Draft Environmental Management & Rehabilitation Plan (EMRP)

The Existing and New Proposed Borrow Pits for the Upgrading of DR3645 (16.3km: Engoyi to Omuntele) to Low Volume Seal (LVS) standards in the Oshikoto Region

ECC Application No.: **APP-004436 (Old ECC Application No. 003953)**

Proponent: **Roads Authority of Namibia**

SAFE ROADS TO PROSPERITY

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Windhoek Namibia

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DOCUMENT INFORMATION

Title: Draft Environmental Management & Rehabilitation Plan (EMRP) - The Existing and New Proposed Borrow Pits for the Upgrading of DR3645 (16.3km: Engoyi to Omuntele) to Low Volume Seal (LVS) standards in the Oshikoto Region

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Date:	31 July 2024

EAP* - *Environmental Assessment Practitioner*

SERJA' STATEMENT OF INDEPENDENCE

As the Appointed Environmental Consultant to undertake the EIA Study and prepare this Environmental Management & Rehabilitation Plan (EMRP) for the Existing and New Proposed Borrow Pits for the Upgrading of DR3645 (16.3km: Engoyi to Omuntele) to Low Volume Seal (LVS) standards in the Oshikoto Region, Serja Hydrogeo-Environmental Consultants cc declare that we:

- do not have, to our knowledge, any information or relationship with Roads Authority of Namibia (Proponent), Roads Contractor Company (RCC), i.e., the road construction contractor nor the Ministry of Environment, Forestry and Tourism (MEFT)'s Department of Environmental Affairs and Forestry (DEAF) that may reasonably have potential of influencing the outcome of this EMRP and the subsequent Environmental Clearance Certificate 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 favorable 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, 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.

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Signature:

Fredrika N. Shagama: Principal Environmental Assessment Practitioner & Hydrogeologist

Date: 31 July 2024

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LIST OF ABBREVIATIONS

Abbreviation	Meaning
BP	Borrow Pit
BP 15 LHS	Borrow Pit 15 on the left-hand side
BP 15 RHS	Borrow Pit 15 on the right-hand side
CSR	Corporate Social Responsibility
DEAF	Department of Environmental Affairs and Forestry
DR	District road
EAP	Environmental Assessment Practitioner
ECC	Environmental Clearance Certificate
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment

Abbreviation	Meaning
EMA	Environmental Management Act
EMP	Environmental Management Plan
EMRP	Environmental Management & Rehabilitation Plan
GG	Government Gazette
GN	Government Notice
HSE Officer	Health, Safety & Environmental Officer
I&APs	Interested and Affected Parties
LVS	Low Volume Standard
MEFT	Ministry of Environment, Forestry and Tourism
MME	Ministry of Mines and Energy
NHC	National Heritage Council (NHC) of Namibia
OTA	Ondonga Traditional Authority
PPE	Personal Protective Equipment
PRO / PLO	Public Relations / Liaison Officer
RCC	Roads Contractor Company
RE	Resident Engineer
Reg, S	Regulation, Section

1 INTRODUCTION

1.1 Project Background and Location

Roads Authority (RA) of Namibia (hereinafter referred to as the Proponent) through the appointed contractor (Roads Contractor Company (RCC)) is currently upgrading the existing 16.3km District Road 3645 (DR3645): Engoyi-Omuntele to low volume seal (LVS) standards in the Oshikoto Region (*the Project*). The road was constructed in 2007 using labour-based methods and now being upgrading from gravel to tarred road (LVS). As part of the road upgrading works, the contractor requires construction materials which is sourced from borrow pits located along the road route as shown on the locality map in Figure 1-1. There are currently four existing borrow pits from 2007/2008 that require extension to continue providing materials for the road upgrade and an additional of three new proposed sites for new borrow pits. The seven borrow pits (BPs) currently identified and utilized are as follows (please refer to the locality map):

1. BP 6 (potential site)
2. BP 8A (existing to be extended)
3. BP 8B (new site)
4. BP 12 (new site)
5. BP 15 RHS (existing to be extended)
6. BP 15 LHS (existing to be extended)
7. BP 31 (existing to be extended into a new adjacent site).

The initial portion of the road from Engoyi to Omuntele is a gravel surfaced road in a poor condition. Thus, upgrading is necessary to upgrade to an all-weather two-lane single carriageway to low volume seal standard which will serve the purpose to:

- Improve rural and regional accessibility,
- Reduction of road user costs,
- Reduction of travel times, and
- Improve access to services such as schools and health centres as well as economic centres.

The extent of the associated disturbance of properties due to the road upgrading works such as fences, fields has been determined and compensations have been made accordingly.

The project will involve inter alia the following:

- Upgrading to LVS standards of the roadway,
- Provision of and Improvement of drainage facilities and features,
- Upgrading of intersections along the route,
- Installation of road furniture, and establishment of the 30m road reserve.

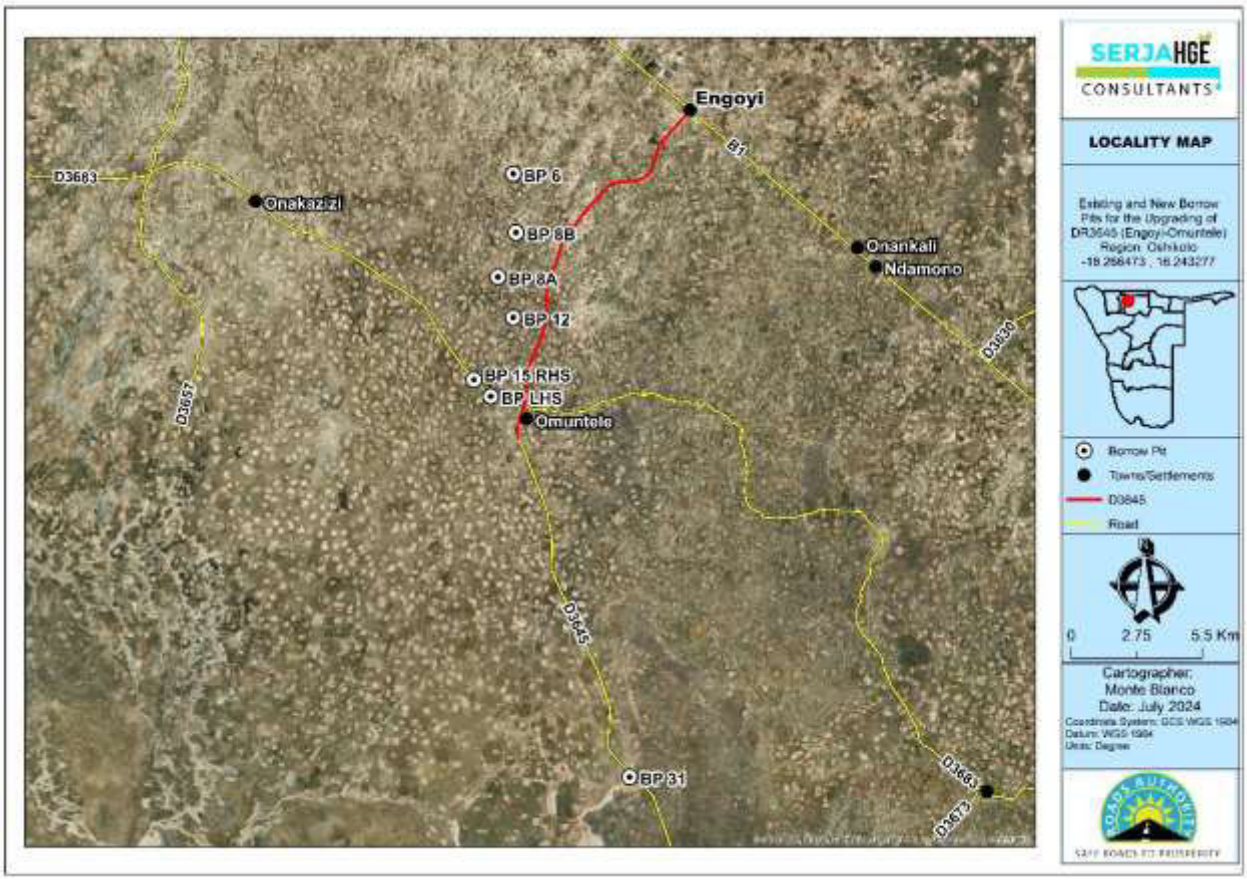


Figure 1-1: Locality map of the borrow pits along the DR3645 (Engoyi-Omuntele) in Oshikoto Region

The road and its associated BPs are in six villages (Okanyowa, Opembelonga, Okandombe, Okwandja, Elonga and Onamutayi) that fall within the jurisdiction of the Ondonga Traditional Authority (OTA). The GPS coordinates of the BPs and villages where they are found in are presented in Table 1-1.

Table 1-1: The GPS coordinates of the 7 BP sites and their hosting villages

Borrow Pit (BP) No.	Borrow Pit (BP) ID and comment, if any	Location / Village	GPS Coordinates
1.	BP 6 (potential)	Okanyowa	18°08′52.77″S 16°14′06.87″E
2.	BP 8A (existing/extension) – the material is depleted and salty. Thus, it is awaiting rehabilitation	Elonga	18°11′13″S 16°13′46″E
3.	BP 8B (New) – awaiting rehabilitation (the material is depleted, thus, no further use)	Opembelonga	18°10′12.55″S 16°14′10.51″E
4.	BP 12 (new)	Okwandja	18°12′11.8″S 16°14′06.97″E

Borrow Pit (BP) No.	Borrow Pit (BP) ID and comment, if any	Location / Village	GPS Coordinates
5.	BP 15 RHS (existing/extension):	Okwandja	18°13′32.62″S 16°13′18.44″E
6.	BP 15 LHS (existing/extension)	Okandombe	18°13′55.2″S 16°13′36.36″E
7.	BP 31 (existing/extension	Onamutayi	18°22′32.63″S 16°16′45.4″E

The road works (DR3645) and associated activities fall under the electoral constituencies, namely Onyaanya and Omuntele, with six of the seven BPs falling under Omuntele Constituency and BP 6 found at the borders of the two constituencies as shown in Figure 1-2.

