UNIVERSITY OF VENDA

ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPR) FOR THE PROPOSED UPGRADING OF UNIVERSITY OF VENDA ACCESS ROAD FROM R524 AND A BRIDGE IN THULAMELA LOCAL MUNICIPALITY OF VHEMBE DISTRICT, LIMPOPO PROVINCE

OCTOBER 2019

REPORT NO. MGEC/UN-EA-THU19/2 Rev.3

PREPARED BY:

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STATUS	**DRAFT**
REPORT NO	**REPORT NO. MGEC/UN-EA-THU19/2 Rev. 3**
AUTHORS	**T.P NDOU (Pr.Sci.Nat)**

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INTERPRETATION

DWA – Department of Water Affairs

DMR- Department of Mineral and Energy

EMPr- Environmental Management Programme

ECO- Environmental Control Officer

LEDET- Limpopo Economic Development, Environment and Tourism

LIHRA- Limpopo Heritage Resource Agency

OPEMPr- Operational Phase Environmental Management Programme

PM- Project Manager

1. INTRODUCTION

1.1 BACKGROUND

University of Venda proposes to upgrade 1.6km access gravel road (of which 500m portion of the road has been issued with the EA) to tar from R524 to the University campus and a new bridge in Thulamela Local Municipality of Vhembe District, Limpopo Province. The proposed development requires Environmental Authorisation in terms of NEMA EIA Regulations 2014 Listing Notice 1, Activity 12, 19 and 27 and Listing Notice 3 Activity 12 and 14. The proposed construction of storm water management system will be undertaken within a watercourse which constitutes a water use in terms Section 21 of the National Water Act.

This Environmental Management Programme (EMPr) forms part of the Basic Assessment Report and Water Use License application report.

1.2 PROJECT APPLICANT

Table 1: Applicant details

Name of applicant	University of Venda
Contact Person	Mr Aluwani Magadani
Postal address	Private Bag X 5050 Thohoyandou 0950
Tel	Tel: (015) 962 8111
Fax	Fax: (015) 963 8222
Email	Aluwani.Magadani@univen.ac.za

1.3 ENVIRONMENTAL ASSESSMENT PRACTITIONER

Mawedza Geo-Environmental Consulting (Pty) Ltd has been appointed as an independent Environmental Impact Assessment Practitioner (EAP) by Nyeleti Consulting (Pty) Ltd on behalf of the University of Venda to undertake environmental authorisation process in terms of the Environmental Impact Assessment (EIA) Regulations, 2014 of the National Environmental Management Act (Act 107 of 1998, as amended) and Water Use License Authorisation in terms of the National Water Act 1998 (Act No 36 of 1998) (NWA) for the above project.

The project team was led by Ms T.Prudence Ndou who is a registered Professional Natural Scientist in the field of Environmental Science with 15 years' experience in the field of Environmental management:

Table 2. EAP details

EAP	Mawedza Geo-Environmental Consulting (Pty) Ltd
CONTACT PERSON	Ms T. Prudence Ndou
CONTACT DETAIL	14 Paul Kruger Street
	POLOKWANE
	0699
	086 766 2124 (Fax)
	prudence@mawedza.co.za (Email)
QUALIFICATIONS	Bachelor of Environmental Sciences Honours Diploma Project Management Environmental Impact Assessment, Environmental Law, ISO 14001 certificates
YEARS OF EXPERIENCE	15 years in the field of Environmental Management
PROFESSIONAL AFFILIATION	South African Council for Natural Scientific Profession(SACNASP) Pr.Sci.Nat (Reg. No. 400376/12), IAIAsa and IWMSA

1.4 APPLICABLE DOCUMENTATION

This EMPr must be read in conjunction with Basic Assessment Report and Water Use License application report for the proposed development and any other relevant legislation.

2. PROJECT DISCRIPTION

2.1 LOCATION

The proposed project is located on portion on portion 0 of the farm Beuster 253 MT and Palmaryville 254 MT within Thulamela local Municipality in the Limpopo Province. Project location, road start 22°59'6.23"S and 30°26'39.06"E, road end 22°58'41.04"S and 30°26'23.08"E, bridge location 22°59'0.53"S and 30°26'36.37"E. The site is located 2 km west of Thohoyandou town.

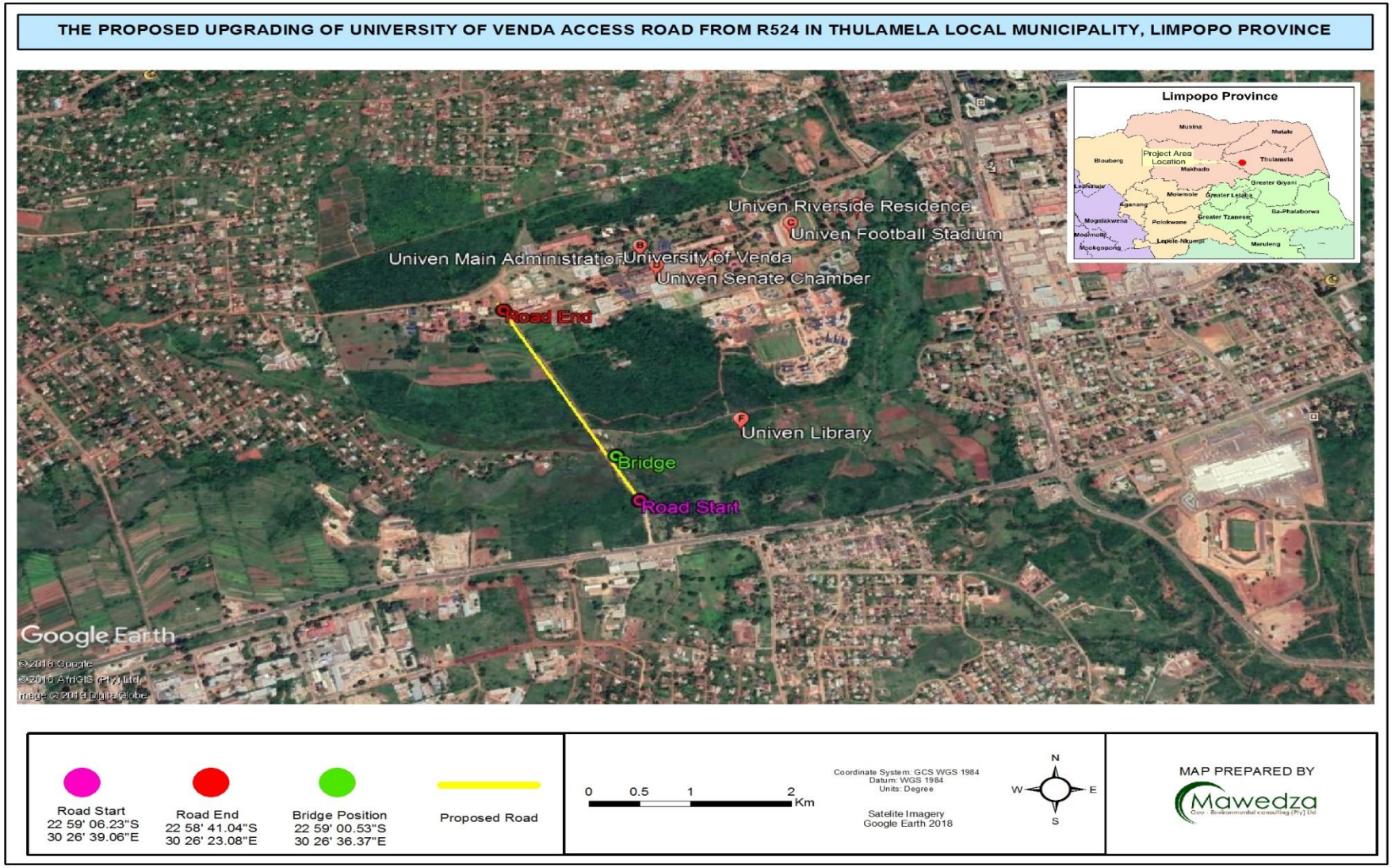

Figure 1. Locality map of the proposed development

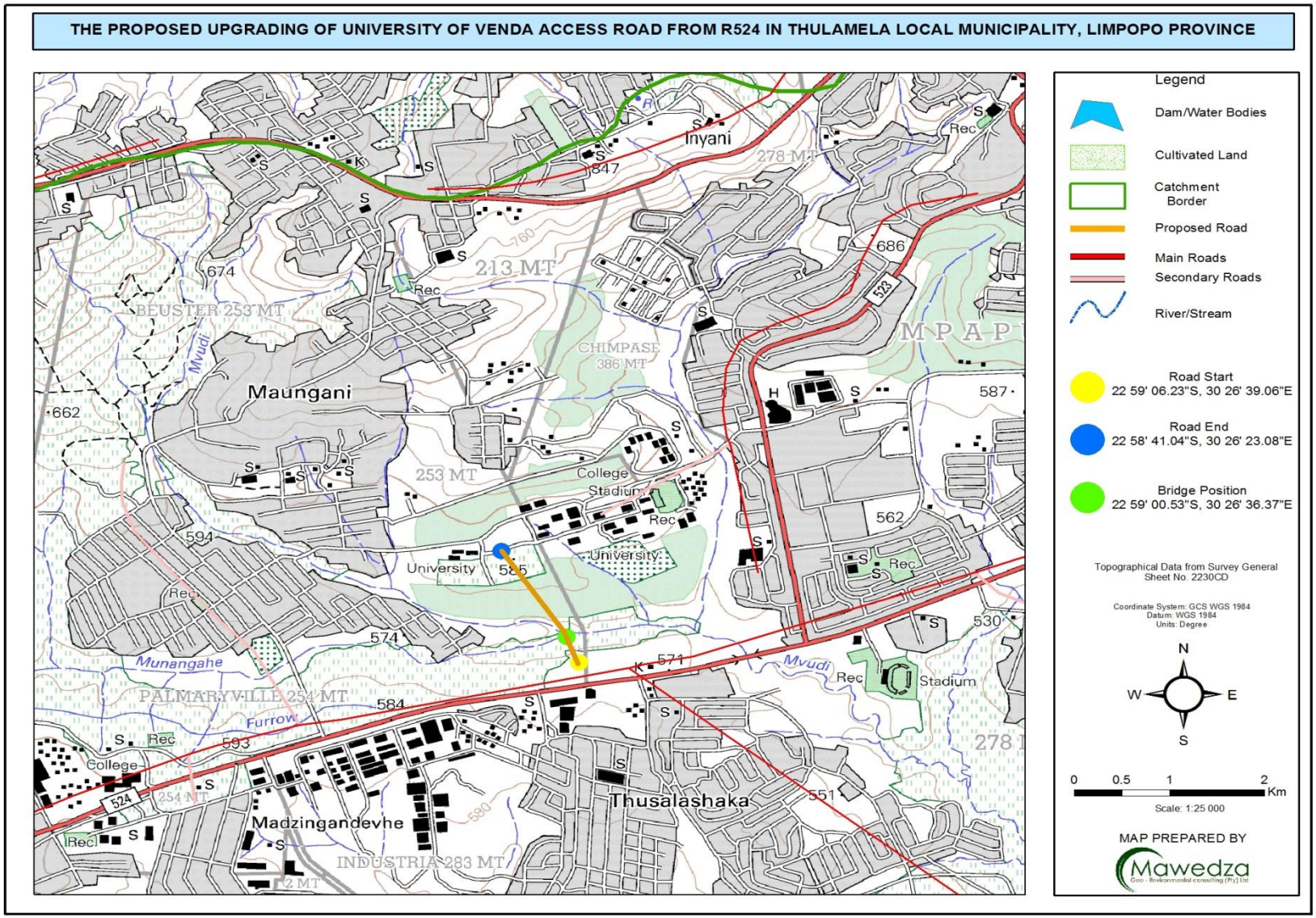

Figure 2. Topographic map of project location

2.2 PROJECT SCOPE

Proposed project includes upgrading of 1.6km access gravel road from R524 to the University of Venda campus and a new bridge in Thulamela Local Municipality of Vhembe District, Limpopo Province. Only 1.1km portion of the road requires EA. The remaining 500m was authorized in 2015

The proposed development includes road alignment which will be undertaken parallel to existing route but within the road reserve

- Approx.500m long dual carriageway from R524 traffic circle tying on the existing university construction access road outside the boundary inclusive of a new traffic circle entering the university and a partial road towards the new student development on the west along the R524
- New university gate
- Approx. 600m of dual carriageway within the university boundary
- Approx. 500m of single carriageway beyond the bridge up to the Health science building with traffic circle leading to agricultural section and planned future developments.
- New bridge over Mvudi River (width=21.8m, height=3.585 measured from top of pile cap to soffit. Height from pile cap to top of tower or pylon is 14.3m and 39.45m long including approach slabs)
- Stormwater measures
- A combination of asphalt and interlocking paving bricks (mainly from the new future gate up to the bridge)
- Installation of new street lighting, 1.5m wide sidewalks on both sides, road signs, road markings and supporting ancillary works.

