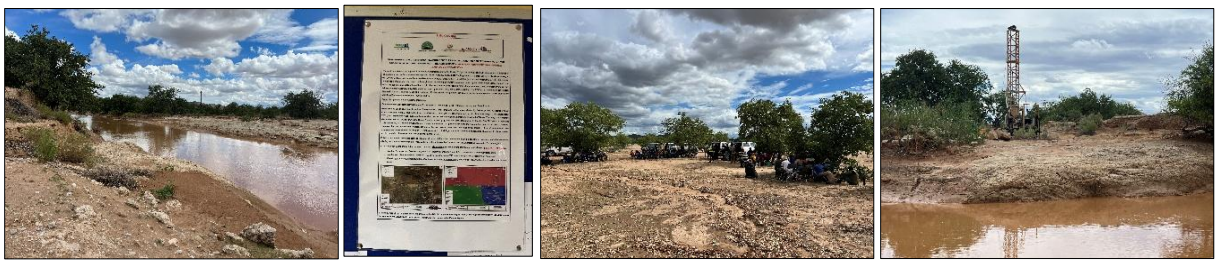
SERJAHGE CONSULTANTS
'Sustainability is Tomorrow's Usage Assurance'

Environmental Impact Assessment (EIA) Study: Report

The Proposed Construction of the New Oute River Bridge on District Road 3703 (DR3703) in the Kunene Region - Application for Environmental Clearance Certificate (ECC)



ECC Application No.: APP-007177

Document Version: Final for Submission to the MEFT

Proponent: Roads Authority of Namibia

ROADS AUTHORITY
SAFE ROADS TO PROSPERITY

Project Consulting Engineer: D&P Engineers, Archetype Project Consultants & Tweya Consulting Engineers Joint Venture (DAT JV)

D&P ENGINEERS AND ENVIRONMENTAL CONSULTANTS "Purpose with Passion"
ARCHETYPE PROJECT CONSULTANTS
Tweya CONSULTING ENGINEERS

April 2026

DOCUMENT INFORMATION

Title: Environmental Impact Assessment (EIA) Study: The Proposed Construction of the New Oute River Bridge on District Road 3703 (DR3703) in the Kunene Region – Application for an ECC

Prepared by:

Author / Environmental Assessment Practitioner (EAP):	Fredrika N. Shagama
Qualifications:	Ph.D. Student: Civil Engineering (Geotechnics & Environmental Hydrogeology), VSB - Technical University of Ostrava, Czech Republic; Post Graduate Diploma in Environmental Studies, International University of Management (IUM), Namibia; MSc. Geological Engineering (*cum laude*) with a focus in Hydrogeology, VSB - Technical University of Ostrava, Czech Republic; BSc. Geological Engineering, VSB - Technical University of Ostrava, Czech Republic
Professional Affiliations:	Environmental Assessment Professionals of Namibia (EAPAN) - Practitioner (Membership No. 183); Geoscience Council of Namibia (GSCN) – Geoscientist, Registration No. GSCN/G-057; International Association of Hydrogeologists (IAH) - Full Member, Membership No.139790; Namibian Hydrogeological Association (NHA) – Member
Contact Details:	Mobile No.: +264 81 749 9223; eias.public@serjaconsultants.com Postal Address: P.O. Box 27318, Windhoek, Namibia
Signature:	
Date:	
THE PROPONENT/ECC APPLICANT'S DETAILS	
Proponent:	Roads Authority of Namibia Private Bag 12030 Ausspannplatz, Windhoek
Name of Representative & Role:	ISMAEL NEHADI, PCE
Contact details:	MOBILE: 0811438162
Signature:	
Date:	28/04/2026

SERJA'S STATEMENT OF INDEPENDENCE

As the Appointed Environmental Consultant to undertake the EIA Study for the Proposed Construction of the New Oute River Bridge on District Road 3703 (DR3703) in the Kunene Region, Serja Hydrogeo-Environmental Consultants declare that we:

- do not have, to our knowledge, any information or relationship with the Roads Authority of Namibia (the Proponent), nor the Ministry of Environment, Forestry and Tourism (MEFT)'s Department of Environmental Affairs and Forestry (DEAF) that may reasonably have the potential to influence the outcome of this Environmental Assessment and the subsequent Environmental Clearance Certificate (ECC) applied for.
- have knowledge of and experience in conducting environmental assessments, the Environmental Management Act (EMA) No. 7 of 2007, and its 2012 Environmental Impact Assessment (EIA) Regulation, as well as other relevant national and international legislation, guidelines, policies, and standards that govern the project activities as presented herein.
- have performed work related to the ECC application in an objective manner, even if the results in views and findings, or some of these may not be favourable to the Proponent.
- have complied with the EMA and other relevant regulations, guidelines, and other applicable laws as listed in this document.
- declare that we do not have and will not have any involvement or financial interest in the undertaking/implementation of the project activities, other than remuneration (professional fees) for work performed to conduct the EIA and apply for the ECC in terms of the EIA Regulations' requirement as an Environmental Assessment Practitioner (EAP).

Disclaimer: Serja Hydrogeo-Environmental Consultants will not be held responsible for any omissions and inconsistencies that may result from information that was not available at the time this document was prepared and submitted for evaluation.

……

Signature:

Fredrika N. Shagama: Principal Environmental Assessment Practitioner & Hydrogeologist

Date: April 2026

EXECUTIVE SUMMARY

The Roads Authority of Namibia (RA) intends to construct and operate the Oute Bridge in the Kunene Region (the Project). The proposed bridge is located on the District Road 3703 (DR3703) over the Oute River (also known as the Hoarusib River) between Okaundje and Orotjitombo Villages, about 33km west of Opuwo Town in the Opuwo Rural Constituency. The DR3703 runs from the Epupa Constituency via the Opuwo Rural Constituency until the Opuwo Urban Constituency. The DR3703 is an important route connecting the villages of Otjitanda and Etanga, and the town of Opuwo, which is the main centre for economic and social facilities. However, the road has become inaccessible during the rainy season when the Oute River flows, thereby cutting off communities from accessing much-needed services in Opuwo. The project, therefore, includes the design of a new bridge or major culvert across the Oute River on DR3703 and subsequently, the bridge construction works.

The bridge construction will commence upon completion of the project design by the joint venture of three consulting engineers (D&P Engineers, Archetype Project Consultants, and Tweya Consulting Engineers, hereinafter referred to as DAT JV). The JV engineering team will administer the construction contract and supervise the construction works of the bridge. The project design will entail the following components:

- Geotechnical investigation and evaluations.
- Hydrological and hydraulic analyses.
- Drainage considerations (75mm diameter weepholes installed at 1.5 m centres in the bridge deck to discharge surface runoff into the river), and
- Construction materials investigation. At this stage, the availability and suitability of coarse and fine aggregates and construction water for structural concrete works have not yet been confirmed, as a detailed geotechnical site investigation and materials investigation are pending completion. The information in this section is therefore preliminary and will be updated once test results and supply options are confirmed.

Furthermore, other activities associated with bridge construction include the abstraction of construction materials, as well as water supply for construction from the area (near the project site).

Project Activities

The project will involve the design, construction, and eventual operation of the Oute Bridge across the DR3703 between Okaundje and Orotjitombo Villages in the Kunene Region. Based on the preliminary constructability and durability assessment, the bridge to be constructed will be a cast-in-situ reinforced concrete cellular type. This is considered the most appropriate structural solution for further development. The cast-in-situ reinforced concrete cellular bridge option best matches the project constraints associated with a remote rural site, reduces reliance on specialist construction expertise and heavy plant. The option also supports the Roads Authority's objective of uplifting emerging contractors, and it is expected to provide

a more durable and less service-intensive solution over the design life when compared with the prestressed precast beam alternative (DAT JV, 2026).

Planning and Design Phase

The main components of the project planning and design will include the following, as provided by the DAT JV Preliminary Design Report (2026):

Geotechnical investigation and evaluations

This entails project-specific geotechnical recommendations, including founding levels, allowable bearing pressures, pile/caisson feasibility, excavation conditions, and seepage/dewatering requirements. These will be provided upon completion of the geotechnical investigation and interpretation of the results.

Hydrological and hydraulic analyses

The hydrological and hydraulic analysis recommendations are based on the findings of the hydrological and hydraulic analyses, undertaken in terms of the requirements of the RA's "Drainage Manual" (1st Edition, October 2014). The project's Hydrological and Hydraulic Analyses Report concluded with the following recommendations for the Oute River Bridge:

- 1:50-Year Flood Event (given return period discharge (QT) = 464.63m³/s)
- 1:100-Year Flood Event (Q2T = 580.10m³/s).

Drainage considerations

75mm diameter weepholes installed at 1.5m centres in the bridge deck to discharge surface runoff into the river.

Construction materials and water supply investigation

This entails the investigation of the availability and suitability of coarse and fine aggregates and construction water for structural concrete works. However, these have not yet been confirmed at this stage, as a detailed geotechnical site investigation and materials investigation have not yet been completed.

Structural considerations

Two bridge concepts were considered at this preliminary design stage to identify the preferred structural form for further development. In selecting alternative structural forms suitable for the Oute River crossing, these design objectives were used as the primary screening criteria:

- Safety (strength, stability, and robustness, including performance under extreme flood events).
- Durability and serviceability (whole-life performance, maintenance requirements, and reliability in a harsh environment).

- Economy and constructability (with specific emphasis on the rural/remote site setting, logistics, programme risk, and the availability of local construction capability), and
- Aesthetics, appropriate to the surrounding environment and road context (DAT JV, 2026).

Construction Phase

The construction phase will include clearing of vegetation along the demarcated area for the bridge, stripping topsoil, and shaping the site. The layers of gravel needed for the construction works will be sourced from approved borrow pits in the area, transported, spread, and compacted in layers. Culverts and side drains are installed to manage surface water, and signage and safety features are added.

The Borrow Pit (BP) for the bridge construction works.

The construction of the bridge requires materials such as sand and gravel that will be sourced (extracted) from selected localities near the site. The exploration/survey and materials testing for the borrow pit to select suitable site for the borrow pit for the construction materials will be done to determine preliminary locations. The selection of the BP site (upon confirmation of good materials) will be based on materials that meet the quality requirements for bridge construction. It is important to note that the BPs will be on communal land. Thus, the exploration, establishment, and utilisation of the BP site have been communicated with communities in the consultation meeting held on the 24th of March 2026 in Ohungumure Village.

For any new BPs where additional BPs may be required, compensation guidelines, as per the Roads Authority and relevant government policies (National Compensation Policy), will be followed for implementation. This is to ensure that the affected landowners/land custodians are compensated fairly and that the process and material extraction are done efficiently, safely, and amicably.

Anticipated Resources and Services Infrastructure

Human resources

The bridge construction will potentially employ about 90 to 100 people. The workforce will comprise safety officers, the resident engineer, contracts manager, land surveyor, quality control technicians, maintenance artisans, general foremen, operators, labourers, security guards, etc. Locals will be prioritised for employment (semi-skilled to unskilled labour.

Contractors' accommodation

Local labourers will be commuting to the project site from their homes in villages near the site.

The skilled project workforce that is from outside the area will be accommodated in a construction camp established in either Otjikuju, Orotjitombo, or Okaundje Villages, which are near the bridge site. However, before the camp can be established, the contractor will need to obtain consent from the relevant traditional authority (headmen) of the area.

Vehicles and equipment

The project equipment, machinery, and vehicles will be stored at designated areas inside the contractor's campsites. Machinery and vehicles such as excavators, dump trucks, bulldozers, loaders, support vehicles (such as 4x4 wheel-drive cars and other maintenance vehicles), etc., will also be parked at designated sites at the campsites.

Water supply

The required water will be used for the actual bridge construction works and dust suppression. This water will be obtained from the existing borehole in proximity to the site, i.e., borehole WW8235 at these GPS coordinates: -18.0047 13.5529. The borehole was drilled in 1964 and has an excellent yield of 91m^3/hr, and this is probably explained by its location in the river (which acts as a direct source of recharge to the borehole). However, the water should be tested to check if it meets the water quality standards for the bridge construction works, as the groundwater quality in the area is poor. With that said, the fresh water supply for the project will be obtained from the nearby fresh water supply scheme, transported to the site by a water truck, and stored in tanks on-site. The water will be stored in an industry-standard water storage tank on-site and refilled as necessary throughout the project.

It is important to note that, for the abstraction and utilisation of groundwater (from the borehole) **for industrial** and commercial purposes, a license should be applied for and obtained from the MAFWLR's Department of Water Affairs (Water Law Administration & Policy).

Fuel supply

Diesel will be used for machinery and equipment, and a fuel generator to ensure an uninterrupted fuel supply to the project. The fuel will be stored in a 23,000-litre tank or less, which will be temporarily installed at a selected point on-site to ensure an uninterrupted supply during construction. The base of the tank will be lined with the impermeable Polyvinyl chloride (PVC) material under a concrete layer to prevent accidental oil spills from infiltrating the soil and groundwater. There will be oil spill control measures onsite, i.e., the absorbent material contained in the fuel spill equipment (such as a natural sponge-like material) that can absorb accidental fuel spillage or leaks. It is anticipated that the fuel tank will be refilled once a week. The Construction Contractor will apply for a consumer installation certificate for the tank from the Ministry of Industries, Mines, and Energy (MIME).

Occupational health and safety

All project workers will be supplied with appropriate and adequate personal protective equipment (PPE) while carrying out project activities on-site. The site will also be equipped with at least three fully furnished first aid kits.

Accidental fire outbreaks

The site vehicles, campsites, and machinery will be equipped with fire extinguishers in case of accidental fire outbreaks.

Waste management (solid waste)

All waste generated from the project activities will be sorted, stored on-site in designated waste containers, and transported to the nearest approved solid waste dumping site in Opuwo. Consent and approval to dispose of solid waste on the Opuwo Town dumpsite will need to be obtained from the Opuwo Town Council before doing so.

Human waste/sanitation

The appointed contractor will establish portable toilets for the workers and project-related visitors. The toilets will be emptied according to the manufacturer's instructions and as regularly as deemed necessary.

Hazardous waste (fuels)

The hazardous waste (waste fuel, grease, and oils) will be properly captured, stored on site in designated waste containers, and transported to the appropriate hazardous waste management facility (in Windhoek). Therefore, no hazardous waste will be disposed of in the project area or any other unapproved waste management facility in the project area or the Kunene Region at large.

Rehabilitation of Disturbed Sites and Decommissioning of Structures

After construction work is completed, temporary infrastructure such as construction camps and detours will be dismantled. Borrow pits are rehabilitated in accordance with environmental regulations, usually by reshaping and re-vegetating the land. Topsoil is replaced, and disturbed areas are stabilized to prevent erosion and encourage natural regrowth, ensuring long-term environmental sustainability.

Decommissioning and rehabilitation are primarily addressed through a decommissioning and rehabilitation plan that encompasses safety, health, environmental, and contingency aspects. Therefore, it is best practice for the Proponent through their contractor to ensure the project and associated activities, mainly the BP sites, are ceased in an environmentally friendly manner and sites are rehabilitated by carrying out the following:

- Dismantling and removal of campsites and associated infrastructures from the project site areas,
- Carrying away all project equipment and vehicles, and

- Clean up of site working areas and transporting the recently generated waste to the nearby approved waste management facility (as per agreement with the waste facility operator/owner).

Further decommissioning and rehabilitation practice at the BPs will include:

- Backfilling of pits and trenches associated with the construction materials sourcing in the area,
- Closing of holes to ensure that they do not pose a risk to both people and animals in the area, and
- Levelling of stockpiled topsoil. This will be done to ensure that the disturbed land sites are left as close to their original state as possible.

Operational and Maintenance Phase

This is the phase that succeeds the construction phase, when the newly constructed bridge will be operational with regular maintenance to ensure usability and safety. The bridge maintenance (when and as necessary) will be carried out by the RA's Maintenance Department in the Kunene Region. Routine inspections will also be critical to prolong the bridge's life and reduce long-term costs.

Communication with I&APs and Means of Consultation Employed

Communication with I&APs about the project activities was facilitated through the following means and in this order:

- A Background Information Document (BID) containing brief information about the project activities was compiled, uploaded on the MEFT (ECC) Portal for project registration, and shared with registered stakeholders / Interested and Affected parties (I&APs).
- A Stakeholders (I&AP) List was developed and updated as new I&APs register for the EIA. The BID was shared with the pre-identified key stakeholders.
- Project EIA notices were published in the *New Era and Windhoek Observer* on the 12th and 19th of March 2026. The consultation period ran from the 12th of March 2026 to the 17th of April 2026.
- EIA notices (posters) in English were prepared for printing and pasted in Opuwo at the Kunene Regional Council and the Governor's office.
- Consultation meetings: a stakeholder consultation meeting was held between the Kunene Governor's office in Opuwo, and a community consultation meeting was held in Ohungumure Village on the 24th of March 2026. The consultation meetings were attended by eleven (11) people and ninety-seven (97), respectively. The attendance included two environmental assessment practitioners from Serja HGE Consultants and two engineers from the DAT JV Consulting Engineering Team.

Concluding remark on stakeholder and public consultation: A few key comments and issues raised during the consultation meetings were significant, but they did not object to the project. These are summarized below

- Proper management of public perceptions and ensuring transparency: The Kunene Region has had complex political dynamics. Thus, leaders will continue to manage perceptions carefully and ensure the process is transparent while still delivering a quality product.
- Following proper communication channels throughout the project: Communication should always go through the Governor's Office, which will convey the information to the Kunene Regional Council. Therefore, going forward, consultations and engagements should continue and avoid bypassing key stakeholders for the project.
- Project support for the Region: The office of the Governor, the regional council, and the community highly support the project as it is long overdue to serve the communities.
- The urgent need for a bridge across the river: That River crossing needs attention as it has many other small rivers that flow into it, and it has claimed lives since before independence.
- The protection of known and unknown archaeological and cultural heritage resources on and around the project site: The protection of the community archaeological factor to the community, as there has been previously unearthed very old pottery in another project in the Region. There is an old grave, some 500 meters north of the river crossing, that needs protection.
- Waste management: Implement proper waste management. Minimise waste and provide a refuse site if needed. Dispose of hazardous waste (e.g., oil from machinery) correctly.
- Employment opportunities for locals: Prioritise local employment by not only considering those close to the site but also the broader area/constituency. For example, not just one village or certain households, or giving most jobs to members of the same families.
- Respecting local traditional practices and rituals: Respecting traditional rituals and consulting spiritual/traditional leaders before key activities, such as drilling, can be undertaken is crucial. Build consensus to avoid disputes over cultural heritage matters.

The above comments serve as significant suggestions to make the design better for both biological, physical, and social environments. Furthermore, stakeholders and I&APs would just like to see the project implemented as well as the implementation of management and mitigation measures to reduce the significance of the impacts during bridge construction works to improve the mobility and accessibility to economic and social services centres in the Constituency, neighbouring constituencies, and regions.

Potential identified positive and adverse (negative) impacts of the proposed project.