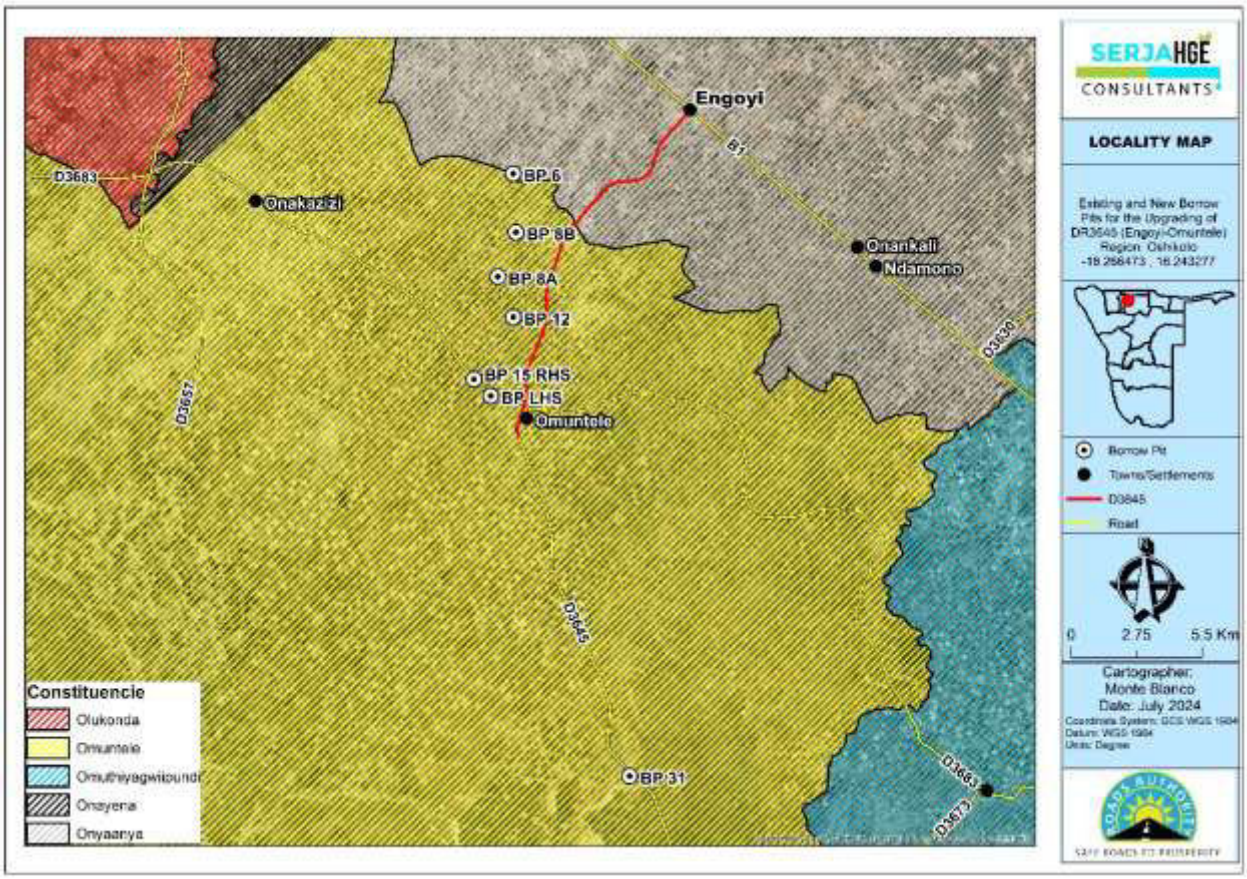


Figure 1-2: The locations of the BPs in relation to the electoral constituencies

1.2 Purpose of the Draft Environmental Management Plan (EMP)

The Draft EMP is developed in accordance with Regulation 8(j) of the EIA Regulations (2012) that it should be included as part of the Environmental Assessment Scoping report. A '**Management Plan**' is defined as:

> *"…a plan that describes how activities that may have significant environments effects on the environment are to be mitigated, controlled and monitored."*

An EMP (herein referred to as an Environmental Management & Rehabilitation Plan (EMRP)) is one of the most important outputs of the EIA process as it synthesizes all the proposed management & mitigation and monitoring actions, set to a timeline and with specific assigned responsibilities. It provides a link between the impacts identified in the EIA process and the required mitigation measures to be implemented to manage project impacts. It is important to note that an EMP is a statutory document and a person who contravenes the provisions of this EMRP may face imprisonment and/or a fine. This EMRP is a living document and can be amended to adapt to address project changes and/or environmental conditions and feedback from compliance monitoring.

The EMP is therefore aimed at guiding environmental management throughout the three main phases of the project activities, namely: operational and maintenance and decommissioning phases:

- **Operation and maintenance phase –** the stage during which the material is sourced from the existing and new borrow pits at selected sites in some of the villages alongside the DR3645.
- **Decommissioning or closure phase -** this the phase when the borrow pits are no longer in operation or use because the desired material for construction has depleted or the materials is too salty and or there is unmanageable ingression of groundwater into the pit(s).

2 BRIEF DESCRIPTION OF THE PROJECT ACTIVITIES

The project phases anticipated for the project operations are presented below.

2.1 Operations and Maintenance

The project activities involve the upgrading of the DR3645 from gravel to low volume seal (LVS) standard by the Roads Contractor Company (the appointed construction contractor) under the supervision of Burmeister & Partners (Pty) Ltd Consulting Engineers. The work has been ongoing since 01 October 2023 and completion of works is anticipated for 26 October 2024.

To complete the road upgrading works, there is a need to expand the existing four borrow pits and open up three more borrow pits to supply the project with construction materials (sand and gravel) which is the core purpose of this EIA Study. The exploration for borrow pits was carried out back in 2006/2007 (for existing BPs) and the new and potential sites was done recently and possibly continuing to supply the road works. To minimize haul costs, BPs are ideally spaced approximately 5km apart for selected sub-grade materials and 10km apart for sub-base and base materials as far as practicable.

The descriptions of the borrow pits as well as resources, services and infrastructure associated with the borrow pit activities are provided in the Scoping Report.

2.2 Decommissioning and Rehabilitation of BPs and disturbed areas

Once the materials get depleted in the BPs or the material in the BPs no longer meets the standards, too salty or there is an unmanageable ingression of groundwater into the pit(s), the construction contractor will need to put site rehabilitation measures in place. Decommissioning and rehabilitation are primarily reinforced through a decommissioning and rehabilitation plan, which consists of safety, health, environmental, and contingency aspects. Therefore, it is of 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 close to their original state as much as possible.

3 LEGAL FRAMEWORK: PERMITTING AND LICENSES

The Proponent has the responsibility to ensure that the project activities as well as the EA process conform to the principles of the EMA and must ensure that employees act in accordance with such principles. Table 3-1 below lists the requirements of an EMP as stipulated by Section 8 (e) of the EIA Regulations, primarily on specific approvals and permits that may be required for the project activities.

Table 3-1: List of legal requirements and permits to the project activities

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
Environmental Management Act EMA (No 7 of 2007)	Requires that projects with significant environmental impacts are subject to an environmental assessment process (Section 27). Details principles which are to guide all EAs.	The EMA and its regulations should inform and guide this EA process. Should the ECC be issued to the Proponent, it should be renewed every 3 years, counting from the date of issue. For any amendments to the EMP (and subsequent ECC), an appropriate application should be submitted to the Office of the Environmental Commissioner at the Department of Environmental Affairs (DEAF) and Forestry of the MEFT. The contact details are: **Mr. Timoteus Mufeti:** Environmental Commissioner **Tel: +264 61 284 2701**
Environmental Impact Assessment (EIA) Regulations GN 28-30 (GG 4878)	Details requirements for public consultation within a given environmental assessment process (GN 30 S21). Details the requirements for what should be included in a Scoping Report (GN 30 S8) and an Assessment Report (GN 30 S15).	

