key parameters that dictated the amount of flow reaching the culvert considered included the land type upstream (developed), the size of the watershed, the topography, the soil type, and the storm frequency that must be conveyed. The effects of scouring were also considered in particular the velocity at the inlet and the outlet of the pipe.

Furthermore, environmental considerations taken into account when choosing the box culvert were its ability to allow the movement of many types of aquatic life from different water bodies. Factors considered were the ability to be embedded below the stream bottom to ensure no disruption of flow could prevent biota movement. Another environmental consideration considered when choosing the box culvert was the fact that the box culvert is precast out of site. All pollution associated with the cast on the site of the culvert is prevented.

7.5. Proposed upgrade methodology.

Before the commencement of works, the contractor would be required to produce detailed watercourse crossing proposals within the Construction Environmental Management Plan (CEMP), which would contain the construction details for each proposed watercourse crossing. The construction Contractor will have overall responsibility for undertaking these water crossings and producing final watercourse crossing proposals.

The detailed design of each watercourse crossing shall seek to ensure hydraulic conveyance is maintained to prevent any restriction of flows, as well as allow the free passage of riparian mammals and aquatic ecology.

Where closed culverts are employed, they shall be oversized such that the base of the culvert may be below the natural bed level of the watercourse allowing the naturalization of the culvert bed substrate. Culverts shall follow the natural flow path and gradient of watercourses to which they are installed and shall be designed such that they do not represent a barrier to aquatic fauna. Culverts shall not include screening.

Detailed flow calculations would be undertaken by the Civil Engineer to inform detailed design and to inform applications for water use authorization. Splash boards and run-off diversion measures,

including silt fencing adjacent and parallel to watercourses beneath crossings, will be used at all crossings during construction to prevent direct siltation of watercourses.

To ensure that all drainage measures employed during the construction phase of the Proposed Development are maintained appropriately and remain effective, the performance of the drainage measures will be monitored. The drainage management works will, therefore, be supervised by the ECO. All monitoring and supervision of the drainage management work will be recorded.

Greenfield 'clean' run-off and roadside run-off will be kept separate where possible and be channeled separately to suitably vegetated areas at least 32m from watercourses to allow the settlement of solids and other pollutants. Where settlement over vegetation is not ecologically sound or where this is not practical due to the type or scarcity of vegetation cover and/or available area, silt traps or settlement lagoons will be utilized and monitored to ensure stored surface water is kept to a minimum.

The culverts used will be long enough so that the road fill does not extend beyond the end of the culvert. Check dams will be installed immediately above a cross-drain inlet, and silt traps are required at the inlet points to prevent blockage due to silt buildup.

7.6. Storm water pollution, erosion, or siltation:

- The site, water system, and attenuation ponds shall be left free from erosion, silting, pollution, and/or unwanted material, and should be cleaned out and maintained periodically under a monitoring program.
- Attenuation ponds are to be vegetated especially at the discharge points to prevent dissipation of the flow of water and prevent excessive erosion from occurring.
- The contractor is to ensure that should there be any excessive quantities of sand, silt, and silt-laden water, do not enter the storm water system.
- The design of the storm water system is to ensure that it does not harm the natural systems.

7.7. NO-GO Alternative

The ‘No-go’ Alternative is not to construct a culverts for stream crossing thereby depriving the community of to use of safe stream crossing thus possible stoping thre roa upgrade or allowing the existing culvert infrastructure to continue to deteriorate with the concomitant reduction in service delivery to local households.

This will increase the risk of accidents espcialy drawning and poor lack of access to the Clawu Clawu community. In time the section of the road that connects to the main road could become considered

an unreliable means of accessing the other reaches of the community and local community members, may seek alternative, widening existing tracks through the surrounding vegetation, resulting in potentially significant environmental impacts.

By not upgrading the culverts the developmental and service delivery imperatives in the IDPs for the respective Local and District Municipalities will not be realized. Local job opportunities will be lost, and the associated stimulation of the local economy will not manifest. In summary, the no-go alternative is not feasible in the short term (failure to meet municipal planning and service delivery imperatives) or in the medium and long term (neglect of community an infrastructural asset).

8. PHYSICAL CHARACTERISTICS OF THE SITE

8.1. Climate

The area has a sub-tropical climate and is in the Lowveld. The site is located in a summer rainfall zone. The average annual rainfall for the Hlawu Hlawu area is averaged at 600 to 700 mm with the highest rainfall and daily temperatures between October and March. The summers are extremely hot and humid. The winters are dry and cooler. Summer temperatures rise as high as an average of 36°C whilst winter temperatures can average between 0.8˚C night-time to 23˚C daytime temperatures.

8.2. Topography

The farm topography has an overall relatively steep gradient. The area generally slopes toward the South. Different areas also slope toward the drainage lines/tributaries. There are several rocky outcrops and higher-lying areas and slopes, especially on the more southern-northern part of the site.

8.3. Regional ecology & biodiversity

Nationally, the site is situated within the Lowveld Sour Bushveld (A9) veld type according to Acocks (1988), or Sour Lowveld Bushveld according to Low & Rebelo (1998) and Schmidt *et al* (2002). However, these classifications are very broad and may include several sub veld types of importance. The more detailed vegetation classification system of Mucina & Rutherford (2006) is used to classify the regional veld units and important ecosystems that are present.

The Mpumalanga Department of Economic Development, Environment and Tourism's Intrinsic Biodiversity Plan (MBC-plan) identifies Provincial priority areas based on specific ecological, faunal,

floral, and other biophysical criteria (Lötter, 2006). According to this plan, the area is rated as an aquatic *Ecological Support Area*, this is specifically an important sub-catchment and fish support area.

8.4. Paleontology

Figure 2: Graveyard alongside the proposed road upgrade

Although there are graves on the sides of the road. The proposed road upgrade does not constitute the construction of a new road, The upgrade is intended to remain within the existing road alignment, Some sctions of the road was paved before but the road is badly damaged due to poor maintenance and persistent storms. This activity does not trigger the requirements of the Paleontology study as the community contend that the road was developed first before the grave were installed. None the less the a public participation process is being undertaken to get a consent from the local tribal authority and the community at large that the graves be fenced off from the road.

It should be noted, though, that the bulk of archaeological remains is normally located beneath the soil surface. It is therefore possible that some significant cultural material or remains not located during

the survey may only be revealed when the soil is disturbed. Should excavation or large-scale earth-moving activities reveal any human skeletal remains, broken pieces of ceramic pottery, large quantities of sub-surface charcoal, or any material that can be associated with previous occupation,

- a qualified archaeologist should be notified immediately.
- This will also temporarily halt such activities until an archaeologist has assessed the situation.
- It should be noted that if such a situation occurs it may have further financial implications.
- It is recommended that the contractor /applicant should be made aware that distinct archaeological material or human remains may only be revealed during the construction phases and informed of the procedure to be followed should that eventuality occur.