Positive impacts (benefits) of the construction of the bridge and its ultimate operations

- Socio-economic development through temporary job (employment) creation in the area during the bridge construction phase for 90 to 100 people or more.
- Improved accessibility: better connections enhance accessibility to remote rural areas, facilitating the transportation of goods and services, and access to healthcare, education centers, and other social services in the area.
- Economic development: better road crossing can stimulate economic growth by attracting investment, promoting development, tourism, and better service delivery in this part of the Region.
- Safety: The new bridge with improved design, culverts, and drainage system can enhance road safety, thus reducing the risk of accidents and fatalities.
- Social cohesion: the bridge will improve connectivity that can strengthen social ties within rural communities by enabling easier access to growth centres, schools, healthcare centres, and other social services in Opuwo and nearby areas on the other side of the DR3703.

Potential environmental and social (adverse) impacts of the bridge construction work

The potential negative (adverse) impacts of the proposed road (mainly during the construction) are listed below. The mitigation measures for these impacts are included in the borrow pits' EMP.

- Soil and water pollution: improper handling of wastewater may lead to pollution of surrounding soils and eventually water resources systems (through wastewater runoff and infiltration).
- Habitat destruction: excavations for material sourcing (borrow pits) can lead to the destruction of natural habitats for plants and animals. This can disrupt local biodiversity.
- Soil erosion: The removal of large amounts of soil and vegetation from borrow pits and bridge positions can increase the risk of soil erosion, especially during heavy rainfall events.
- Depletion of local groundwater table: excavation of borrow pits may affect the local water table, leading to changes in groundwater levels.
- The depletion of the local groundwater table can impact the availability of water for vegetation that relies on groundwater as a water source in the area.
- Land use change: The conversion of natural landscapes into borrow pits can permanently alter landscapes, affecting the aesthetic value of the area.
- Deforestation: construction may require the clearing of trees and vegetation at and near the site to set up construction infrastructure and services, resulting in habitat loss.

- Impact on air quality: dust and particulate matter generated during the excavation of materials (sand and gravel) and transportation (the movement and operation of heavy vehicles and machinery) can compromise air quality in the surrounding area.
- Water pollution: Runoff from construction activities can carry pollutants such as oil, fuels, and heavy metals into the Oute River and nearby surface water bodies, thus impacting aquatic ecosystems.
- Noise associated with the movement of heavy machinery and trucks can disturb nearby locals and animals.
- Disruption of hydrological systems by borrow pits can alter natural drainage patterns, causing changes in surface water flow in the area and potentially exacerbating flooding or drought conditions in the area.
- General environmental pollution (mishandling of project-related waste associated with the project).
- Occupational and community health and safety: Improper handling of materials and equipment may cause health and safety risks to workers and locals. Community safety can also be compromised by unfenced borrow pits or abandoned borrow pits (that are not properly rehabilitated to safe conditions).
- Potential archaeological and cultural heritage impact: borrow pits and site preparation activities may impact local cultural heritage sites or traditional land use practices through inadvertent unearthing of such resources (sites and objects).

Some key potential positive and negative impacts were identified by the Environmental Consultant, based on issues raised by I&APs during the consultation period. The issues raised by I&APs were addressed and incorporated into this Report, whereby mitigation measures have been provided in the Environmental Management Plan (EMP) for implementation to avoid and/or minimize their significance on the environmental and social components.

Impact Assessment: The key negative impacts were described and assessed. The potential negative impacts indicated a medium rating of significance. To minimize significance, the Proponent, their contractors, and their workers implement appropriate management and mitigation measures to avoid and/or minimize their impact on the environmental and social components. The effective implementation of the recommended management and mitigation measures, accompanied by monitoring, will particularly reduce the significance of adverse impacts that cannot be completely avoided (from medium to low).

Recommendations and Conclusions

The EIA Study was deemed sufficient and concluded that no further detailed assessments are required for the ECC application for the bridge construction and associated activities.

Serja Consultants are confident that the potential negative impacts associated with the project activities can be managed and mitigated by the effective implementation of the recommended management and mitigation measures, and by putting more effort and commitment into monitoring the implementation of these measures. It is therefore recommended that the project be granted an ECC, provided that:

- All the management and mitigation measures provided herein are effectively and progressively implemented.
- All required permits, licenses, and approvals for the activities are obtained as required. These include permits and licenses, and ensuring compliance with these specific legal requirements.
- Transparency in communication and continued engagement with the communities and or through their leaders (local leaders and constituency councillors), and stakeholders should be maintained throughout the project cycle.
- The buffer zones around marked biological, physical, and socially sensitive sites (such as archaeological and cultural heritages; the grave site near the bridge) should be respected, and no activity should be conducted inside the 500m buffer zones (boundaries).
- The Proponent, their project workers and contractors comply with the legal requirements governing their project and its associated activities, and ensure that project permits and or approvals required to undertake specific site activities are obtained and renewed as stipulated by issuing authorities.
- Site areas where excavations were carried out and have ceased are rehabilitated, as far as practicable, to their pre-excavation state. This includes the levelling of stockpiled topsoil, backfilling trenches, and closing/capping of project-associated holes, as well as borrow pit rehabilitation.
- The EMP implementation should be checked and done by the responsible team member onsite (Environmental Control Officer/HSE Officer), and audited by an Independent Environmental Consultant on a bi-annual basis to compile Environmental Monitoring (audit) reports. These reports are to be submitted to the Environmental Commissioner at the DEAF. This will be required by the Environmental Commissioner (as part of the ECC conditions).

In conclusion, although significant, the identified impacts would not hinder the project activities. However, the recommended measures should be effectively implemented and monitored to reduce the significance of adverse impacts from medium to low, and eventually to negligible. The effectiveness of the implementation of the management and mitigation measures and EMP compliance will be done by an Environmental Control Officer or HSE Officer and audited by an Independent Environmental Consultant on a bi-annual basis. This is to ensure that EMP implementation can be tracked via Bi-Annual Environmental Monitoring exercises and documented in the monitoring reports to the Environmental Commissioner. The monitoring of EMP implementation will not only be done to ensure that the impact's significance is reducing and or maintaining a low significance rating, but also to ensure that all potential unforeseen impacts that might arise during implementation are properly identified in time and addressed immediately.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

Appendix C: The list of registered Stakeholders/Interested & Affected Parties (I&APs)

Appendix D: The copy of the BID circulation (email) to the EIA pre-registered Stakeholders / Interested & Affected Parties (I&APs)

Appendix E: EIA Notification in the newspapers (*New Era* and *Windhoek Observer*)

Appendix F: Original Copy of the EIA notification posters placed for the bridge EIA Study

Appendix G: Minutes from consultation meetings with stakeholders / interested & affected parties (communities) on the 24th of March 2026

Appendix G1: Minutes from the Consultation Meeting with the Kunene Governor

Appendix G2: Minutes of the Meeting with the public/community and some key local, regional, and national stakeholders at the Ohungumure Village

LIST OF ABBREVIATIONS

Abbreviation	Meaning
AASHTO	American Association of State Highway and Transportation Officials
BID	Background Information Document
BP	Borrow Pit
CBR	California Bearing Ratio
CEB	Cuvelai-Etosha Basin
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
DAT JV	D&P Engineers, Archetype Project Consultants, and Tweya Consulting Engineers
DCP	Dynamic Cone Penetration
DEAF	Department of Environmental Affairs and Forestry
DR	District Road
EAP	Environmental Assessment Practitioner
ECC	Environmental Clearance Certificate
EIA	Environmental Impact Assessment
EMA	Environmental Management Act
EMP	Environmental Management Plan

Abbreviation	Meaning
GG	Government Gazette
GN	Government Notice
I&APs	Interested and Affected Parties
IFC	International Finance Corporation
MAFWLR	Ministry of Agriculture, Fisheries, Water, and Land Reform
MEFT	Ministry of Environment, Forestry and Tourism
MIME	Ministry of Industries, Mines and Energy
NHC	National Heritage Council (NHC) of Namibia
NORED	Northern Regional Electricity Distributor Company
PPE	Personal Protective Equipment
PVC	Polyvinyl chloride
RA	Roads Authority of Namibia
Reg, S	Regulation, Section
UNCCD	The United Nations Convention to Combat Desertification

GLOSSARY (KEY TERMS)

Term	Definition
Alternative	A possible course of action, in place of another that would meet the same purpose and need of the proposal.
Baseline	Work done to collect and interpret information on the condition/trends of the existing environment.
Biophysical	The part of the environment that does not originate with human activities (e.g., biological, physical, and chemical processes).
Borrow Pit	Literal pits are dug to provide fill material, such as sand and gravel, for construction projects.
Cumulative Impacts/Effects Assessment	Concerning an activity, it means the impact of an activity that may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

Term	Definition
Decision-maker	The person(s) entrusted with the responsibility for allocating resources or granting approval to a proposal
Ecological Processes	Processes that play an essential part in maintaining ecosystem integrity. Four fundamental ecological processes are the cycling of water, the cycling of nutrients, the flow of energy, and biological diversity (as an expression of evolution).
Environment	As defined in Environmental Management Act - the complex of natural and anthropogenic factors and elements that are mutually interrelated and affect the ecological equilibrium and the quality of life, including – (a) the natural environment that is land, water, and air; all organic and inorganic matter and living organisms and (b) the human environment that is the landscape and natural, cultural, historical, aesthetic, economic and social heritage and values.
Environmental Management Plan (Draft EMP)	As defined in the EIA Regulations (Section 8(j)), a plan that describes how activities that may have significant environmental effects are to be mitigated, controlled, and monitored.
Interested and Affected Party (I&AP)	Concerning the assessment of a listed activity, it includes - (a) any person, group of persons, or organization interested in or affected by an activity; and (b) any organ of state that may have jurisdiction over any aspect of the activity.
Fauna and Flora	The animals and plants found in an area.
Mitigate	Practical measures to reduce adverse impacts.
Mitigation	The purposeful implementation of decisions or activities that are designed to reduce the undesirable impacts of an action on the affected environment
Monitoring	Activity involving repeated observation, according to a pre-determined schedule, of one or more elements of the environment to detect their characteristics (status and trends).
Proponent	Organization (private or public sector) or individual intending to implement a development proposal. As defined in the Environmental Management Act, the Proponent is a person who proposes to undertake a listed activity. The Proponent in this case is the Roads Authority of Namibia (RA).
Public Consultation/Involvement	A range of techniques that can be used to inform, consult, or interact with stakeholders affected by the proposed/project activities.
Protected Area	Refers to a protected area that is proclaimed in the Government Gazette according to the Nature Conservation Ordinance number 4 of 1975, as amended.

Term	Definition
Scoping	An early and open activity to identify the impacts that are most likely to be significant and require specialized investigation during the EIA work. Can also be used to identify alternative project designs/sites to be assessed, obtain local knowledge of the site and surroundings, and prepare a plan for public involvement. The results of scoping are frequently used to prepare a Terms of Reference for the specialized input into a full EIA.
Significant impact	Means an impact that, by its magnitude, duration, intensity, or probability of occurrence, may have a notable effect on one or more aspects of the environment

1 INTRODUCTION

1.1 Project Background and Location

The Roads Authority of Namibia (RA) intends to construct and operate the Oute Bridge in the Kunene Region (the Project). The proposed bridge is located on the District Road 3703 (DR3703) over the Oute River (also known as the Hoarusib River) between Okaundje and Orotjitombo Villages (Figure 1-1), about 33km west of Opuwo Town in the Opuwo Rural Constituency. The DR3703 runs from the Epupa Constituency via the Opuwo Rural Constituency until the Opuwo Urban Constituency, as shown on the map in Figure 1-2. The DR3703 is an important route connecting the villages of Otjitanda and Etanga, and the town of Opuwo, which is the main centre for economic and social facilities. However, the road has become inaccessible during the rainy season when the Oute River flows, thereby cutting off communities from accessing much-needed services in Opuwo. The project, therefore, includes the design of a new bridge or major culvert across the Oute River on DR3703 and subsequently, the bridge construction works.

The bridge construction will commence upon completion of the project design by the joint venture of three consulting engineers (D&P Engineers, Archetype Project Consultants, and Tweya Consulting Engineers, hereinafter referred to as DAT JV). The JV engineering team will administer the construction contract and supervise the construction works of the bridge. The project design will entail the following components:

- Geotechnical investigation and evaluations
- Hydrological and hydraulic analyses
- Drainage considerations (75mm diameter weepholes installed at 1.5m centres in the bridge deck to discharge surface runoff into the river), and
- Construction materials investigation. At this stage, the availability and suitability of coarse and fine aggregates and construction water for structural concrete works have not yet been confirmed, as a detailed geotechnical site investigation and materials investigation are pending completion. The information in this section is therefore preliminary and will be updated once test results and supply options are confirmed.

Furthermore, other activities associated with bridge construction include the abstraction of construction materials, as well as water supply for construction from the area (near the project site).

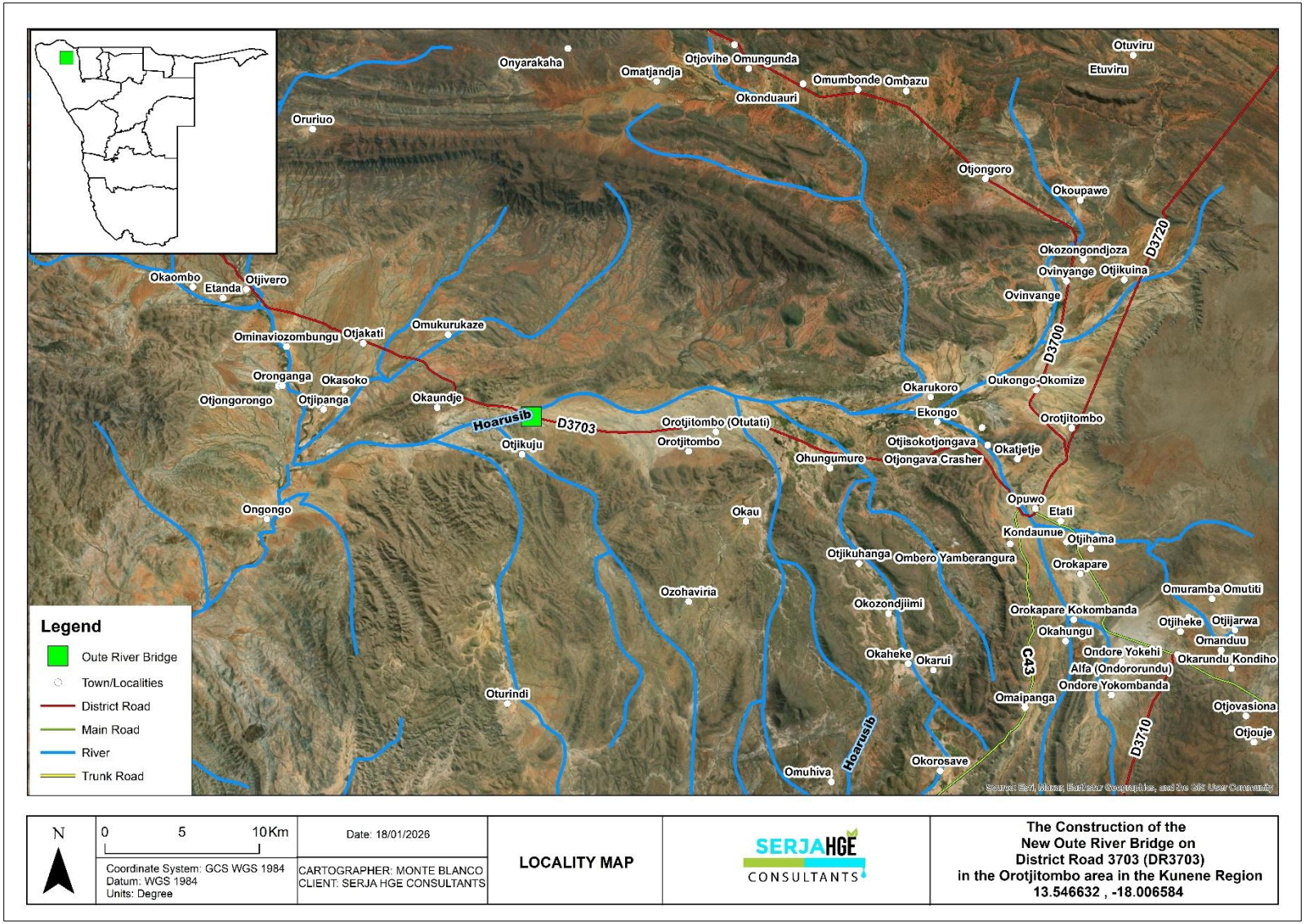


Figure 1-1: Locality map of the proposed New Oute Bridge on the DR3703 near Otjikuju and Orotjitombo Villages in the Kunene Region

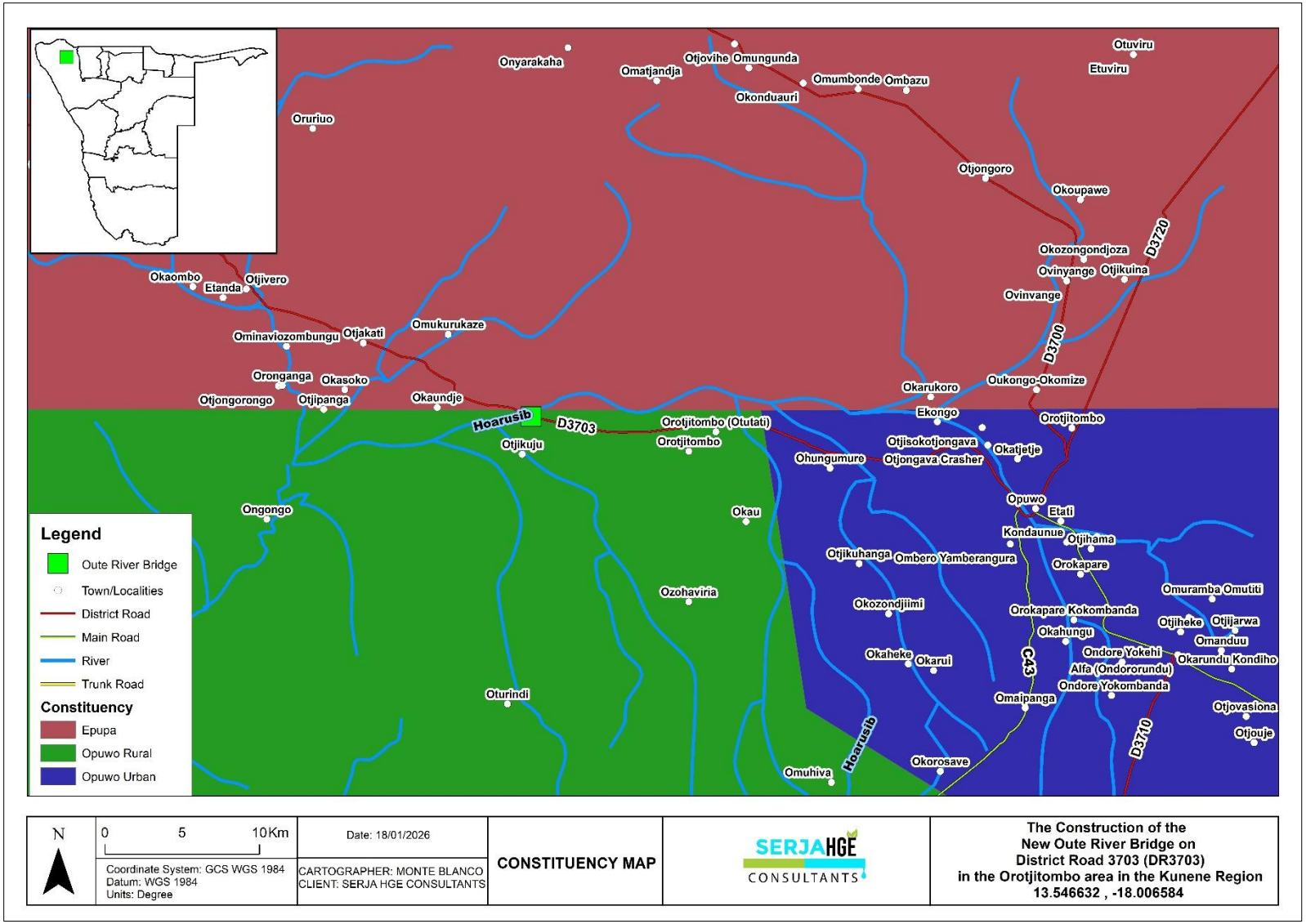


Figure 1-2: The regional constituency and villages map through which the DR3703 (with the proposed Oute Bridge) passes in the Kunene Region

1.2 The Need and Desirability of the Project Activities

As mentioned earlier, the DR3703 provides a crucial route connecting the villages of Otjitanda and Etanga, and the town of Opuwo, the main centre for economic and social facilities. However, the road becomes inaccessible during the rainy season when the Oute (Hoarusib) River flows, cutting off communities from accessing much-needed services in Opuwo. Therefore, the construction of the new Oute Bridge is necessary to provide safe, reliable, and year-round access along DR3703 (across the river). The bridge will enhance mobility for residents, improve access to essential services, support local economic activities, and strengthen regional connectivity within the Kunene Region. Additionally, the project will contribute to reducing travel risks during floods, improving emergency response, and facilitating the movement of goods, services, and people between rural communities and Opuwo.