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
Traditional Authority Act (Act No. 25 of 2000):	The Act also stipulates that Traditional Authorities (TAs) should ensure that natural resources are used on a sustainable basis that conserves the ecosystem. The implications of this Act are that TAs must be fully involved in the planning of land use and development for their area. It is the responsibility of the TA's customary leadership, the Chiefs, to exercise control on behalf of the state and the residents in their designated area.	The BPs fall within the OTA's villages under. Therefore, the local representatives (headmen) should be consulted for the land use consent and engagement should continue throughout the project. The respective headmen for the affected village should be consulted and engaged. The contact details for the village headmen in which the current BPs of interest are situated are provided in the EIA's I&APs / stakeholders list.
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 MME for the storage of fuel on-site. This entails the application of consumer installation certificate. The consumer installation certificate is being applied for under a different application with its own EMP. **Mr. Carlo Mcleod: Acting Director of Petroleum Affairs** **Tel: +264 61 284 8291**
Forestry Act (Act No. 12 of 2001	The Act provides for the management and use of forests and forest products.	The Proponent will apply for the relevant permit under this Act if it becomes necessary to remove protected trees such as camelthorn, Marula, Makalani Palm and sand corkwood at the BP sites. Contact the MEFT's Forestry Office in Onankali (Oshikoto Region) **Mrs. Monika Amutenya: Senior Forester: Forestry Directorate, Oshikoto Region** **Tel: +264 (0) 65 286 309**

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
National Heritage Act No. 76 of 1969	Call for the protection and conservation of heritage resources and artefacts.	Should any archaeological material, such as bones, unknown graves, old weapons/equipment etc. be found onsite, work should stop immediately, and the National Heritage Council of Namibia must be informed as soon as possible. The Heritage Council will then decide to clear the area or decide to conserve the site or material. Contact Details at National Heritage Council (NHC) of Namibia **Mrs. Erica Ndalikokule – Director: NHC** **Tel: +264 61 301 903**
Hazardous Substance Ordinance, No. 14 of 1974: **regulated by the Ministry of Health and Social Services**	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 handling, storage and use of hazardous substances should be managed properly so that they do not harm or compromise the site environment. For better management and handling of waste fuel, RCC can contact Waste oil recyclers (Oiltech Namibia CC, Windhoek https://oiltech.com.na/) Tel: +264 81 343 5676, Email: collections@oiltech.com.na OR WESCO Group Namibia (Walvis Bay) Tel: +264 64 213 200 https://www.wesco.com.na/page/waste-management

4 EMP IMPLEMENTATION RESPONSIBILITIES

Roads Authority of Namibia (the Proponent) is ultimately responsible for the implementation of the EMRP. However, the Proponent may delegate this responsibility or part of it at any time, as they deem necessary. The roles and responsibilities of all delegates/parties involved in the effective implementation of this EMRP are set in Table 4-1.

Table 4-1: The EMP implementation responsibilities for the borrow pits activities

Role	Responsibilities
Roads Authority of Namibia	-Managing the implementation of this EMRP and updating and maintaining it when necessary. -Management and monitoring of individuals and/ or equipment on-site in terms of compliance with this EMRP and issuing fines for contravening EMRP provisions.
Project / Site Manager	This individual will be responsible to ensure that the project activities are completed on time. The Manager's duties and responsibilities will include: -Ensure that relevant commitments contained in the EMRP are adhered to. -Ensure relevant staff is trained in procedures entailed in their duties. -Maintain records of all relevant environmental documentation for the project. -Reviewing the EMRP annually and amending the document when necessary. -Issuing fines to individuals who may be in breach of the EMP provision and if necessary, removing such individuals from the site. -Cooperate with all relevant interested and affected parties/stakeholders. -Development and management of schedules for daily activities
Resident Engineer (RE)	The RE of the Engineering Consulting Team will act with restricted powers and responsibilities as delegated by the Engineer in writing. The RE may fulfil the function of the ECO thereby taking responsibility of the ECO's duties (see below) on this project. Any on-site decisions regarding environmental management are ultimately the responsibility of the RE with consultation with the environmental Consultant. Therefore, the RE must assign the role of ECO to a competent member of its site supervising team. The RE shall assist the ECO where

Role	Responsibilities
	necessary and will have the following responsibilities in terms of the implementation of this EMRP: -Ensuring that the necessary environmental authorisations and permits have been obtained by the Contractor (RCC) -Assisting the Contractor in finding environmentally responsible solutions to problems with input from the ECO where necessary. -Ordering the removal of person(s) and/or equipment not complying with the EMP specifications. -Issuing fines for transgressions of site rules and penalties for contravention of the EMRP.
Construction Contractor or simply the ''Contractor'' (RCC) who is also responsible for their subcontractors	The Contractors' representative or site supervisors (as appropriate) will be required to: -Ensure that the relevant commitments contained in the EMRP Action Plans are adhered to. -Compile relevant procedures and method statements for approval by the applicable phase site manager prior to initiation of project activities on the sites. -Ensure that all relevant staff are trained in procedures. -Maintain records of all relevant environmental documentation applicable to their work
Health, Safety, & Environmental (HSE) Officer or Safety Officer, and commonly referred to as Environmental Control Officer (ECO)	The Proponent may assign the responsibility of ensuring EMP compliance throughout the project life cycle to a designated member of staff or external qualified and experienced person, referred to in this EMP as the HSE or Safety Officer. This officer will have the following responsibilities: -Management and facilitation of communication between the Proponent and communities / I&APs and stakeholders regarding this EMRP. -Conducting site inspections of all areas with respect to the implementation of this EMRP (monitor and audit its implementation). -Advising the Proponent or Project/Site Manager on the removal of person(s) and/or equipment not complying with the provisions of this EMRP. -Making recommendations to the Manager with respect to the issuing of fines for contraventions of the EMRP. -Undertaking an annual review of the EMRP and recommending additions and/or changes to this document.

Role	Responsibilities
	-Ensuring that the project activities are conducted in accordance with the International System organization (ISO) standard 14001: 2015.
Public Relations / Liaison Officer (PRO) / PLO	The PRO will be responsible for the following tasks: -Liaising between the stakeholders, communities and the Proponent. -Ensure effective communication with stakeholders, media (if necessary) and the community. -Organising and overseeing public relations activities, -Managing public and community relations issues. -Preparing and submitting public relations reports, if required. -Collaborating with personnel and maintaining project-related open communication among personnel.

4.1 Financing of Environmental Control

The financing of environmental requirements as outlined in this document, apart from the appointment of the EAP (environmental consultant) and specialists, is the sole responsibility of the Contractor appointed by Roads Authority. Therefore, it is accepted that the cost incurred for implementing this EMRP by the Contractor would be allocated for in the tender document. Any responsibilities not defined in this document or where any uncertainties arise in this matter will be the responsibility of Roads Authority.

4.2 Amendments of the EMP

Any party involved with the project can suggest changes to the EMP (EMRP) via the Environmental Consultant or Resident Engineer. Therefore, such suggestions or changes will need to be discussed collectively. Approved changes will be drafted and incorporated into the existing EMP/EMRP in the form of an appendix or amendments.

4.3 Procedures for non-compliance with the EMP

The Contractor (RCC) shall comply with the environmental specifications and requirements on an ongoing basis and any failure on his part to do so will entitle the Resident Engineer (RE) to impose a penalty. This applies to the Environmental Management & Rehabilitation Plan (EMP/EMRP).

In the event of non-compliance, the following recommended process shall be followed (as adopted from ESMP for DR3633)[1]:

- The RE shall consult the environmental consultant and if agreed, issue a notice of non-compliance to the Contractor, stating the nature and magnitude of the contravention. A copy shall be provided to the ECO.
- The Contractor shall act to correct the non-conformance within 24 hours of receipt of the notice, or within a period that may be specified within the notice.
- The Contractor shall provide the RE with a written statement describing the actions to be taken to discontinue the non-conformance, the actions taken to mitigate its effects and the expected results of the actions. A copy shall be provided to the ECO.
- In the case of the Contractor failing to remedy the situation within the predetermined time frame, the RE shall impose a monetary penalty based on the conditions of contract.
- In the case of the Contractor being unable to remedy the situation due to permanent environmental damage already incurred, the RE shall impose a monetary penalty based on the conditions of contract.
- In the case of non-compliance giving rise to physical environmental damage or destruction, the RE shall be entitled to undertake or to cause to be undertaken such remedial works as may be required to make good such damage and to recover from the Contractor the full costs incurred in doing so.
- In the event of a dispute, difference of opinion etc., between any parties in regard to or arising out of interpretation of the conditions of the EMRP, disagreement regarding the implementation or method of implementation of conditions of the EMRP etc., any party shall be entitled to require that the issue be referred to independent specialists for determination.
- The RE shall at all times have the right to stop work and/or certain activities on site in the case of safety and EMRP non-compliance or failure to implement remediation measures.

4.4 Fines and Penalties related to the EMRP Contraventions

The following fines and penalties are in place for transgressions listed below. It will be issued after the procedures contained herein has been duly followed and only in severe cases and after repeated non-compliance. The graveness of the transgression is justified by each specific penalty.

4.4.1 Fines

Fines may be issued per incident at the discretion of the RE. Such fines will be issued in addition to any remedial costs incurred as a result of noncompliance with the EMP. The RE will inform the Contractor of

[1] EnviroPlan Consulting. (2021). Environmental & Social Impact Assessment for the Upgrade to Low Volume Seal (LVS) Standard of the DR3633 Tsandi - Ongulumbashe (22km) in the Omusati Region, Namibia: Environmental and Social Management Plan (ESMP). Windhoek. MEFT.

the contravention and the amount of the fine and will deduct the amount from monies due under the Contract.

Fines for the activities detailed below, will be imposed by the RE on the Contractor and/or his Subcontractors.

Any persons, vehicles, plant, or thing related to the Contractors operations within the designated boundaries of a "no-go" area.	**N$2,000**
Any vehicle guilty of reckless driving on and in the vicinity of the site, including excessive speeds.	**N$1,000**
Any vehicle being driven, and items of plant or materials being parked or stored outside the demarcated boundaries of the site.	**N$2,000**
Persons repeatedly walking outside the demarcated boundaries of the site.	**N$1,000**
Persistent and un-repaired spilling of hazardous materials and materials causing pollution.	**N$3,000**
Persistent littering on site.	**N$500**
Individuals repeatedly not making use of the designated toilet facilities.	**N$200**
Disposal of waste other than agreed on in the waste management plan.	**N$5,000**
Deliberate lighting of illegal fires on site (e.g. outside of the designated camp site).	**N$2,000**

For each subsequent similar offence, the fine may, at the discretion of the RE, be doubled in value.

The RE shall be the judge as to what constitutes a transgression in terms of this document.

4.4.2 Penalties

Where the Contractor inflicts non-repairable damage upon the environment or fails to comply with any of the environmental specifications, he shall be liable to pay a penalty fine over and above any other contractual consequence.