8.5. Aquatic ecology

8.51 The study area is located in the heavily populated residential area of Kabokweni.

The topography is mountainous with deep ravines in the slopes. The road start on the northern slope and follws a route (on existing informal roads and tracks) around a large hillside and decline to the valley bottom to the south where it cross the main drainage line of the local area. The stream is second order and is a tributary of the Nsikazi which in turn is a tributary of the Crocodile River, further to the south. The surrounding area is completely transformed to residential settlements, services infrastructure and roads. No natural terrestrial habitat remains intact but some protected and large trees remain on the roadside

(Figure 1 of the specialist report). There are no sensitive ecological features, habitats or biota present on or near the site. The terrestrial ecological sensitivity is ***Very Low*****.**

The terrestrial habitat is completely transformed to residential suburban and the only vegetation of significance is protected Marula trees that remain on the roadsides

8.5.2 **Freshwater ecology and integrity**

8.5.2.1 **Watercourse classification and description**

The main watercourse is classified as a *chanelled valley bottom wetland* and *small hillslope seepage wetlands are connected to the valley bottom wetland / stream*. The wetland classification is presented in Table 2.1 and the site locations and watercourse delineation are projected on an aerial image (Figure. 5).

Table 4 Classification and location of water courses of the existing stream General site description and terrestrial ecology

Watercourse classification and attributes							
Ref. No.	Level 1 Spatial setting	Level 2 Regional setting / Veg type	Level 3 Landscape setting	Level 4 Hydrogeo-morphic	Level 5 Hydrological regime	Site description	Site coordinates
C1	Inland	Lowveld Group 7	Valley floor	Channelled valley bottom	Perennial	Modified: Existing informal crossing	25°22'8.70"S / 31° 8'45.60"E
C2	Inland	Lowveld Group 8	Slope	Seep with channel	Perennial	Modified: Existing informal crossing	25°21'58.81"S / 31° 8'39.85"E
C3	Inland	Lowveld Group 8	Slope	Seep	Seasonal	Modified: Existing informal crossing	25°22'0.35"S / 31° 8'36.83"E
C4							25°22'1.11"S / 31° 8'30.29"E
C5	Inland	Lowveld Group 8	Slope	Seep	Seasonal	Modified: Existing informal crossing	25°22'1.20"S / 31° 8'20.10"E
C6	Inland	Lowveld Group 8	Slope	Seep	Seasonal	Modified: Existing informal crossing	25°21'58.43"S / 31° 8'14.74"E
C7							25°21'59.22"S / 31° 8'12.11"E
C8							25°21'59.70"S / 31° 8'9.70"E
C9	Inland	Lowveld Group 8	Slope	Seep with channel	Perennial	Modified: Existing informal crossing	25°21'48.30"S / 31° 7'49.00"E

The aerial image (Figure 4) clearly illustrates the setting in the heavily populated residential area. Flow is from west to east and tribute to the Nsikazi on the border with the Kruger National Park. The terrestrial environment has been completely transformed to residential and formal infrastructure). Residential dwellings and gardens encroach into the temporary and seasonal zones of the wetland. The site descriptions follow:

Site C1:

This is the largest watercourse along the route and an important drainage line in the sub-catchment

Existing informal crossing site. Valley bottom wetland with channel and perennial flow, Water quality is largely natural but will be under stress during periods of low flow when pollution from residences and roads will be more concentrated. The bed and banks are sandy and modified by the creation of the crossing site. A large loss of natural riparian vegetation has occurred and is replaced by alien invasive species. *Phragmites australis* and *Typha capensis* stabilize the in-stream and marginal sections. There is no sensitive biota or ecological features present at the site.

Site C2:

Existing informal crossing that is located on the drainage channel of a seepage zone situated on a step slope adjacent to the main road. The channel ahs become deeply eroded due to storm water discharge from the main road. Flow is perennial and water quality is largely natural in this reach. The bed and banks are sandy and modified by the creation of the crossing site. Flow is diverted through culverts. Most large riparian trees have been lost and replaced by ta thicket of alien invasive species, notably *Tecoma stans*. The road leading to the site is severely eroded. There is no sensitive biota or ecological features present at the site.

Alien vegetation has formed a thicket along the channel and the roads is severely eroded

Site C3; Site C4; Site C5; Site C6; Site C7; Site C8:

These sites are all very similar and are located across relatively small seepage wetlands. Flow is probably seasonal after periods of significant presipitation when the groundwater is forced to surface as result of the shallow bedrock. Soil is sandy with high clay content.

These are small seepage wetlands that flow seasonally after significant prcipitation

The road leading to the sites are severely eroded after the recent prolonged rain. There is no sensitive biota or ecological features present at the site.

The informal roads are severely eroded

The wetland zones along the road are used to cultivate garden crops and most natural vegetation has been removed

Site C9

Existing informal crossing that is located on the drainage channel of a seepage zone situated on a steep slope adjacent to the main road. The channel has become deeply eroded due to storm water discharge from the main road. Flow is perennial and water quality is largely natural in this reach. The bed and banks are sandy and modified by the creation of the crossing site. Flow is diverted through culverts. Most large riparian trees have been lost and replaced by ta thicket of alien invasive species, notably *Tecoma stans*. The road leading to the site is severely eroded. This watercourse is used by the local community to discharge solid waste. There is no sensitive biota or ecological features present at the site.

This is an eroded drainage line and exisiting crossing site. Solid waste is disposed into this watercourse

crossings

Figure 3: The terrestrial habitat is completely transformed to residential suburban and the only vegetation of significance is protected Marula trees that remain on the roadsides

The Present Ecological state of all the crossings is tabled below. The first two aspects are flow and sediment regimes as well as water quality.

For and detailed aquatit report INCLUDING Risk Matrix of the site see (APPENDIX C)

10. POTENTIAL IMPACT OF PROPOSED ACTIVITY

The construction of culverts has the potential to affect the environment in many ways. They can differ widely in terms of their construction method, mode of operation, and location, and key issues are likely to vary from site to site. Therefore, it is recommended that expert advice on detailed technical issues be obtained from the civil engineers as well as the Environmental Control Officer. The issues arising for all environmental receptors will change over time as the site is prepared and managed following the end of operations. The Developers and site operators should therefore consider the impacts arising from both construction activities and operational practices. The following environmental aspects should be cared for during construction.

11.1. Surface water hydrology

Surface water hydrology can be affected during all phases of the culvert activities. Construction activities can result in the compaction of soils and an increase in impermeable (or slowly permeable) surfaces. The subsequent increase in surface runoff may, in turn, increase the risk

of flooding. Culverts can potentially alter the flow regimes of the watercourse thereby affecting water velocity, depth, depositional patterns, and channel morphology. These changes in turn may increase the risk of flooding and erosion.