1.3 Need for an Environmental Clearance Certificate (ECC)

The bridge construction and associated works, such as the abstraction of construction materials and water to supply the bridge construction works, are listed activities in the Environmental Impact Assessment (EIA) Regulations (2012) of the Environmental Management Act (EMA) No. 7 of 2007 that may not be undertaken without an Environmental Clearance Certificate (ECC). The listed activities that are relevant to the proposed project activities are as follows:

- Listed Activity 10.2: the construction of the route determination of roads and the design of associated physical infrastructure, where –
    - *(a)* ***It is a public road***
    - *(b) The road reserve is wider than 30 meters; or*
    - *(c) The road caters for more than one lane of traffic in both directions.*
- The Listed Activity 10.2 (a) is further explained under Schedule 1 (b) of the EIA Regulations as:

*"**Public road**" means any road, street, or thoroughfare or any other place which is commonly used by the public or any section thereof, or to which the public or any section thereof has a right of access, and includes*

(a) the verge of any such road, street, or thoroughfare
(b) ***any bridge, culvert****, causeway, ferry, ford, or drift traversed by any such road, street, or thoroughfare.*

Associated activities: mining and quarrying activities for sand and gravel from borrow pits

- Listed Activity 3.1 The construction of facilities for any process or activities that require a license, right, or other forms of authorization, and the renewal of a license, right, or other forms of authorization, in terms of the Minerals (Prospecting and Mining Act), 1992.

- Listed Activity 3.2 Other forms of mining or extraction of any natural resources, whether regulated by law or not.

Water resources development – to supply construction works

- Listed Activity 8.1: The abstraction of ground or surface water for industrial or commercial purposes.

The purpose of the EIA Study and subsequent issuance of the ECC is therefore to ensure that the project activities are undertaken in an environmentally & socially friendly and sustainable manner, through the effective implementation of recommended environmental management measures to minimize the adverse identified impacts while maximizing the positive impacts.

To comply with the EMA and its EIA Regulations and ensure environmental sustainability, the Proponent, through the consulting engineer supervising the construction contractor, has appointed Serja Hydrogeo-Environmental Consultants CC (Serja HGE Consultants), independent environmental consultants, to apply for the ECC on their behalf.

An application for the ECC is being launched with the Ministry of Environment, Forestry and Tourism (MEFT)'s Department of Environmental Affairs and Forestry (DEAF) by Serja Consultants. Upon screening of this Background Information Document (BID), Serja Consultants has been required to prepare an Environmental Scoping Report and Environmental Management Plan (EMP) in an application for the ECC. The required documents (Scoping Report and EMP) will be submitted to the MEFTs for evaluation and consideration of the ECC.

1.4 Appointed Independent Environmental Consultant

To comply with the EMA and its Regulations and ensure environmental management, protection, and sustainability, the Proponent through the project design engineer (DAT JV/Consulting Engineers, who will administer the construction contract and supervise the construction works) appointed Serja Hydrogeo-Environmental Consultants CC, Independent Environmental Consultants to apply for the ECC and conduct the required Environmental Assessment Process, which includes Public Consultation and prepare the EIA Report and EMP – Appendix A.

The EIA process (stakeholder / public consultation and engagement, including consultation meeting facilitation) and environmental mapping were conducted and done by Mr. Stefanus Johannes, respectively. Mr. Johannes is an experienced environmental assessment practitioner (EAP) and qualified and experienced GIS Specialist/Cartographer with over 5 years of experience in Natural Resources Management Consulting and Mapping (Geospatial Analysis).

Furthermore, the EIA Scoping, EMP, and associated documents were compiled by Ms. Fredrika Shagama. Ms. Shagama is a qualified and experienced Hydrogeologist and EAP, with over 10 years of experience in Groundwater and Environmental Management Consulting. The CVs of the two EAPs are attached to this Report as Appendix B.

1.5 Application for the Environmental Clearance Certificate

The application for the ECC process was done as follows:

- Preparation of the Background Information Document (BID) for the project activities,
- Launching of the ECC application on the ECC Portal of the Ministry of Environment, Forestry and Tourism (MEFT) with the Proponent details (accompanied by the BID) for project registration purposes and obtaining a MEFT application/reference number (APP-007177).
- Completion of the ECC Form 1 (Section 32) of the EIA Regulations with the required project and Proponent information.
- Submission of the printed hard copy of the ECC application (with affixed NAD300 revenue stamps as application fees attached hereto) is submitted to the MEFT. The MEFT's date-stamped copy of the ECC application is uploaded on the ECC Portal as proof of application and payment.

The next component of the ECC application was to undertake an EIA process, which entails a Baseline Assessment of the Biophysical and Social environments, as well as public consultation and engagement. The findings of the EIA process are then incorporated into an EIA Report, and an EMP is also developed for the mitigation of potential adverse impacts anticipated from the project activities. The two documents and associated documents (appendices) are then submitted to the Environmental Commissioner at MEFT's Department of Environmental Affairs and Forestry (DEAF) for evaluation and consideration of the ECC.

1.6 Scope of Work and Report Contents

This Study has been conducted according to the EMA No. 7 of 2007, and its 2012 EIA Regulations, as mentioned in the preceding subsections, i.e., the project requires an ECC. Therefore, the process has been undertaken as required and guided by the Regulations.

This Report has been compiled as a required output of an environmental assessment process after the ECC application has been launched with MEFT. The Scoping Report, together with the EMP and all its appendices, will be submitted to the DEAF.

The document (report) covers the following chapters or sections, in addition to the introductory chapter:

- Project description and associated activities - (Chapter 2).
- Project alternatives considered (that were found to be environmentally friendly and technically feasible) - Chapter 3.
- The Legal requirements governing the project and its related activities, i.e., the legislation that the project activities must comply with (Chapter 4).
- The Environmental and Social Baseline of the project area - Chapter 5.
- The Public Consultation & Engagement Process undertaken to inform, invite, and engage the public (stakeholders and interested & affected parties) on the project activities - Chapter 6.
- The Assessment of identified potential impacts associated with the project activities (Chapter 7) - This chapter presents both the positive and negative (adverse) as well as cumulative impacts, assessment methodology, and the assessment of the negative impacts. The mitigation measures in the form of management action plans, with a timeframe and implementation responsibilities, are given in the EMP.
- The recommendations and conclusions of the environmental assessment are presented under Chapter 8. The data sources (literature/references) consulted for the assessment are listed under Chapter 9.

Based on the information provided by the Proponent and the EAP’s experience, a description of the project activities is presented in the next chapter.

2 DESCRIPTION OF THE PROJECT ACTIVITIES

The project will involve the design, construction, and eventual operation of the Oute Bridge across the DR3703 between Okaundje and Orotjitombo Villages in the Kunene Region. The current condition of the site for the proposed Oute Bridge across the DR3703 by March 2026 is as shown in Figure 2-1.

Figure 2-1: The condition of the DR3703-Oute River site for the bridge construction in March 2026

Based on the preliminary constructability and durability assessment, the bridge to be constructed will be a cast-in-situ reinforced concrete cellular type. This is considered the most appropriate structural solution for further development. The cast-in-situ reinforced concrete cellular bridge option best matches the project constraints associated with a remote rural site, reduces reliance on specialist construction expertise and heavy plant. The option also supports the Roads Authority's objective of uplifting emerging contractors, and it is expected to provide a more durable and less service-intensive solution over the design life when compared with the prestressed precast beam alternative (DAT JV, 2026).

In addition to the above, the bridge construction will also address the erosion aspects through the drainage systems to be designed. Bridge construction materials from a borrow pit with quality material sites (to be identified and sited by materials personnel), and sources of nearby raw and fresh water will be determined.

2.1 Planning and Design

The main components of the project planning and design will include the following, as provided by the DAT JV Preliminary Design Report (2026). The consulting engineering works will focus on the detailed engineering design, including consultation, data collection, survey, geotechnical and materials investigation and testing, geometric design, structural and drainage design, and tender documentation. Further responsibilities for the engineering team will include the administration of the tender process, contract administration, and site supervision of the bridge construction.

2.1.1 Geotechnical Investigations and Evaluations

This entails project-specific geotechnical recommendations, including founding levels, allowable bearing pressures, pile/caisson feasibility, excavation conditions, and seepage/dewatering requirements. These will be provided upon completion of the geotechnical investigation (Figure 2-2) and interpretation of the results.

Figure 2-2: The ongoing project's geotechnical investigation (geotechnical drilling) in March 2026

2.1.2 Hydrological and hydraulic analyses

The hydrological and hydraulic analysis recommendations are based on the findings of the hydrological and hydraulic analyses, undertaken in terms of the requirements of the RA's "Drainage Manual" (1st Edition, October 2014). The project's Hydrological and Hydraulic Analyses Report concluded with the following recommendations for the Oute River Bridge:

- 1:50-Year Flood Event (given return period discharge (QT) = 464.63m³/s)
- 1:100-Year Flood Event (Q2T = 580.10m³/s).

2.1.3 Drainage considerations

75mm diameter weepholes installed at 1.5m centres in the bridge deck to discharge surface runoff into the river.

2.1.4 Construction materials and water supply investigation

This entails the investigation of the availability and suitability of coarse and fine aggregates and construction water for structural concrete works. However, these have not yet been confirmed at this stage, as a detailed geotechnical site investigation and materials investigation have not yet been completed.

2.1.5 Structural considerations

Two bridge concepts were considered at this preliminary design stage to identify the preferred structural form for further development. In selecting alternative structural forms suitable for the Oute River crossing, these design objectives were used as the primary screening criteria:

- Safety (strength, stability, and robustness, including performance under extreme flood events).
- Durability and serviceability (whole-life performance, maintenance requirements, and reliability in a harsh environment).
- Economy and constructability (with specific emphasis on the rural/remote site setting, logistics, programme risk, and the availability of local construction capability), and
- Aesthetics, appropriate to the surrounding environment and road context (DAT JV, 2026).

2.2 Construction Phase

The construction phase will include clearing of vegetation along the demarcated area for the bridge, stripping topsoil, and shaping the site. The layers of gravel needed for the construction works will be sourced from approved borrow pits in the area, transported, spread, and compacted in layers. Culverts and side drains are installed to manage surface water, and signage and safety features are added. The environmental management plan will be implemented and monitored throughout to minimize ecological and social impact.

2.2.1 The Borrow Pit (BP) for the bridge construction works

The construction of the bridge requires materials such as sand and gravel that will be sourced (extracted) from selected localities near the site. The exploration/survey and materials testing for the borrow pit to select suitable site for the borrow pit for the construction materials will be done to determine preliminary locations. The selection of the BP site (upon confirmation of good materials) will be based on materials that meet the quality requirements for bridge construction.

It is important to note that the BPs will be on communal land. Thus, the exploration, establishment, and utilisation of the BP site have been communicated with communities in the consultation meeting held on the 24th of March 2026 in Ohungumure Village.

For any new BPs where additional BPs may be required, compensation guidelines, as per the Roads Authority and relevant government policies (National Compensation Policy), will be followed for implementation. This is to ensure that the affected landowners/land custodians are compensated fairly and that the process and material extraction are done efficiently, safely, and amicably.

2.2.2 Required Resources and Services Infrastructure

2.2.2.1 Human resources

The bridge construction will potentially employ about 90 to 100 people. The workforce will comprise safety officers, the resident engineer, contracts manager, land surveyor, quality control technicians, maintenance artisans, general foremen, operators, labourers, security guards, etc. Locals will be prioritised for employment (semi-skilled to unskilled labour).

2.2.2.2 Contractors' accommodation

Local labourers will be commuting to the project site from their homes in villages near the site. The skilled project workforce that is from outside the area will be accommodated in a construction camp established in either Otjikuju, Orotjitombo, or Okaundje Villages, which are near the bridge site. However, before the camp can be established, the contractor will need to obtain consent from the relevant traditional authority (headmen) of the area.

2.2.2.3 Vehicles and equipment

The project equipment, machinery, and vehicles will be stored at designated areas inside the contractor's campsites. Machinery and vehicles such as excavators, dump trucks, bulldozers, loaders, support vehicles (such as 4x4 wheel-drive cars and other maintenance vehicles), etc., will also be parked at designated sites at the campsites.

2.2.2.4 Water supply

The required water will be used for the actual bridge construction works and dust suppression. This water will be obtained from the existing borehole in proximity to the site, i.e., borehole WW8235 at these GPS coordinates: -18.0047 13.5529. The borehole was drilled in 1964 and has an excellent yield of 91m^3/hr, and this is probably explained by its location in the river (which acts as a direct source of recharge to the borehole). However, the water should be tested to check if it meets the water quality standards for the bridge construction works, as the groundwater quality in the area is poor (Figure 5-11). Therefore, this borehole would be able to supply only the raw water for the bridge construction works. With that said, the fresh water supply for the project will be obtained from the nearby fresh water supply scheme, transported to the site by a water truck, and stored in tanks on-site. The water will be stored in an industry-standard water storage tank on-site and refilled as necessary throughout the project.

It is important to note that, for the abstraction and utilisation of groundwater (from the borehole) **for industrial** and commercial purposes, a license should be applied for and obtained from the MAFWLR's Department of Water Affairs (Water Law Administration & Policy).

2.2.2.5 Fuel supply

Diesel will be used for machinery and equipment, and a fuel generator to ensure an uninterrupted fuel supply to the project. The fuel will be stored in a 23,000-litre ($23m^3$) tank or less, which will be temporarily installed at a selected point on-site to ensure an uninterrupted supply during construction.

The base of the tank will be lined with the impermeable Polyvinyl chloride (PVC) material under a concrete layer to prevent accidental oil spills from infiltrating the soil and groundwater. There will be oil spill control measures onsite, i.e., the absorbent material contained in the fuel spill equipment (such as a natural sponge-like material) that can absorb accidental fuel spillage or leaks. It is anticipated that the fuel tank will be refilled once a week. The Construction Contractor will apply for a consumer installation certificate for the tank from the Ministry of Industries, Mines, and Energy (MIME).

2.2.2.6 Occupational health and safety

All project workers will be provided with appropriate and adequate personal protective equipment (PPE) while carrying out on-site project activities. The site will be equipped with fully furnished first aid kits.

2.2.2.7 Accidental fire outbreaks

The campsite and vehicles will be equipped with fire extinguishers in case of accidental fire outbreaks.

2.2.2.8 Waste management (solid waste)

All waste generated from the project activities will be sorted, stored on-site in designated waste containers, and transported to the nearest approved solid waste dumping site in Opuwo. Consent and approval to dispose of solid waste on the Opuwo Town dumpsite will need to be obtained from the Opuwo Town Council before doing so.

2.2.2.9 Human waste/sanitation

The appointed contractor will establish portable toilets for the workers and project-related visitors. The toilets will be emptied according to the manufacturer's instructions and as regularly as deemed necessary.

2.2.2.10 Hazardous waste (fuels)

The hazardous waste (waste fuel, grease, and oils) will be properly captured, stored on site in designated waste containers, and transported to the appropriate hazardous waste management facility (in Windhoek). Therefore, no hazardous waste will be disposed of in the project area or any other unapproved waste management facility in the project area or the Kunene Region at large.

2.3 Rehabilitation of Disturbed Sites and Decommissioning of Structures

After construction work is completed, temporary infrastructure such as construction camps and detours will be dismantled. Borrow pits are rehabilitated in accordance with environmental regulations, usually by reshaping and re-vegetating the land. Topsoil is replaced, and disturbed areas are stabilized to prevent erosion and encourage natural regrowth, ensuring long-term environmental sustainability.

Decommissioning and rehabilitation are primarily addressed through a decommissioning and rehabilitation plan that encompasses safety, health, environmental, and contingency aspects. Therefore, it is best practice for the Proponent through their contractor to ensure the project and associated activities, mainly the BP sites, are ceased in an environmentally friendly manner and sites are rehabilitated by carrying out the following:

- Dismantling and removal of campsites and associated infrastructures from the project site areas,
- Carrying away all project equipment and vehicles, and
- Clean up of site working areas and transporting the recently generated waste to the nearby approved waste management facility (as per agreement with the waste facility operator/owner),

Further decommissioning and rehabilitation practice at the BPs will include:

- Backfilling of pits and trenches associated with the construction materials sourcing in the area,
- Closing of holes to ensure that they do not pose a risk to both people and animals in the area, and
- Levelling of stockpiled topsoil. This will be done to ensure that the disturbed land sites are left as close to their original state as possible.

2.4 Operational and Maintenance Phase

This is the phase that succeeds the construction phase, when the newly constructed bridge will be operational with regular maintenance to ensure usability and safety. The bridge maintenance (when and as necessary) will be carried out by the RA’s Maintenance Department in the Kunene Region. Routine inspections will also be critical to prolong the bridge's life and reduce long-term costs.

The next chapter presents different and relevant alternatives considered for the project activities.

3 PROJECT ALTERNATIVES

Alternatives are defined as the “different means of meeting the general purpose and requirements of the activity” (EMA, 2007). This section will highlight the different ways the project can be undertaken and identify the most practical alternative, while minimizing environmental damage.

Once the alternatives have been established, these are examined by asking the following three questions:

- *What alternatives are technically and economically feasible?*
- *What are the environmental effects associated with the feasible alternatives?*
- *What is the rationale for selecting the preferred alternative?*

The alternatives considered for the project activities are presented below.