The Contractor is deemed NOT to have complied with this specification if:

- within the boundaries of the site, site extensions and haul/ access roads there is evidence of contravention of the specification, environmental damage due to negligence,
- Safety of contractor personnel and public being compromised due to negligence,
- the Contractor fails to comply with corrective or other instructions issued by the Engineer within a specific time,
- the Contractor fails to respond adequately to complaints from the public, and
- Payment of any fines in terms of the contract shall not absolve the offender from being liable from prosecution in terms of any law.

The RE will be responsible for a report on the non-repairable damage and / or non-compliance with visual and other evidence as well as issuing the penalty to the contractor with the report attached. The suggested penalties for transgressions with regards to the biological, physical and social components are provided in Table 4-2 below.

A copy must be handed to the ECO.

Table 4-2: The penalties suggested for transgressions

Actions leading to erosion:	A penalty equivalent in value to the cost of rehabilitation plus 20%.
Oil spills:	A penalty equivalent in value to the cost of clean-up operation plus N$1,000.
Damage to indigenous vegetation:	A penalty equivalent in value to the cost of restoration plus N$2,000.
Damage to trees:	A penalty to a maximum of N$5,000 shall paid for each tree removed without prior permission, or a maximum of N$2,000 for damage to any tree, which is to be retained on site.
Damage to indigenous vegetation:	A penalty equivalent in value to the cost of restoration operation plus N$2,000.
Damage to sensitive environment:	A penalty equivalent in value to the cost of restoration operation plus 20%.
Damage to cultural sites:	A penalty to a maximum of N$100,000 shall be paid for any damage to any cultural historical site.
Damage to natural fauna:	A penalty to a maximum of N$2,000 for damages to any natural occurring animal.
Accident due to safety negligence:	A penalty to a maximum of N$50,000 for injuries to personnel or public.

5 ENVIRONMENTAL MANAGEMENT MEASURES

5.1 Key identified Potential negative Impacts

The key potential negative impacts identified, described, and assessed in the Scoping Report and for which the management measures (action plans) have been provided are listed below:

- Socio-economic development through temporary job (employment) creation in the area during the road upgrading phase to over 100 people.
- Procurement of local goods and services by small and medium businesses to promote local entrepreneurship empowerment and local economic development.
- The rehabilitated borrow pits can be used as rainwater holding (storage) structures for the community (this was requested by the community during consultation meetings in 2006/2007).

The ultimate long-term benefits of the upgraded road will include:

- Improved accessibility: better roads connections enhance accessibility to remote rural areas, facilitating transportation of goods and services, and access to healthcare and education centres in rural areas.
- Economic development: better roads can stimulate economic growth by attracting investment, promoting tourism, and facilitating the movement of goods and people.
- Safety: upgraded roads with improved design and signage can enhance road safety, reducing the risk of accidents and fatalities.
- Social cohesion: improved connectivity through upgraded roads can strengthen social ties within rural communities by enabling easier access to markets, schools, and healthcare centres and other social services.

Potential environmental and social (adverse) impacts of borrow pits:

- Displacement of properties and or loss of productive to create borrow pits for road upgrade.
- Habitat destruction: Excavation of borrow pits 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.
- Soil erosion: The removal of large amounts of soil and vegetation from borrow pits can increase the risk of soil erosion, especially during rainfall events in northern Namibia. This erosion can result in sedimentation of nearby water bodies, leading to water quality issues and habitat degradation for aquatic life.

- Lowering of the local groundwater table: Excavation activities may affect the local water table, leading to changes in groundwater levels. This can impact the availability of water for vegetation that rely on groundwater as a water source in the area.
- Noise associated with borrow pits (from heavy machinery and trucks) can disturb locals and animals.
- Occupational and community health and safety risks: The handling of machinery and equipment by workers at the borrow pits may result into injuries and if worse, can lead to fatalities on duty. Local children may get curious to get close to heavy trucks and big machinery at borrow pit sites. The unfenced, and un-rehabilitated and deep and steep-sided borrow pits can be a hazard to the communities resulting in accidents such as drowning (children and or livestock if they fall in).
- Impact on air quality: dust and particulate matter generated during excavation of materials (sand and gravel) and transportation can compromise air quality in the surrounding area.
- Disruption of hydrological systems: borrow pits can alter natural drainage patterns, causing changes in surface water flow and potentially exacerbating flooding or drought conditions 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.
- Archaeological or cultural heritage impact: the borrow pits may impact local cultural heritage sites or traditional land use practices, potentially leading to social tensions or conflicts.

The management and mitigation measures are provided under the next chapter for implementation

<u>Associated potential negative impacts of road construction works</u>

Although the borrow pits activities are associated with the road construction, the scope of the EIA Study only covers the borrow pits impacts. Regardless, potential impacts associated with the road construction works have been identified and listed below and mitigation measures of these impacts are included herein.

- 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).
- General environmental pollution through mishandling of project related waste associated with road upgrading. These waste types include solid (domestic), hazardous, wastewater, and sewage.
- Deforestation: road construction may require clearing trees and vegetation along the road or vegetation that fall within the road reserve, leading to habitat loss and potentially contributing to deforestation.

- Air pollution by potential dust from unpaved areas owing to the movement and operation of heavy vehicles and machinery and excavations associated with the road construction.
- Water pollution: runoff from roads can carry pollutants such as oil, salt, and heavy metals into nearby streams and rivers, impacting aquatic ecosystems.
- Occupational and community health and safety: improper handling of materials and equipment may cause health and safety risks to workers and local communities, if no measures are implemented.

5.2 Environmental Management and Mitigation Measures

The management actions are aimed at avoiding the above-listed potential negative impacts, where possible, and where it is impossible to avoid these impacts, measures are provided to reduce the impacts' significance. Management and mitigation measures recommended for the potential impacts in the Scoping Report were based on the:

- Operational phase activities for BPs (Table 5-1),
- Road construction works (Table 5-2), and
- Decommissioning phase (Table 5-3).

5.2.1 Management and mitigation measures for impacts stemming from the utilization of borrow pits (operation activities)

The measures proposed for implementation to manage and mitigate the environmental and social impacts of borrow pits in the area are provided in Table 5-1.

Table 5-1: Operational phase management and mitigation measures for the borrow pits – establishment and utilization activities

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
EMP implementation and training	Lack of EMP awareness and implications thereof	-EMP trainings should be provided to all workers involved in the project and its associate activities. -All site personnel should be aware of necessary health, safety, and environmental considerations applicable to their respective work. -The implementation of this EMP should be monitored. The site should be inspected, and a compliance audit done throughout **the project activities, monthly and bi-annually for overall EMP implementation.** -EMP non-compliance penalty system should be implemented.	-Training of project personnel on the EMP -Records of EMP compliance/monitoring conducted bi-annually -The ECC is renewed every 3 years -Records of EMP training conducted.	-Site Manager -Construction Contractor -HSE Officer	Throughout the operation phase, and when deemed necessary (for certain activities such as ECC renewal)
Conflict	Communities dissatisfied with the activities Nuisances caused by the excavation activities	-Establish clear communication between RCC and community (and or through their leaders) on the anticipated timeframe for operations at the sites. This should be done as follows: a) Means for lodging a complaint concerning materials extraction, and provision of feedback to the complainant from RCC stating how the issue is being addressed. b) Report back on issues raised and how addressed from the Contractor to the Project/Site Manager and Proponent. -The affected communities or neighbours to the site should be consulted before establishing a BP. The communication can be shared through their headmen and then decide together on what to be done with the BPs after use (backfilled with stockpile material or rehabilitated into an earth dam).	-There are records of engagement meeting minutes of meetings -There is a community communication plan related to the BPs -Communities are consulted and or represented through their headmen (leaders) on BP activities and end use (post-excavation)	-RCC -Project / Site Manager -Public relations /Liaison Officer	Throughout the phase
Soils	Physical soil / land disturbance and loss of topsoil	-Stockpiled topsoil and excavated materials should be used to backfill the excavated and disturbed sites after completing work on the pits.	-No proliferation of informal vehicle tracks created by project activities. -No new erosion gullies.	-Site Manager -Construction Contractor	Throughout the phase

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
		-Soils that are not within the intended footprints of the BPs should be left undisturbed and soil conservation implemented as far as possible. -Project vehicles/machinery should stick to access route provided and not to unnecessarily create further tracks onsite by driving everywhere causing soil compaction and erosion.	-No signs of soil compaction -No disturbance to unmarked areas onsite.	-HSE Officer	
Water resources	Lowering of groundwater table owing to excavation activities	-The excavation depth should be limited to minimize the impact on the groundwater table. This can help in reducing the drawdown effect. -Conduct excavation in phases rather than all at once. This allows for localized groundwater impacts to stabilize between phases. -For long-term activities at certain borrow pits, consider establishing retention ponds or sumps to collect water that seeps into the excavation area. This can help in maintaining a higher groundwater level nearby. -Upon completion of excavation activities, the site should be rehabilitated, thus, restoring natural drainage patterns and vegetation, which can help to recharge groundwater.	-Monitoring of the water movement in the BPs and acting accordingly -Implementation of the provided measures where possible.	-Construction Contractor -Site Manager	Throughout the phase
Biodiversity	Loss of Flora	-Avoid unnecessary removal and disturbance of site vegetation. -Vegetation found on the site, but not in the actual footprint should not be disturbed, therefore, should be avoided. -The area to be constructed on the site, as well as lay-down areas, access routes, etc. should be clearly demarcated. The workforce must be instructed to operate within these boundaries. Any activity resulting in the chopping down of trees or removal of vegetation without the required authorisation is strictly prohibited. Therefore, a permit for removing protected trees should be **obtained from MEFT's Oshikoto Region's Forestry Office (in Onankali) upon their inspection – see contact details in Table 3-1.** -All protected tree species should be tagged so that they are visible during construction works. -Avoid leaving equipment or machinery leaning on vegetation.	-No complaints of unauthorised vegetation removal associated with project personnel. -No intentional disturbance and destruction of site vegetation -Barricading tape (to indicate working areas)	-Site Manager -Construction contractor -HSE Officer	Throughout the phase