11.1.1. Surface water quality

Surface water quality could be affected by some factors during operations on-site. Construction activities may encourage soil erosion and increase the sediment loads of nearby streams, while accidental leaks/spills of oil/fuel from storage tanks or construction, maintenance, and decommissioning vehicles can also pollute surface waters.

11.2. Land

Culvert projects will have implications for land-take, the physical characteristics, and land use of the site. Issues to consider include the effect on landscape character from the change in land use, soil erosion, and compaction resulting from the construction and decommissioning phases of the development. The potential for contamination via runoff from roads and hard standings must be addressed.

11.3. Air and climatic factors

The construction and decommissioning phases of culverts development have the potential to affect local air quality and climate. During these activities, local air quality may decline because of gaseous and particulate emissions from vehicle movements on and off-site. Dust emissions will be produced as well. Dust suppression must be used to control the amount of dust created and released into the atmosphere and working environment. Potable water must not be used for dust suppression. Mitigation measures stipulated in the Environmental Management Programme (EMPr) must be adhered to.

11.4. Noise

Noise levels in the area will increase during the construction phase due to the operation of heavy machinery. Noise levels are not expected to exceed the guideline levels as per SANS 10103. Also, construction will only occur during working hours i.e., 7h00 – 17h00, and therefore will not cause a noise disturbance during the night time.

11.5. Ecology

The removal of native vegetation and its replacement with culvert engineering structures can cause direct damage, disturbances, fragmentation, or loss of terrestrial and aquatic habitats and ecology. Construction and decommissioning activities could also result in the increased sediment loading of streams and changes in turbidity may impact adversely aquatic populations. In addition to this, local ecological populations may be adversely affected by pollution incidents attributed to fuel leaks and oil spills associated with construction, maintenance, and decommissioning operations on site. The physical presence a culvert engineering structures may affect ecological populations in several ways. The local ecology may be disrupted as habitat corridors become severed. Culverts will cause some shading of the watercourse bank and bed thereby potentially altering the aquatic flora present in the watercourse bed. Ecological impacts may operate over a longer timescale, as populations take time to respond to environmental changes

11.6. Human environment

The potential impacts of development for culverts may include,

a) visual impact and nuisance issues; and disturbance of cultural, heritage, and archaeology aspects

b) The potential for socio-economic and health impacts (real and perceived)

arising from culvert and culvert developments is likely to be small. Such operations usually require comparatively small staffing levels and, as a result, employees are not likely to have a significant effect on local socio-economic issues.

11.7. Solid Waste Management

During the construction activities, solid waste will be generated. Solid waste must be disposed of at a registered and operational landfill site that accepts both hazardous and non-hazardous waste Any hazardous waste must be separated from the non-hazardous waste before being disposed of.

11.8. Liquid Effluent and Waste

Portable toilets must be provided along the working route, and they must be serviced by an independent service provided. The toilets must be serviced and sewage removed at least twice per week. The sewage must be disposed of at the nearest municipal waste water treatment works (WWTW). A receipt of collection and disposal must be kept in the environmental file at all times.

12. PROPOSED MITIGATION

- A small, designated construction work area must be demarcated on the riparian. zone, banks, and instream. This area must be as small as possible and construction equipment must stay within this demarcated work area.
- No refueling or servicing of equipment is allowed in this area. Access to this area must be through a single route to limit disturbance.
- The preconstruction watercourse bed structure and roughness must be preserved. post construction to maintain hydrological functioning.
- Construction must occur during the dry or low-flow season when the volume of water in the watercourse is at reduced levels;
- Erosion berms, silt traps, etc. must be in place for all areas where vegetation removal or excavation activities occur to ensure excess sedimentation does not enter the watercourse;
- Vehicles and other equipment and machinery must be kept out of the watercourse.
- Construction materials must be stored at least 30m away from the watercourse bank and riparian areas and have suitable retention and bunding structures in place to prevent spills or run-off entering the watercourse and riparian zone;
- Re-fuelling and maintenance of equipment and vehicles must not take place within 30m of the riparian and in-stream areas;
- Areas where vegetation is removed or damaged during the construction process need to be suitably upgraded with an approximate mix of grasses and shrubs as determined by a botanist or vegetation ecologist familiar with the area and the riparian species.
- No riparian flora outside of the construction footprint must be disturbed.

13. PUBLIC PARTICIPATION

It is stipulated in the National Environmental Management Act, 1998 (Act No. 107 of 1998) and associated Environmental Impact Assessment Regulations (2014) that a public participation process must be conducted as part of the basic assessment process. A Public Participation Guideline was gazetted which instructs on the requirements of public participation. This section outlines the public participation process followed in the fulfillment of these requirements, being:

- Notify potentially interested and affected parties of the proposed application (include steps that were taken to achieve this).
- Proof that notices boards, advertisements, and notices notifying potentially interested and affected parties of the proposed application have been displayed, placed, or given;
- A list of all persons, organizations, and organs of state that were registered as interested and affected parties concerning the application; and
- A summary of the issues raised by interested and affected parties, the date of receipt, and the response of the EAP to those issues.

13.1. Notification of the interested and affected parties

Interested and Affected Parties (I&APs) were notified of the project in the following ways:

- Fixing a notice board at a place conspicuous to and accessible by the public the route.
- Written notice has been given to I&APs, property owners, persons in control of, and occupiers of land adjacent to the farm where the construction of the proposed culvert is being applied for. The municipal councilor, municipality, and applicable government departments. This has been done through email and hand-delivered notices;
- Placing a newspaper advertisement in local newspapers.
- The notices put up and information given out include the following:
- Details of the proposed application/project;
- What procedure is being undertaken, i.e., Basic Assessment and Water Use License;
- The nature and location of the proposed activity;
- Where further information on the application can be obtained; and
- Contact details for the person who represents the applicant.
- A background information document (BID) was sent to these individuals via email.

13.2. Newspaper Advertisement of the project

To distribute the information regarding the proposed development to the broader public and to ensure that all potential I&APs are allowed to comment, during the first round of public

participation a commenting period of 30 days was given with regards to the Basic Assessment process. During the first round of public participation, an advertisement was published in the Lowvelder on 23 February 2023.

13.3. Public participation site notice

Figure 4: Site Notice Erected alongside the proposed site.

Two site notices were erected along the main routes which displayed the details of the proposed project, location, and application process. The Environmental Assessment Practitioners' details were also displayed. These notices served to inform I&APs of the project and allowed them to comment.