It is estimated that an area of 37834.437m² of land will be disturbed by the proposed development, with 309.367m³ of sand/soil excavated from the river during construction of the bridge

An estimated 9581.621 m^3 of water will be required for construction purposes. The applicant intend to abstract water for construction from Mvudi River where the bridge will be located.

The entire road is approximately 1.6km inclusive of the section (500m) from the R524 circle outside the university boundary of which the EA was issued in 2015.

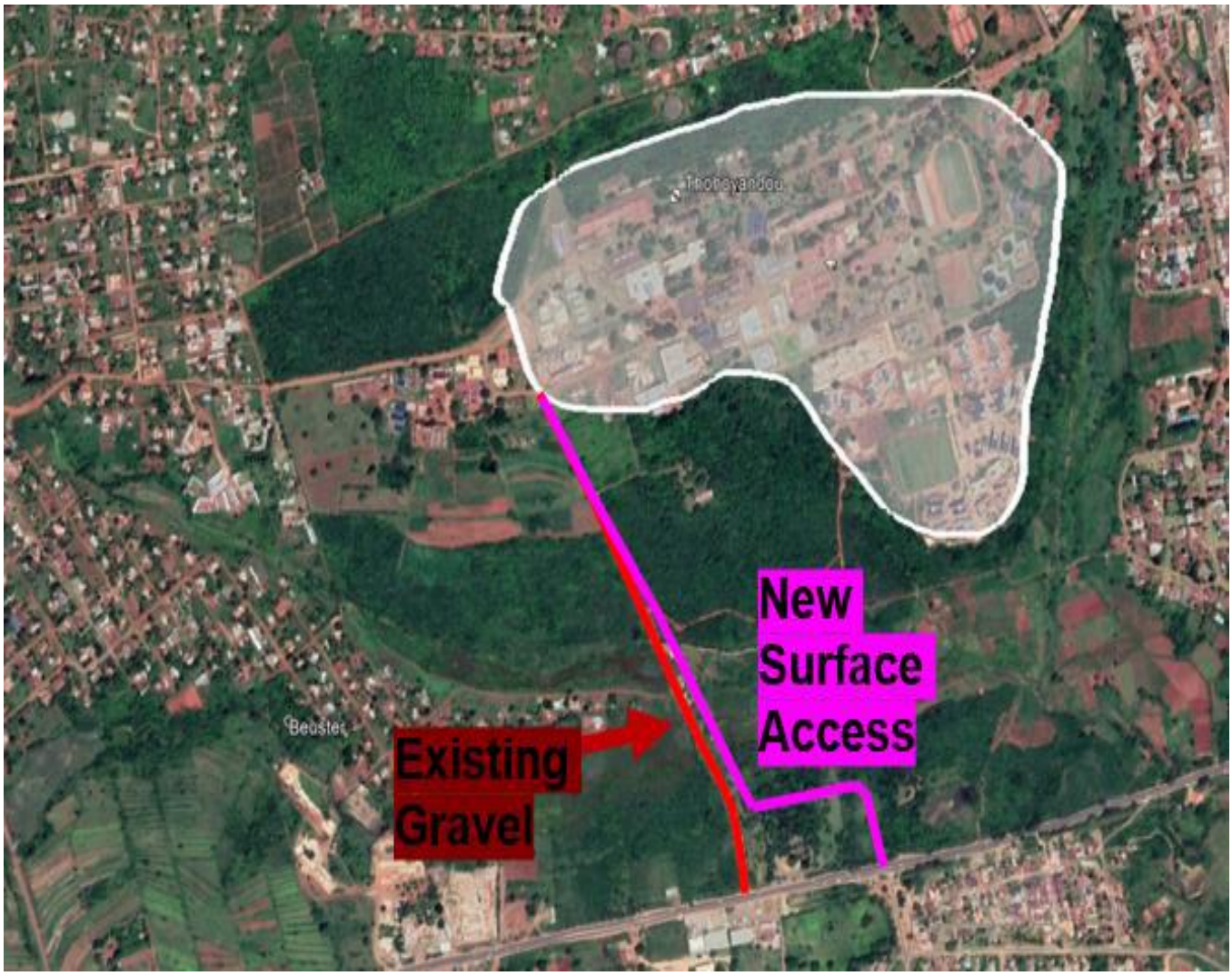

Figure 3. Project general layout

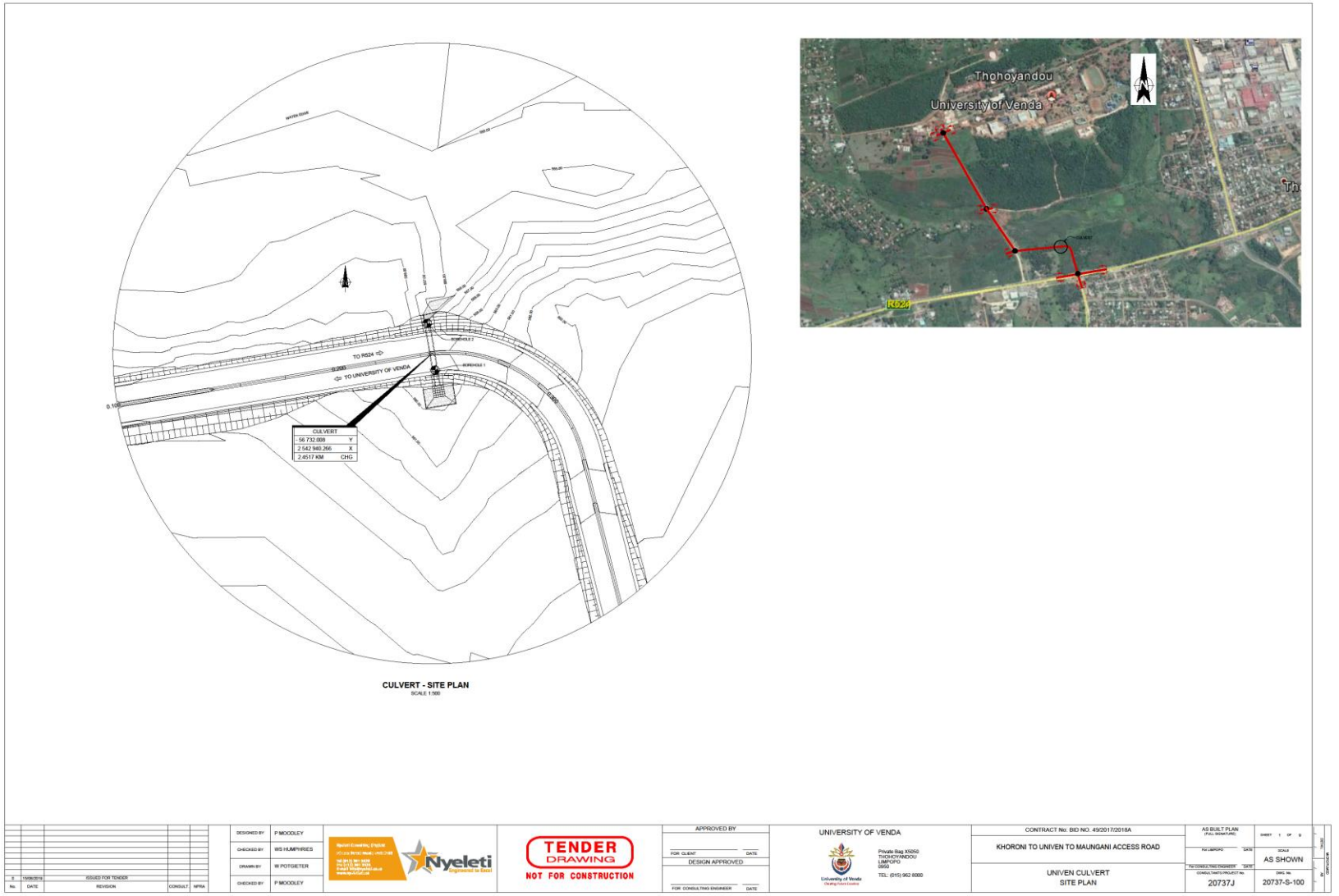

Figure 4. Road layout 1

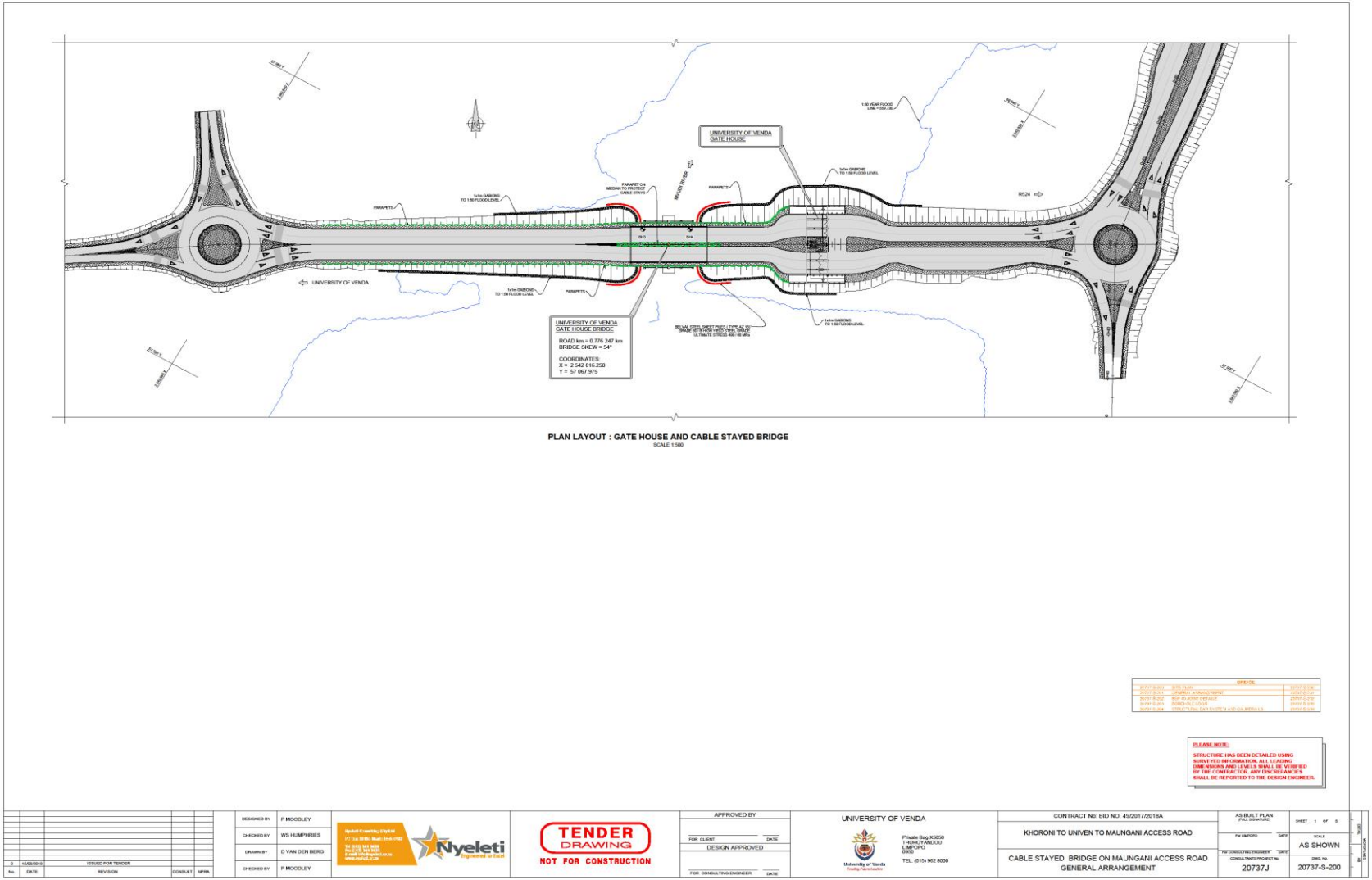

Figure 5. Road layout 2

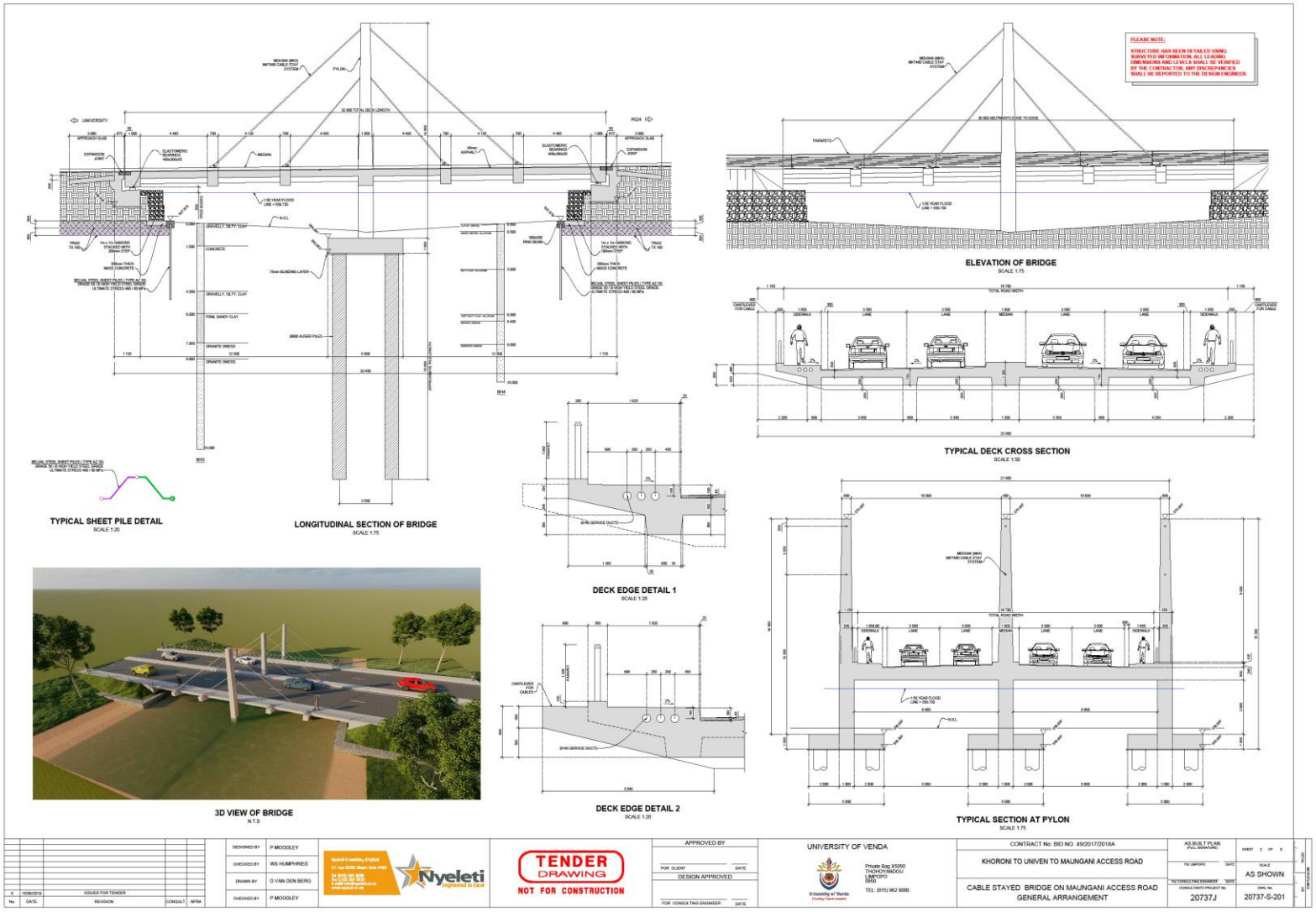

Figure 6. Bridge layout

3. SITE DESCRIPTION

3.1 BIODIVERSITY

The proposed road upgrade will run parallel to the existing alignment but within the existing road reserve. The proposed development will be undertaken in an area comprised of both disturbed and natural vegetation with low alien plant infestation.