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
		-Environmental awareness on biodiversity preservation (both plants and even small animals encountered onsite) should be provided to the workers and contractors during EMRP induction. -No alien vegetation may be introduced to the site in the form of seeds or plants, for beautification or any other reason. -At the end of construction all alien vegetation that has established should be eradicated.			
	Impact on fauna: livestock, wild animals such as reptiles, birds, etc.	-The killing, snaring, trapping and stealing of community livestock is strictly prohibited. -Refrain from disturbing or killing small soil and animal species found on and around the site. -Visible breeding sites for birds and animals occurring on and around the sites should not be destroyed nor disturbed. -Refrain from removing or destroying the bird nests on trees. -BPs and associated trenches should be secured and backfilled or levelled upon completion of works to prevent animals from falling into trenches or even drowning during rainy seasons. -The recommended speed of 40-60km/hr around, to and from sites should be adhered to while looking out for animals and people (especially children) in the community. -Incorporate Environmental awareness and biodiversity preservation into the employment contracts of all workers.	No complaints of stolen and killed livestock by the project workers. -No intentional disturbance and destruction of habitats and faunal species	-Site Manager -Construction contractor -HSE Officer	Throughout the phase
Vehicular traffic safety	Presence of heavy vehicles in the area	-Vehicles drivers and equipment operators should be in possession of valid and appropriate driving licenses and adhere to the road safety rules. -Make provision for haul roads and maintain them so that the local small vehicles can continue to use their community roads. -Drivers should drive slowly (60km/hour and less) on the roads. -Project vehicles should be in a road worthy condition and serviced regularly to avoid accidents owing to mechanical faults. -Vehicle drivers should only make use of designated site access roads provided and as agreed. -Vehicle drivers should not be allowed to operate vehicles while under the influence of alcohol.	-No complaints from members of the public regarding vehicular traffic issues related to the project activities. -All personnel operating the project vehicles and machinery are appropriately licensed and possession of valid driving licenses.	-Site Manager -Construction contractor	Throughout the phase

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
		-Project vehicles should be parked within the boundary or demarcated areas for such purpose at sites. -Deliveries from and to site should be done optimally during weekdays and between the hours of 8am and 5pm.	-Demarcated areas for parking, offloading, and loading zones onsite.		
Occupational and locals health and safety	General health and safety for workers	-During induction, personnel should be provided with an awareness training of the risks of mishandling equipment and materials on site. -Appropriate and clearly written warning signage should be placed onsite, where visible. -A fully furnished first aid kit should be placed at each working site to attend to minor injuries, while major injuries should be attended to at a nearby health centre (clinic and hospitals). 1 or 3 site personnel should be trained on how to administer first aid. -Projected loads should be securely fastened to vehicles to avoid falling off and injuring people. -Heavy vehicle and equipment should be properly secured to prevent any harm or injury to both project personnel and locals. -When working on site, employees should be properly equipped with personal protective equipment (PPE) such as coveralls, masks, gloves, safety boots, earplugs, safety glasses, and hard hats. -Personnel should not be allowed to consume alcohol or other intoxicants prior to and during working hours as this may lead to mishandling of equipment resulting in health and safety risks.	-Comprehensive health and safety plan for the activities is compiled. -Availability of fully furnished first aid kits -Trained worker to administer first aid	-Site Manager -HSE / Safety Officer	Throughout the phase
	Community health and safety	-Construction trenches should be backfilled after completion of road works at sections of the road before proceeding forward. -Ensure that goods and projected loads are securely fastened to vehicles to avoid falling and injure people along the road. -Warning signage should be erected at danger site areas such as open trenches on the road. -Make provision for temporary crossroads at growth centres or where a community vehicle access paths cross over the road so that the community can cross over safely.	-The road trenches are backfilled -there are sufficient, clear and appropriate warning signs near risk site areas -The community are warned of the dangers of walking around BP sites and encouraged to stay away and exercise precautions at all times	-Site Manager -RCC -HSE / Safety Officer	Throughout the phase

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
		-The site areas that are considered temporary risks should be equipped with "danger" or "cautionary" signs clearly written in languages such as Oshiwambo and may be English.			
	Potential increase of prevalence of HIV and AIDS, as well as other sexually transmitted diseases (STDs) prevalence	-Engage workers in sexual health talks and training about the dangers of engaging in unprotected sexual relations which results in contracting HIV/AIDS and other sexual related infections. -Provision of condoms and sex education through distribution of pamphlets and health trainings. These pamphlets can be obtained from the nearest local health facility in Omuntele, Omuthiya or Ondangwa. -Emphasize on the continued recruitment of locals to avoid the influx of out-of-area people into the community for casual work that can be carried out by local people. Thus, reducing the creation of new sexual relations between local women and out-of-area men resulting in the potential local transmission of STDs and HIV.	-No new infections recorded linked to project workers -Occupational health and safety personnel -Sex and Health Education/Awareness -Provision of condoms at the campsite	-Site Manager -RCC -HSE Officer	Throughout the phase
Fire management	Accidental fire outbreaks	-Portable and serviced fire extinguishers should be availed at the working sites along the road and campsite. -No open fires should be created by project personnel onsite. -Make provision for smoking areas for crew members who smoke. This is to ensure that the cigarettes' fire is completely put out to and disposed of in allocated bins onsite. -Consider using gas or paraffin cooks to prepare food instead of open fires. The cooks/stoves fire should be put out before leaving the camp. -Personnel and visitors alike must be sensitised about responsible fire protection measures and good housekeeping such as the removal of flammable materials (e.g., rubbish, plastics, papers, clothing, dry vegetation, and hydrocarbon-soaked soil) near hazardous substances' containment and handling areas. In other words, these flammable materials should not be left or thrown near the areas. Regular inspections should be carried out to check for these materials at the site.	-No veld fires recorded (due to presence of project personnel) -Fire extinguishers (1 per vehicle)	-Site Manager -RCC -HSE Officer	Throughout the phase

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
		-Make provision for smoking areas for crew members who smoke. This is to ensure that the cigarettes' fire is completely put out to and disposed of in allocated bins at the smoking area. -Potential flammable areas and structures such as fuel storage tanks should be marked as such with clearly visible signage. -Raise awareness to workers on the impact of careless handing of fires and flammable substances in the fire.			
Littering and waste management	Environmental Pollution	-Dispose of waste in a responsible manner and not to litter. -After each daily works, ensure that there are no wastes left onsite or scattered within site premises. -All domestic and general operational waste produced daily should be contained onsite until such that time it will be transported to designated waste sites. -No waste may be buried or burned on site or anywhere else. -The site should be equipped with separate waste bins for solid and general/domestic waste. -A penalty system for irresponsible disposal of waste onsite and anywhere in the area should be implemented.	-No visible litter around the project area -Provision of sufficient waste storage containers -Waste management awareness -Waste disposal permits to municipality -Environmental, Health and Safety Statements and Policy	-Site Manager -Construction contractor -HSE Officer	Throughout the phase
	Sewage generated BP site workers	-Provide sufficient toilet facilities for workers while onsite (portable chemical toilet, if possible). -No open defecation is allowed on and around the site. Use provided portable toilets for the workers at the BP sites and along the road. -Sewage waste should be stored as per the portable chemical toilets supplied on site and regularly disposed of at the nearest treatment facility.	-Adequate toilet and basic ablution facilities at sites -Chemical toilets Sewage removal operator -Waste treatment agents/chemicals.	-Construction contractor -HSE Officer	Throughout the phase
Noise	Noise from project activities	-Noise from vehicles and equipment on sites should be reduced to acceptable levels. -Excavation, hauling and transporting of materials from the BPs hours should be done between 08AM and 5PM to prevent noise generated by equipment and movement of heavy vehicles. -When operating excavators and other noise generating machinery onsite, workers should be equipped with personal	-No complaints of noise associated with the project	-Construction contractor -HSE Officer	Throughout the phase

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
		protective equipment (PPE) such as earplugs to reduce exposure to excessive noise.			
Air quality	**Dust generation:** Dust proliferation due to fines content of soil resulting in localized poor air quality and bad visual	-Soil stacks should be placed downwind from the main activity areas and from the road detour. -All site areas and soil stacks should be regularly wetted. -During windy days, materials transporting trucks from BPs should be covered to prevent dust release from wind-blown loaded material. -A reasonable amount of water should be used to suppress the dust along the road/ -Vehicles from and to BP sites should be driven at a speed of 40-60km/hr to avoid the generation of dust owing to high speeds. This is also to ensure road safety due ongoing road works and many detours.	-Visual monitoring for dust nuisance and safety -Daily monitoring. -Complaints from neighbours -Records of how complaints or grievances have been addressed.	-Resident Engineer -RCC -Safety Officer	Throughout the phase
Archaeology and heritage	Accidental disturbance of archaeological or heritage objects	-If any archaeological materials or human burials or skeletal remains are uncovered during earthworks, the work in the immediate area should be halted, the finds would need to be reported to the NHC may require inspection by an Archaeologist. The ECO should have the area fenced off and contact NHC (Tel: +264 61 244 375), National Forensic Laboratory (+264 61 240 461) immediately. -Avoid direct damaging of archaeological or heritage such that may be encountered during excavations. -All accidental discoveries shall be reported immediately to an archaeologist/heritage practitioner so that an investigation and evaluation of the finds can be made, acting upon advice the HSE Officer will advise the necessary actions to be taken. -RCC and their subcontractor should adhere to the provisions of Section 55 of the National Heritage Act in the event significant heritage and cultural features are discovered in the course of project activities.	-Preservation of all artefacts and objects that are discovered onsite -Salvage equipment -Flag tapes -GPS (site marking)	-Site Manager -Construction contractor -HSE Officer	As and when required, i.e., prior to site establishment.