3.1 The "No-Go" Alternative

The “no action” alternative implies that the status quo remains, and nothing happens. Should the proposed bridge construction be discontinued, the current difficult link between the villages in the DR3703 area, near the site and Opuwo Town during rainy seasons, would remain as is. Consequently, there will be no bridge construction across the Oute River part of the DR3703. Moreover, none of the potential impacts (positive and negative) identified would occur. If the project activities are to be discontinued, the status quo of the project site would remain unchanged. This option was considered, and a comparative assessment of the environmental and socio-economic impacts of the “no action” alternative was undertaken to establish what benefits might be lost if the project is not completed.

Considering the above losses, the “no-action/go” alternative was not considered a viable option for this project.

3.2 Bridge Location

The bridge site is specific to the part of the Oute River where the DR3703 crosses the river, which needs upgrading to improve accessibility between the Orotjitombo Village and the surrounding areas and Opuwo. Therefore, finding alternative locations for the bridge would not be feasible from a social and economic perspective.

3.3 Services Infrastructure

Alternatives were considered for different supporting infrastructures to ensure that the most feasible options were selected. The technological, economic, and environmental limitations were considered to select the most feasible option. The alternative considered in this regard is presented in Table 3-1 below.

Table 3-1: The presentation of service infrastructure alternatives considered for the project activities

Category of Infrastructure	Alternatives Considered	Justification for the selected option
Ablution facilities	-Install a fixed facility with a septic tank -Portable facilities with a septic tank	-To minimize rehabilitation costs and ensure good hygiene onsite, a flushing portable facility was selected as the best option.
Water supply	-Bring water from elsewhere -Abstract from site boreholes	-The project will use a combination of both fresh and raw water. The raw water would be sourced from an existing borehole near the site (the groundwater quality of the area is poor, as the groundwater quality map in Figure 5-11, despite the high potential and yield as per Figure 5-10: geohydrology map. Thus, fresh water will be sourced from elsewhere in the Region (possibly from a rural water scheme).
Fuel storage	-Trailer-mounted diesel tank -Fixed bunded fuel tank	-A fixed bunded fuel tank will be installed at the construction campsite near the road. The fuel will be dispensed under controlled conditions from one dedicated site for the project.
Power supply	-Diesel generator set, and if considered, solar power. -Powerline (grid) supply	-The actual construction works will use generators. A campsite will be established near the site, which is close to the power grid. However, a solar system will be considered for the construction site.
Offices, accommodation	-Erect dismantlable prefabricated units -Fixed structures	-Dismantable prefabricated units are favored due to: (a) Ease of installation, (b) Low installation costs, and (c) Ease of dismantling and moving.
Accommodation site	-Setting up a campsite -Commuting from towns -Commuting from home in the area	-Set up a temporary campsite near the site for out-of-area specialized personnel. -Other personnel, such as some casual laborers and operators from the communities, will commute from their homes to the site, where possible.

The following chapter presents the national and international legal requirements applicable to the project.

4 APPLICABLE LEGAL FRAMEWORK

Some of the project's activities may be subject to certain legal policies. Therefore, it is necessary to review and consider this legislation and these legal requirements. These legal requirements are either local (institutional), national (Namibian), or international in scope, such as legislation, policies, guidelines, etc. The review of the relevant legal framework serves to inform the project Proponent, interested and affected parties, and the decision-makers at the DEAF of the requirements and expectations, as set out in these instruments, to be fulfilled to establish the project activities.

4.1 National Legal Framework: Laws, Policies, and Regulations

The national applicable legal framework and policies relevant to the project are presented in Table 4-1.

Table 4-1: List of applicable legislation for the project activities

Legislation / Policy / Guideline	Relevant Provisions	Implications for the project activities
The Constitution of the Republic of Namibia, 1990, as amended	The Constitution of the Republic of Namibia (1990 as amended) addresses matters relating to environmental protection and sustainable development. Article 91(c) defines the functions of the Ombudsman to include: "…the duty to investigate complaints concerning the over-utilisation of living natural resources, the irrational exploitation of non-renewable resources, the degradation and destruction of ecosystems and failure to protect the beauty and character of Namibia…" Article 95(l) commits the state to actively promoting and maintaining the welfare of the people by adopting policies aimed at: "…Natural resources situated in the soil and on the subsoil, the internal waters, in the sea, in the continental shelf, and in the exclusive economic zone are property of the State."	By implementing the environmental management plan, the establishment will comply with the constitution in terms of environmental management and sustainability. Ecological sustainability will be the project's main priority.

Legislation / Policy / Guideline	Relevant Provisions	Implications for the project activities
Environmental Assessment Policy of Namibia 1994	The policy provides a broad definition of the term "Environment," broadly interpreted to include biophysical, social, economic, cultural, historical, and political components, and references the inclusion of alternatives in all projects, policies, programmes, and plans.	This EIA outlines the environmental consequences of this project and considers the definition of the Environment.
Environmental Management Act No. 7 of 2007 and its 2012 EIA Regulations	The Act aims to ensure that the potential impacts of the development on the environment are considered carefully and in good time; that all interested and affected parties have a chance to participate in the environmental assessments and that the findings of the environmental assessments are fully considered before any decisions are made about activities which might affect the environment.	The Act aims to promote the sustainable management of the environment and the use of natural resources. The EMA is broad; it regulates land use development through environmental clearance certification and/or EIAs. The Act provides for the issuance of clearance certificates for quarrying activities associated with borrow pits.
The Regional Councils Act (No. 22 of 1992)	This Act sets out the conditions under which Regional Councils must be elected and administer each delineated region. From a land use and project planning point of view, their duties include, as described in section 28 "to undertake the planning of the development of the region for which it has been established with a view to physical, social and economic characteristics, urbanisation patterns, natural resources, economic development potential, infrastructure, land utilisation pattern and sensitivity of the natural environment.	The relevant Regional Councils are I&APs and must be consulted during the Environmental Assessment (EA) process. The project site falls under the Kunene Regional Council (Opuwo Rural Constituency) and, therefore, they should be consulted.

Legislation / Policy / Guideline	Relevant Provisions	Implications for the project activities
Traditional Authority Act (Act No. 25 of 2000):	The Act also stipulates that Traditional Authorities (TAs) should ensure that natural resources are used sustainably to conserve the ecosystem. This Act implies that TAs must be fully involved in planning land use and development in their area. It is the responsibility of the TAs' customary leadership, the Chiefs, to exercise control on behalf of the state and the residents in their designated area.	The local traditional representatives (chief and headmen). Therefore, they should be consulted regarding land-use consent, and engagement should continue throughout the project.
Communal Land Reform Act 5 of 2002	To provide for the allocation of rights in respect of communal land; to establish Communal Land Boards; to provide for the powers of Chiefs and Traditional Authorities and boards concerning communal land; and to make provision for incidental matters.	The Proponent should ensure that the project complies with the regulations set out therein for the reserves, furniture, and borrow pits.
Roads Authority Environmental Manual (October 2014)	The manual seeks to inform practitioners regarding the legal and contractual framework within which roads must be designed and built. It also seeks to guide the requirements of the Roads Authority in respect of environmental issues	The EIA and resultant road upgrade design and activities should be conducted in line with the guidelines within the document.
Roads Ordinance No. 17 of 1972	The Ordinance consolidates the laws relating to roads: Section 3.1 deals with the width of proclaimed roads and road reserve boundaries. Section 27.1 concerns the control of traffic on urban trunk and main roads. Section 36.1 regulates rails, tracks, bridges, wires, cables, subways, or culverts across or under proclaimed roads. Section 37.1 deals with infringements/obstructions on and interference with proclaimed roads.	The bridge upgrade must comply with all applicable provisions of the Roads Ordinance.

Legislation / Policy / Guideline	Relevant Provisions	Implications for the project activities
Petroleum Products and Energy Act (No. 13 of 1990) Regulations (2001)	Regulation 3(2)(b) states that "No person shall possess [sic] or store any fuel except under authority of a licence or a certificate, excluding a person who possesses or stores such fuel in a quantity of 600 litres or less in any container kept at a place outside a local authority area."	The Proponent, through their construction contractor, should obtain the necessary authorisation from the MIME to store fuel on-site. This entails the application of a consumer installation certificate.
Road Traffic Ordinance 30 of 1967	The Ordinance governs road traffic comprehensively.	The project should consider the impact on road traffic in the subject area.
Roads Authority Act No. 17 of 1999	The Act establishes a Roads Authority to manage Namibia's national road network.	Although not the Proponent for the project, the Roads Authority is ultimately responsible for the project's operational phase (bridge maintenance).
National Road Safety Act No. 9 of 1972	The Act establishes the National Road Safety Council and includes provisions intended to promote road safety.	The project should consider the impact it will have on road safety in the subject area.
Hazardous Substance Ordinance, No. 14 of 1974	The ordinance provides for the control of toxic substances. It covers manufacture, sale, use, disposal, and dumping, as well as import and export. Although the environmental aspects are not explicitly stated, the ordinance provides for the importing, storage, and handling.	The Proponent, through their construction contractor, should handle and manage the storage and use of hazardous substances on site so that they do not harm or compromise the site environment.
National Solid Waste Management Strategy	The Strategy ensures that future directions, regulations, funding, and action plans to improve solid waste management are properly coordinated and consistent with national policy, and that co-operation between stakeholders is facilitated. Waste disposal is the main problem in Namibia's current solid waste management. The top priority is to reduce risks to the environment and public health from current waste disposal sites and illegal dumping in many areas of Namibia.	The bridge construction can generate a significant amount of solid waste (stockpiles, soil residue, rubble) that will require proper management by contractors to prevent pollution. Waste management plans should be generated and implemented before the commencement of civil works and during project operations.

Legislation / Policy / Guideline	Relevant Provisions	Implications for the project activities
Water Resources Management Act (No 11 of 2013) and its 2023 Water Regulations	The Act provides for the management, protection, development, use, and conservation of water resources; the regulation and monitoring of water services; and incidental matters. The objects of this Act are to: Ensure that the water resources of Namibia are managed, developed, used, conserved, and protected in a manner consistent with, or conducive to, the fundamental principles set out in Section 66 - protection of aquifers, Subsection 1 (d) (iii), which provides for preventing the contamination of the aquifer and water pollution control (Section 68).	The protection of water resources (both quality and quantity/abstraction) should be a priority. Relevant consent and or agreement should be obtained from NamWater/Rural Water Supply to supply water for construction.
National Heritage Act No. 27 of 2004	To provide for the protection and conservation of places and objects of heritage significance and the registration of such places and objects; to establish a National Heritage Council; to establish a National Heritage Register; and to provide for incidental matters.	The Proponent should ensure compliance with the requirements of these Acts. The necessary management measures and related permitting requirements must be taken. This is done by consulting with the National Heritage Council of Namibia. A Chance Finds Procedure provided to the Draft EMP should be implemented upon discovery of archaeological and heritage resources.
The National Monuments Act (No. 28 of 1969)	The Act enables the proclamation of national monuments and protects archaeological sites.	
Soil Conservation Act (No 76 of 1969)	The Act provides for the prevention and control of soil erosion and the protection, improvement, and conservation of soil, vegetation, and water supply sources and resources, through directives issued by the Minister.	Duty of care must be applied to soil conservation, and management measures must be included in the EMP.
Forestry Act (Act No. 12 of 2001	The Act provides for the management and use of forests and forest products.	The Proponent (through the construction contractor) will apply for the relevant permit under this Act if it becomes necessary to remove protected trees along the road.

Legislation / Policy / Guideline	Relevant Provisions	Implications for the project activities
	Section 22. (1) provides: "Unless otherwise authorised by this Act, or by a licence issued under subsection (3), no person shall on any land which is not part of a surveyed erven of a local authority area as defined in section 1 of the Local Authorities Act, 1992 (Act No. 23 of 1992) cut, destroy or remove - (a) vegetation which is on a dune or drifting sand or a gully unless the cutting, destruction or removal is done to stabilise the sand or gully; or (b) any living tree, bush or shrub growing within 100 m of a river, stream or watercourse."	
Public Health Act (No. 36 of 1919)	Section 119 states that "no person shall cause a nuisance or shall suffer to exist on any land or premises owned or occupied by him or of which he is in charge any nuisance or other condition liable to be injurious or dangerous to health."	The Proponent and all its employees should ensure compliance with the provisions of these legal instruments.
Public and Environmental Health Act No. 1 of 2015	The Act serves to protect the public from nuisance. It states that no person shall cause a nuisance or shall suffer to exist on any land or premises owned or occupied by him or of which he is in charge any nuisance or other condition liable to be injurious or dangerous to health.	
Health and Safety Regulations GN 156/1997 (GG 1617)	Details various requirements regarding the health and safety of labourers.	
Atmospheric Pollution Prevention Ordinance (1976)	This ordinance provides for the prevention of air pollution and is affected by the Health Act 21 of 1988. Under this ordinance, the entire area of Namibia, apart from East Caprivi, is proclaimed as a controlled area for section 4(1) (a) of the ordinance.	The project and related activities should be undertaken in such a way that they do not pollute or compromise the surrounding air quality. Mitigation measures should be implemented.

Legislation / Policy / Guideline	Relevant Provisions	Implications for the project activities
Road Traffic and Transport Act, No. 22 of 1999	The Act provides for the establishment of the Transportation Commission of Namibia; the control of traffic on public roads; the licensing of drivers; the registration and licensing of vehicles; the control and regulation of road transport across Namibia's borders; and for matters incidental thereto.	Mitigation measures should be provided if the roads and traffic impact cannot be avoided.
Labour Act (No. 6 of 1992)	The Ministry of Labour, Industrial Relations and Employment Creation is aimed at ensuring harmonious labour relations through promoting social justice, occupational health and safety, and enhanced labour market services for the benefit of all Namibians. This ministry ensures the effective implementation of the Labour Act No. 6 of 1992.	The Proponent should ensure that the project activities do not compromise the safety and welfare of workers.

4.2 International Policies, Principles, Standards, Treaties, and Conventions

4.2.1 Applicable International statutes (treaties and conventions) and policies

The other international statutes, such as policies, standards, and conventions that may govern the project activities, are provided under Table 4-2 below.

Table 4-2: Other international treaties and conventions governing the project activities

Statue	Relevant Provisions	Implications for the project / Requirements
The United Nations Convention to Combat Desertification (UNCCD) 1992	Addresses land degradation in arid regions with the purpose of contributing to the conservation and sustainable use of biodiversity and the mitigation of climate change. The convention objective is to forge a global partnership to reverse and prevent desertification/land degradation and to mitigate the effects of drought in affected areas to support poverty reduction and environmental sustainability.	The project activities should not be undertaken in such a way that they contribute to desertification.
Convention on Biological Diversity 1992	Regulate or manage biological resources important for the conservation of biological diversity, whether within or outside protected areas, to ensure their conservation and sustainable use.	The removal of vegetation cover and destruction of natural habitats should be avoided, and where not possible, minimised.

Statue	Relevant Provisions	Implications for the project / Requirements
	Promote the protection of ecosystems, natural habitats, and the maintenance of viable populations of species in their natural surroundings.	
Stockholm Declaration on the Human Environment, Stockholm (1972)	It recognizes the need for "a common outlook and common principles to inspire and guide the people of the world in the preservation and enhancement of the human environment.	Protection of natural resources and prevention of any form of pollution.

Other relevant international Treaties and Protocols ratified by the Namibian Government are:

- Convention on International Trade and Endangered Species of Wild Fauna and Flora (CITES), 1973.
- Convention on Biological Diversity, 1992, and
- World Heritage Convention, 1972.

In addition to the project description, alternatives, and legal framework, it is important to note that the project activities are undertaken in a specific environment, with respect to biophysical and social factors. Therefore, understanding these existing environmental features before the project activities is crucial for assessing the potential impacts of the project activities on these features.

5 BIOPHYSICAL AND SOCIAL BASELINE

The bridge construction works and associated activities are undertaken in specific environmental and social conditions. Therefore, understanding the pre-project environmental conditions aids in describing the status quo versus future projections of environmental conditions once the project is implemented. The baseline information also aids in identifying the sensitive environmental features and how the best suitable management and mitigation measures can be recommended for implementation. The summary of selected biophysical and social baseline information about the project area is given below.

The baseline information presented below is sourced from a site visit (on the 24th of March 2026), online sources, including old reports, books, and publications, as well as other relevant research in the broader area. The project baseline that is deemed necessary for the project activities is as follows.

5.1 Biological Environment

5.1.1 Fauna

The site area is a communal land with subsistence farming, which is done with large and small livestock such as cattle, donkeys, sheep, and goats.

5.1.2 Flora

The bridge site is dominated by grass, shrubs, and trees comprising the following (alongside their protection status under the Forestry Act):

- Mopane Trees and shrubs (*Colophospermum mopane*) trees – protected
- Red-bark acacia and camelthorn (*Vachellia reficiens and Vachellia erioloba*) shrubs and trees – protected
- Commiphora species (such as the *Commiphora saxicola*)
- Purple-pod cluster-leaf (*Terminalia prunioides*) – not protected
- Stinkbush (*Pechuel-loeschea*) – not protected
- Shepherd's tree (*Boscia albitrunca*) - protected
- Leadwood (*Combretum imberbe*) – protected, etc.

In terms of vegetation structure, the project area is characterised mainly by woodland - Figure 5-1.

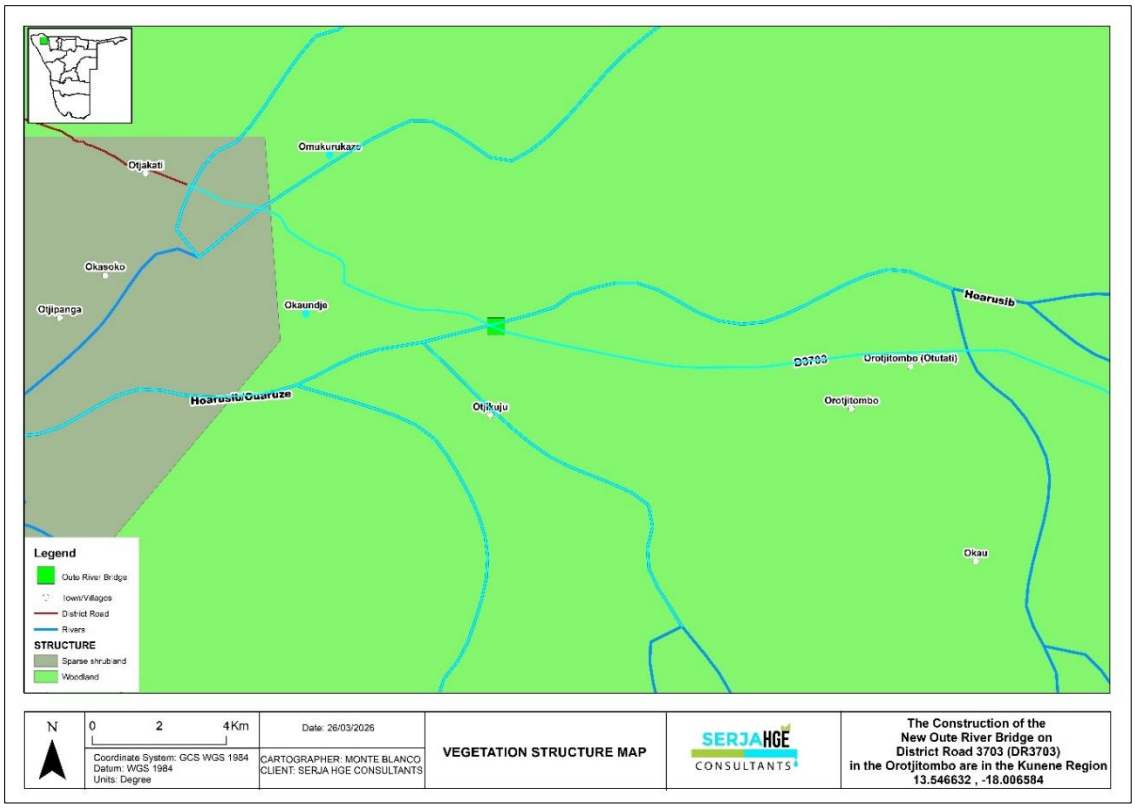


Figure 5-1: The vegetation structure map in the project area

Some of the vegetation species observed during the site visit, dominated by the stinkbush, camelthorn, and mopane trees, are shown in Figure 5-2.