Following information was adapted from the Ecological Impact Assessment study report for the proposed project by Naledzani Environmental Services, May 2019.

The site chosen for the proposed development falls within Savanna biome (Rutherford and Westfall (1994). Mucina and Rutherford (2006) classified the study area as falling under two vegetation types, the Soutpansberg Mountain Bushveld (SVcb 21) vegetation type of the Central Bushveld, and the Granite Lowveld of the Lowveld. The conservation status of **Soutpansberg Mountain Bushveld** is Vulnerable with 24% target for conservation and Granite Lowveld vegetation is considered Vulnerable with a target of 19% for conservation. (Mucina and Rutherford, 2006).

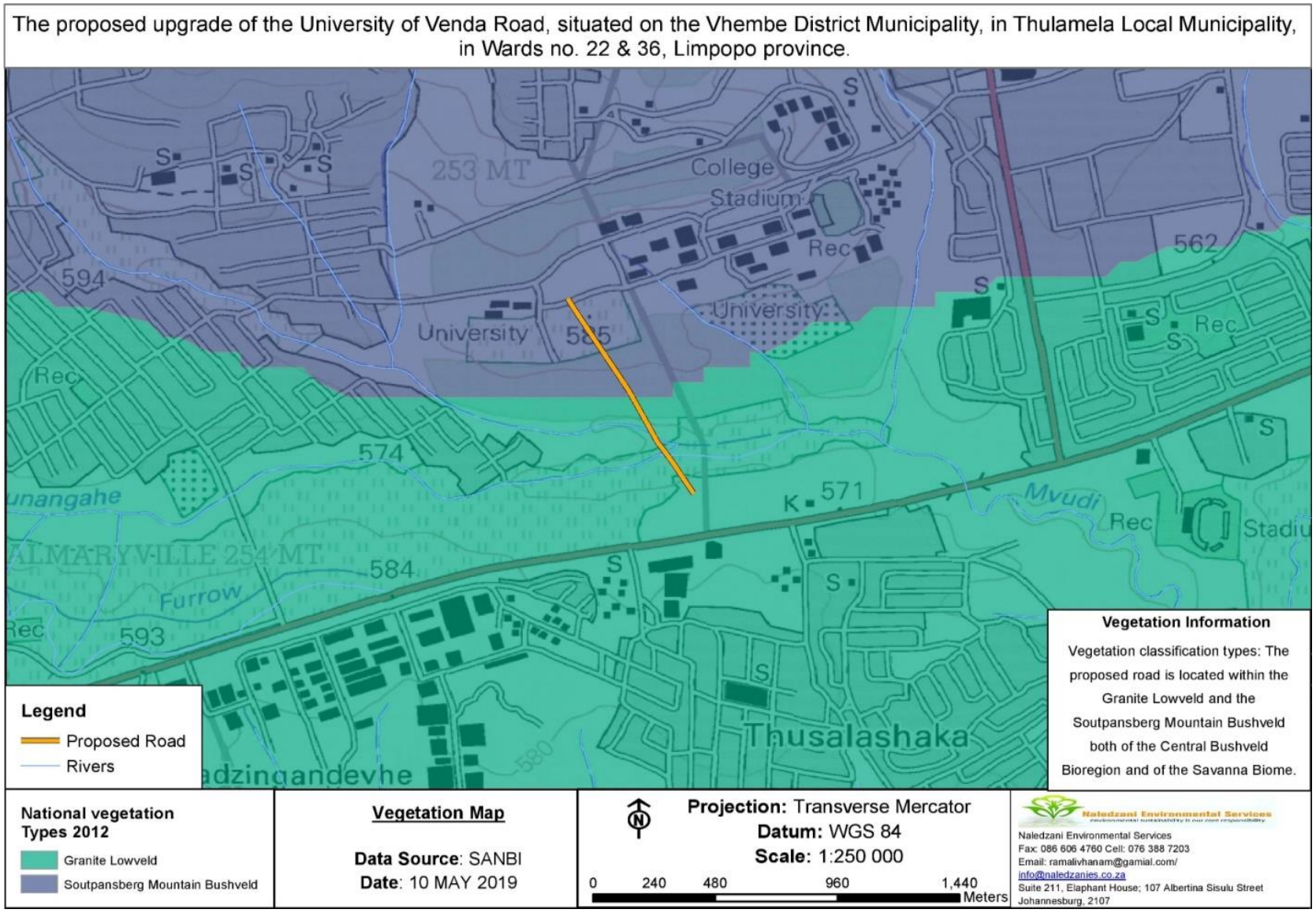

Figure 7. Broad-vegetation map for the site

The results from the desktop survey conducted by Naledzani Environmental Services indicated that the proposed area is located at 2230CD quarter degree grid square. From the data, the desktop results showed that the proposed development could have impacts on the seven (7) Red Data Listed plant species that could occur in the quarter degree grid square. During the field assessment no red data listed plant was encountered on site.