13.4. Interest and affected parties' issues and concerns

So far, no comments have been received from the interested and affected parties. In the future, comments and issues received during the public participation process will be captured in the format presented below. See table 5 below:

Table 4: Interested and Affected Parties Issues and Concerns

I&AP	COMMENTS / ISSUES	DATE	RESPONSE

13.5. Public meeting

No Public meeting is anticipated. Should a need arise the ward councilor will be requested to assist with the meeting.

13.6. Distribution of the draft basic assessment reports

This draft BAR is made available at the Mbombela Local Municipality library and will be distributed electronically to all Interested and Affected Parties for comments as part of the Public Participation Process.

14. IMPACT ASSESSMENT

Significance scoring assesses and predicts the significance of environmental impacts through the evaluation of the following factors; ***probability of the impact; duration of the impact;***

extent of the impact; and magnitude of the impact. The significance of environmental impacts is then assessed by considering any proposed mitigations. The significance of the impact "without mitigation" is the prime determinant of the nature and degree of mitigation required. Each of the above impact factors has been used to assess each potential impact using ranking scales.

Unknown parameters are given the highest score (5) as significance scoring follows the Precautionary Principle. The Precautionary Principle is based on the following statement: *When the information available to an evaluator is uncertain as to whether or not the impact of a proposed development on the environment will be adverse, the evaluator must accept as a matter of precaution, that the impact will be detrimental. It is a test to determine the acceptability of a proposed development. It enables the evaluator to determine whether enough information is available to ensure that a reliable decision can be made.* This section indicates significant potential positive and negative environmental impacts associated with the proposed construction of the Culvert Methodology.

Table 5: Risk Assessment

The formula for Significance Scoring SS = (Magnitude + Duration + Scale) x Probability			
Duration		**Magnitude**	
Permanent	5	Very High / Do not Know	10
Long Term (Ceases with operation life)	4	High	8
Medium Term (5-15 years)	3	Moderate	6
Short Term (0-5 years)	2	Low	4
Immediate	1	Minor	2
Scale / Extent		**Probability**	
International	5	Definite	5
National	4	Highly Probable	4
Regional	3	Probable	3
Local Area	2	Improbable	2
Site Only	1	Very Improbable	1

Scoring Calculation:

Significance Scoring (SS) = (Magnitude + Duration + Scale) x Probability

Table 6: Significance Scoring (Negative Impact Results)

Low significance (<30 significance points)	Low environmental significance	Impacts with negligible effect and which should not have an influence on or require modification of the project design.
Medium significance (31-59 significance points	Moderate environmental significance	An impact or benefit which is sufficiently important to require management, and which could influence the decision unless mitigated.
High significance (>60 significance points)	High environmental significance	An impact that could influence the decision about whether to proceed with the project regardless of any mitigation.

Table 7: Significance scoring (Positive impact results)

Low significance (<30 significance points)	Low environmental significance	Impacts with the little positive effect and which should not have an influence on or require modification of the project design.
Medium significance (31-59 significance points	Moderate environmental significance	A positive impact or benefit that is sufficiently important to which could influence the decision taking into consideration set mitigation measures.
High significance (>60 significance points)	High environmental significance	A positive impact could influence the decision in a positive way about whether to proceed with the project regardless taking into consideration set mitigation measures.

The impacts discussed below are based on generic construction methods used for the upgrading of a road and the construction of Culverts. Impact scores are given “with mitigation” and are based on the assumption that the mitigation measures recommended in this assessment are implemented correctly and at all times and that upgrade of the site is fully and correctly undertaken. Failure to implement

mitigation measures during construction and upgrade will keep the impacts at an unacceptably high level. The impacts discussed in the specialist reports have been incorporated into this section.

15. POTENTIAL ENVIRONMENTAL IMPACTS DURING THE CONSTRUCTION PHASE

Riparian / Hydrophilic Vegetation Loss

Riparian/hydrophilic vegetation will be lost during the construction of the new Culvert at the Watercourse crossing as activities will be undertaken within the water resource.

Impact	Without mitigation					With mitigation * Positive outcome				
	Probability	Duration	Extent	Magnitude	Rating	Probability	Duration	Extent	Magnitude	Rating
Riparian vegetation loss	5	2	2	8	60 High	5	2	1	6	45 Moderate

Mitigation Measures –

- Bed-level crossings which fully span the watercourse channel provide the best. opportunities for maintaining channel functions,
- Areas, where vegetation is removed or damaged during the construction process, must be suitably rehabilitated with an approximate mix of grasses and shrubs determined by a botanist or vegetation ecologist familiar with the area and riparian species.
- Rehabilitation must occur once work in the area has been completed and must not wait

until the end of the project.

- Protect as much indigenous hydrophilic vegetation as possible.
- No riparian flora outside of the direct construction boundary must be disturbed on account of the endangered nature of this veld type.
- Activities must be managed in such a way as to ensure that there is no net decline in aquatic or riparian health as a result of the construction and associated activities.
- No mining of soil/sand is required for construction purposes from the banks of water resources, channels, or watercourses are allowed.
- Sand must be brought to the site if required for construction. This material must be. stockpiled at least 30m away from the water resources' and watercourses' edge.
- Use vehicular digging of the banks of the stream only in areas where this is deemed necessary. Working during the winter months will reduce soil erosion potential in disturbed areas.
- Upgrade disturbed hydrophilic vegetation as soon as construction in this area has ended. An aquatic upgrade plan must be compiled by a suitable/experienced specialist and complied with on-site.
- Watercourse and water resource vegetation must be carefully harvested before construction activities commencing so that sufficient and appropriate vegetation will be. available for the upgrade of the watercourse and water resource systems.
- Plants that are harvested must be kept on-site in a condition conducive to their existence.
- Hydrophytic plants must be kept damp in streams/water resources that will be crossed, using for example a coffer dam.

- A of the Watercourse Assessment Report must supplement these plants where necessary.

15.1. Site Preparation:

- Use erosion and sediment control techniques where needed.
- Grade the disturbed area to a stable uniform slope. Vegetative cover will not develop on an unstable slope;
  Loosen the soil by hand;
- Plant when the weather will permit, e.g. suitable temperatures and moisture for plant growth. Spring plantings give the best results;
- On unstable soils use a soil saver to protect bare soil before planted vegetation has become established.

15.2. Terrestrial Vegetation Removal

Vegetation will be removed during the establishment of the work servitude along the road route.