Figure 5-2: Photos of some vegetation observed near the project site and along the Oute River

5.2 Physical Environment

5.2.1 Climate

The climate data for the Orotjitombo Village/area, which is closest to the proposed bridge site, has been sourced from the World Weather Online website to provide a baseline climatic condition of the project site area.

Temperature

The Orotjitombo area experiences average low and high temperatures of 12ºC in June/July and 35ºC in September/October, as shown in Figure 5-3.

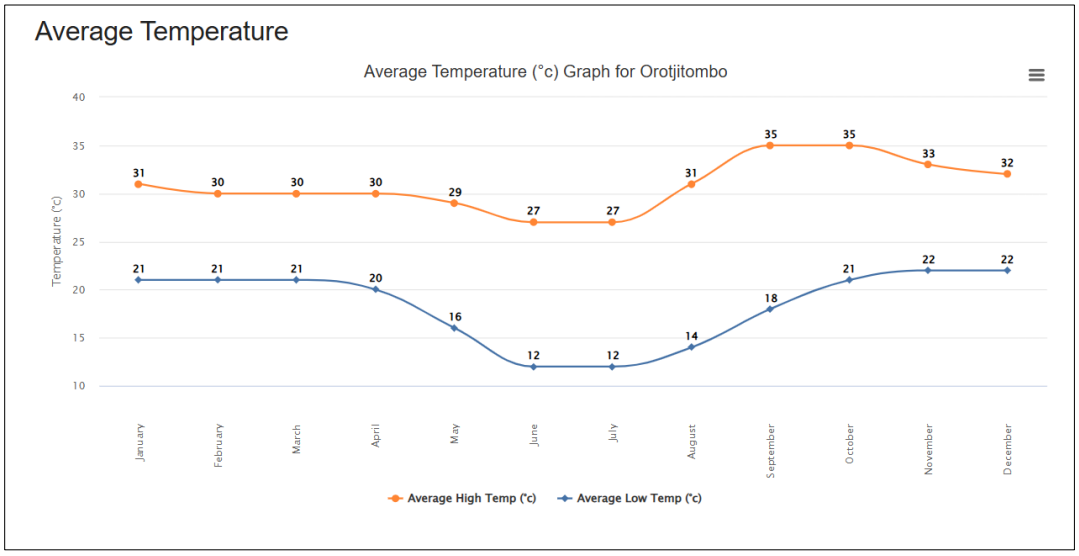


Figure 5-3: Average low and high temperature chart for the Orotjitombo area (source: World Weather Online, 2026)

Rainfall

The area experiences good annual rainfall ranging between 120 and 180mm between January and March, with the highest rainfall recorded at 240mm in 2011, 224mm in 2009, 206mm in 2012, and 180mm in 2020 (World Weather Online, 2026). The highest average rainfall for the area is 135mm in February and 130mm in January, as shown on the chart in Figure 5-4.

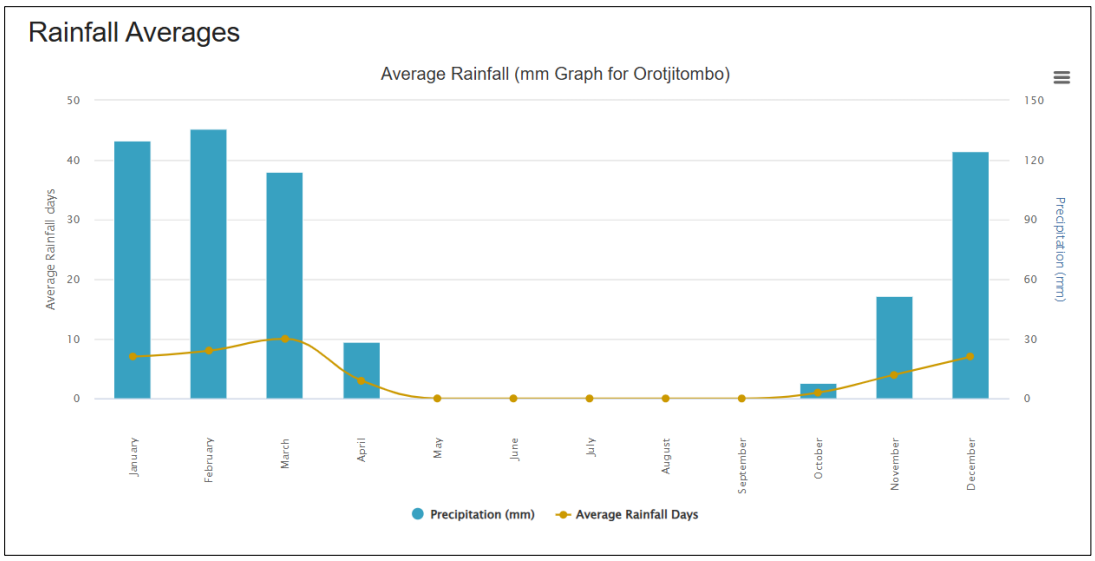


Figure 5-4: Average rainfall chart for the Orotjitombo area (source: World Weather Online, 2026)

5.2.2 Landscape and topography

The project site and surrounding areas fall within the Karstveld landscape, as shown on the map in Figure 5-5. This landscape is underlain exclusively by rocks formed from sediments deposited 750–600 million years ago in a shallow sea covered by mats of microbial organisms. These rocks are quite soluble in rainwater and thus slowly dissolve over time, leaving cavities that may develop into extensive aquifers, cave systems, and underground lakes. Lake Guinas and Lake Otjikoto were such underground lakes before the ground above them eroded so thin that it collapsed. There is little surface runoff from rain in this area because most of it rapidly drains into the ground and underground cavities. Water that evaporates from the soil leaves behind dissolved calcium carbonate, which aggregates into distinctive calcrete rocks that are abundant around the Karstveld (Atlas of Namibia Team, 2022).

The project area is relatively flat with elevations ranging between 547 and 951 meters above sea level (masl), as shown on the topographic map in Figure 5-5 below.

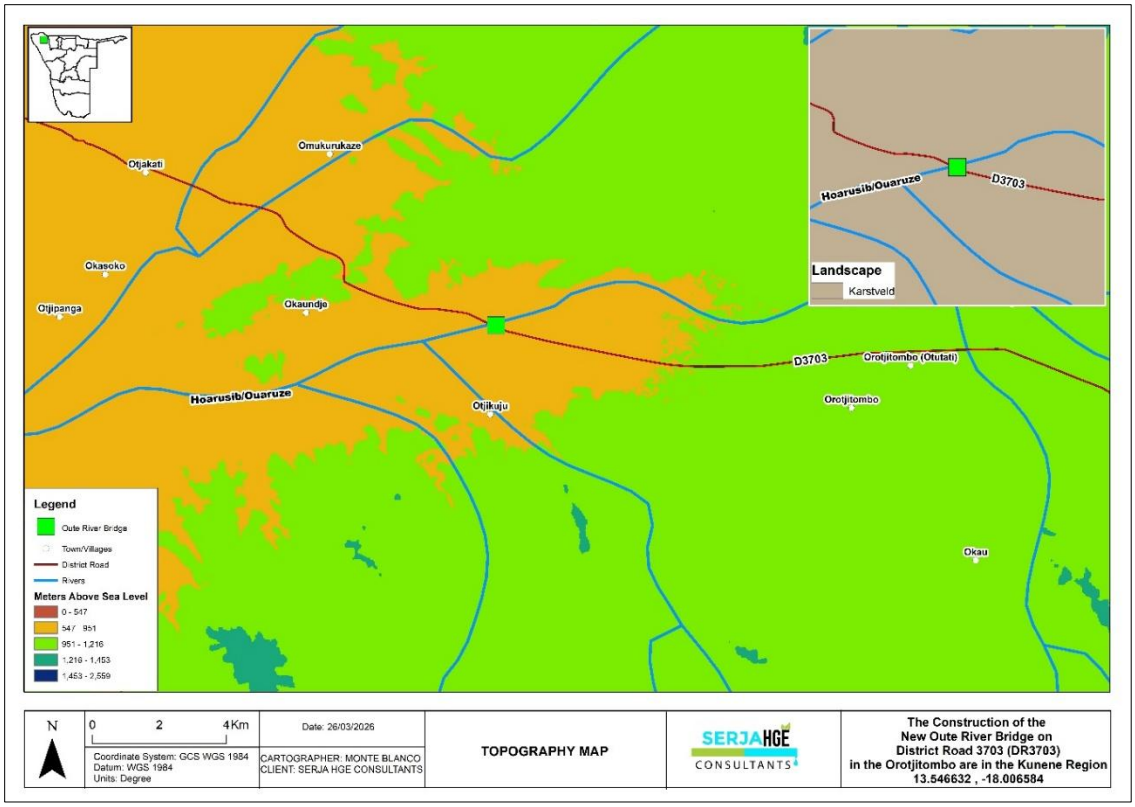


Figure 5-5: The topography and landscape of the area

5.2.3 Geology

The geology of the site area is mainly dominated by rocks of the Damara Orogeny comprising Otavi Group sediments that are superimposed (unconformity) on the basement rocks of the Epupa Complex. The Epupa Metamorphic Complex is a term for a complex association of basement granitic ortho- and paragneisses and minor basic rocks which extend from the middle reaches of the Hoanib River west of Sesfontein to the Kunene River. According to Lohe et al. (2021), the area is further characterized by the granitic and gneissic rock types that cover vast areas in the Kaokoveld. Granites, gneiss, and old volcanic rocks are roughly located in a triangle between Marienfluss, Swartbooisdrift, and Sesfontein. Metamorphic rocks, including marble and quartzitic bands, occur in the western part of the Kaokoveld. They form a strip between the Hartmann's Mountains and the coast that goes all the way down to the Uniab River.

Apart from preliminary distinctions made by Goscombe (1999), the complex is poorly mapped. It includes highly deformed Archaean, Palaeoproterozoic, and Mesoproterozoic rocks, which are difficult to distinguish from each other because of the intensity of both pre- and post-Damaran deformation (OMAVI Consultants, 2023). The bridge will be sitting on rock units comprising quartzite, conglomerate, schist, and marble, as shown on the map in Figure 5-6. Some of the rock units (weathered calcium carbonate rock) observed near the proposed site are shown in Figure 5-7.

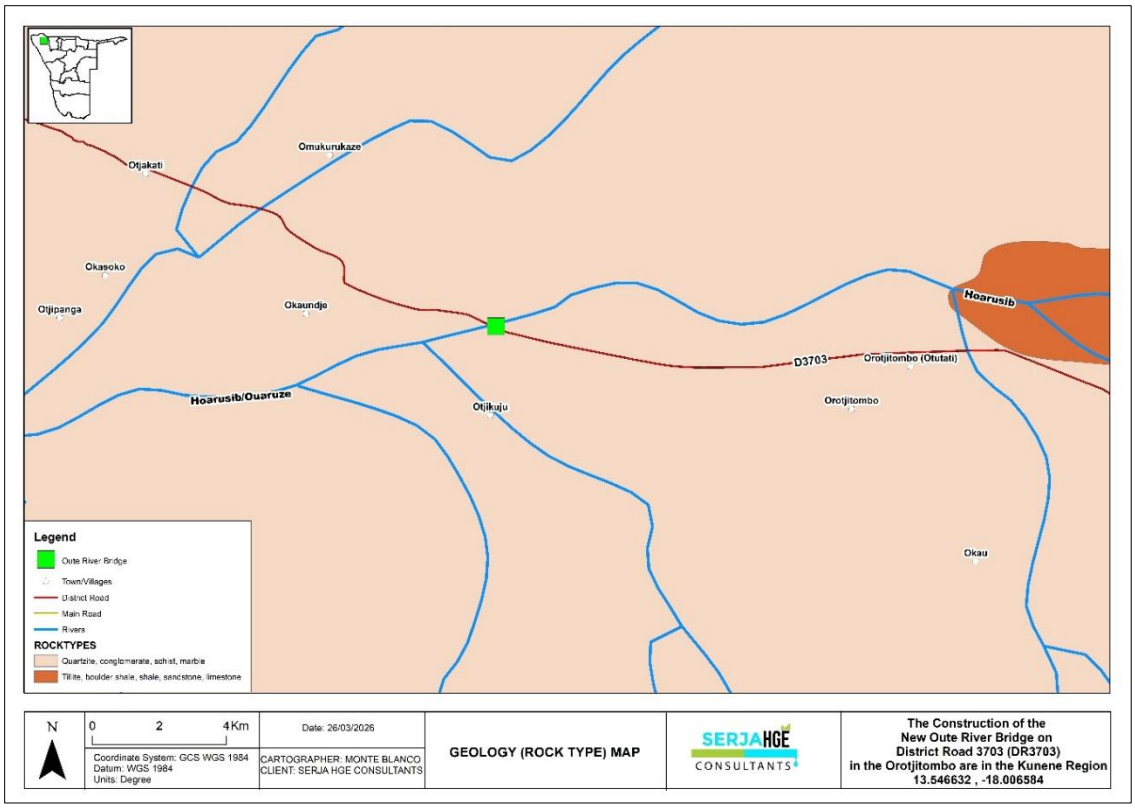


Figure 5-6: The geology of the project site area and surroundings

Figure 5-7: The rock unit (weathered calcium carbonate rock with calcrete nodules) near the proposed bridge site

5.2.4 Soils

The dominant soil types in the area are petric calcisols, as shown on the soil map in Figure 5-8. Mendelsohn et al (2002) describe petric soils as those with a solid layer at a shallow depth that remains hard even when they are wet. According to the Atlas of Namibia Team (2022), calcisols are widespread in Namibia. They

are commonly found in arid and semi-arid environments that have distinct dry seasons. They form in alluvial, colluvial, and aeolian deposits that are rich in calcium and magnesium. Significant amounts of calcium carbonate (lime) form below the surface where the soil is alternately dampened by rain and dried by evaporation, which concentrates the calcium carbonate into soft masses or layers of hard calcrete.

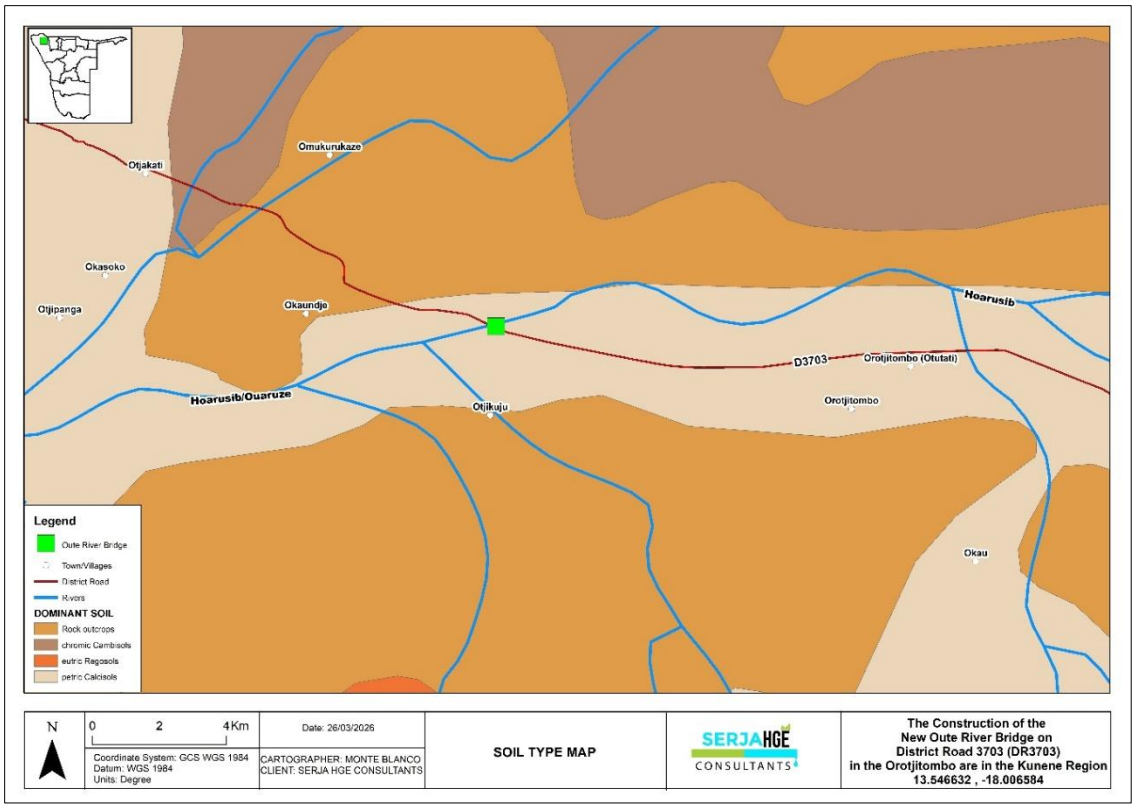


Figure 5-8: The dominant soil types on and around the project site

Soils near the site are light brown and reddish-brown loamy sand soils with gravel - Figure 5-9.

Figure 5-9: The light brown and reddish-brown soils on and around the site

5.2.5 Water resources: groundwater (hydrogeology) and surface water (hydrology)

The project area and the Kunene Region fall under the Northern Namib and Kaokoveld groundwater basin. The region generally has a low groundwater potential. The area with aquifer potential, more or less, reflects the rainfall distribution, decreasing westwards. Knowledge of the aquifers in this area is sparse, due to the small number of boreholes and limited groundwater investigations (Lohe et al., 2021).

Lohe et al. (2021) further state that recharge from rainfall is an important parameter determining the groundwater potential, but the degree of metamorphism in the area affects the groundwater potential, too. The groundwater potential of the rocks decreases as the degree of metamorphism increases. In the ephemeral rivers such as the Hoarusib and Oute, alluvial groundwater, which could explain the porous aquifers in and along such rivers (Figure 5-10). These ephemeral rivers are, in many cases, tapped by boreholes and hand-dug wells, as they provide an important groundwater source, especially in the western half of the area. Boreholes drilled in bedrock nearby are also sustained by alluvial groundwater. The groundwater potential of these drainage lines is considered far better than the surrounding rock.

According to the groundwater database, there is one borehole (WW8235) within proximity to the bridge site at these GPS coordinates: -18.0047 13.5529. The borehole was drilled in 1964 at a depth of 630m, with an initial water level of 16m below ground level and a yield of 91m^3/hr (owing to direct recharge by the river). Therefore, this borehole will supply the water for the bridge construction works.