The section from the R524 towards the River (Mvudi) has a well-developed grass layer. Species such as *Urochloa mosambicens, Panicum maximum, Perotis patens, Anthephora pubescens, Melinis repens, Elionurus muticus, Eragrostis nindensis, Themeda triandra,* and *Trachypogon spicatus* were recorded. The herb and shrub layer was categorised by *Lippia javanica, Lantana camara, Datura ferox, Bidens pilosa, Senna didymobotrya, Ricinus communis, Ipomea purpurea, Commelina africana, Dichrostachys Cinerea, Gymnosporia senegalensis and Xanthium strumarium.* Tall trees recorded on site include *Ficus sycomorus, Vachellia karoo*, *Annona senegalensis, Vachellia sieberiana.*

Figure8 9. Overview of the current road facing the University of Venda

Figure 9. Section of the road with Vachellia karoo and a well-developed grass layer

Towards the river (wetland) hydrophilic vegetation that is associated with permanent or frequently saturated soils were recorded. Plant species such as *Typha capensis, Phragmites australis, Cyperus denudatus, Arundo donax and Cyperus fulgens* were recorded. Facultative dry-land species such as *Verbena arborescens, Lippia javanica, Ricinus communis, Vachellia sieberiana, senna didymobotrya, Mucuna coriacea.*

Figure 10. Area proposed for the new bridge

Figure 11. *Vachellia sieberiana* with a well-developed grassland underneath

Alien plants

The level and abundance of the alien plant species was low on site but those recorded are tabulated below on **table 3** including the NEMBA category for each species.

Scientific name	Common name	NEMBA Category
Argemone Mexicana	Mexican prickly poppy	1b
Lantana camara	Lantana	1b
Xanthium strumarium	Large cocklebur	1b
Riccinus communis	Castor oil	2
Melia azedarach	White syringa	1b
Arundo donax	Giant reed	1b
Verbena arborescens	Tall verbena	1b
Solanum mariantanum	Bug weed	1b
Senna didymobotrya	Peanut butter cassia	1b

Figure 12. *Xanthium strumarium* an invader on site

Figure 13. *Ricinus communis* as a dominating invader on site

Medicinal Plants

The site proposed for the development is also comprised of medicinal plants

Table 4. Medicinal plants recorded in the study areas.

Scientific name	Common name	Conservation Status
Lippia javanica	Lemon bush	Indigenous
Ricinus communis	Castor oil	Exotic
Lantana camara	Common lantana	Exotic
Annona senegalensis	African custard-apple	Indigenous
Amaranthus hybridus	Smooth pigweed	Exotic

According to the Limpopo Conservation Plan (C-Plan, v2), the proposed road is located within an Ecological Support Area 2 from the R524 road to the river. From the river to the University of Venda, the site is classified as Critical Biodiversity Area 1.

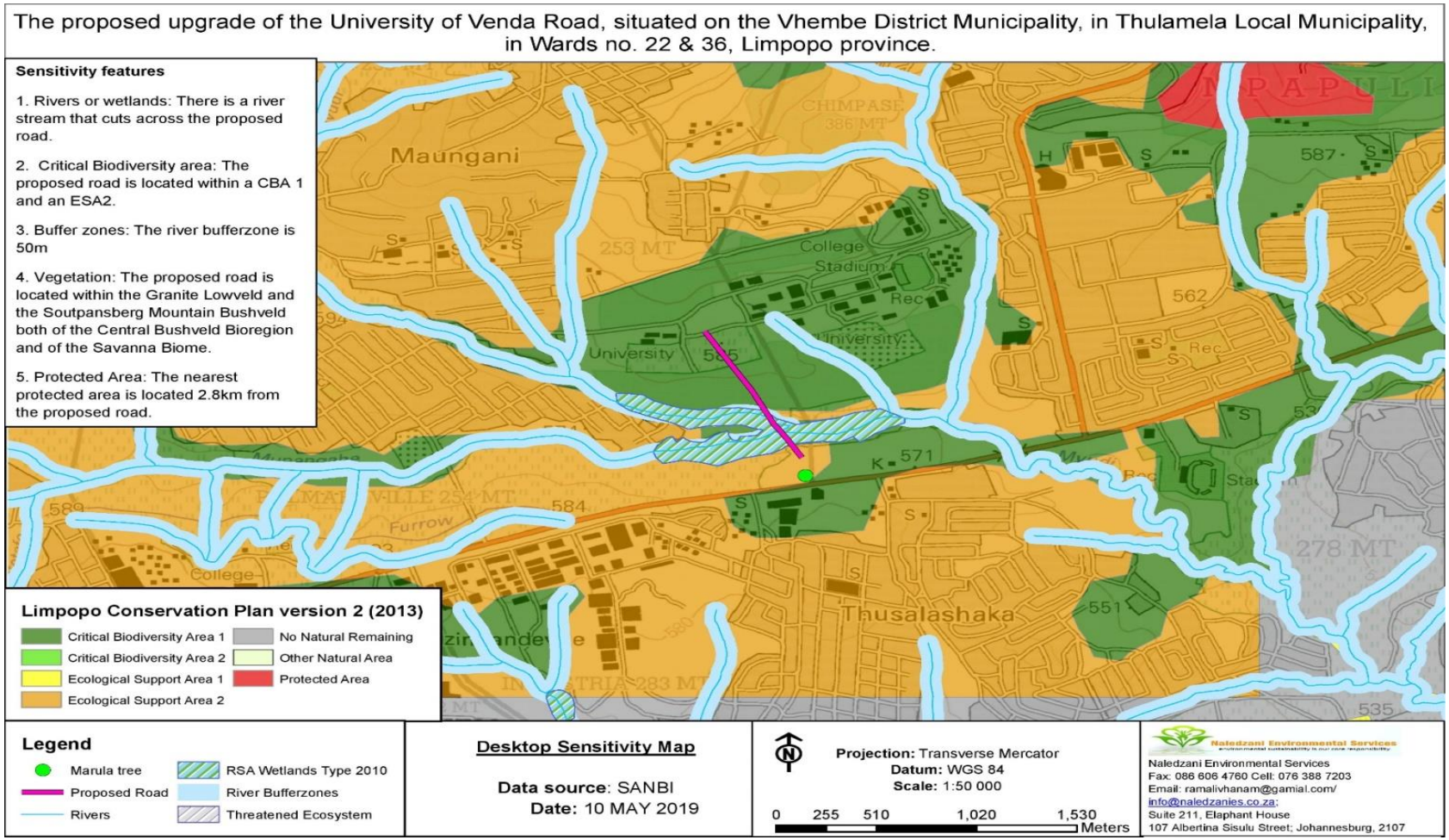

Figure 14. Study area in relation to the Limpopo Conservation Plan

Wetland

The field assessment revealed the road is crossing one wetland type (**channelled-valley bottom wetland**), which mostly flat wetland area located along a valley floor with a river channel running through it. Characterized by being positioned on a Valley Floor and the absence of characteristic floodplain features. Dominant water inputs are from the river channel flowing through the wetland, either as surface flow resulting from flooding or as lateral seepage, and/or from adjacent valley-side slopes. This wetland occurs along the Mvudi stream which the road crosses.

Wetland vegetation

The wetland on site had hydrophillics such as *Typha capensis, Phragmites australis, Cyperus denudatus, Arundo donax and Cyperus fulgens*

Figure 15. The hydrophilics (*Typha capensis and Phragmites australis*) along the wetland area

PES of wetland in the study area

The wetland on site was assessed and it was allocated the PESC of B - being largely natural with some habitat modification. The Present ecological state (PES) of the wetland on site is calculated as per the table below

Table 5. Broad PES values and categories of the wetland in the study area

Wetland type	Mean PES value	PESC
Channelled valley bottom	3.1	B

EIS of wetland in the study area

The wetland in the study area has EIS categories and EMC values as indicated below

Table 6. EIS and EMC values of wetlands in the study area.

Wetland	EIS Category (Median value)	EMC
Channelled valley bottom	High (2.3)	B

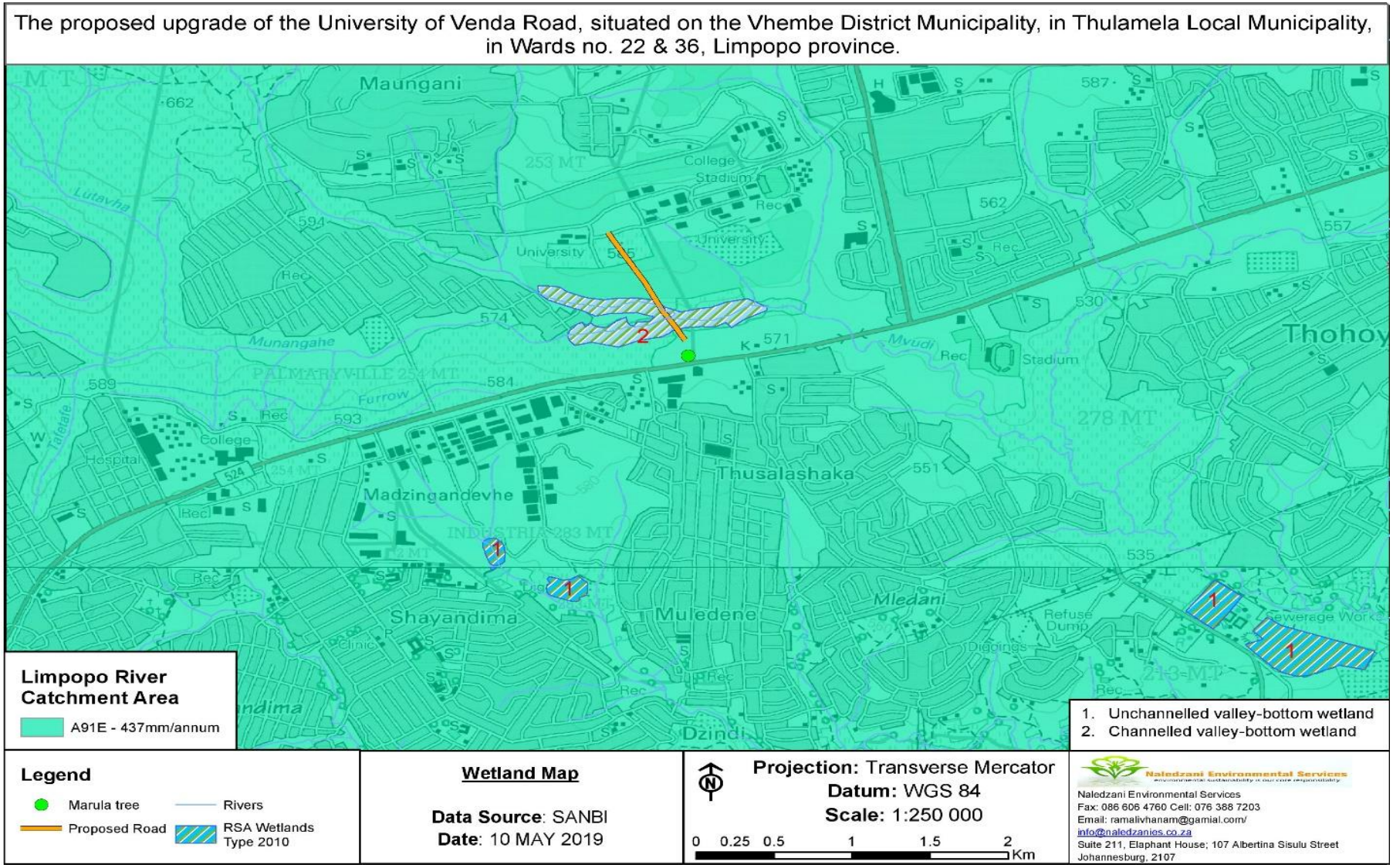

Figure 16. Wetland unit map for the site

Faunal Survey

From the assessment of the study area by Naledzani Environmental Services, no wild mammal species were identified including both large and small mammals which may be due to build up nature of the surrounding environment. As such, No Red Data mammal species or mammals of conservation importance were sighted during the field surveys. Only cows were seen grazing on the area where a new access is planned.