Impact	Without mitigation					With mitigation * Positive outcome				
	Probability	Duration	Extent	Magnitude	Rating	Probability	Duration	Extent	Magnitude	Rating
Vegetation removal for	5	2	2	8	60 High	5	2	1	6	45 Moderate

construction activities										

Mitigation Measures –

- Before the commencement of construction, a designated work area on the riparian zone, banks, and instream must be demarcated. This area must be as small as possible and construction activities and equipment must stay within this demarcated work area.
- Access to the demarcated work area must be via a single route to limit disturbance.
- Use vehicular digging of the banks of the stream only in areas where this is deemed necessary. Working during the winter months will reduce soil erosion potential in disturbed areas.
- Areas, where vegetation is removed or damaged during the construction process, must be. suitably rehabilitated with an approximate mix of grasses and shrubs determined by a botanist or vegetation ecologist familiar with the area and riparian species. The upgrade must occur once work in the area has been completed and must not wait until the end of the project.
- If there is a need to cut, destroy or remove an indigenous tree, a DAFF permit must be obtained before the activity. The permit and application will need to be made and an offset for the loss of these individuals will be required. The offset must be the planting of 3 individuals of the same species for each tree that will be lost.

  Relocation of some of the provincially protected species will be required and must be carried out by a qualified botanist or similarly qualified individual. The plants must be relocated into areas with

the same aspect, soil conditions, and elevation to ensure a successful relocation. Relocation must occur during the summer months.

15.3. Soil Erosion and Sedimentation control

The soil will be exposed to wind and water erosion once the vegetation has been cleared. Soil erosion will result in the sedimentation of nearby water resources and tributaries.

Impact	Without mitigation					With Positive outcome mitigation				
	Probability	Duration	Extent	Magnitude	Rating	Probability	Duration	Extent	Magnitude	Rating
Soil erosion and sedimentation	5	2	3	10	75 High	5	2	2	8	60 High

Mitigation Measures –

- Stormwater management techniques must be designed and placed correctly to ensure. that stormwater runoff is controlled and channeled effectively to prevent soil erosion and vegetation disturbance.
- Erosion protection measures must be installed at all culverts or stormwater drainage

pipes outlets located along the route before the proposed Watercourse crossing, this is a requirement in addition to velocity control measures.

- Care must be taken at the design phase to ensure the correct placement of water directing techniques within the up gradient of the proposed Culvert, so that they are designed and specified in a manner that will best mitigate the effects of stormwater run-off.
- The use of sustainable drainage systems must be incorporated into the design of the road. and stormwater infrastructure such as swales and infiltration trenches/filter drains.
- Vegetation clearance must not be undertaken more than 10 days in advance of the Work front.
- Vegetation clearing within 50m of a watercourse or water resource must only be. undertaken when construction is underway, and these areas must be rehabilitated within 2 weeks of initial clearing;
- Stockpiling of any materials must not occur within 30m from or adjacent to any of the channels, watercourses, or water resources.
- Stockpiles of material must be protected during the construction phase, to prevent. material from entering drainage channels and water resources.
- Erosion control measures must be implemented in areas sensitive to erosion. Such measures must include *inter alia* the use of sandbags, hessian sheets, silt fences, retention, or replacement of vegetation and geotextiles such as soil cells.
- Water must not be allowed to flow down cut and fill slopes without adequate soil erosion protection in place.
- No scupper pipes may be placed onto any Culverts at the water resource crossing;

stormwater must be captured and directed into an attenuation area allowing underground filtration back into the water resource.

- Heavy machinery must be limited to work servitude only.
- Inspect and maintain erosion control structures at stormwater outlets at least once per week during construction and upgrade.
- Disturbed sites must be upgraded as soon as construction in an area is complete and or near complete and not left until the end of the project;
- No mining of soil/sand required for construction purposes from water resource banks, channels, or watercourses is allowed. Sand must be sourced from a legally permitted borrow pit and must be stockpiled away from the water resources and watercourse edges.

15.4. Surface and Groundwater Pollution from In-Situ Concrete Casting

Water pollution will occur during the in-situ concrete casting of the new Watercourse Culvert and associated structures. In general, in-situ concrete casting is not supported, however in this case, due to the location of the proposed new Culvert, an alternative area is not available within proximity to be used as a casting yard.

Impact	Without mitigation					With mitigation * Positive outcome				
	Probability	Duration	Extent	Magnitude	Rating	Probability	Duration	Extent	Magnitude	Rating

Surface and groundwater pollution due to in situ concrete casting	5	2	3	10	75 High	5	2	2	8	60 High

Mitigation Measures –

- In-situ concrete pouring must take place during winter / low flow season to reduce the risk of contaminating the water in the Watercourse.
- In-situ concrete casting must be controlled and must not escape the structure of the cement is poured into.
- Water in the stream must be diverted around the in-situ structures until they are completely
- set and do not pose a risk of water contamination.
- No washing of pouring objects or any object that is contaminated with cement will not be allowed to be washed in any water resource. No concrete mixing trucks must be washed on site.
- Concrete must not be mixed on-site. Pre-mixed concrete must be brought onto the site.
- A batching plant must not be constructed for this project.
- Culvert abutments must not constrict the width of the water resource channel and the face of the abutment must be parallel with the banks of the watercourse.
- At all times during the construction period, at least two-thirds (2/3) of the channel must

remain unobstructed to allow fish passage.

15.5. Increase in turbidity

Sand and other particles (from construction materials i.e. cement, gravel) generated through the construction process cause turbidity when they reach the water resource systems which mostly occurs during run-off. Turbidity decreases water quality and disturbs aquatic processes.

Impact	Without mitigation					With mitigation * Positive outcome				
	Probability	Duration	Extent	Magnitude	Rating	Probability	Duration	Extent	Magnitude	Rating
Increase in turbidity from run-off related to construction activities	5	2	3	10	75 High	4	2	2	6	40 Moderate

Mitigation Measures –

Sediment traps, sediment curtains, or fabric must be used between the construction activities and water resources and drainage channels.

- At all times, the integrity of the water resource system is to be protected against pollution or degradation from substances that may cause pollution and/or degradation such as oil; cement; paint, etc.
- The condition of any water that may occur in the water resource is to remain clear and no increase in turbidity is allowed as a result of increased sediment levels resulting from working on the banks or bed.
- The contractor is to put in place a silt curtain that transverses the water resource. This curtain must be placed 3m from the end of the workforce and is to be in place throughout the construction period including after hours and over weekends until ALL construction work has ceased; the site has been cleared up and the upgrade has been completed.
- Two such curtains must be available so that they can be swapped out daily.
- The curtain must be fixed to two sturdy poles which are then embedded into the Watercourse banks in such a way as to allow the bottom of the curtain to lie on the water resource bed by approximately 30cm.
- The bottom of the curtain must be folded so that it faces upstream. It should then be. weighted down with rocks or cleaned bricks to ensure that it does not lift.
- At the end of each workday, the curtain is to be carefully lifted from the water resource bed and removed in such a way as to not allow any of the material/substances that have been caught by the curtain to spill. It must be cleaned in a bunded area so all such debris can be collected and removed off-site.
- A clean curtain must be put in place before any further work commences.
- At no time must the curtain be torn or damaged. If this occurs, it must immediately be.

replaced before work can continue.