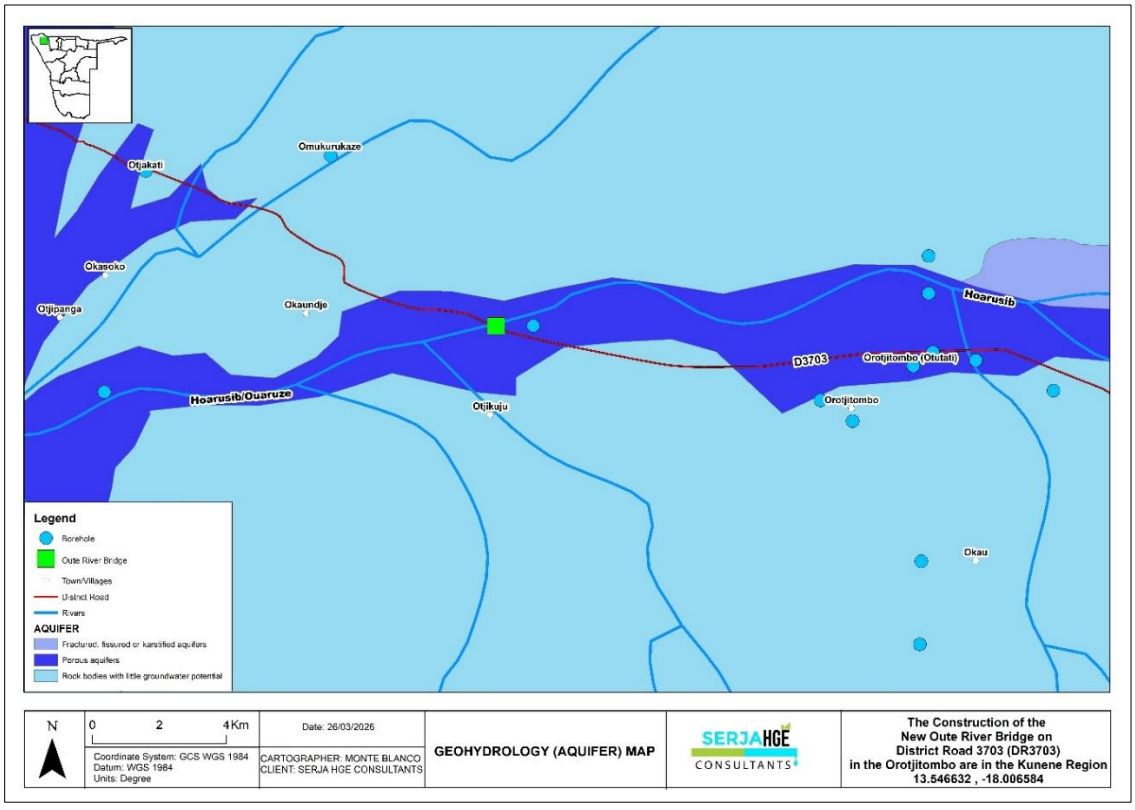


Figure 5-10: The surface and groundwater (geohydrology) map of the area

The groundwater quality map of the area is shown in Figure 5-11. The groundwater quality around the project area is not suitable for drinking (human consumption), as shown on the groundwater quality map (Figure 5-11). Thus, this water cannot be used for the bridge construction works.

The groundwater quality map indicates that the quality of water of the project site has a concentration of total dissolved solids (TDS) that is more than 5,000 milligrams per litre (mg/l), and a sulphate (SO_4) concentration of more than 1,200mg/l. Furthermore, the nitrate (NO_3) concentration of the groundwater is more than 110mg/l, and Fluoride (F) is more than 2mg/l. Therefore, the water quality is classified as category D: Not suitable for any drinking water. Therefore, it is not suitable for bridge construction either, where fresh water is needed.

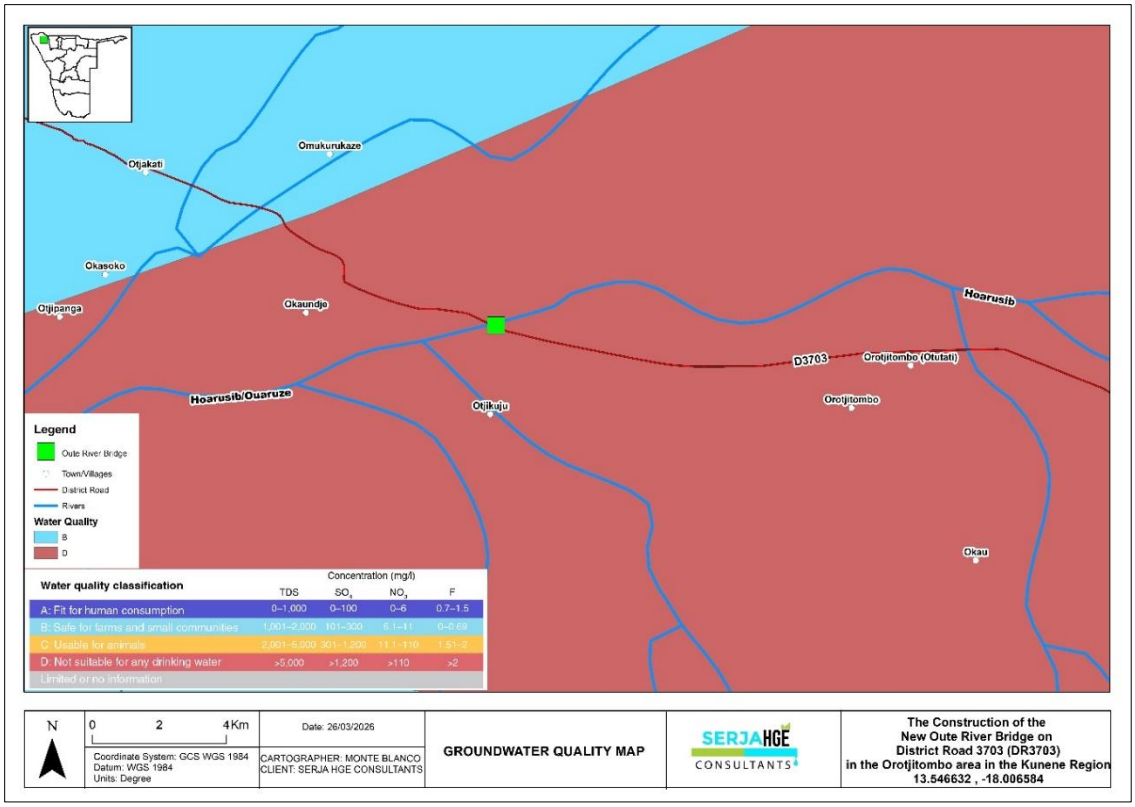


Figure 5-11: Groundwater quality map of the area

5.2.6 Surface and Groundwater Vulnerability to Pollution

With regards to surface water, potential pollution is likely if construction works are undertaken during the heavy rain seasons. i.e., between December and March, particularly where the highest rainfalls are recorded, there would be a high risk of accidental spills of hydrocarbons (oils or fuels) and effluent (wastewater) washed off into nearby surface water bodies.

In the case where bridge construction works are carried out during the dry season (dry months of the year, i.e., April to November), then the risk of surface water pollution will be low to none because accidental wet

waste spills would be easy to control and manage compared to the rainy season with surface runoff. In terms of groundwater vulnerability, the project area has a rather low vulnerability to pollution - Figure 5-12.

The rather low vulnerability of groundwater to pollution in the area could be explained by the consolidated sediments and compacted bedrock units overlying and underlying the project site, which could prevent ready and easy pathways for polluted water to flow in case of a pollutant.

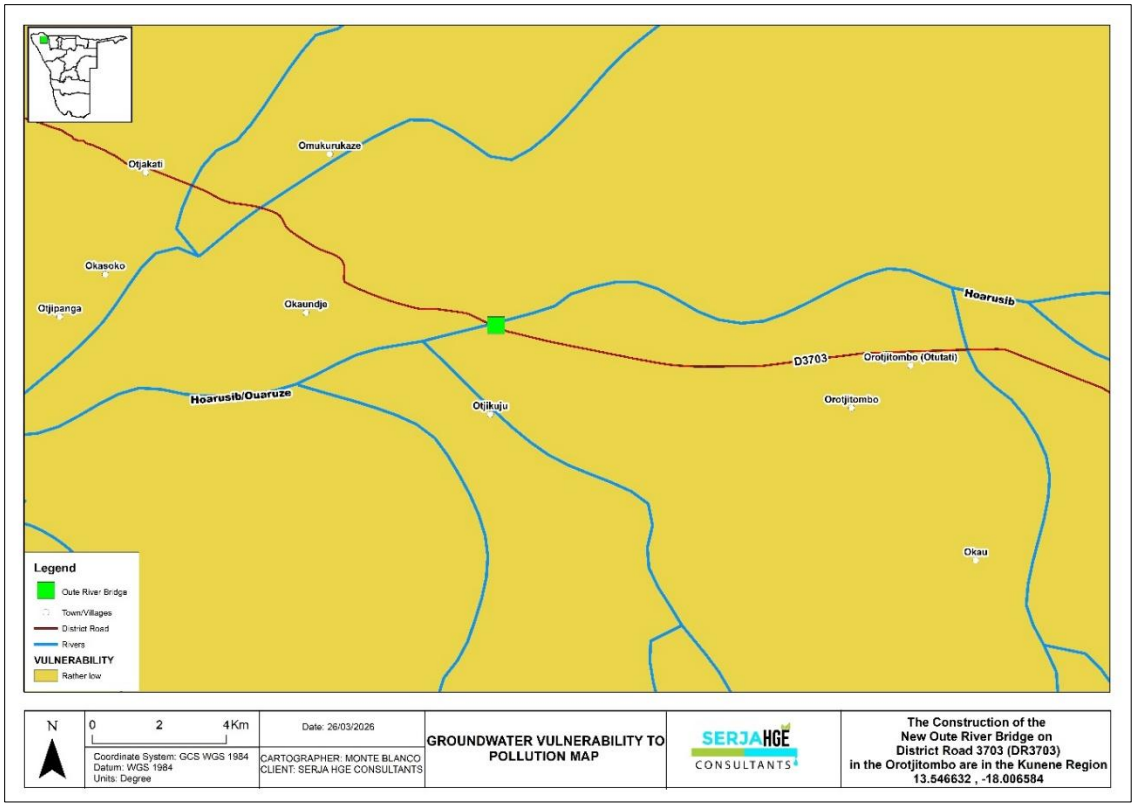


Figure 5-12: Groundwater vulnerability to Pollution map of the area

5.3 Social and Economic Environment

5.3.1 Demography

According to the 2023 Population and Housing Census data, the Kunene Region has a total population of 120,762 as per the 2023 National Population and Housing Census. Of the total population, 60,573 were males and 60,189 females (Namibia Statistics Agency (NSA), 2024a), with a population density of 10.0 persons per square kilometer (km^2). The proposed bridge site falls in the Opuwo Rural Constituency, which has a population of 14,894 and a population density of 0.7 persons/km^2, respectively (NSA, 2024b).

The Kunene Region has a literacy rate of 63.8%. The early childhood development (age 0 to 5) stands at 11.0%, while for the population of 15+ years of age, 37.6% have never attended school, 14.6% is the

population that is currently in school, and 45.9% have left school (NSA, 2024a). Furthermore, NSA (2024a) indicates that the population of 3 years and above has access to the internet (15.3%), and the population that owns cellphones is at 46.4%.

5.3.2 Economic activities

According to the NSA (2024a), the main sources of income in households in the Kunene Region are farming (16.2%), wages and salaries (35.0%), old age pension (12.8%), and business, non-farming (4.7%). The Opuwo Rural Constituencies thrive on both livestock (cattle, goats, and sheep) and small-crop farming, as well as small-scale businesses at settlements and villages.

5.4 Infrastructure and Services

In terms of infrastructure, the Kunene Region is well equipped with good infrastructure and services such as roads (tarred and gravel), water supply, powerlines, and telecommunications. In terms of the site area, this is a rural area with quite some good infrastructure, such as access roads and single-track roads, solar energy, and water supply. The map of services and infrastructures at the proposed site area and the broader area is shown in Figure 5-13.

The summary of the current services infrastructure in the project area includes:

- Road network: Access to the project site area from Opuwo and Etanga is gained through the DR3703 gravel road, which provides access to nearby villages and settlements.
- Electricity and water supply: The communities are in rural areas where most houses use firewood to cook, light, and heat water. The major settlements use electricity supplied from Northern Namibia's Regional Electricity Distributor (NORED) power grid. There is a NORED power line near the bridge site, as shown on the infrastructure map. A few houses in the Region have the privilege of getting connected to the grid, while some use solar energy for power supply. T
  In terms of water supply, the community relies on borehole water in some areas, and others rely on MAFWLR's Rural Water Supply Division facilitated schemes that are NamWater operated.
- Telecommunication services: The area has good network coverage for MTC Namibia, while the Telecom network may be more reliable in towns such as Opuwo.
- Education and health services: There is Orotjitombo Primary School near the bridge site.

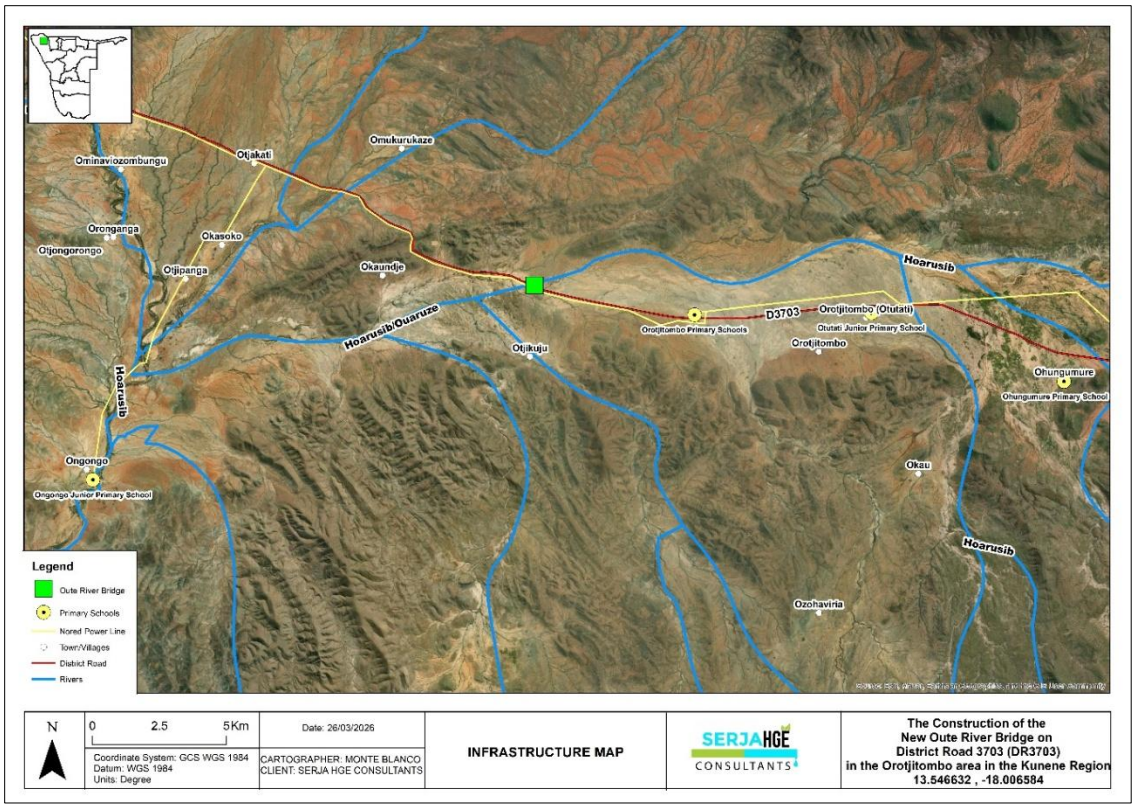


Figure 5-13: The infrastructure map of the project area

5.5 Archaeology and Heritage Aspect

5.5.1 Local Perspective and Findings

The expected archaeological and cultural heritage resources in the broader area of the site are graves (marked and unmarked), artefacts, etc. In terms of locally specific known and recorded archaeological and cultural heritage sites, there is a grave located less than 500m north of the bridge site (at the GPS coordinates: -18.006111, 13.545063), as shown on the map in Figure 5-14.

The archaeological and cultural heritage information was confirmed by local leaders and communities consulted on the 24th of March 2026. Therefore, this surface archaeological site should be protected during construction. It is also recommended that the National Heritage Act, No. 27 of 2004, be strictly enforced, and that, concurrently, the recommendations in the statutory documents for this project be strictly adhered to, particularly for unknown and undiscovered subsurface sites of archaeological and cultural value.

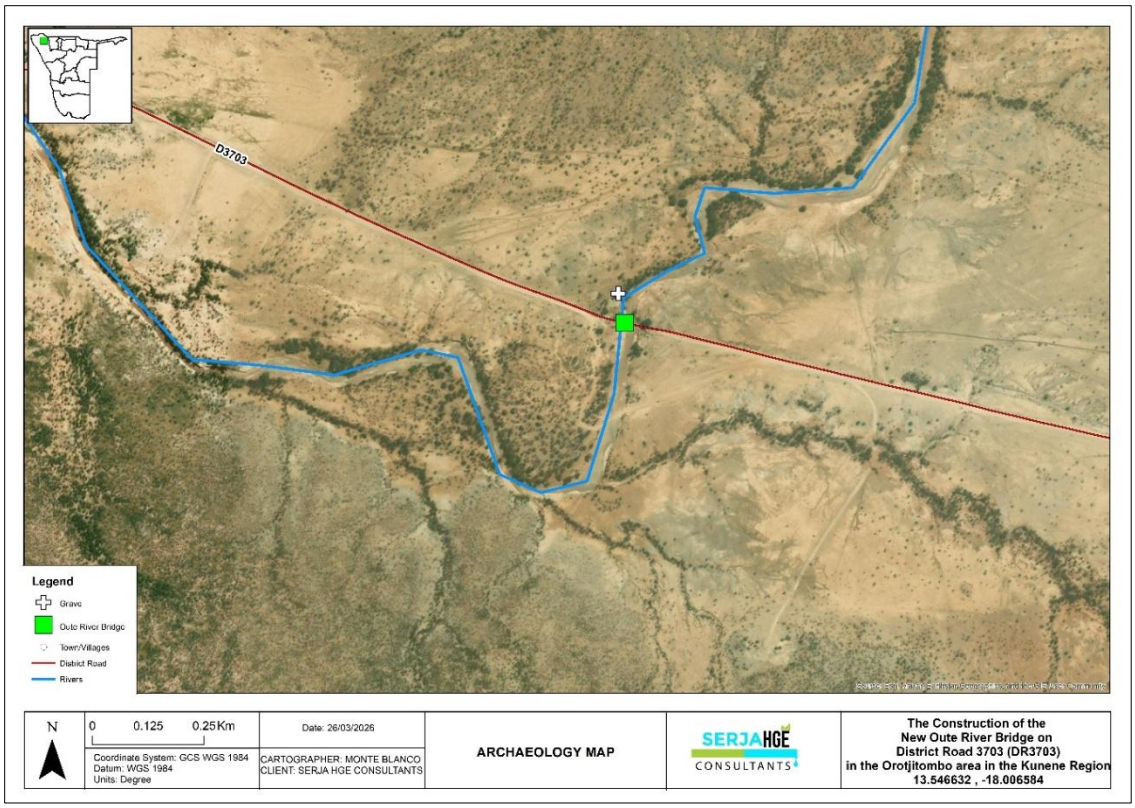


Figure 5-14: The known archaeological sites near the proposed bridge site

Furthermore, if a heritage site or items of heritage significance are found during the excavation, a chance finds procedure should be followed as per the National Heritage Act, No. 27 of 2004. Moreover, care should be taken during excavation to implement archaeological management and precautionary measures. Thus, ensuring the continued protection of the resources during excavation activities in the area.