Avi-fauna

Desktop assessment (SABAP 2) showed that a total of 325 bird species have been confirmed within the QDGC. From field evaluation of the study area, few birds' nests were noted on the reeds on the area were a new access road is proposed. Few birds were heard at a distance making bird-sounds.

Amphibians

According to Minter et al. (2004), 13 amphibian species have been confirmed to occur within the affected QDGC. One of which was confirmed within the study area namely *Amietia angolensis* (Common River Frog). Based on habitat availability within the present study area, especially many non-perennial drainage lines as well as the river, many of the frog species confirmed to be present within QDGC's are likely to be present within the study site.

3. 2 TOPOGRAPHY AND GEOLOGY

The proposed development is located on slightly irregular plains. The road is currently gravel with a bridge/culvert crossing Mvudi river

The regional area is underlain by Leucocratic biotite gneiss, granite and pegmatite of the Swazian Erathem, Diabase dykes are common

3.3 SOIL

The proposed project location is predominantly underlain by red-yellow apedal, freefly drained soils, red dystrophic and/mesotrophic. The soil of the project is highly suitable for arable agriculture where climate persist.

3.4 HYDROLOGY AND WATER MANAGEMENT AREA

The proposed project will cross Mvudi River which is within a wetland. The site is also surrounded by several streams which drains into Mvudi River

The proposed development falls within the rivers and streams of the Limpopo Water Management within drainage region No A91E.

3.5 CLIMATE

Thohoyandou receives about 751.5mm of rain per year, with most rainfall occurring during summer. It receives the lowest rainfall (4 mm) in June and the highest (154 mm) in January. The average midday temperatures for Thohoyandou range from 22.9°C in June to 30.3°C in January. The region is the coldest during July when the mercury drops to 7.5°C on average during the night.

3.6 HERITAGE

They were no visible resources of archaeological or heritage importance identified on site during the assessment. However it must be noted that such resources might be buried underground.

3.7 SURROUNDING LAND USES

The surrounding land uses is comprised of filling station and small shop across the R524 south of the project site. There are also small agricultural activities west of the proposed site. Majority of the project site is bushes where there is an existing road.

4. ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr)

4.1 EMPr OBJECTIVES

This EMPr forms part of the Basic Assessment Report and is aimed at ensuring that reasonable measures are taken to prevent pollution and degradation as identified during impact assessment studies. The EMPr includes:

- Details of project
- Details of the mitigation measure that need to be implemented and procedure for implementation
- Descriptions of roles, responsibilities to ensure that all personnel involved in the proposed project

4.2 STRUCTURE OF THE EMPr

This EMPr is structured to provide environmental management guidelines to the Applicant (University of Venda), project management and contractors during pre-construction, construction and operational phases of the project.

4.3. EMPr IMPLEMENTATION

4.3.1 APPLICABLE LEGISLATIONS

This EMPr shall be read together with all authorizations regarding the proposed project.

The Contractor shall ensure that all activities associated with this project complies with all relevant legislations such as, but not limited to

- National Environmental Management Act No. 107 of 1998
- Environmental Conservation Act No 73 of 1989
- Minerals and Petroleum Development Act No.28 of 2002
- National Water Act No. 36 of 1998
- National Environmental Management-Waste Management Act No.59 of 2008

- National Environmental Management Air Quality Act No.39 of 2004
- National Veld and Forestry Fire Act No. 101 of 1998
- National Heritage Resource Act No. 25 of 1999
- Conservation of Agricultural Resources Act No 43 of 1983
- Occupational Health and Safety Act No.85 of 1993

4.3.2 ROLES AND RESPONSIBILITY

4.3.2.1 University of Venda

- Be familiar with the content of this EMPr
- Bears the overall responsibility for the implementation of this EMPr
- Ensures that services of a qualified and experienced Engineer/Project Manager is engaged in the proposed project
- Appoint qualified and experienced Environmental Control Officer to guide and monitor the compliance with the requirements of this EMPr
- Provide all necessary resources for the implementation of this EMPr
- Ensure that the corrective actions are implemented in the event of non-compliance
- Ensure smooth communication between all role players

4.3.2.2 Project Engineers

- Be familiar with the content of this EMPr
- The Project Manager shall ensure that the Contractor complies with environmental measures stipulated in this EMPr.
- Ensure that this EMPr forms part of the Contractor’s contract pack
- Conduct regular inspection together with the Contractor and ECO to monitor compliance with this EMPr
- Ensure that remedial actions are implemented in the event of non-compliant
- Ensure smooth communication between all role players
- Ensure that complaint register is maintained and all grievances are addressed satisfactory
- Participate in environmental audits and EMPr review together with ECO

4.3.2.3 Contractor

- Be familiar with the content of this EMPr
- Ensure compliance with all environmental measures stipulate in this EMPr
- Ensure that every personnel involved in this project has undergone awareness and training regarding their obligations towards this EMPr
- Keep records such as incident register, corrective action, training register and any other records regarding implementation of this EMPr
- Monitor activities of subcontractors and ensures environmental control measures are implemented
- Participate during environmental audits
- Implement remedial actions in the event of non-compliant

4.3.2.4 Sub-Contractors

- Be familiar with the content of this EMPr
- Ensure compliance with all environmental measures stipulate in this EMPr
- Ensure that every personnel involved in this project has undergone awareness and training regarding their obligations towards this EMPr
- Keep records such as incident register, corrective action, training register and any other records regarding implementation of this EMPr
- Participate during environmental audits
- Implement remedial actions in the event of non-compliant

4.3.2.5 ECO

- Be familiar with the content of this EMPr
- Monitor activities of the Contractor, Subcontractor and ensures that environmental control measures identified in this EMPr are implemented
- Conduct regular inspection and produce reports of findings
- Report findings to the contractor, Sub-contractor and Project Manager
- Ensure that remedial actions are implemented in the event of non-compliant

- Keep records of non-conformance and corrective actions
- Ensure smooth communication channel between all interested and affected parties
- Conduct environmental audits and EMPr review together with the Project Manager
- Ensure that records such as incident register, corrective action, training register and any other records regarding implementation of this EMPr is maintained

4.4 METHOD STATEMENT

The Contractor shall submit a method of statement prior to project commencement for approval by Project Manager and ECO. The Method Statement shall address the following:

- What- provide the description of activity to be undertaken
- Who- All personnel involved and their level of involvement
- When – the start date and completion date of the activity
- Where- the location where such activity is intended to take place (locality map/sketches/ designs shall be included where necessary)
- How- detailed description of process to unfold, method and material/equipment
- Identification of environmental aspects and impacts that might arise from the activity
- Emergency procedures

The activities which require a Method Statement are as follows, but not limited to:

- Site Preparations
- Excavations
- Storage of hazardous/hydrocarbon material
- Hazardous waste management
- Storm water management
- Fuelling of vehicles/machinery
- Spillage clean up
- Any changes/amendment made to the original Method Statement shall be submitted to Project Manager and ECO for approval.
- Copies of all Method Statements shall be retained and forms part of EMP implementation records.

4.5 ENVIRONMENTAL TRAINING

Project Team shall undergo environmental awareness training on their obligation towards environmental management specification of this EMPr prior to commencement of works. Attendance of such induction and training shall be recorded and record kept for filling.

4.6 EMERGENCY RESPONSE

The Contractor shall develop an emergency response procedure to be used during the project lifecycle. Emergency response contact details shall be readily available on site. All personnel involved in the project shall be made aware of the emergency response procedure through induction and training.

4.7 ENVIRONMENTAL MANAGEMENT SPECIFICATIONS

4.7.1 PLANNING PHASE

This section details mitigation measures that must be taken into consideration during planning phase of this project

Table 7: **Planning Phase mitigation measures**

ADMINISTRATIVE REQUIREMENTS				
ASPECT	**MITIGATION MEASURE**	**RESPONSIBLE PERSON**	**FREQUENCY**	**MONITORING MECHANISM**
Compliance	A suitable ECO is appointed to monitor compliance with this EMPr	Contractor, PM and University of Venda	Once-off	Site inspection and Audit
	Only the activities for which the environmental authorisation was issued for will be undertaken. Should they be changes in scope of work, LEDET must be notified and appropriate measures must be implemented	Contractor, ECO, PM and University of Venda	Project duration	Site inspection and Audit
	No water use activities such water abstraction from a watercourse, altering the bed and banks of a watercourse, impeding or diverting flow of water in a watercourse, etc shall be undertaken without Authorisation from DWS			
	The applicant must acquire a permit for sourcing materials			

	such as gravel, soil or sand from DMR prior to commencement of works. Only the materials sourced legally will be used during construction			
Induction and Training	Provide induction and training which covers amongst other this EMPr and Emergency Response Procedures to personnel involved in the project	Contractor and PM	Once-off	Audit
Community involvement and recruitment	The landowners and local residents must be informed of the construction works 3-4 weeks before commencing with the project	and University of Venda	Once-off	Audit
	Local residents considered during employment process	Contractor, PM and University of Venda	Once-off	Audit
Design	The bridge designed must be designed in such a way that it minimizes negative impact on the river, wetland and aquatic life	PM and University of Venda	Once-off	Audit
BIODIVERSITY AND SOIL MANAGEMENT				
ASPECT	**MITIGATION MEASURE**	**RESPONSIBLE PERSON**	**FREQUENCY**	**MONITORING MECHANISM**
Site layout	Locate camp in an appropriate location, preferably in an already disturbed area. Camp footprint shall be kept to a minimum	Contractor, PM and ECO	Once-off	Site inspection and audit

	Camp layout plan shall be submitted to ECO and Project Manager for approval. The construction layout plan shall consist of the following: • Location of the camp and access • Material and equipment storage areas (including hazardous material storage areas) • Waste storage • Provision of potable water and ablution facilities • Storm water control measures • Stockpiling and spoils areas Method/plan for removal of these facilities shall be included in the layout plan			
	The construction camp shall be equipped with drainage works to assist in controlling sedimentation and erosion on site	Contractor and ECO	Project duration	
	All drainages on site shall be inspected on daily basis to ensure that they are working effectively. Any fault is to be addressed immediately	Contractor and ECO		
Vegetation clearing	• The ECO must conduct regular site inspections prior to	Contractor	Project duration	Site inspection and audit

	clearing • The unnecessary removal of vegetation should be avoided and should not extend beyond the perimeters of the construction footprints. Permission shall be sought from ECO before any vegetation clearing commences • No removal of adjacent riparian vegetation. Where appropriate, large individual indigenous riparian tree species should be avoided during construction and should be clearly marked on site (danger tape etc.). • Appropriate rehabilitation of the macro-channel banks after the completion of construction activities is recommended • Workers must be limited to areas under construction within the road servitude and access to the undeveloped areas, especially the surrounding wooded riparian zones must be strictly regulated ("nogo" areas during construction as well as operational activities). • Medicinal and other indigenous trees of significance should be protected where necessary.			