- Where necessary, turbid water that is pumped from excavations within the water resource must be passed through a sand filter or settling pond before being released back into the water resource. This discharge of the water must be done in a controlled manner and no erosion may result.
- Timing of instream work is imperative and is recommended to occur during the winter low flow periods. This will reduce the amount of sediment entering the water resource and reduce damage to any sensitive faunal life cycle periods.
- Further to this it is easier to isolate low flows to work in isolation of streamflow. Isolating high flows could lead to flooding and increase the risk of introducing sediment into the watercourse.

15.6. Surface water pollution

Pollution caused throughout the construction process will result in water pollution of water resources and drainage channels. Pollution is caused using of hazardous chemical substances (i.e., oil, diesel, cement, paint, and bitumen) as well as general construction materials such as sand and gravel. General waste generated throughout the construction site (i.e., litter) will also result in surface water pollution.

Impact	Without mitigation					With mitigation * Positive outcome				
	Probability	Duration	Extent	Magnitude	Rating	Probability	Duration	Extent	Magnitude	Rating

Surface water pollution from construction activities (hazardous chemical substances, general litter, construction material)	5	2	3	10	75 High	4	2	2	6	40 Moderate

Mitigation Measures –

- Work within the riparian instream must be kept to a minimum.
- The preconstruction water resource bed structure and roughness must be maintained post. construction to maintain hydrological functioning.
- Construction of the Culvert must be conducted during the dry or low-flow season, when. the volume of water in the water resource is at reduced levels.
- Erosion berms, silt traps, etc. must be put in place for all areas where vegetation is removed. or excavation activities occur to ensure excess sedimentation does not enter the water resource, watercourses, and drainage channels.
- Vehicles or other potentially polluting equipment/machinery must be kept out of the

water resource.

- Construction materials and equipment must be stored at least 30m away from the water. resource bank and riparian areas and have suitable retention and bunding structures in place to prevent spills or run-off from entering the water resource and riparian zone.
- Re-fuelling and maintenance of equipment and vehicles must not take place within 30m. of the riparian and instream areas.
- No washing of construction equipment (e.g., paintbrushes, spades, cement trucks, wheelbarrows, picks, etc.) are permitted in any watercourse or stream.
- Proper management and disposal of construction waste must occur during the lifespan of the project.
- No substances (e.g., Cement, oil, fuel, paint, bitumen, etc.) must be released into any stream, watercourses, or watercourses.
- Do not locate the construction camp within 100m of the watercourses.
- Spillages of fuels, oils, and other potentially harmful chemicals must be cleaned up. immediately and contaminants properly drained and disposed of using permitted. hazardous waste landfill sites. Any contaminated soil must be uplifted and removed and disposed of at a permitted hazardous waste landfill site.

15.7. Soil and groundwater pollution

Soil and groundwater pollution may occur through hazardous chemical substance spills, such as petroleum hydrocarbons, paint, and bitumen. The spread of hazardous substances to groundwater

depends on the structure of the soil. In some cases, the substances will move easily through the soil and contaminate groundwater.

Impact	Without mitigation					With mitigation * Positive outcome				
	Probability	Duration	Extent	Magnitude	Rating	Probability	Duration	Extent	Magnitude	Rating
Soil and groundwater pollution	5	3	3	8	70 High	5	2	2	6	50 Moderate

Mitigation Measures –

- Hazardous chemical substances must be stored within a bunded and roofed area to prevent spills from occurring directly on the ground/soil.
- Handling of hazardous chemical substances (i.e., re-fuelling, pouring of oil, etc.) must be done within a spill tray. Bitumen must be handled with care and uncontrolled releases must be prevented.
- Spillages of fuels, oils, and other potentially harmful chemicals must be cleaned up immediately and contaminants properly drained and disposed of using permitted hazardous waste landfill sites.
- Any contaminated soil must be uplifted and removed and disposed of at a permitted hazardous waste landfill site.

15.8. Noise

Noise levels along the road will increase during construction activities due to the use of heavy machinery and vehicles.

Impact	Without mitigation					With mitigation * Positive outcome				
	Probability	Duration	Extent	Magnitude	Rating	Probability	Duration	Extent	Magnitude	Rating
Increase in noise	5	2	2	8	60 High	4	2	1	6	36 Moderate

Mitigation Measures –

- All machinery must be serviced at regular intervals to ensure that they are in good working. order and do not emit unnecessary noise.
- Vegetation along the road servitude must not be removed unnecessarily to maintain a vegetative barrier which will assist with preventing noise from travelling to residents and neighboring farms.
- Working hours must be limited from 7:00 am to 5:00 pm to prevent noise from affecting nearby. residents.
- Workers must be made an area of their conduct while working to prevent unnecessary noise. (Screaming and shouting at one another).

15.9. Alien invasive vegetation

Disturbance of vegetation results in the proliferation of alien invasive vegetation.

Impact	Without mitigation					With mitigation * Positive outcome				
	Probability	Duration	Extent	Magnitude	Rating	Probability	Duration	Extent	Magnitude	Rating
The proliferation of alien invasive vegetation species	5	5	2	8	75 High	4	3	2	6	44 Moderate

Mitigation Measures –

- An alien invasive management program must be incorporated into the Environmental. Management Programme (EMPr) and implemented throughout the construction and upgrade phases of the project.
- Ongoing alien plant control must be undertaken along the road route and particularly in the disturbed watercourse and riparian areas.
- Monitor all sites disturbed by construction activities for colonization by exotics or invasive. plants and control these as they emerge. Monitoring must take place throughout the whole.

construction phase and must continue for an additional 5 years (every 3 months) once the construction is completed

15.10. Waste generation during construction

Waste will be generated on-site due to the construction activities. Waste will include litter and domestic waste, construction waste, effluent, and hazardous waste.

Impact	Without mitigation					With mitigation * Positive outcome				
	Probability	Duration	Extent	Magnitude	Rating	Probability	Duration	Extent	Magnitude	Rating
Temporary waste generation – litter, domestic, construction, and hazardous waste and effluent.	5	2	2	8	60 High	5	2	1	6	45 Moderate

Mitigation Measures –

- The construction site (work servitude) and camp must be cleaned daily and all. Litter should be collected and stored in suitable waste bins on site.
- Waste should be stored in a demarcated waste area.
- An appropriate collection and disposal strategy must be implemented to ensure that waste is removed at least once per week and taken to a permitted landfill site.
- Hazardous waste must be stored separately and disposed of at a permitted hazardous landfill site at least once per week.
- Waste bins must be secured and have lids to prevent litter from being blown and spread over the site.

15.11. Temporary disturbance for pedestrians and vehicular traffic

The construction activities will result in a disturbance in vehicular and pedestrian traffic.