The public consultation and engagement process and means employed for the EIA Study are presented under Chapter 6.

6 PUBLIC CONSULTATION AND PARTICIPATION PROCESS

Public consultation and participation form an important component of an EIA process. It provides potential Interested and Affected Parties (I&APs) and stakeholders with an opportunity to comment on and raise any issues relevant to the project for consideration as part of the assessment process. This greatly assists the EAP (Environmental Consultant) in thoroughly identifying and recording potential impacts and to what extent further investigations are necessary. Public consultation can also aid in identifying potential mitigation measures. The consultation for this project has been done under the EMA and its EIA Regulations, and as per the following subsections.

6.1 Pre-identified and Registered Interested and Affected Parties (I&APs)

Relevant and applicable national, regional, and local authorities, as well as other interested members of the public, were identified. Pre-identified I&APs were contacted directly, while other parties who contacted the Consultant after project advertisement notices in the newspapers were registered upon their request.

6.2 Communication with I&APs and Means of Consultation Employed

Regulation 21 of the EIA Regulations details the steps to be taken during a public consultation process, and these have been used in guiding this process. Communication with I&APs regarding the project was facilitated through the following means, in this order. Local community input is essential to the EIA and, ultimately, to the project, ensuring the road serves both local and regional development goals.

- A Background Information Document (BID) containing brief information about the project activities was compiled, uploaded on the MEFT (ECC) Portal for project registration, and shared with registered stakeholders / Interested and Affected parties (I&APs).
- A Stakeholders (I&AP) List was developed (Appendix C) and updated as new I&APs register for the EIA. The BID was shared with the pre-identified key stakeholders (Appendix D).
- Project EIA notices were published in the following newspapers - Appendix E:
    - *New Era*: The notice appeared in the newspaper on the 12th and 19th of March 2026.
    - *Windhoek Observer*: The notice appeared in the newspaper on the 12th and 19th of March 2026.

The consultation period ran from the 12th of March 2026 to the 17th of April 2026.

- EIA notices (posters) in English were prepared for printing and pasted in Opuwo at the Kunene Regional Council and the Governor’s office (Figure 6-1). The original copy of the poster is appended hereto as Appendix F.

Figure 6-1: The EIA public notice posters in Opuwo at the Kunene Regional Council and the Governor's Office

- Consultation meetings: a stakeholder consultation meeting was held between the Kunene Governor's office in Opuwo (Figure 6-2) and a community consultation meeting was held in Ohungumure Village on the 24th of March 2026 (Figure 6-3). The consultation meetings were attended by eleven (11) people and ninety-seven (97), respectively. The attendance included two environmental assessment practitioners from Serja HGE Consultants and two engineers from the DAT JV Consulting Engineering Team. Minutes were taken from both consultation meetings, and these are attached hereto as Appendix G1 and G2.

Figure 6-2: Stakeholder engagement meeting in progress at the Kunene Regional Council in Opuwo on the 24th of March 2026

Figure 6-3: EIA Community Consultation meeting in progress at Ohungumure Village) on the 24th of March 2026

6.3 Feedback and Issues Raised by the Stakeholders (I&APs)

Some issues were raised by key stakeholders and I&APs (communities) during the consultation period (consultation meetings). These issues have been recorded and incorporated into the EIA Scoping Report and EMP. The summary of these few key issues is presented in Table 6-1.

Table 6-1: Summary of main issues and comments received throughout the consultation period

Aspect	Summary of impact or concern
Comments and Issues received or noted during the consultation period (in the consultation meetings)	
Proper management of public perceptions and ensuring transparency	The Kunene Region has had complex political dynamics. Thus, leaders will continue to manage perceptions carefully and ensure the process is transparent while still delivering a quality product.
Following proper communication channels throughout the project	Communication must always go through the Governor's Office, which will convey the information to the Kunene Regional Council. Therefore, going forward, consultations and engagements should continue and avoid bypassing key stakeholders for the project.
Project support for the Region	The office of the Governor, the regional council, and the community highly support the project as it is long overdue to serve the communities.
The urgent need for a bridge across the river	That river crossing needs attention as it has many other small rivers that flow into it, and it has claimed lives since before independence.
The protection of known and unknown archaeological and cultural heritage resources on and around the project site	The protection of the community archaeological factor for the community, as there has been previously unearthed very old pottery in another project in the Region. There is an old grave, some 500 meters north of the river crossing,
Waste management	Implement proper waste management. Minimise waste and provide a refuse site if needed. Dispose of hazardous waste (e.g., oil from machinery) correctly.
Employment opportunities for locals	Prioritise local employment. "Local" should mean the broader area/constituency, not just one village or certain households. Therefore, the contractor must avoid giving most jobs to members of the same family.
Respecting local traditional practices and rituals	Respect traditional rituals and consult spiritual/traditional leaders before key activities, such as drilling, can be undertaken. Thus, building a consensus to avoid disputes over cultural heritage matters.

The consultation period ran from the 12th of March 2026 to the 17th of April 2026 to allow the submission of comments after the consultation meeting. Comments received during the consultation meeting and email were summarized as above and indicated in the meeting minutes.

6.3.1 Concluding remark on the overall EIA Consultation process and feedback

The comments and issues raised during the consultation period were significant; however, they were not objections that would hinder, halt, or terminate the project activities. The stakeholders and I&APs would like to see the implementation of management and mitigation measures to reduce the significance of impacts during the bridge construction works, and improve their mobility and accessibility to economic and social service centers in Opuwo Town, as well as the Opuwo Rural Constituency at large and neighbouring constituencies in the Region.

The next chapter (Chapter 7) presents the identified potential impacts, the impact assessment methodology, the description of impacts, and their assessment.

7 IMPACTS IDENTIFICATION, ASSESSMENT, AND MEASURES

7.1 Identification of Potential Impacts

The proposed bridge construction and associated bridge works are usually associated with a range of potential positive and negative impacts. For an environmental assessment, the focus is mainly on the negative impacts likely to affect the host environment and social features. The assessment is done to ensure that these impacts are sufficiently addressed, and adequate mitigation measures are recommended thereto for implementation so that the impact's significance is brought under control, while maximizing the positive impacts. The potential positive and negative impacts that have been identified from the project activities are listed as follows:

7.1.1 Positive impacts (benefits) of the bridge construction

The positive impacts (benefits) of the proposed bridge construction are listed below.

- Socio-economic development through temporary job (employment) creation in the area during the bridge construction phase for 90 to 100 people or more.
- Improved accessibility: better connections enhance accessibility to remote rural areas, facilitating the transportation of goods and services, and access to healthcare, education centers, and other social services in the area.
- Economic development: better road crossing can stimulate economic growth by attracting investment, promoting development, tourism, and better service delivery in this part of the Kunene Region.
- Safety: The new bridge with improved design, culverts, and drainage system can enhance road safety, thus reducing the risk of accidents and fatalities.
- Social cohesion: the bridge will improve connectivity that can strengthen social ties within rural communities by enabling easier access to growth centres, schools, healthcare centres, and other social services in Opuwo and nearby areas on the other side of the DR3703.

7.1.2 Potential environmental and social (adverse) impacts of the bridge construction

The potential negative (adverse) impacts of the proposed bridge (during construction) are listed below. The mitigation measures for these impacts are included in the EMP for the borrow pits.

- Soil and water pollution: improper handling of wastewater may lead to pollution of surrounding soils and eventually water resources systems (through wastewater runoff and infiltration).
- Habitat destruction: excavations for material sourcing (borrow pits) can lead to the destruction of natural habitats for plants and animals. This can disrupt local biodiversity.

- Soil erosion: The removal of large amounts of soil and vegetation from borrow pits and bridge positions can increase the risk of soil erosion, especially during heavy rainfall events.
- Depletion of local groundwater table: excavation of borrow pits may affect the local water table, leading to changes in groundwater levels.
- The depletion of the local groundwater table can impact the availability of water for vegetation that relies on groundwater as a water source in the area.
- Land use change: The conversion of natural landscapes into borrow pits can permanently alter landscapes, affecting the aesthetic value of the area.
- Deforestation: construction may require the clearing of trees and vegetation at and near the site to set up construction infrastructure and services, resulting in habitat loss.
- Impact on air quality: dust and particulate matter generated during the excavation of materials (sand and gravel) and transportation (the movement and operation of heavy vehicles and machinery) can compromise air quality in the surrounding area.
- Water pollution: Runoff from construction activities can carry pollutants such as oil, fuels, and heavy metals into the Oute River and nearby surface water bodies, thus impacting aquatic ecosystems.
- Noise associated with the movement of heavy machinery and trucks can disturb nearby locals and animals.
- Disruption of hydrological systems by borrow pits can alter natural drainage patterns, causing changes in surface water flow in the area and potentially exacerbating flooding or drought conditions in the area.
- General environmental pollution through the mishandling of project-related waste associated with the project.
- Occupational and community health and safety: Improper handling of materials and equipment may cause health and safety risks to workers and locals. Community safety can also be compromised by unfenced borrow pits or abandoned borrow pits (that are not properly rehabilitated to safe conditions).
- Potential archaeological and cultural heritage impact: borrow pits and site preparation activities may impact local cultural heritage sites or traditional land use practices through inadvertent unearthing of such resources (sites and objects).

The impacts are briefly described and assessed under the next subheadings. The management and mitigation measures are provided in the EMP for implementation.

7.2 Impact Assessment Methodology

The Environmental Assessment process primarily ensures that potential impacts arising from project activity are identified and addressed through environmentally sound approaches and legal compliance. The impact assessment method used for this project follows Namibia's Environmental Management Act (No. 7 of 2007) and its 2012 Regulations, as well as the International Finance Corporation (IFC) Performance Standards.

The identified impacts were assessed in terms of scale/extent (spatial scale), duration (temporal scale), magnitude (severity), and probability (likelihood of occurring), as presented in Table 7-1.

To enable a scientific approach to determining environmental significance, a numerical value is assigned to each rating scale. This methodology ensures uniformity and that potential impacts can be addressed in a standard manner, making a wide range of impacts comparable. It is assumed that an assessment of the significance of a potential impact is a good indicator of the associated risk. The following process will be applied to each potential impact:

- Provision of a brief explanation of the impact,
- Assessment of the pre-mitigation significance of the impact, and
- Description of recommended mitigation measures.

The recommended mitigation measures prescribed for each potential impact contribute to the attainment of environmentally sustainable operational conditions for the project across various features of the biophysical and social environment. The following criteria (in Table 7-1) were applied in this impact assessment:

Table 7-1: Criteria used for impact assessment (extent, duration, intensity, and probability)

The Criteria used to assess the potential negative impacts.				
Extent or (spatial scale) - extent is an indication of the physical and spatial scale of the impact.				
Low (1)	**Low/Medium (2)**	**Medium (3)**	**Medium/High (4)**	**High (5)**
Impact is localised within the site boundary: Site only	Impact is beyond the site boundary: Local	Impacts felt within adjacent biophysical and social environments: Regional	Impact widespread far beyond the site boundary: Regional	Impact extends beyond National or international boundaries
Duration- Duration refers to the timeframe over which the impact is expected to occur, measured in relation to the lifetime of the project				
Low (1)	**Low/Medium (2)**	**Medium (3)**	**Medium/High (4)**	**High (5)**

The Criteria used to assess the potential negative impacts.				
Immediate mitigating measures, immediate progress	Impact is quickly reversible, short-term impacts (0-5 years)	Reversible over time; medium term (5-15 years)	Impact is long-term	Long term, beyond closure, permanent, irreplaceable, or irretrievable commitment of resources
Intensity, Magnitude/severity - Intensity refers to the degree or magnitude to which the impact alters the functioning of an element of the environment. This is a qualitative type of criterion.				
H-(10)	**M/H-(8)**	**M-(6)**	**M/L-(4)**	**L-(2)**
Very high deterioration, high quantity of deaths, injury or illness / total loss of habitat, total alteration of ecological processes, extinction of rare species	Substantial deterioration, death, illness or injury, loss of habitat/diversity or resource, severe alteration, or disturbance of important processes	Moderate deterioration, discomfort, partial loss of habitat/biodiversity or resource, moderate alteration	Low deterioration, slight noticeable alteration in habitat and biodiversity. Little loss in species numbers	Minor deterioration, nuisance or irritation, minor change in species/habitat/diversity or resource, no or very little quality deterioration.
Probability of occurrence: the likelihood that the impacts occur. This determination is based on previous experience with similar projects and/or based on professional judgment.				
Low (1)	**Medium/Low (2)**	**Medium (3)**	**Medium/High (4)**	**High (5)**
Improbable; low likelihood; seldom. No known risk or vulnerability to natural or induced hazards.	Likely to occur from time to time. Low risk or vulnerability to natural or induced hazards	Possible, distinct possibility, frequent. Low to medium risk or vulnerability to natural or induced hazards.	Probable if mitigating measures are not implemented. Medium risk of vulnerability to natural or induced hazards.	Definite (regardless of preventative measures), highly likely, continuous. High risk or vulnerability to natural or induced hazards.

7.3 Impact Significance

Impact significance is determined through a synthesis of the above impact characteristics. The significance of the impact “without mitigation” is the main determinant of the nature and degree of mitigation required. As stated in the introduction to this chapter, for this assessment, the significance of the impact in the absence of prescribed mitigation actions was measured.

Once the above factors (Table 7-1) have been ranked for each potential impact, the impact significance of each is assessed using the following formula:

SP = (magnitude + duration + scale) x probability

The maximum value per potential impact is 100 significance points (SP). Potential impacts were rated as high, moderate, or low significance, based on the following significance rating scale (Table 7-2).

Table 7-2: Impact significance rating scale

Significance	Environmental Significance Points	Colour Code
High (positive)	>60	H
Medium (positive)	30 to 60	M
Low (positive)	<30	L
Neutral	0	N
Low (negative)	>-30	L
Medium (negative)	-30 to -60	M
High (negative)	>-60	H

For an impact with a high significance rating, mitigation measures are recommended to reduce the impact to a low or medium significance rating, provided that the impact with a medium significance rating can be adequately controlled by the recommended mitigation measures. To maintain a low or medium significance rating, monitoring is recommended for a period to confirm that the impact is low or medium and under control.

The assessment of the project phases is conducted for both pre-mitigation (before mitigation is implemented) and post-mitigation (after mitigation is implemented). The objective of the mitigation measures is to firstly avoid the risk, and if the risk cannot be avoided, mitigation measures to minimize the impact are recommended. Once the mitigation measures have been applied, the identified risk will be of low significance.

7.1 Description and Assessment of Potential Impacts

The potential impacts of the project activities are described and assessed in Table 7-3 and Table 7-4. The management and mitigation measures in the form of management action plans are provided in the EMP.

Table 7-3: The description and assessment of the potential positive impacts of the proposed bridge construction and associated activities

Impact	Impact Description	Impact Assessment									
		Pre-mitigation Rating					Post-mitigation Rating				
		Extent	Duration	Intensity	Probability	Significance	Extent	Duration	Intensity	Probability	Significance
Positive Impacts											
Employment creation	Socio-economic development through the creation of temporary jobs (employment) in the area during the road upgrading phase, for over 90 people.	L / M- 2	L / M - 2	L / M - 4	L - 1	L - 8	M / H - 4	H - 5	M - 6	H - 5	H - 75
Empowerment of local businesses	Procurement of local goods and services for the project activities by small and medium businesses in the area and Region will promote local entrepreneurship and empowerment, as well as local economic development (income generation).	L / M- 2	L / M - 2	L / M - 4	L / M - 2	L - 16	M - 3	M / H - 4	L / M - 4	M / H - 4	M - 44
Improved accessibility:	Better connections enhance accessibility to remote rural areas, facilitating the transportation of goods and services, and access to healthcare and education centers in the area.	L / M- 2	L / M - 2	L / M - 4	L - 1	L - 8	M - 3	M / H - 4	L / M - 4	M / H - 4	H - 75
Economic development	The road will stimulate local economic growth in the Constituency. The movement of goods and people to services	L / M- 2	L / M - 2	L / M - 4	L - 1	L - 8	M / H - 4	H - 5	M - 6	H - 5	H - 75

Impact	Impact Description	Impact Assessment									
		Pre-mitigation Rating					Post-mitigation Rating				
		Extent	Duration	Intensity	Probability	Significance	Extent	Duration	Intensity	Probability	Significance
	from rural areas and Opuwo will be made easier.										
Community safety and social cohesion	The new bridge across the DR3703 can enhance road safety, thereby reducing the risk of accidents and fatalities. The road will improve connectivity, strengthening social ties within rural communities by enabling easier access to economic centers, schools, healthcare centers, and other social services.	L / M- 2	L / M - 2	L / M - 4	L - 1	L - 8	M / H - 4	H - 5	M - 6	H - 5	H - 75

Table 7-4: The description and assessment of the potential negative impacts of the bridge construction and associated activities on the biophysical and social environment

Impact	Impact Description	Impact Assessment									
		Pre-mitigation Rating					Post-mitigation Rating				
		Extent	Duration	Intensity	Probability	Significance	Extent	Duration	Intensity	Probability	Significance
Negative (Adverse) Impacts associated with bridge construction activities											
Unfair recruitment and procurement process	The employment of outsiders at the expense of capable local communities would create tensions and conflicts between the construction contractor and communities. Similarly, the outsourcing of the procurement of locally available	M - 3	M - 3	M/H - 8	M/H - 4	M – 56	L / M - 2	L / M - 2	L - 2	L / M - 2	L - 12

Impact	Impact Description	Impact Assessment									
		Pre-mitigation Rating					Post-mitigation Rating				
		Extent	Duration	Intensity	Probability	Significance	Extent	Duration	Intensity	Probability	Significance
	goods and services may create conflicts and lead to the loss of income for local communities and businesses.										
Over-abstraction of water resources (irresponsible use of resources)	The potential over-abstraction and irresponsible use of water resources (both groundwater and surface water) and practices during construction would result in water wastage and subsequent strain (exerting pressure) on the resources in the area. Thus, the project activities will likely have a moderately high impact on water resources due to increased demand. This could temporarily reduce water availability for nearby rural communities, livestock, and ecological systems, particularly in an already water-scarce environment. There is also a risk of localized groundwater drawdown. However, after the implementation of measures, the impact significance is expected to be low and short-term. With controlled abstraction, adherence to permitted volumes, use of alternative sources where	M - 3	M - 3	M/H - 8	M/H - 4	M – 56	L / M - 2	L / M - 2	L - 2	L / M - 2	L - 12