	• Medicinal plants can be trans-located during construction and replanted • Unnecessary driving around in the veld or bulldozing natural habitat must not take place. Routes should be clearly defined as not to endanger fauna, flora			
Vegetation clearing	• Do not disturb nests, breeding sites or young ones. Do not attempt to kill or capture snakes unless directly threatening the safety of employees. • No animals should be intentionally killed or destroyed and poaching and hunting should not be permitted on the site.	Contractor	Project duration	Site inspection and audit
	License authorization must be obtained from DAFF for the felling of protected trees			
	All the cleared areas will be re-vegetated, where possible to minimize soil erosion			
	A proper and effective control program must be put in place to eradicate invasive alien vegetation to prevent further invasion on site			
Access road	No access road shall be constructed. The project team shall	Contractor	Project duration	Site inspection

	make use of existing access road			and audit
Topsoil stripping and storage	The topsoil must be striped prior to construction activities, stockpiled separately and used for rehabilitating purposes	Contractor, ECO and PM	Project duration	Site inspection and audit
	The disturbed areas and duration the areas are left exposed should be minimized to avoid soil erosion	Contractor		
	Slopes produced by the removal of soil must be kept to a minimum to reduce the chances of erosion damage at construction sites			
	Topsoil should be handled twice only - once to strip and stockpile, and secondly to replace, level, shape and scarify.			
	Topsoil should not be compacted in any way, nor should any object be placed or stockpiled upon it.			
	Topsoil stockpiles should not exceed 1.5 m in height and should be protected by a mulch cover where possible			
Topsoil stripping and storage	No construction equipment or vehicles shall be allowed to drive on the stockpile area	Contractor	Project duration	Site inspection and audit
	Measures shall be put in place to channel storm water away from stockpile area			
	Topsoil and subsoil to be protected from contamination. Construction material, fuel and other chemicals must be			

	stored away from the topsoil and subsoil in a bunded area			
Hazardous substance storage	Hydrocarbon and chemicals must be stored in a demarcated area which is impermeable 50m away from the river and wetland or alternatively outside the project boundary	Contractor	Project duration	Site inspection and audit
	Construction machinery and vehicles must be checked regularly and maintained for leakages			
	Soil contaminated by oils, fuels or other hazardous substances must be remediated in-situ or disposed of as hazardous waste			
	• All flammable substances are stored within demarcated area which is free of vegetation and litter • Flammable substances shall be kept in tight closed containers. The area where flammable substances are stored will be inspected daily. Any sings of faults or leaks are recorded and attended immediately to prevent further negative impact on the environment			
Hazardous substance storage	Vegetation clearing equipment and machines shall be parked in an demarcated area consist of impermeable surface to avoid hydrocarbon leaks into the ground or place a spill tray	Contractor	Project duration	Site inspection and audit

	under stationery machines and vehicles			
WATER MANAGEMENT				
ASPECT	**MITIGATION MEASURE**	**RESPONSIBLE PERSON**	**FREQUENCY**	**MONITORING MECHANISM**
Construction camp	No camp shall be located within 50m of a watercourse	Contractor	Project duration	Site inspection and audit
	Provision of adequate toilet facilities must be implemented to prevent the possible contamination of ground and surface water in the area.			
	Ablution facilities shall not be located in waterlogged area or within 50m of a watercourse			
	The chemical toilets must also be inspected and serviced by an appropriate contractor on an on-going basis to prevent any leaks or spillages to surface and groundwater sources.			
	Toilets must be emptied on a weekly basis at a licensed sewerage works by a registered service provider. The contractor must provide proof of the weekly removal of sewage by the service provider.			
	Care shall be taken during emptying of the toilets to prevent			

	spillages onto the ground			
Hazardous material handling and storage	• All hazardous substances shall be confined to the demarcated impermeable surface area. The designated area shall not be too close to the construction activities. • No hazardous material and substances such as (bituminous products, fuel, oil, diesel, etc.) shall be note be stored 50m near river, streams , wetland or any other watercourses	Contractor	Project duration	Site inspection and audit
Hazardous material handling and storage	Inspection of hazardous material containers for signs of faults and leakages shall be carried	Contractor	Project duration	Site inspection and audit
	• In the event of accidental hydrocarbon spillages, the spill must be immediately contained to a small area as possible. Spill shall be blocked from entering surface, water drains and streams. All source of the spill shall be identified and removed immediately • For a large spill or in case hydrocarbon absorbent booms proved to be ineffective, a professional service provider shall be involved to clean up the area at the expense of the Contractor • The used contaminated absorbent booms and rags shall	Contractor and ECO	Project duration	

	be stored in container, placed on impermeable surface and disposed to hazardous waste landfill site • No hydrocarbon absorbents shall be rinsed or disposed on the ground or in a watercourse • Contaminated soil shall be bio remediated on site or removed from site for remediation or alternatively disposed to hazardous waste landfill site			
Construction vehicle and machines	• All re-fuelling (if required) shall not be done on site. A designated area off site shall be provided for refueling. Oil and fuel must be stored in a designated impermeable • Spill trays must be used during under stationery construction machineries. • No repairs of construction vehicles or machines shall take place on site • Servicing of construction vehicles or other machinery should be done at the site camp(consist of impermeable surface) or at designated and approved servicing station	Contractor	Project duration	Site inspection and audit

AIR POLLUTION CONTROL				
ASPECT	**MITIGATION MEASURE**	**RESPONSIBLE PERSON**	**FREQUENCY**	**MONITORING MECHANISM**
Material transportation	All material loads such as gravel, sand, soil, etc must be adequately covered during transportation	Contractor	Project duration	Site inspection and audit
	Adherence to set speed limit on site			
Waste disposal	No domestic waste or cleared vegetation may be burned at the site camp or nearby bushes			
WASTE MANAGEMENT				
ASPECT	**MITIGATION MEASURE**	**RESPONSIBLE PERSON**	**FREQUENCY**	**MONITORING MECHANISM**
Waste handling	Caution must be taken to prevent construction waste from entering the streams.	Contractor	Project duration	Site inspection and audit
	Adequate colour coded waste bin/drums must be provided on site to encourage waste separation for recycling purposes Waste bins shall not be located within 50m of river, wetland			
	General waste is separated from hazardous waste			
	Hazardous waste bins are placed on impermeable surface to prevent any potential hydrocarbon leaks from contaminating			

	the ground			
Waste disposal	General waste shall be removed and disposed of at the municipal landfill site	Contractor	Weekly	Site inspection and audit
	Hazardous waste shall be removed and disposed of at an approved disposal facility for hazardous waste by an approved hazardous waste removal contractor		Project duration	
	Waste from chemical ablution facilities is to be cleaned and disposed to an appropriate facility by an approved contractor		Weekly	
	Waste removal register is used to record waste removed from site		Project duration	
	Safety disposal certificate and waste manifest are to be obtained for the hazardous waste removed from site		Project duration	Site inspection and audit
Waste disposal	Record all incidents related to waste (storage, disposal) in the incident register	Contractor	project duration	Site inspection and audit
Waste disposal	Inspection shall be carried out regularly and any incident related to waste segregation and incorrect disposal is to be reported and recorded	Contractor and ECO	project duration	Site inspection and audit
	No dumping of waste in the bush or watercourses shall be allowed	Contractor		
	There will be burning of waste onsite			

HEALTH AND SAFETY				
ASPECT	**MITIGATION MEASURE**	**RESPONSIBLE PERSON**	**FREQUENCY**	**MONITORING MECHANISM**
Security	The construction site shall be demarcated and access to the site is to be controlled to ensure safety and security of the site as well as the general public	Contractor	Project duration	Site inspection
	Barrier tape should be provided along trenches or signboards must be provided as a general warning to local people. Necessary signboards (information) must be placed close to and in the direction of the site			
	The lighting shall be provided on site to ensure security. Lighting must be done in a way not to cause nuisance to the public			
Basic needs	Proper ablution facilities must be provided and located not too far from the site	Contractor	Project duration	Site inspection and audit
	A minimum of 1 chemical toilet for every 15 construction workers must be provided			
	Ablution facilities are maintained on a weekly basis by an approved contractor			
	Water safe for human consumption must be provided on site			

Waste	Waste must be removed from site as it may become breeding ground for disease-causing vectors if left for long period		Weekly	
Cooking	Fires for cooking must be restricted to designated areas and extra care should be taken to ensure to prevent veldt fires from occurring		Project duration	
Health and Safety representative	The Act requires the designation of a Health and Safety representative when more than 20 people are employed	Contractor	Project duration	Site inspection and audit
	Provide information and awareness to construction workers at the site camp regarding health and hygiene	Contractor	Once-off	Audit
Material handling and storage	Proper PPE is provided and worn by all personnel handling material both hazardous and non-hazardous	Contractor	Project duration	Site inspection and audit
	Hazard signs indicating the nature of stored material shall be displayed on each containment facility			
	Material Safety Data Sheet shall be made available for all hazardous material on site			
	Hazardous storage areas must be safeguarded from fire and suitable firefighting equipment shall be supplied by the Contractor			
	Warning signs or notices must be displayed at the entrances to the site camp (e.g. no smoking), in accordance with the requirements of SABS 1186. Emergency response procedure			

	shall be made available on site. Fire service and other emergency numbers must also be displayed at the site camp.			
	Access to the hazardous material area shall be restricted.			
	Construction material and equipment shall be securely stacked			
	General firefighting equipment (e.g. portable fire extinguishers or fire hoses) must be made available at the site camp.			
	Personnel must be given the appropriate training in the use of the firefighting equipment and other emergency procedures.			
Emergency response	Adequate first aid services must be provided at the Construction Camp	Contractor	Project duration	Site inspection and audit
	Emergency response procedure shall be made available on site. Fire service and other emergency numbers must also be displayed at the camp site			
	Personnel involved in construction works are to be trained on emergency response procedures			

4.7.2 CONSTRUCTION PHASE

This section details mitigation measures that must be taken into consideration during construction phase of the proposed project.