Impact	Without mitigation					With mitigation * Positive outcome				
	Probability	Duration	Extent	Magnitude	Rating	Probability	Duration	Extent	Magnitude	Rating
Temporary pedestrians	5	2	1	8	55 Moderate	5	2	1	6	45 Moderate

and vehicular disturbance										

Mitigation Measures –

- A traffic management plan must be designed for this road during construction, this must be circulated to residents in the area.
- Warning signs regarding the construction activities must be erected to warn pedestrians and water resource users in the area.
- A suitably trained and experienced traffic controller/flag man must be used on the roads to slow traffic and warn of upcoming workers and construction activities.

15.12. Air pollution

The use of heavy machinery in the area will result in increased levels of diesel emissions (carbon monoxide). General construction activities will also increase dust pollution.

Impact	Without mitigation					With mitigation * Positive outcome				
	Probability	Duration	Extent	Magnitude	Rating	Probability	Duration	Extent	Magnitude	Rating

Increased air pollution – dust and vehicular emissions (diesel emissions/carbon monoxide)	5	2	2	8	60 High	5	2	1	6	45 Moderate

Mitigation Measures –

- Dust suppression must be implemented along the road during construction to prevent dust from being blown from the project site into neighboring properties and from causing visibility problems for users on the road.
- Heavy machinery and vehicles must not exceed a speed limit of 40 km/hr along the area under construction.
- Heavy machinery must be serviced at regular intervals to ensure that they are operating at optimum to reduce the chance of excessive emissions from being emitted.
- Heavy machinery must not be left idling unnecessarily on-site / along the construction route.

15.13. First, the flush effect

The first flush is the initial surface runoff following a rainfall event, particularly runoff from impervious surfaces. Pollutants (such as hydrocarbons and rubber from tires etc) accumulate on hard surfaces during preceding dry periods. Polluted water is discharged directly into streams and water resources via inadequate stormwater infrastructure. This is considered a significant form of diffuse pollution, contaminating receiving water with considerable heavy metal loads. Efficient and effective stormwater management techniques supplemented by soft engineering techniques help minimize the contaminants from entering water resources.

Impact	Without mitigation					With mitigation * Positive outcome				
	Probability	Duration	Extent	Magnitude	Rating	Probability	Duration	Extent	Magnitude	Rating
First, flush effect – contaminated water released into water resources	5	5	2	10	85 High	3	5	1	6	36 Low

Mitigation Measures –

- Sustainable Urban Drainage Systems' soft engineering techniques must be implemented.

along the entire road length to assist in capturing surface runoff and filtering out contaminants before the water reaches the water resources.

- No scupper pipes may be placed onto any Culverts at the water resource crossing.
  stormwater must be captured and directed into an attenuation area allowing underground filtration back into the water resource.

15.14. Potential environmental impacts during the operation phase

Pollution enters water resources.

Litter and other contaminants may enter the water system during the operation phase of the road.

Impact	Without mitigation					With mitigation * Positive outcome				
	Probability	Duration	Extent	Magnitude	Rating	Probability	Duration	Extent	Magnitude	Rating
Pollution entering the water resource	5	5	2	8	75 High	5	5	1	6	60 High

Mitigation Measures –

- No scupper pipes may be placed onto any Culverts at the water resource crossing;
  stormwater must be captured and directed into an attenuation area allowing underground filtration back into the water resource.
- Grids must be placed on stormwater inlet structures to capture litter before being

discharged into water resources.

- Stormwater outlet structures must be inspected every month to ensure that little is removed and discarded correctly (at a permitted landfill site).

15.15. First, the flush effect

The first flush is the initial surface runoff following a rainfall event, particularly runoff from impervious surfaces. Pollutants, such as hydrocarbons and rubber from tires accumulate on hard surfaces during preceding dry periods. Polluted water is discharged directly into streams and water resources via inadequate stormwater infrastructure. This is considered a significant form of diffuse pollution, contaminating receiving water with considerable heavy metal loads. Efficient and effective stormwater management techniques supplemented by soft engineering techniques help minimize the contaminants from entering water resources.

Impact	Without mitigation					With mitigation *Positive outcome				
	Probability	Duration	Extent	Magnitude	Rating	Probability	Duration	Extent	Magnitude	Rating
First, flush effect – contaminated water released	5	5	2	10	85 High	3	5	1	6	36 Low

into water resources										

Mitigation Measures –

- Sustainable Urban Drainage Systems' soft engineering techniques must be implemented along the entire road length to assist in capturing surface runoff and filtering out contaminants before the water reaches the water resources.
- Oil/grease traps must be incorporated into the stormwater management at inlets to prevent pollutants from entering the water resource.

15.16. Other positive impacts as an outcome of the proposed re-alignment

Improved transport system

The residents of ward 11 will enjoy peace of mind with the less hazardous road I, their ward.

Impact	During operation				
	Probability	Duration	Extent	Magnitude	Rating
Improved transport system	5	4	2	10	* 80 High

* Positive outcome

On-going Recommendations –

- The road must be inspected once every six months for the first 3 years and thereafter once a year to ensure that any faults with the road are reported and repaired.
- Road maintenance must occur to ensure that the road is maintained.
- Any reports regarding potholes or deterioration of the road must be addressed as soon as practicably possible to ensure that the positive impact created is maintained.

15.17. Reduction in soil erosion

Hardening of the road surface will reduce soil erosion experienced at present. Formalized stormwater management will also reduce soil erosion along the route.

Impact	Without mitigation				
	Probability	Duration	Extent	Magnitude	Rating
Reduction in soil erosion	5	4	2	10	* 80 High

* Positive outcome

On-going Recommendations –

- The road and associated stormwater management must be inspected once every six

months for the first 3 years and thereafter once a year to ensure that any faults with the road are reported and repaired.

- Any reports regarding stormwater management damages or deterioration of the road must be addressed as soon as practicably possible to ensure that the positive impact created is maintained.

15.18. Temporary employment and long-term skills development

Communities can be employed during the construction phase. This short-term employment could lead to long-term skills development.

Impact	Without mitigation				
	Probability	Duration	Extent	Magnitude	Rating
Creation of temporary employment and long-term skills development	5	2	2	8	* 60 High

* Positive outcome

- During the upgrade of the road the contractor should devise means of capacitating the local people with skills that they will use in the long term
- Working on-site should also be considered a practical skills training program

16. ASSUMPTIONS AND GAPS IN KNOWLEDGE

Construction work method statements have not been provided, as this is developed/provided by the contractors once appointed (A generic work method statement has been provided in the interim). The construction work method statements must be provided and submitted to the environmental assessment practitioner and the Department of Agriculture Economic Development, Tourism, and Environmental Affairs for review and approval before construction activities begin.