5.2.2 Management and mitigation measures for impacts stemming from the road construction works

The measures proposed for implementation to manage and mitigate the environmental and social impacts of road construction works are provided in Table 5-2.

Table 5-2: Management and mitigation measures for the impacts from road construction works

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
EMP implementation and training	Lack of EMP awareness and implications thereof	-EMRP trainings should be provided to all workers onsite. -All site personnel should be aware of necessary health, safety, and environmental considerations applicable to their respective work. -The implementation of this EMRP should be monitored. The site should be inspected, and a compliance audit done throughout **the project activities (monthly) and bi-annually for overall EMRP implementation.** -EMP non-compliance penalty system should be implemented.	-Records of EMP compliance/monitoring conducted bi-annually -The ECC is renewed every 3 years -Records of EMP training conducted.	-Site Manager -Construction Contractor -HSE / Safety Officer	Throughout the phase, and when deemed necessary
Conflict	Communities dissatisfied with the activities Nuisances caused by the contractor	-Establish clear communication between RCC and community (and or through their leaders) on the anticipated schedule/timeframe for operations and the duration of the construction phase. This should be provided for in the form of a Public Consultation Plan which should include at least: a) Means for lodging a complaint concerning materials extraction, and provision of feedback to the complainant from RCC stating how the issue is being addressed. b) Report back on issues raised and how addressed from the Contractor to the Resident Engineer and Proponent. -The detailed construction programme should be presented in ongoing meetings with the local communities or their leaders.	-There are records of engagement meeting minutes of meetings -There is a community communication plan related to road construction works	-Resident Engineer -RCC -Public Relations / Liaison Officer (PRO) / PLO	Throughout the phase
Construction progress	Delayed construction, which has cost implications and	-Programme delays into the schedule and communicate this to the community.	-Resident Engineer and RCC to constantly monitor delays and adapt programme accordingly. -Constantly update communities (through the	-Resident Engineer -RCC -Public Liaison Officer	Throughout the phase

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
	causes low user satisfaction		leaders) on delays and latest schedules.		
Borrow Pit Sites	Sand mining/ road material mining	-RCC in consultation with the environmental consultant and/or Resident Engineer should visit all potential excavation sites prior to excavation (for new sites). The engineers and surveyors must then draft a plan for approval before commencement of excavations. This plan must indicate the required resources and sensitive areas that may not be mined (indication of the mature trees). -No removal of trees with a stem diameter of 200mm or more. Protect clusters of trees and individual trees with a space buffer of at least 5m. -The top 150mm of topsoil must be stored separately for use to rehabilitate the borrow pit. -The removal of material at excavation sites shall be focused where the least significant vegetation exists. -RCC should liaise with the applicable local residents regarding the location of excavation sites.	RCC and environmental consultant to visit all potential excavation sites (this has been done for current BPs).	-Resident Engineer -RCC	Throughout the phase
Soils	Physical soil / land disturbance and loss of topsoil	-Stockpiled topsoil and excavated materials should be used to backfill the excavated and disturbed sites after completing work on the pits. -Soils that are not within the intended footprints of the road and its reserve should be left undisturbed and soil conservation implemented as far as possible. -Project vehicles/machinery should stick to access route provided and not to unnecessarily create further tracks onsite by driving everywhere causing soil compaction and erosion. -The movement of vehicles to and across the site should be controlled. Construction material required should be moved to where it is needed by means of wheelbarrows (when possible) instead of trucks thereby minimizing the impact on the soil. -For the safety of the community members who utilize the existing access paths (to BP sites), RCC should create safer	-No proliferation of informal vehicle tracks created by project activities. -No new erosion gullies. -No signs of soil compaction -No disturbance to unmarked areas onsite.	-Site Manager -Construction Contractor / RCC	Throughout the phase

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
		routes to be used by the road construction vehicles only and avoid the existing community (homestead) paths, if possible.			
Soil and water resources	Soil and water pollution from garbage, cement, concrete, sewage, chemicals, fuels, oils or any other objectionable or undesirable material	-Accidental spills must be cleaned immediately to avoid the pollution of the wetland, and ground water, since the soil around the site is highly permeable. -Hazardous waste should be disposed of in the prescribed manner in order to prevent contamination of soils (see waste management heading). -In case of accidental spills, the contaminated soil must be suitably disposed of in a container for hazardous waste -If fuel is stored at the construction camp, fuel tanks must be properly bunded. The volume of the bunded area must be sufficient to hold 1.5 times the capacity of the storage tanks. The floor of the bunded area must be impermeable and the sides high enough to achieve the 1.5 times holding capacity. -Drip trays should be available for all equipment that is intended to be used during construction. These trays should be placed underneath each vehicle while the vehicles are parked. The drip trays should be cleaned every morning and the spillage handled as hazardous waste. -Cement should not be mixed on open soil. A designated metal container should be made available for this purpose. -All cleaning of equipment should take place within the construction site and the water from washing operation should be collected in a tank and disposed of in agreed manner.	Inspection daily, reporting, and regular clean up	-Site Manager -Safety Officer	Throughout the phase
Irresponsible use of water resources	Water wastage due to careless practices during construction. Leaks from tanks and taps and or water earth dam	-Educate the work force on sustainable and effective use of water, e.g. clean equipment in containers. -No member of the construction team is allowed to wash clothes OR vehicles on the construction site, i.e., along the road. -Water should be used sparingly throughout construction. It is the responsibility of the site coordinator to ensure that water conservation is strictly enforced. -Water tanks / taps and earth dam liner breakages must be fixed immediately. The water tank or taps must have water meters	-Daily inspections and condition reports -Water conservation awareness to all personnel	-RCC	Throughout the phase

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
		and be accessible to visual inspection. All faulty and leaking taps and pipes shall be immediately repaired.			
Biodiversity	Loss of Flora Planting of alien flora species into the area	-Avoid unnecessary removal and disturbance of site vegetation. -Vegetation found on the site, but not in the actual footprint should not be disturbed, therefore, should be avoided. -The area to be constructed on the site, as well as lay-down areas, access routes, etc. should be clearly demarcated. The workforce must be instructed to operate within these boundaries. Any activity resulting in the chopping down of trees or removal of vegetation without the required authorisation is strictly prohibited. Therefore, a permit for removing protected trees should be **obtained from MEFT's Oshikoto Region's Forestry Office (in Onankali) upon their inspection – see contact details in Table 3-1.** -All protected tree species should be tagged so that they are visible during construction works. -Avoid leaving equipment or machinery leaning on vegetation. -Environmental awareness on biodiversity preservation (both plants and even small animals encountered onsite) should be provided to the workers and contractors during EMRP induction. -No alien vegetation may be introduced to the site in the form of seeds or plants, for beautification or any other reason. -At the end of construction all alien vegetation that has established should be eradicated.	-No complaints of unauthorised vegetation removal associated with project personnel. -No intentional disturbance and destruction of site vegetation -Barricading tape (to indicate working areas) -Biodiversity conservation awareness is raised to workers / personnel Regular review of photographic records. Take photographs before construction starts as a record	-Site Manager -RCC -HSE / Safety Officer	Throughout the phase
	Impact on fauna: livestock, wild animals such as reptiles, birds, etc.	-The killing, snaring, trapping and stealing of community livestock is strictly prohibited. -Refrain from disturbing or killing small soil and animal species found on and around the site. -Visible breeding sites for birds and animals occurring on and around the sites should not be destroyed nor disturbed. -Refrain from removing or destroying the bird nests on trees. -BPs and associated trenches should be secured and backfilled or levelled upon completion of works to prevent animals from falling into trenches or even drowning during rainy seasons.	No complaints of stolen and killed livestock by the project workers. -No intentional disturbance and destruction of habitats and faunal species	-Site Manager -Construction contractor -HSE Officer	Throughout the phase

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
		-The recommended speed of 40-60km/hr around, to and from sites should be adhered to while looking out for animals and people (especially children) in the community. -Incorporate Environmental awareness and biodiversity preservation into the employment contracts of all workers.			
Waste management	**Construction waste:** Incorrect or infrequent disposal of building rubble. Construction waste blown by wind (e.g., cement bags).	-Construction waste should be stored in skips and should regularly be removed off the site for disposal at an applicable municipal waste disposal site (Ondangwa). -Empty cement bags, plastics, wrapping waste, strapping, etc. to be secured in containers for general waste to prevent wind-blown waste.	Regular inspection on site.	-Resident Engineer -RCC -Safety Officer	Throughout the phase
	Domestic waste from construction team: Increased general waste	-Waste should be separated according to cardboard/paper materials, plastic, bottles and tins. -The various waste types should be disposed of at appropriate municipal and recycling facilities. -Appropriate containers should be placed on site for waste separation and the workforce trained sensitised accordingly. In other words, sufficient waste bins should be supplied along the road at each working site so that no waste or rubbish is thrown in the environment. -Only the general waste, which cannot be recycled shall be disposed of at the municipal / Town Council's waste disposal facility. -The workforce must be sensitised to dispose of waste in a responsible manner and not to litter, not at the construction site and not at the campsite or in the wider environment. -Domestic waste which cannot be recycled should be stored in a skip and removed via truck once a week.	-Daily inspection and clean up. -There are sufficient waste storage containers for different waste -No littering caused by project personnel -No visible litter around the project area -Provision of sufficient waste storage containers -Waste management awareness -Waste disposal permits to municipality -Environmental, Health and Safety Statements and Policy are in place	-Resident Engineer -RCC -Safety Officer	Throughout the phase