Table 8: Construction Phase mitigation measures

ADMINISTRATIVE REQUIREMENTS				
ASPECT	**MITIGATION MEASURE**	**RESPONSIBLE PERSON**	**FREQUENCY**	**MONITORING MECHANISM**
Compliance	Only the activities for which the authorizations were issued for will be undertaken. Should they be changes in scope of work, LEDET must be notified and appropriate measures must be implemented	Contractor, ECO and PM	Project duration	Site inspection and audit
	Compliance with all relevant legislations during construction			
BIODIVERSITY AND SOIL MANAGEMENT				
ASPECT	**MITIGATION MEASURE**	**RESPONSIBLE PERSON**	**FREQUENCY**	**MONITORING MECHANISM**
Vegetation clearing	• The ECO must conduct regular site inspections prior to clearing • The unnecessary removal of vegetation should be avoided and should not extend beyond the perimeters of the construction footprints. Permission shall be sought from ECO before any vegetation clearing commences	Contractor	Project duration	Audit

	• No removal of adjacent riparian vegetation. Where appropriate, large individual indigenous riparian tree species should be avoided during construction and should be clearly marked on site (danger tape etc.). • Appropriate rehabilitation of the macro-channel banks after the completion of construction activities is recommended • Workers must be limited to areas under construction within the road servitude and access to the undeveloped areas, especially the surrounding wooded riparian zones must be strictly regulated ("no go" areas during construction as well as operational activities). • Medicinal and other indigenous trees of significance should be protected where necessary. • Medicinal plants can be trans-located during construction and replanted • Unnecessary driving around in the veld or bulldozing natural habitat must not take place. Routes should be clearly defined as not to endanger fauna, flora			

	• Construction during rainy and windy days should be avoided to minimize compaction of areas outside the project boundaries			
	• Use low-impact methods of excavation • Keep heavy machinery used for excavations out of adjacent areas of natural habitat, wherever possible			
	Construction machinery and vehicles must be checked regularly and maintained for leakages			
	Soil contaminated by oils, fuels or other hazardous substances must be remediated in-situ or disposed of as hazardous waste			
	Erosion monitoring shall take place regularly			
Alien invader plant control	• A proper and efficient alien plant invader control programme shall be development and implemented • Alien invader species and weeds must be removed and disposed of on a regular basis in accordance with relevant legislation.	Contractor and ECO	Project duration	Site inspection and audit
Aquatic fauna	• Construction activities are recommended to take place during dry period. • Stormwater management must be implemented to prevent the ingress of runoff into the watercourse, thus	Contractor and ECO	Project duration	Site inspection and audit

	reducing the sediment loads entering the watercourse			
Stockpiling	• All material stockpiles shall be approved by the Project Manager/Engineer and ECO. • The Contractor shall demarcate area for stockpiles and submit a stockpile plan to the Project Manager for approval. • First consideration shall be given to previously disturbed areas for the location of stockpiles	Contractor	Project duration	Site inspection and audit
	The topsoil must be striped prior to construction activities, stockpiled separately and used for rehabilitating purposes			
	Soil stockpiling areas must be sufficiently situated not less than 50m away from the drainage areas to prevent siltation and sedimentation			
	Topsoil should be handled twice only - once to strip and stockpile, and secondly to replace, level, shape and scarify			
	Topsoil stockpiles should not exceed 1.5 m in height and should be protected by a mulch cover where possible			
	Slopes produced by the removal of soil must be kept to a minimum to reduce the chances of erosion			
	Avoid excessive wetting during dust suppression as this might lead to soil erosion			

	Topsoil should not be compacted in any way, nor should any object be placed or stockpiled upon it.			
Stockpiling	Soil stockpiles shall be maintained free of weed	Contractor	Project duration	Site inspection and audit
	Measures shall be put in place to channel storm water away from stockpile area			
	The careful position of soil piles and runoff control during all phases of development will limit the extent of erosion occurring on the site			
	Stockpile topsoil for the minimum time period possible i.e. strip just before the relevant activity commences and replaced as soon as it is completed			
	All disturbed areas are to rehabilitated as soon as possible	Contractor	Project duration	Site inspection and audit
	No construction equipment or vehicles shall be allowed to drive on the stockpile area	Contractor	Project duration	Site inspection and audit

WATER MANAGEMENT				
ASPECT	**MITIGATION MEASURE**	**RESPONSIBLE PERSON**	**FREQUENCY**	**MONITORING MECHANISM**
Construction, storage, movement of vehicles and machines, parking	• No construction shall take place within a watercourses without approval by DWS and LEDET • Aligning the proposed bridge to the existing bridge. • Construction across wetlands/rivers should be restricted to low flow period (dry winter season) • Ensure that construction activities are carefully monitored to limit unnecessary impacts to wetlands/riparian areas (particularly in-stream habitat) and should be approved by WUL. • Do not lower the original stream bed / profile of the wetland/river, when constructing the bridge, as this may result in scouring in an upstream direction and further alteration of bed conditions. • Ensure that coarse immovable material including boulders and other rock in river channels is reinstated/rehabilitated to ensure continued stability and functioning of the river systems. River sediments should not be permanently removed from the system in any case. Rehabilitation of the river and wetland as soon as	Contractor	Project duration	Site inspection and audit

	construction is completed. • Construction vehicles and machinery must be well maintained to prevent oil and fuel leaks. Spill trays must be placed under stationery machines. Spill kits must be kept on site and staff must be trained in the correct use of these kits. • No maintenance of construction machineries shall take place on site. Spill trays must be used during repairs of construction vehicles or machines. • No refueling of vehicles and machineries on site. • Ensure that all hazardous material are properly stored in a designed area which bunded, outside 100 year floodline or 50m away from the watercourse • An emergency management procedure which includes spill response must be prepared and kept onsite • Staff must be trained to implement the emergency management procedure; • Used oil must be taken to the nearest approved oil refiner or fuel recycling point for recycling and must not be stored for extended periods within the site camp.			

	• The location for the site camp must be carefully selected at least 50 meters away from the water courses • Water quality shall be monitored by a qualified Environmental Officer. • Excavated and imported material should be stored away from the river banks /areas of concentrated flow to limit the risk of sediment wash to downstream areas. • Any topsoil removed from wetlands must be stockpiled separately from subsoil material and replaced once construction is complete to facilitate re-colonization of the site. • Operation and storage of machinery and construction-related equipment must be done outside of wetlands and rivers wherever possible, unless authorized by a WUL. • Toilets should be located outside of the 1:100 yr. flood line of a watercourse or 50m or from any natural water bodies including streams and wetlands. Waste from chemical toilets should be disposed of regularly and in a responsible manner by a registered waste contractor. • A sufficient number of wind and animal proof waste bins			

	must be allocated. The contractor must ensure that these waste bins are emptied at a licensed landfill site on a weekly basis • The site should be shaped in order that proper surface drainage and storm water management would be effective and water should not pond after heavy rains • In the event of accidental hydrocarbon spillages, the spill must be immediately contained to a small area as possible. Spill shall be blocked from entering surface, water drains and streams. All source of the spill shall be identified and removed immediately • For a large spill or in case hydrocarbon absorbent booms proved to be ineffective, a professional service provider shall be involved to clean up the area at the expense of the Contractor • The used contaminated absorbent booms and rags shall be stored in container, placed on impermeable surface and disposed to hazardous waste landfill site • No hydrocarbon absorbents shall be rinsed or disposed			

	on the ground or in a watercourse • Contaminated soil shall be bio remediated on site or removed from site for remediation or alternatively disposed to hazardous waste landfill site			
Backfilling	No soils containing hazardous or toxic material of any kind may be used for backfilling purposes	Contractor	Project duration	Site inspection and audit
Mixing of concrete, cement and stone crushing	Concrete batching plants and crushing plants shall be subjected to the requirements of the Department of Minerals and Resources legislation	Contractor	Project duration	Site inspection and audit
	Mixing of concrete shall be done on impermeable surface which is located far from the watercourse			
	Concrete, cement, and masonry products may never be discharged into watercourse or storm water measures	Contractor	Project duration	Site inspection
	Concrete, cement, and masonry mixing containers and tools may not be washed or rinsed watercourse or drainage measures			
Mixing of concrete, cement and stone crushing	Effluent from these process shall be contained to prevent surface and groundwater pollution and treated in a suitable designated sedimentation dam or disposed to an approved municipal landfill site	Contractor	Project duration	Site inspection

Washing of equipment	Hydrocarbon and hazardous contaminated equipment shall not be washed in the watercourse and storm water measures, washing can be done on an impermeable surface with proper containment measures	Contractor	Project duration	Site inspection and audit
Painting	Paint and paint thinner may never be discharged into the storm drain system and watercourse. Paint brushes, paint spray guns, paint trays or containers, and paint cans may not be cleaned or rinsed into the ground, watercourse and storm drain system	Contractor	Project duration	Site inspection and audit
Use of water for construction	• No water can be abstracted from a water source, i.e rivers, streams, ground without a permit being obtained from **Department of Water and Sanitation (DWS).** • Record water consumption during construction phase • Water shall be utilized wisely to minimize water usage			
NOISE CONTROL				
ASPECT	**MITIGATION MEASURE**	**RESPONSIBLE PERSON**	**FREQUENCY**	**MONITORING MECHANISM**
Construction activities	The contractor must ensure that construction activities are limited to hours of daylight during weekdays. No work must be undertaken on Sundays and public holidays unless an	Contractor	Project duration	Site inspection and audit

	agreement has been reached with nearby residents, or applicable landowners			
	Proper equipment and vehicle maintenance must be implemented on a regular basis to keep noise levels to acceptable levels.			
	Local regulatory requirements shall be complied with in terms of work activities that may cause potential excessive noise	Contractor	Project duration	Site inspection
	Residents are notified of activities that could generate excessive noise prior to undertaking such activities			Audit
	Possible measures shall be undertaken to keep noise to a minimal	Contractor	Project duration	Audit
Construction activities	Noise measurements are taken upon receipt of a complaint	ECO and Contractor	Project duration	Audit
Construction activities	Proper records regarding noise complaints shall be maintained	ECO and Contractor	Project duration	Audit
	Public to be notified in advance of any activities that will be undertaken which might cause excessive noise generation			
	Contractors must comply with Provincial Noise Regulations /or Local Municipal By-Laws.			

	No work must be undertaken on Sundays and public holidays unless an agreement has been reached with nearby residents, or applicable landowners.			
	The contractor must ensure that construction activities are limited to hours of daylight during weekdays.			
	Proper equipment and vehicle maintenance must be implemented on a regular basis to keep noise levels to acceptable levels.			
AIR POLLUTION CONTROL				
ASPECT	**MITIGATION MEASURE**	**RESPONSIBLE PERSON**	**FREQUENCY**	**MONITORING MECHANISM**
Excavation	• Vegetation clearing shall be done in phases so as to minimize the time which the stripped areas are exposed. • Clearing, grubbing and soil stripping shall not be done during excessive winds to minimize dust generation	Contractor	Project duration	Site inspection and audit
	• Excavations and other clearing activities must only be done during permitting weather conditions to avoid excessive dust			
Stockpiling	• The cleared topsoil must be stockpiled in such a way that transportation by wind is limited. This can be done by restricting the height of stockpiles to 1.5 m height.	Contractor	Project duration	Site inspection and audit

Transportation of materials and movement of construction equipment	• Construction areas must be dampened to prevent excessive dust formation, especially during the winter months (dry and windy conditions) • Construction vehicles and machinery must be well maintained (serviced) to reduce excessive emissions during operation. • Vehicles carrying material that may generate excessive dust shall be covered • Onsite speed limit shall be obeyed at all times	Contractor	Project duration	Site inspection and audit
Use of construction equipment	All machinery and equipment shall be maintained in accordance with manufacturer's specifications to prevent emissions and odour during their operation	Contractor	Project duration	Site inspection and audit
Waste management	No burning of waste including removed grass and tree stumps on site	Contractor and ECO	Project duration	Site inspection and audit
WASTE MANAGEMENT				
ASPECT	**MITIGATION MEASURE**	**RESPONSIBLE PERSON**	**FREQUENCY**	**MONITORING MECHANISM**
Waste handling	Caution must be taken to prevent construction waste from entering the streams.	Contractor	Project duration	Site inspection and audit
	Adequate colour coded waste bin/drums must be provided			

	on site to encourage waste separation for recycling purposes			
	General waste is separated from hazardous waste			
	Hazardous waste bins shall be placed on impermeable surface to prevent any potential hydrocarbon leaks from contaminating the ground			
Waste disposal	General waste shall be removed and disposed of at the municipal landfill site	Contractor	Weekly	Site inspection and audit
	Hazardous waste shall be removed and disposed of at the approved disposal facility for hazardous waste by an approved hazardous waste removal contractor	Contractor	Project duration	Site inspection and audit
	Waste from chemical ablution facilities shall be cleaned and disposed to an appropriate facility by an approved contractor	Contractor	Project duration	Site inspection and audit
	Waste removal register shall be used to record waste removed from site			
	Safety disposal certificate and waste manifest are to be obtained for the hazardous waste removed from site			
	Record all incidents related to waste (storage, disposal) in the incident register	Contractor and ECO Contractor	Project duration	Site inspection
	Inspection shall be carried out regularly and any incident related to waste segregation and incorrect disposal is to be			