The drawings submitted by the engineers have been assessed, if there are any changes in the design these must be submitted to the environmental assessment practitioner and the Department of Agriculture Economic Development, and Environmental Affairs for review and approval before construction activities begin. This application is for the construction of the Culvert across the Watercourse at Hlawu-Hlawu Ward 11 as part of the upgrading of the Joe Slovo road from gravel to paving.

17. PROPOSED MONITORING AND AUDITING

The following monitoring and auditing strategies are recommended for the proposed re-Culvert construction:

General – An Independent Environmental Control Officer (IECO) with suitable experience must be appointed for the duration of the construction and upgrade phase. The ECO duties must include at least one site inspection and one audit every month (therefore at least two visits to the site per month). The ECO must also ensure that they are present at the progress meetings each month. (Specialist Report will advise further)

Aquatic – Although no water resource monitoring was recommended by the specialists if it is deemed necessary that a monitoring program which must include water monitoring upstream and downstream of the construction activities. This will assist in determining whether the water quality is being impacted by the construction activities. During general construction, the risks identified for the water resource habitat must be monitored visually by the ECO. Any concerns must be noted and prioritized for immediate corrective action. . (Specialist Report will advise further)

Watercourse – No watercourse monitoring has been included in the Watercourse Assessment, due to the location of the watercourses with the Culvert construction.

However, to maintain the watercourses and the surrounding areas, it is suggested that an Alien Invasive Species Removal program be implemented during the construction, upgrade, and operation phase of this project. (Specialist Report will advise further)

18. ENVIRONMENTAL IMPACT STATEMENT AND EAP'S RECOMMENDATION

The Environmental Assessment Practitioner recommends that the Culvert be approved with the condition that the mitigation measures are implemented during the pre-construction, construction, post-construction, decommissioning, and operation phases. The following conditions should form part of the Environmental Authorisation should a positive decision be granted by the Competent Authority:

- Construction of the Culverts crossing the Watercourse must be planned well before activities start. As much indigenous hydrophilic vegetation must be protected as possible. In areas where vegetation will be damaged, vegetation must be harvested carefully, kept, and maintained on-site to be used during the upgrade process. Hydrophilic plants must be kept damp in streams/water resources (using for example coffer dams) to be used during the upgrade.
- No riparian vegetation outside of the direct construction boundary must be disturbed.
- An experienced botanist must be onsite during the pegging out of the road, Culvert and construction footprint to ensure that no sensitive vegetation is damaged and where necessary, permits can be applied for. Demarcated work areas within the riparian zone must be kept as small as possible to limit disturbance.
- Silt fences must be placed along the Watercourse before the construction of the new Culvert as well as before the commissioning of the old causeway to prevent pollution/construction rubble from moving down the water resource.
- Silt fences must be placed between the construction areas and the Watercourse (along the banks) to prevent construction waste from reaching the water and flowing down the water resource. A second silt fence must be available to ensure that it can be changed out (cleaned) daily.
- There must be NO net decline in aquatic or riparian health as a result of the construction activities. An aquatic specialist must be appointed to monitor the construction activities of the Watercourse Culvert.
- Baseline and monthly monitoring must be conducted as well as final monitoring once the activities are complete to assess whether any decline in aquatic or riparian health has occurred.

- No mining of soil/sand must take place from banks of water resources, channels, or watercourses are allowed.
- Rehabilitation of hydrophilic vegetation must occur as soon as construction is complete in that area. The upgrade must be monitored to ensure success.
- If there is a need to cut, destroy or remove an indigenous tree, a DAFE permit must be obtained before the activity. The permit and application will need to be made and an offset for the loss of these individuals will be required. The offset must be the planting of 3 individuals of the same species for each tree that will be lost.
- Relocation of some of the provincially protected species will be required and must be carried out by a qualified botanist or similarly qualified individual. The plants must be relocated into areas with the same aspect, soil conditions, and elevation to ensure a successful relocation. Relocation must occur during the summer months.
- Scupper pipes MUST NOT be used on the Culvert. Stormwater must be captured and directed into an attenuation area allowing underground filtration back into the water resource.
  In-situ concrete pouring must take place during winter / low flow season to reduce the risk of contaminating the water resource water.
  In-situ concrete casting must be controlled and must not escape the structure the cement is poured into it to prevent pollution.
  Water in the stream must be diverted around the in-situ structures until they are completely set and do not pose a risk of water contamination.
  Sediment traps, sediment curtains, or fabric must be used between the construction activities and water resources, watercourses, and drainage channels.
- Erosion berms, silt traps, etc. must be put in place for all areas where. vegetation removal or excavation activities occur to ensure excess sedimentation does not enter the water resource, watercourses, and drainage channels.
- Velocity dissipaters must be provided with stormwater management. systems to slow down surface water runoff and prevent erosion further downstream (in drainage channels, watercourses, and water resources).
- At no point, must water runoff be allowed to flow directly onto unprotected soil or vegetation.
- Due cognizance of the likely perched water table will need to be considered during the construction phase.
- The alien invasive management program (in the EMPr) must be

implemented throughout the construction, and upgrade phases and continue in perpetuity.

19. CONSTRUCTION TIMEFRAMES

Construction timeframes have not been confirmed as yet; however, it is estimated that the proposed construction will take approximately 12 months to complete. Further, it is requested that the Environmental Authorization, if issued by the Competent Authority, be granted with a validity period of five (10) years from the date of signature.

20. SUBMISSION AND CONSIDERATION OF DOCUMENTATION BY THE COMPETENT AUTHORITY

The following paragraphs have been retained from the draft Basic Assessment Report as proof that all State Departments were informed of their obligation to comment on the report within legislated timeframes:

"It is to be noted that in terms of Section 43(2) of the EIA Regulations (GN R. 982 of 2014), all State Departments that administer a law relating to a matter affecting the environment, specific to the Application, must submit comments within 30 days of the receipt of this report to the EAP. Should no comment be received within the 30-day commenting period, it will be assumed that the relevant State Department has no comment to provide.

All comments received in response to the Basic Assessment Report will be attached to, summarized, and responded to in a comments and responses report, which will be included in the final submissions to the Competent Authority, (i.e. DARDLEA) for consideration in terms of issuing a decision on the Application for Environmental Authorization."

21. UNDERTAKING

NEDA/AEB hereby confirms that the information provided in this draft report is correct at the time of compilation and was compiled with technical information provided by the applicant Technical information from specialists has not yet been integrated with this report. NEDA/BA further confirms that this draft BA is being circulated in a draft form and all comments received from Stakeholders and IAPs will be included in the final report. A record has been kept to date and will continue to be kept, of all comments. These will be

consolidated and incorporated into all subsequent reports, either submitted for further comments to IAPs, or to the DARDLEA for consideration and decision-making.

END-

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