Impact	Impact Description	Impact Assessment									
		Pre-mitigation Rating					Post-mitigation Rating				
		Extent	Duration	Intensity	Probability	Significance	Extent	Duration	Intensity	Probability	Significance
	feasible, and continuous monitoring of water levels and quality, the risk of resource depletion and user conflict will be minimized. The construction will be of a temporary nature; thus, any minor impacts are likely to be reversible, and water resources are expected to recover post-activities naturally.										
Soil and Water Resources Pollution	Project activities are associated with a variety of potential pollution sources (e.g., lubricants and fuel) that may contaminate soils and, if not handled properly, eventually contaminate groundwater and surface water (e.g., nearby streams). The anticipated potential source of pollution to water resources from the project activities would be accidental spills of fuels and oil from project vehicles and machinery. Runoff from bridge construction works can carry pollutants such as oil, salt, and heavy metals into nearby streams and rivers, as well as the water supply borehole, impacting aquatic	M: -3	M: -3	M: -6	M / H: 4	M: -48	L / M: -2	L / M: -2	L / M: -4	L / M: 2	L: -16

Impact	Impact Description	Impact Assessment									
		Pre-mitigation Rating					Post-mitigation Rating				
		Extent	Duration	Intensity	Probability	Significance	Extent	Duration	Intensity	Probability	Significance
	ecosystems and the local water supply, respectively. This impact would occur during the heavy rainy season, when surface runoff would be inevitable. However, it should be noted that the scale and footprints of the activities where potential sources of pollution will be handled are small. Therefore, the impact will be moderately low and manageable.										
Habitat destruction and deforestation	Excavation for bridge construction to provide road reserves and erect supporting infrastructure can lead to the destruction of natural habitats for plants and animals. This can disrupt local biodiversity and reduce the availability of resources for animals and people. Added to that, bridge construction may require significant clearing of trees and vegetation within the bridge footprint, leading to habitat loss.	M: -3	M: -3	M: -6	M / H: 4	M: -48	L / M: -2	L / M: -2	L / M: -4	L / M: 2	L: -16
Soil erosion	The removal of large amounts of soil and vegetation to allow road works can leave soils exposed to	M: -3	M: -3	M / L: -4	M / H: 4	M: -40	L / M - 2	L / M - 2	L - 2	L / M - 2	L - 12

Impact	Impact Description	Impact Assessment									
		Pre-mitigation Rating					Post-mitigation Rating				
		Extent	Duration	Intensity	Probability	Significance	Extent	Duration	Intensity	Probability	Significance
	erosion, especially during heavy rainfall events.										
Air pollution	There is potential for dust owing to the movement and operation of heavy vehicles and machinery, and excavations. This can compromise air quality in the surrounding area.	M: -3	M: -3	M: -6	M / H: 4	M: -48	L / M: -2	L / M: -2	L / M: -4	L / M: 2	L: -16
Noise	The nuisance associated with the movement of heavy machinery and trucks in the area can disturb locals and animals.	M: -3	M: -3	M / L: -4	M / H: 4	M: -40	L / M - 2	L / M - 2	L - 2	L / M - 2	L - 12
Waste Generation (Environmental pollution)	Waste types such as solid waste, wastewater, sewage, and hazardous waste (waste fuels and oils) will be generated during project activities. If the generated waste is not disposed of responsibly, land pollution may occur at or around borrow pit sites. If solid waste, such as paper and plastic, is not properly stored or disposed of (littering), it may be consumed by animals, which could be detrimental to their health.	M: -3	M: -3	M / L: -4	M / H: 4	M: -40	L - 1	L - 1	L - 2	L / M - 2	L - 8
Occupational and	Improper handling of materials and equipment by personnel	M: -3	M: -3	M: -6	M / H: 4	M: -48	L / M: -2	L / M: -2	L / M: -4	L / M: 2	L: -16

Impact	Impact Description	Impact Assessment									
		Pre-mitigation Rating					Post-mitigation Rating				
		Extent	Duration	Intensity	Probability	Significance	Extent	Duration	Intensity	Probability	Significance
community health and safety	may cause health and safety risks to workers and locals. Community safety can also be compromised by unsecured project materials, such as fuel and oils, and by unattended heavy equipment near communities.										
Accidental fire outbreaks	The use of heavy equipment, especially when hydrocarbons are present at borrow pit sites, may result in accidental fire outbreaks. This could pose a safety risk to the project personnel (workers) and locals.	M - 3	M - 3	M - 6	M / H - 4	M – 48	L / M - 2	L / M - 2	L - 2	L / M - 2	L - 12
Archaeological or cultural heritage impact	Excavation for site preparation may result in inadvertent unearthing of archaeological cultural heritage resources. In terms of locally specific known and recorded archaeological and cultural heritage sites, there is a grave within 500m of the bridge site (at the GPS coordinates: -18.006111 13.545063). Thus, potentially vulnerable if care is not taken, especially during construction. Therefore, the	M: -3	M: -3	M: -6	M / H: 4	M: -48	L / M: -2	L / M: -2	L / M: -4	L / M: 2	L: -16

Impact	Impact Description	Impact Assessment									
		Pre-mitigation Rating					Post-mitigation Rating				
		Extent	Duration	Intensity	Probability	Significance	Extent	Duration	Intensity	Probability	Significance
	impact is of medium significance without implementing measures.										
Negative (Adverse) Impacts from the establishment of borrow pit(s)											
Physical disturbance to the site soils results in erosion.	The removal of large amounts of soil and vegetation from borrow pits can increase the risk of soil erosion, especially during rainfall events. This erosion can result in sedimentation of nearby water bodies, leading to water quality issues and habitat degradation. Furthermore, the movement of heavy vehicles and equipment may lead to soil compaction.	M - 3	M / H - 4	L / M - 4	M / H - 4	M – 44	L / M - 2	L / M - 2	L / M - 4	L / M - 2	L - 16
Property displacement and land loss	The excavation of borrow pits potentially results in the loss of useful communal land. Borrow pits inside private land would result in the loss of productive land and the displacement of fences and pipelines to allow for sufficient road reserves and the movement of heavy vehicles.	M: -3	M: -3	M: -6	M / H: 4	M: -48	L / M: -2	L / M: -2	L / M: -4	L / M: 2	L: -16
Habitat destruction	Excavation of borrow pits can destroy natural habitats for plants and animals. Thus, disrupting local biodiversity and reducing the availability of	M: -3	M: -3	M: -6	M / H: 4	M: -48	L / M: -2	L / M: -2	L / M: -4	L / M: 2	L: -16

Impact	Impact Description	Impact Assessment									
		Pre-mitigation Rating					Post-mitigation Rating				
		Extent	Duration	Intensity	Probability	Significance	Extent	Duration	Intensity	Probability	Significance
	resources for animals and people near the project site.										
Impact on flora biodiversity	The clearing of sites to establish borrow pits and activities can affect vegetation and species, especially protected tree species. The sites will be strategically located mainly in areas with minimal vegetation or at already disturbed sites where no further vegetation removal is required. Hence, the impact will be localized, site-specific, and therefore manageable.	M: -3	M: -3	M: -6	M / H: 4	M: -48	L / M: -2	L / M: -2	L / M: -4	L / M: 2	L: -16
Impact on groundwater table: Lowering of the local groundwater table	The borrow pit excavations may affect the local water table, leading to changes in groundwater levels. This can affect the availability of water for vegetation and communities that rely on groundwater in the area.	M: -3	M: -3	M / L: -4	M / H: 4	M: -40	L / M -2	L / M - 2	L - 2	L / M - 2	L - 12
Air Quality: Dust Generation	There is a potential impact of dust (and particulate matter) emanating from excavation activities and from heavy vehicles moving on site access and haul roads when transporting materials from borrow pit sites and travelling to	M: -3	M: -3	M / L: -4	M / H: 4	M: -40	L / M -2	L / M - 2	L - 2	L / M - 2	L - 12

Impact	Impact Description	Impact Assessment									
		Pre-mitigation Rating					Post-mitigation Rating				
		Extent	Duration	Intensity	Probability	Significance	Extent	Duration	Intensity	Probability	Significance
	the site. This may contribute to the dust level and compromise air quality in the area. The impact is considered short-term and localized as borrow pit activities are carried out over a specified duration and distance at selected sites only. Therefore, manageable with mitigation measures.										
Noise	Noise associated with borrow pits (from heavy machinery and trucks, and excavation activities) can disturb local communities and animals (livestock) in the area. Exposure of project personnel to excessive noise without protective measures in place can also be a health risk. The activities are considered small to medium in scale, and the noise level is likely to be limited to the site and to some distance from nearby homes. Thus, the impact likelihood is manageable.	M - 3	M - 3	M - 6	M / H - 4	M – 48	L / M: -2	L / M: -2	L / M: -4	L / M: 2	L: -16
Disruption of hydrological systems	Borrow pits can alter natural drainage patterns, altering surface water flow and	M - 3	M - 3	M - 6	M / H - 4	M – 48	L / M - 2	L / M - 2	L - 2	L / M - 2	L - 12

Impact	Impact Description	Impact Assessment									
		Pre-mitigation Rating					Post-mitigation Rating				
		Extent	Duration	Intensity	Probability	Significance	Extent	Duration	Intensity	Probability	Significance
	potentially exacerbating flooding or drought in the area.										
Occupational and Community Health and Safety Risks	The mishandling of machinery and equipment by workers at the borrow pits may result in injuries and, if worse, fatalities on duty. The curiosity of local children may lead them to play with unattended heavy trucks and other big machinery at borrow pit sites near their homes. The unfenced, unrehabilitated, deep, and steep-sided borrow pits can be a hazard to the communities (people) and their animals. The deep and steep-sided borrow pits can cause accidents such as drowning, especially for children or animals, if they fall in. If not properly managed, borrow pits can fill with water, creating stagnant pools. These pools can become breeding grounds for mosquitoes and other disease vectors, such as malaria and dengue fever, increasing health risks for nearby communities and animals.	M - 3	M - 3	M - 6	M / H - 4	M – 48	L / M - 2	L / M - 2	L - 2	L / M - 2	L - 12

Impact	Impact Description	Impact Assessment									
		Pre-mitigation Rating					Post-mitigation Rating				
		Extent	Duration	Intensity	Probability	Significance	Extent	Duration	Intensity	Probability	Significance
Vehicular Traffic Safety	The local roads, such as DR3703 and further D3700 and C43 in the broader area, are the main transportation routes for all vehicular movement in the area. There would be a potential increase in traffic due to the transport of construction materials from borrow pits. Not only the transport of materials, but also the delivery of supplies, goods, and services to the site. Depending on project needs, trucks, medium, and small vehicles will frequent the BP site areas. This could increase slow-moving heavy-vehicle traffic along these roads, potentially leading to road accidents.	M - 3	M / H - 4	L / M - 4	M / H - 4	M - 44	L / M - 2	L / M - 2	L - 2	L / M - 2	L - 12
Impact on local road use	The movement of heavy trucks on the community roads (single-track sandy routes) would result in their deterioration, making it difficult for community small vehicles to use them due to worsened road conditions.	M: -3	M: -3	M / L: -4	M / H: 4	M: -40	L - 1	L - 1	M / L - 4	M / L -2	L - 12
Land use change	The conversion of natural landscapes into borrow pits can	M - 3	M - 3	M - 6	M / H - 4	M – 48	L - 1	L / M - 2	L - 2	L / M -2	L - 10

Impact	Impact Description	Impact Assessment									
		Pre-mitigation Rating					Post-mitigation Rating				
		Extent	Duration	Intensity	Probability	Significance	Extent	Duration	Intensity	Probability	Significance
	permanently alter them, affecting the area's aesthetic value.										
Archaeological or cultural heritage impact	The Kunene Region has a rich cultural landscape and potential archaeological sensitivity. Thus, unmanaged excavation for construction works and of borrow pits may result in the inadvertent destruction of known and unknown archaeological sites.	M - 3	M - 3	M - 6	M / H - 4	M – 48	L - 1	L - 1	M / L - 4	M / L -2	L - 12

7.2 Cumulative Impacts Associated with the Borrow Pits

According to the International Finance Corporation (2013), cumulative impacts are defined as “those that result from the successive, incremental, and/or combined effects of an action, project, or activity (collectively referred to in this document as 'developments') when added to other existing, planned, and/or reasonably anticipated future ones”. The main cumulative impact that the project and associated activities potentially contribute to is:

- Impact of unrehabilitated borrow pits on the community and animals (livestock): Unrehabilitated borrow pits can pose threats to the community, especially children who may play around these sites during rainy seasons and drown when the pits are filled with water. Furthermore, deep and steep-sided borrow pits can cause accidents such as drowning, especially for children or animals, if they fall into the borrow pits in the future.

  Borrow pits that are not rehabilitated or not rehabilitated properly can cause conflicts and disputes in communities over their post-activity land uses. For instance, some community members may opt to leave the borrow pits for community rainwater storage, while others may opt to have them completely backfilled because they consider it unsafe or risky. These community conflicts over borrow pits can strain or damage community relations and local governance over a long time if they remain unresolved. In some cases, community members tend to gang up against their leaders over issues in their villages. Therefore, traditional authorities, communities, and project contractors need to come together and make an informed decision on the way forward regarding the end use of borrow pits in their areas.

The recommendations and conclusions made for the EIA Study are presented in the next chapter.

8 RECOMMENDATIONS AND CONCLUSIONS

The EIA Study for the proposed construction of the Oute Bridge in the Kunene Region was conducted in accordance with the 2012 EIA Regulations, and all due processes were followed as listed below.

- A Background Information Document (BID) containing brief information about the project activities was compiled, uploaded on the MEFT (ECC) Portal for project registration, and shared with registered stakeholders / Interested and Affected parties (I&APs).
- A Stakeholders (I&AP) List was developed and updated as new I&APs register for the EIA. The BID was shared with the pre-identified key stakeholders.
- Project EIA notices were published in the *New Era and Windhoek Observer* on the 12th and 19th of March 2026. The consultation period ran from the 12th of March 2026 to the 17th of April 2026.
- EIA notices (posters) in English were prepared for printing and pasted in Opuwo at the Kunene Regional Council and the Governor's office.
- Consultation meetings: a stakeholder consultation meeting was held between the Kunene Governor's office in Opuwo, and a community consultation meeting was held in Ohungumure Village on the 24th of March 2026. The consultation meetings were attended by eleven (11) people and ninety-seven (97), respectively. The attendance included two environmental assessment practitioners from Serja HGE Consultants and two engineers from the DAT JV Consulting Engineering Team

Some key potential positive and negative impacts were identified by the Environmental Consultant, based on issues raised by I&APs during the consultation period. The issues raised by I&APs were addressed and incorporated into this Report, whereby mitigation measures have been provided in the Environmental Management Plan (EMP) for implementation to avoid and/or minimize their significance on the environmental and social components.

Impact Assessment: The key negative impacts were described and assessed. The potential negative impacts indicated a medium rating of significance. To minimize significance, the Proponent, their contractors, and their workers implement appropriate management and mitigation measures to avoid and/or minimize their impact on the environmental and social components. The effective implementation of the recommended management and mitigation measures, accompanied by monitoring, will particularly reduce the significance of adverse impacts that cannot be completely avoided (from medium to low).

8.1 Recommendations

The EIA Study was deemed sufficient and concluded that no further detailed assessments are required for the ECC application for the bridge construction and associated activities. Serja Consultants are confident that the potential negative impacts associated with the project activities can be managed and mitigated through the effective implementation of the recommended management and mitigation measures and by

increasing monitoring of their implementation. It is therefore recommended that the project be granted an ECC, provided that:

- All the management and mitigation measures provided herein are effectively and progressively implemented.
- All required permits, licenses, and approvals for the activities are obtained as required. These include permits and licenses, and ensuring compliance with these specific legal requirements.
- Transparency in communication and continued engagement with the communities and or through their leaders (local leaders and constituency councillors), and stakeholders should be maintained throughout the project cycle.
- The buffer zones around marked biological, physical, and socially sensitive sites (such as archaeological and cultural heritages; such as graves) should be respected, and no activity should be conducted inside the 500m buffer zones (boundaries).
- The Proponent, their project workers and contractors comply with the legal requirements governing their project and its associated activities, and ensure that project permits and or approvals required to undertake specific site activities are obtained and renewed as stipulated by issuing authorities.
- Site areas where excavations were carried out and have ceased are rehabilitated, as far as practicable, to their pre-excavation state. This includes levelling stockpiled topsoil, backfilling trenches, and closing and capping project-associated holes and borrow pits.
- The EMP implementation should be checked and done by the responsible team member onsite (Environmental Control Officer/HSE Officer), and audited by an Independent Environmental Consultant on a bi-annual basis to compile Environmental Monitoring (audit) reports. These reports are to be submitted to the Environmental Commissioner at the DEAF. This will be required by the Environmental Commissioner (as part of the ECC conditions).

8.2 Recommendations and Conclusions

In conclusion, although significant, the identified impacts would not hinder the project activities. However, the recommended measures should be effectively implemented and monitored to reduce the significance of adverse impacts from medium to low, and eventually to negligible. The effectiveness of the implementation of the management and mitigation measures and EMP compliance will be done by an Environmental Control Officer (ECO) or HSE Officer and audited by an Independent Environmental Consultant on a bi-annual basis. This is to ensure that EMP implementation can be tracked via Bi-Annual Environmental Monitoring exercises and documented in the monitoring reports to the Environmental Commissioner. The monitoring of EMP implementation will not only be done to ensure that the impact's significance is reducing and or maintaining a low significance rating, but also to ensure that all potential unforeseen impacts that might arise during implementation are properly identified in time and addressed immediately.

9 LIST OF REFERENCES

1. Atlas of Namibia Team. (2022). Atlas of Namibia: its land, water, and life. Available from https://atlasofnamibia.online/ and https://atlasofnamibia.online/chapter-5.
2. DAT JV. (2026). Engineering Consultancy Services for the Design, Contract Administration, and Construction Supervision of Oute River Bridge on District Road 3703: Preliminary Bridge Report. Windhoek. Unpublished.
3. Lohe, C., Amster, R., and Swartz, B. (editors). (2021). Groundwater in Namibia: An explanation of the Hydrogeological Map. Windhoek. Unpublished.
4. Mendelsohn J., Jarvis A., Roberts C., and Robertson T. (2002). Atlas of Namibia: A Portrait of the Land and Its People. Cape Town: David Philip Publishers.
5. Namibia Statistics Agency (NSA). (2024a). Namibia 2023 Population & Housing Census Main Report. Windhoek. NSA.
6. Namibia Statistics Agency (NSA). (2024b). Kunene Region: Stats by Region. Available from https://census.nsa.org.na/kunene-region/.
7. OMAVI Consultants. (2023). Environmental & Social Scoping Assessment Study for the Proposed Mineral Prospecting and Exploration Activities on Exclusive Prospecting License (EPL) No. 8955 situated north of Opuwo Town in the Kunene Region, Namibia. Windhoek. MEFT.
8. World Weather Online. (2026). Orotjotombo - Kunene Region, Namibia Weather. Available from https://www.worldweatheronline.com/orotjitombo-weather-averages/kunene/na.aspx.