	reported and recorded			
	No dumping of construction material in the bush or watercourses shall be allowed			
	There will be no burring and burning of waste onsite			
	Caution must be taken to prevent construction waste from entering the streams.			
	All waste produced during the construction should be removed as soon as possible, preferable on a weekly basis and disposed of at a Municipal landfill facility or registered hazardous waste landfill facility			
HERITAGE PROTECTION				
ASPECT	**MITIGATION MEASURE**	**RESPONSIBLE PERSON**	**FREQUENCY**	**MONITORING MECHANISM**
Construction	If archaeological materials are uncovered, work should cease immediately and the LIHRA be notified, in the meantime activity should not resume until appropriate management provisions are in place.	Contractor and PM	Project duration	Audit
	No heritage material or burial remains will be removed from the site without permission from LIHRA			
Site clearing and	It is the responsibility of the Applicant to notify contractors	Contractor,	Project duration	Audit

excavation	and workers that archaeological material (e.g. pottery, remains of stone-walling, graves, etc) and fossils are often located underground	PM and Applicant		
VISUAL/ AESTHETIC AND LANDSCAPE CHARACTER				
ASPECT	**MITIGATION MEASURE**	**RESPONSIBLE PERSON**	**FREQUENCY**	**MONITORING MECHANISM**
Topography	Excavation of stream bed and banks must be limited to the area required for construction	Contractor and PM	Project duration	Site inspection and audit
	The original geometry, topography and geomorphology in both cross-sectional and longitudinal profile should be reinstated, above and below the river crossing			
Material stockpiling	Material and stockpiles must not be higher than 1.5m All stockpiles shall be placed in position that will create least visual impact.	Contractor	Project duration	Site inspection and audit
Vegetation removal	As much vegetation as possible must be retained to screen off the construction site. Removal of vegetation must be limited to the actual construction footprints	Contractor and ECO		
Waste management	The site shall be kept visually and aesthetically pleasing, especially in and around the construction camp	Contractor	Project duration	Site inspection and audit
	Camp site, stockpiles and waste material will be removed			

	from site at the completion of the proposed development			
	Litter and solid construction waste must be removed and disposed of on a weekly basis at the licensed landfill or waste disposal facility for which permission had been obtained for.	Contractor	Project duration	Site inspection and audit
Lighting	Lighting shall be position in a way not to obstruct or cause nuisance to the public	Contractor	Project duration	Site inspection
FIRE CONTROL				
ASPECT	**MITIGATION MEASURE**	**RESPONSIBLE PERSON**	**FREQUENCY**	**MONITORING MECHANISM**
Cooking and heating	No open fire is allowed on site – only enclosed fire can be used for cooking	Contractor	Project duration	Site inspection and audit
	No burning of waste on site			Site inspection
Storage, usage of hazardous and hydrocarbon material	All hazardous materials are safeguarded against fire	Contractor	Project duration	Site inspection and audit
	Combustible material shall not be stored in the same storage area			
	Adequate firefighting equipment must be readily available on site in all fuel handling and flammable substances storage areas			
	No smoking shall be allowed in the vicinity of the store flammable gases. Safety signs depicting “No Smoking or Danger” are to be provided as per the relevant SANS code.			

HEALTH AND SAFETY				
ASPECT	**MITIGATION MEASURE**	**RESPONSIBLE PERSON**	**FREQUENCY**	**MONITORING MECHANISM**
Staff and public	The contractor shall conform to all the stipulations of the Occupational Health and Safety act and the applicable Regulations	Contractor	Project duration	Site inspection and audit
	Safety measures must be implemented during the construction phase for local people as well as construction workers. Barrier tape should be provided along exiting trenches or signboards must be provided as a general warning to local people. Necessary signboards (information) must be placed close to and in the direction of the construction site.			
	No construction workers are allowed to enter private property. Strict control measures must be implemented in this regard			
	Firefighting equipment must be available on site			
Material handling	Proper PPE is to be provided and worn by all personnel handling material, both non-hazardous and hazardous material	Contractor	Project duration	Site inspection and audit

Stockpiling	Material are securely stacked and access is controlled	Contractor	Project duration	Site inspection and audit
Hazardous materials handling ,usage and storage	Material Safety Data Sheet shall be readily available on site	Contractor	Project duration	Site inspection and audit
	Hazard signs are displayed on all hazardous/hydrocarbon storage facilities			
	All hazardous material containment facilities are equipped with firefighting equipment			
	Warning signs or notices must be displayed at the entrances to the site camp (e.g. no smoking), in accordance with the requirements of SABS 1186.			
Emergency response	Emergency response procedure shall be made available on site. Fire service and other emergency numbers must also be displayed at the construction site	Contractor	Project duration	Site inspection and audit
	Personnel involved in construction works are to be trained on emergency response procedures			
	Adequate first aid services will be provided at the Construction Camp			
Access control	The construction site shall be demarcated and access to the site must be controlled	Contractor	Project duration	Site inspection and audit
	Barrier tape should be provided along exiting trenches or signboards must be provided as a general warning to local			

	people. Necessary signboards (information) must be placed close to and in the direction of the construction site			
	Construction activities should aim to minimise disturbances to the adjacent residential uses.			
	Where access is restricted due to construction activities, arrangements for alternative access should be provided.			
	Safety concerns should be addressed by implementing health and safety procedures. Where necessary adequate fencing should be installed and other site security measures to prevent trespassing, theft and vandalism.	Contractor	Project duration	
Cooking using fire	No open fire shall be allowed on site and extra care should be taken to ensure to prevent veldt fires from occurring.	Contractor	Project duration	Site inspection and audit
Waste management	Waste must be removed from site as it may become breeding ground for disease-causing vectors if left for long period	Contractor	Weekly	Site inspection and audit
Vehicle movement	Speed reduction measures (signboards) must be provided close to the construction sites	Contractor	Project duration	Site inspection and audit

4.7.3 DECOMMISSIONING AND REHABILITATION

- All residual stockpiles, construction material left overs and waste from construction process shall be cleaned and removed from the site
- Discarded building materials must never be left along the road or within or near river or wetland
- The Contractor shall rehabilitate all areas affected by construction activities such as construction camp site, access roads, river and wetland, etc.
- Hardened surface by concrete shall be ripped-off and such waste disposed to an approved landfill site.
- All spillages (oil, tar, bitumen) shall be cleaned-up and contaminated soil bio remediated on site or re-moved off site for remediation or disposal to hazardous landfill site
- Usable leftover materials should be recycled or donated as appropriate and appropriately separated from unusable/non-recyclable garbage and debris
- No hydrocarbon, hazardous and alien seeds contaminated top soil shall be used for rehabilitation purposes
- Disturbed areas should be rehabilitated with a grass mix that blends in with the surrounding vegetation. The grass mix should consist of indigenous grasses, shrubs and trees adapted to the local environmental conditions.
- Shaping of remaining and exposed soil profile to blend in with the gradients of the surrounding landscape.
- Exotic weeds and invaders that might establish on the re-vegetated areas should be controlled to allow the re-vegetated area to properly establish.

4.7.4 OPERATIONAL PHASE

This section of the EMPr outlines the actions required to protect the environment during operational phase of the proposed project.

4.7.4.1 ROLES AND RESPONSIBILITIES

4.7.4.1.1 University of Venda

- Be familiar with the content of this EMPr
- Bears the overall responsibility for the implementation of this EMPr
- Provide all necessary resources for the implementation of this EMPr
- Ensure that the corrective actions are implemented in the event of non-compliance

4.7.3.1.2 Contractor

Contractors on behalf of University of Venda are required to:

- To familiarize themselves with the content of this operational EMPr
- Comply with this operational EMPr
- Ensure that employees and subcontractors are aware of the requirements of this EMPr
- Allocate sufficient resources for the implementation of this EMPr
- Notify University of Venda in the event of environmental incidents and take necessary actions

Table 9. Operational Phase mitigation measures

BIODIVERSITY AND SOIL			
ASPECT	**MITIGATION MEASURE**	**RESPONSIBLE PERSON**	**FREQUENCY**
Vegetation	Rehabilitated area shall be maintained to ensure sufficient plant growth	University of Venda	Ongoing
	The road and bridge servitudes must be regularly inspected during the operational phase and alien vegetation that had re-emerged; must be removed and follow-up treatment applied	University of Venda	Ongoing
Soil erosion	Storm water measures shall be properly maintained to ensure effective control of storm water	University of Venda	Ongoing
	Inspection of the storm water drainage system to confirm its functionality and instituting maintenance as and when required		
	Maintenance of rehabilitated area		
SAFETY			
	The road must be maintained once operational to ensure the positive road safety impacts	University of Venda	Ongoing

5. MONITORING

5.1.1 MONITORING DURING CONSTRUCTION PHASE

Site inspections shall be undertaken during construction process to monitor the compliance with the environmental measures as discussed in **Section 4**. Inspections shall be carried out by the Contractor and ECO and findings shall be recorded using checklist to be developed in line with the Environmental Management Measures tabled above. Non-conformances shall be addressed immediately and reported to the Project Manager. Inspection reports shall be retained and form part of the monthly report.

The Contractor, ECO and Project Manager shall convene monthly meetings for the project duration. The purpose of these meetings will be amongst others:

- To discuss project matters related to environment- challenges, concerns
- To assess and track the progress regarding implementation of this EMPr
- To discuss non-conformance, incidents, complaints

5.1.2 MONITORING DURING OPERATIONAL PHASE

Monitoring shall also be undertaken during operational phase to determine compliance status to this EMPr in line with OPEMPr **(4.7.4).** All non-conformances found shall be addressed immediately and efforts shall be made to comply with the OPEMPr.

6. EMPr AUDITING, REVIEW AND AMENDMENT

6.1 EMPr AUDITING

This EMPr shall be subjected to audits to determine the progress of its implementation on a 6 month basis during project lifecycle. The audit team shall consist of the ECO, Project Manager and Contractor representative. The audit results shall be documented and forms part of the EMPr review.

6.2 EMPr REVIEW AND AMENDMENT

This EMPr should be viewed as a working document and therefore shall be reviewed and amended as and when required to improve the effectiveness of identified control measures. The frequency of reviews is dependent on a number of factors such as, but not limited to

- Change of project scope or design
- After environmental audits
- Following environmental incident

Reasons for EMPr amendment shall be documented and all copies (original and amended versions) shall be kept for records.

EMPr review will be done by ECO and Project Manager. The Project Manager shall inform the Contractor of such review. The Contractor must ensure that everyone involved in the project is aware of the changes and all have undergone training regarding such changes.

7. LIST OF REFERENCES

DEAT (2004), Environmental Management Plans, Integrated Environmental Management, Information Series 12, Department of Environmental Affairs and Tourism (DEAT), Pretoria

Draft Basic Assessment Report for the proposed upgrading of University of Venda access road and a new bridge, Mawedza Geo-Environmental Consulting, May 2019

Ecological Impact Assessment study report for the proposed upgrading of University of Venda access road and a new bridge, Naledzani Environmental Services, May 2019.

Phase 1 Archaeological Impact Assessment Specialist study report for the proposed Upgrading of University of Venda access road from R524 and a bridge, Vhubvo Archaeo Heritage Consultants, May 2019