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
		-After each daily works, ensure that there are no wastes left onsite or scattered within site premises. -All domestic and general project waste produced daily should be contained onsite until such that time it will be transported to designated waste sites. -No waste may be buried or burned on site or anywhere else. -A penalty system for irresponsible disposal of waste onsite and anywhere in the area should be implemented.			
	Hazardous waste: Accidental / negligent spillages from equipment working on site. Storage of hazardous materials.	-Spillages of any potentially toxic materials, whether by accident or through negligence, must be scooped up immediately into drums. -Contact Wesco Group https://www.wesco.com.na/page/waste-management and or Oiltech Namibia https://oiltech.com.na/ to salvage the spilled materials -Bitumen products waste, oil sludge, oily rags, contaminated spill clean-up materials, contaminated soils and other hazardous materials waste must be kept off-site or in a dedicated separate container on site. These containers must be locked and only accessible by the site foreman. Wesco Group or Oiltech should be approached to collect these wastes periodically or as needed – please also refer to the Engoyi fuel tanks' EMP for measures.	Daily inspection and clean up.	-Resident Engineer -RCC -Safety Officer	Throughout the phase
	Ablution waste (sewage): Construction team.	-Open defecation and urinating in public is strictly prohibited. Workers should be provided with appropriate toilets for the field. -Only portable chemical toilets should be used on site (along the road) and at the campsite. Under no circumstances may the waste from these toilets be dumped in the veld. -The waste should be removed at least once a week to the nearest municipal sewage site for handling and treatment. Alternatively, it may be pumped out into sealable containers and stored until it can be removed by truck. If stored, the containers should be kept out of direct sunlight and should not be stored for longer than a month. People responsible for cleaning these toilets should be provided with latex gloves and masks. -Spillage or leakage to be cleaned-up and fixed immediately.	Daily inspections and clean-up. -There are sufficient toilets at the campsites and along the road for workers -No open defecation by project workers -There are sewage removal operators	-Resident Engineer -RCC	Throughout the phase

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
Air quality	**Dust generation:** Dust proliferation due to fines content of soil resulting in localized poor air quality and bad visual	-Soil stacks should be placed downwind from the main activity areas and from the road detour. -All construction areas and soil stacks should be regularly wetted. -A reasonable amount of water should be used to suppress the dust along the road/ -Vehicles should be driven at a speed of 40-60km/hr to avoid the generation of dust owing to high speeds. This is also to ensure road safety due ongoing road works and many detours.	-Visual monitoring for dust nuisance and safety -Daily monitoring. -Complaints from neighbours -Records of how complaints or grievances have been addressed.	-Resident Engineer -RCC -Safety Officer	Throughout the phase
Noise	Noise from vehicles and construction activities	-All machinery should be calibrated and maintained regularly. -Noise from vehicles and equipment on sites should be reduced to acceptable levels. -Construction activities, excavation, hauling and transporting of materials from the BPs hours should be done between 08AM and 5PM and over weekends to prevent noise generated by equipment and movement of heavy vehicles. -When operating excavators and other noise generating machinery onsite, workers should be equipped with personal protective equipment (PPE) such as earplugs to reduce exposure to excessive noise.	-Daily monitoring. -Complaints from neighbours -Records of how complaints or grievances have been addressed -Workers operating machinery and noisy equipment are equipped with nosy PPE	-Resident Engineer -RCC -Safety Officer	Throughout the phase
Vehicular traffic safety	Presence of heavy vehicles in the area	-Vehicles drivers and equipment operators should be in possession of valid and appropriate driving licenses or operating permits and adhere to the road safety rules. -Make provision for haul roads and maintain them so that the local small vehicles can continue to use their community roads. -Drivers should drive slowly (40 -60km/hour and less) while onsite. -Vehicles should be in a road worthy condition and serviced regularly to avoid accidents owing to mechanical faults. -Vehicle drivers should only make use of designated site access roads provided and as agreed. -Vehicle drivers should not be allowed to operate vehicles while under the influence of alcohol.	-No complaints from members of the public regarding vehicular traffic issues related to the project activities. -All personnel operating the project vehicles and machinery are appropriately licensed and possession of valid driving licenses. -Demarcated areas for parking, offloading, and loading zones onsite.	-Site Manager -Construction contractor -Safety Officer	Throughout the phase

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
		-Project vehicles should be parked within the boundary or demarcated areas for such purpose at sites. -Deliveries from and to site should be done optimally during weekdays and between the hours of 8am and 5pm.			
Occupational and locals (community) health and safety associated with project activities	General health and safety for workers	-During induction, personnel should be provided with an awareness training of the risks of mishandling equipment and materials on site. -Appropriate and clearly written warning signage should be placed onsite, where visible. -A fully furnished first aid kit should be placed at each working site to attend to minor injuries, while major injuries should be attended to at a nearby health centre (clinic and hospitals). 1 or 3 site personnel should be trained on how to administer first aid. -Projected loads should be securely fastened to vehicles to avoid falling off and injuring people. -Heavy vehicle and equipment should be properly secured to prevent any harm or injury to both project personnel and locals. -When working on site, employees should be properly equipped with personal protective equipment (PPE) such as coveralls, masks, gloves, safety boots, earplugs, safety glasses, and hard hats. -Personnel should not be allowed to consume alcohol or other intoxicants prior to and during working hours as this may lead to mishandling of equipment resulting in health and safety risks.	-Comprehensive health and safety plan for the activities is compiled. -Availability of fully furnished first aid kits -Trained worker to administer first aid	-Site Manager -HSE / Safety Officer	Throughout the phase
	Community health and safety	-Construction trenches should be backfilled after completion of road works at sections of the road before proceeding forward. -Ensure that goods and projected loads are securely fastened to vehicles to avoid falling and injure people along the road. -Warning signage should be erected at danger site areas such as open trenches on the road. -Make provision for temporary crossroads at growth centres or where a community vehicle access paths cross over the road so that the community can cross over safely.	-The road trenches are backfilled -there are sufficient, clear and appropriate warning signs near risk site areas -The community are warned of road construction dangers and encouraged to stay away and exercise precautions at all times	-Site Manager -RCC -HSE / Safety Officer	Throughout the phase

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
		-The site areas that are considered temporary risks should be equipped with "danger" or "cautionary" signs clearly written in languages such as Oshiwambo and may be English.	when crossing the road or walking nearby		
	Potential increase of prevalence of HIV and AIDS, as well as other sexually transmitted diseases (STDs) prevalence	-Engage workers in sexual health talks and training about the dangers of engaging in unprotected sexual relations which results in contracting HIV/AIDS and other sexual related infections. -Provision of condoms and sex education through distribution of pamphlets and health trainings. These pamphlets can be obtained from the nearest local health facility in Omuntele, Omuthiya or Ondangwa. -Emphasize on the continued recruitment of locals to avoid the influx of out-of-area people into the community for casual work that can be carried out by local people. Thus, reducing the creation of new sexual relations between local women and out-of-area men resulting in the potential local transmission of STDs and HIV/AIDS.	-No new infections recorded linked to project workers -Occupational health and safety personnel -Sex and Health Education/Awareness -Provision of condoms at the campsite	-Site Manager -RCC -HSE Officer	Throughout the phase
Fire management	Accidental fire outbreaks	-Portable and serviced fire extinguishers should be availed at the working sites along the road and campsite. -No open fires should be created by project personnel onsite. -Make provision for smoking areas for crew members who smoke. This is to ensure that the cigarettes' fire is completely put out to and disposed of in allocated bins onsite. -Consider using gas or paraffin cooks to prepare food instead of open fires. The cooks/stoves fire should be put out before leaving the camp. -Personnel and visitors alike must be sensitised about responsible fire protection measures and good housekeeping such as the removal of flammable materials (e.g., rubbish, plastics, papers, clothing, dry vegetation, and hydrocarbon-soaked soil) near hazardous substances' containment and handling areas. In other words, these flammable materials should not be left or thrown near the areas. Regular inspections should be carried out to check for these materials at the site.	-No veld fires recorded (due to presence of project personnel) -Fire extinguishers (1 per vehicle)	-Site Manager -RCC -HSE Officer	Throughout the phase

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
		-Make provision for smoking areas for crew members who smoke. This is to ensure that the cigarettes' fire is completely put out to and disposed of in allocated bins at the smoking area. -Potential flammable areas and structures such as fuel storage tanks should be marked as such with clearly visible signage. -Raise awareness to workers on the impact of careless handing of fires and flammable substances in the fire.			
Archaeology and heritage	Accidental disturbance of archaeological or heritage objects	-If any archaeological materials or human burials or skeletal remains are uncovered during earthworks, the work in the immediate area should be halted, the finds would need to be reported to the NHC may require inspection by an Archaeologist. The ECO should have the area fenced off and contact NHC (Tel: +264 61 244 375), National Forensic Laboratory (+264 61 240 461) immediately. -Avoid direct damaging of archaeological or heritage such that may be encountered during excavations. -All accidental discoveries shall be reported immediately to an archaeologist/heritage practitioner so that an investigation and evaluation of the finds can be made, acting upon advice the HSE Officer will advise the necessary actions to be taken. -RCC and their subcontractor should adhere to the provisions of Section 55 of the National Heritage Act in the event significant heritage and cultural features are discovered in the course of project activities.	-Preservation of all artefacts and objects that are discovered onsite -Salvage equipment -Flag tapes -GPS (site marking)	-Site Manager -Construction contractor -HSE Officer	As and when required

5.2.3 Management measures for the decommissioning and rehabilitation of borrow pits

The measures proposed for implementation to decommissioning and rehabilitate the borrow pit sites are provided in Table 5-3.

Table 5-3: Decommissioning (closure) phase management and mitigation measures for borrow pits

Aspect	Impact	Management and Mitigation Measure(s)	Monitoring actions and Methods	Implementation Responsibility	Timeline
Unsightly borrow areas	Unstable slopes of un-rehabilitated borrow pit. Loose sediment washed away from unstable slopes	-Shape all sides of the borrow pit to 30° to horizontal. Rip the terrain and access routes and replace the stored topsoil evenly over the terrain. -The stockpiled topsoil should be levelled soon after completion of works at sites. Some of the stockpile materials should be used for rehabilitation	Inspection by Resident Engineer, Environmental consultant after rehabilitation	-RCC -Consulting Engineer.	Throughout this phase and before abandoning the area
Rehabilitation of borrow pits	-Unfenced / unsecured and un-rehabilitated borrow pits	-Since complete rehabilitation of borrow pits is impossible (because one would need to get materials elsewhere to fill up the pit and this leaves another pit at the area where one gets materials). Therefore, the contractors should level the BPs as far as possible to make them less dangerous so that the BPs or some of them can be used for future purposes such as water storage structures as requested in the EIA meetings. -BPs can also be rehabilitated by using stockpiled materials that were removed from the top layers of the BPs to raise the base or fence off the borrow pits that pose as a hazard to the communities and cannot be safely rehabilitated. -Respective community leaders should be consulted to approve and sign off BP Rehabilitation Completion to their satisfaction	Inspection by Resident Engineer, Environmental consultant after rehabilitation	-RCC -Consulting Engineer. -HSE/Safety Officer	Throughout this phase and before abandoning the area
Monitoring of borrow pits	-Lack of monitoring of the efficiency/success of borrow pit rehabilitation	-Annual inspections should be carried out on all rehabilitated BPs to determine rehabilitation success and assess any potential weed infestations. -Additional seeding may be carried out using local species if adequate vegetation growth has not been achieved using the seed bank in topsoil. -Any weeds present, weed control measures will be undertaken.			

5.3 Environmental Monitoring Actions

To ensure that the implementation of recommended environmental management measures is working and produces the desired results (minimizing the "medium" and uphold the "low" significance ratings of impacts), certain key impacts will need to be monitored and reported on. The ‘’Observation*, compliance status and ‘’Recommended Action*’’ columns will be completed for every monitoring done on site. Monitoring reports are to be compiled by the project HSE / Safety Officer, audited by an Independent Environmental Consultant, and submitted to the DEAF for archiving on a bi-annual basis (every 6 months throughout the project operations) or as required by the Environmental Commissioner (as per the ECC conditions). The environmental components or features provided in the Table will be updated accordingly once the project commences.

6 RECOMMENDATIONS AND CONCLUSION

Based on the assessment of potential impacts by the environmental consultants, the project has some adverse (negative) impacts on the biological, physical and social environment. However, to minimize the significance of these impacts while maximizing the benefits of the project activities, there should not be significant environmental degradation. It is for that this reason that this EMRP was developed for implementation to ensure sustainable land use for the borrow pits and subsequent road construction works for prosperity.

6.1 Recommendations

To mitigate the adverse impacts that may emanate from the borrow pits establishment and associated road upgrade (construction) works, RCC and Roads Authority should follow recommendations as follows:

6.1.1 Environment Management Plan Recommendations

To ensure a healthy and safe environment in the BP site areas and their environs, a plan for environmental management has to be instituted through monitoring. This involves the collection and analysis of relevant environmental data as well as periodic documentation and reporting.

- External Auditing: The key to a successful EMRP is appropriate monitoring and review to ensure effective functioning of the EMRP and to identify and implement corrective measures in a timely manner. In the event that discrepancies are identified, the problem must be investigated and attended to. All the results obtained during environmental monitoring must be documented for audit purposes.

  An audit of the environmental management actions undertaken is essential to ensure that it is effective in operation, is meeting specified goals, and performs in accordance with relevant regulations and standards. Audits should be conducted during the operational phase of the facility to ensure adherence to the management measures contained in the EMP.

6.1.2 Conclusion

Considering the potential impacts of the project and its associated activities, the mitigation measures contained in this EMRP are considered sufficient to manage and mitigate these impacts. Therefore, Serja Consultants recommends that the Environmental Commissioner approve the borrow pits towards the upgrading of DR3645 from gravel to LVS and issue an ECC on condition that the Proponent will ensure complete compliance to the developed EMRP.

APPENDIX 1: CHANCE FINDS PROCEDURE (AFTER KINAHAN, 2020)

Areas of project activities are subject to heritage survey and assessment at the planning stage. These surveys are based on surface indications alone, and it is therefore possible that sites or items of heritage significance will be found during development (operations and decommissioning) works. The procedure set out here covers the reporting and management of such finds.

Scope: The "*chance finds*" procedure covers the actions to be taken from the discovery of a heritage site or item to its investigation and assessment by a trained archaeologist or other appropriately qualified person.

Compliance: The "chance finds" procedure is intended to ensure compliance with relevant provisions of the National Heritage Act (27 of 2004), especially Section 55 (4): "*a person who discovers any archaeological …. object ……must as soon as practicable report the discovery to the Council*". The procedure of reporting set out below must be observed so that heritage remains reported to the NHC are correctly identified in the field.

The Site Manager/Supervisor must report the findings to the following competent authorities:

- **National Heritage Council of Namibia: Head Office: +264 61 244 375**

  Technical Office +264 61 301 903
- **National Museum (+264 61 276 800)**
- **National Forensic Laboratory (+264 61 240 461)**

Responsibility:

Operator:	To exercise due caution if archaeological remains are found
Foreman:	To secure site and advise management timeously
Superintendent	To determine safe working boundary and request inspection
Archaeologist	To inspect, identify, advise management, and recover remains

Procedure:

<u>Action by person identifying archaeological or heritage material</u>

a) If operating machinery or equipment stop work

b) Identify the site with flag tape

c) Determine GPS position if possible

d) Report findings to foreman

Action by foreman

a) Report findings, site location and actions taken to superintendent

b) Cease any works in immediate vicinity

Action by superintendent

a) Visit site and determine whether work can proceed without damage to findings

b) Determine and mark exclusion boundary

c) Site location and details to be added to project GIS for field confirmation by an archaeologist

Action by Archaeologist

a) Inspect site and confirm addition to project GIS

b) Advise NHC and request written permission to remove findings from work area

c) Recovery, packaging and labelling of findings for transfer to National Museum

In the event of discovering human remains

a) Actions as above

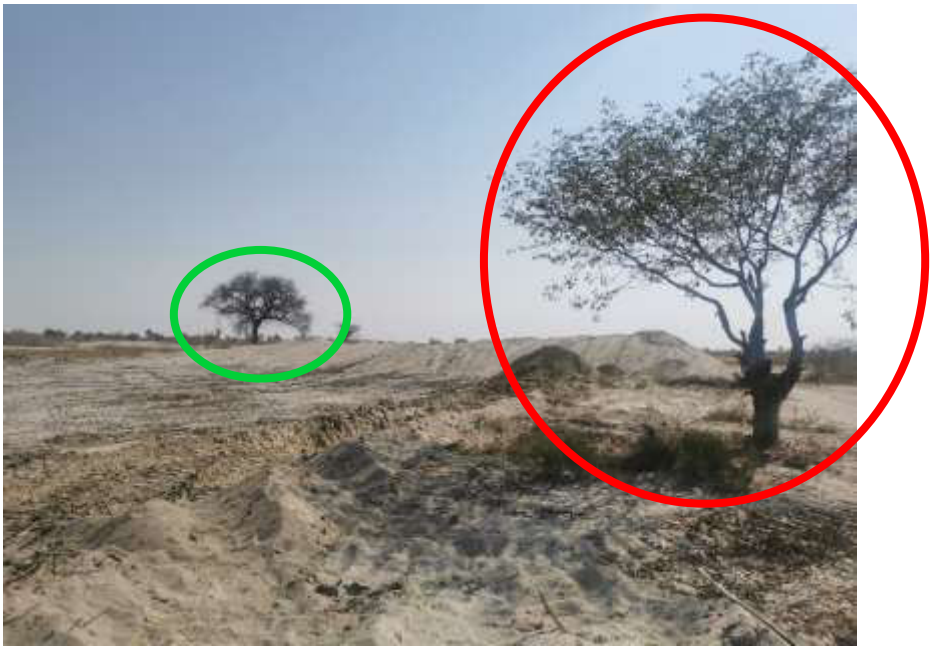
b) Field inspection by archaeologist to confirm that remains are human

c) Advise and liaise with NHC and Police

d) Recovery of remains and removal to National Museum or National Forensic Laboratory, as directed.

APPENDIX 2: LIST AND PHOTOS OF SOME IDENTIFIED PROTECTED TREE SPECIES ON AND IN THE IMMEDIATE SURROUNDINGS OF BPS, WHERE APPLICABLE (PENDING FULL INSPECTION AND VERIFICATION BY MEFT'S OSHIKOTO REGION FORESTRY OFFICE)

Sand corkwood species (*Commiphora angolensis*) next to a Mopani shrub at the western edge of BP 15 RHS



Marula tree (*Sclerocarya birrea*) – green circle and Mopani (*Colophospermum mopane*) young tree (red circle) at the northern and north-eastern site borders / edges of BP6