Roads Authority **Government of the Republic of Malawi**

Southern Africa Trade and Connectivity Project (SATCP)

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT FOR REHABILITATION OF LIWONDE - MATAWALE (M003) ROAD



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EXECUTIVE SUMMARY

1.0 Project Background

The proposed rehabilitation of the Liwonde to Matawale Road (M003) in Machinga and Zomba districts is a key infrastructure project by the Government of Malawi, implemented through the Roads Authority with financial assistance from the World Bank under the Southern Africa Trade and Connectivity Project (SATCP). The project aims to upgrade the existing road to improve connectivity, road safety, and access to markets and essential services along the corridor.

Construction is expected to commence in December 2025, with a planned implementation period of 24 months, followed by a 12-month defects liability period. The project will engage a total of 267 workers, comprising 197 males and 70 females. Of this workforce, 243 (approximately 86%) will be locally sourced, while 24 (14%) will be international staff, reflecting a strong emphasis on local employment. Jobs will span various sectors, including civil engineering, surveying, masonry, carpentry, electrical and mechanical works, drainage construction, pavement and asphalt works, road safety, environmental management, and general site services. The rehabilitation of Liwonde-Matawale (M003) Road and its associated works is expected to cost around USD 61,687,183.73.

Currently at the detailed design stage, the project is undertaking environmental, social, and engineering assessments necessary for finalizing road alignment and design standards. Key deliverables under this stage include preparation of an Environmental and Social Impact Assessment (ESIA) and a Resettlement Action Plan (RAP) to address any anticipated displacement or livelihood disruptions. According to the Resettlement Action Plan (RAP, August 2025), the project will impact 1,744 Project-Affected Persons (PAPs). This includes 488 permanent structures (such as dwellings, business premises, fences, signposts) and 553 temporary structures. Additionally, 769 PAPs will face economic displacement, those operating shops, kiosks (Airtel/TNM/Mukuru), sheds, garages, barber and butcher shops, and eateries. To mitigate these impacts, MWK 10,7 billion (USD 6.1 milion) has been allocated for compensation, ensuring fair redress and livelihood restoration.

The project also aims to promote gender inclusion and community participation, aligning with both national safeguards and the World Bank's Environmental and Social Framework (ESF).

2.0 Nature and Scope of the Proposed Project

The proposed project involves the rehabilitation of a 47.9 km paved road along the existing Liwonde–Matawale (M003) alignment, with a design speed of 100 km/h, a 7.4 m carriageway, 1.5 m shoulders, and a 2.5% crossfall. Key infrastructure includes 160 crossings (900 mm), 25 access culverts (600 mm), 20 portal culverts, and 3 bridges, designed to SATCC standards for regional harmonization. The road lies within a 60 m road reserve, with a Right-of-Way (RoW) of 15.5 to 20 m for construction activities. The corridor of impact, covering 30–35 m, includes the RoW and areas affected by construction diversions and works.

3.0 Objectives of the Proposed Project

The Project aims to enhance the safety, reliability, and efficiency of transport between Liwonde and Matawale to support regional integration and socio-economic development. Specifically, the project will:

- Upgrade the road to bitumen, all-weather standards;
- Improve road safety for all users;
- Reduce travel time and transport costs by facilitating efficient movement;
- Enhance access to trading centres, health services, and schools;
- Generate employment opportunities during and after construction; and
- Integrate climate resilience and environmental safeguards into project design.

4.0 Rationale for the Proposed Project

The proposed project is a strategic infrastructure priority under Malawi's National Transport Master Plan (2017–2037), which highlights the need to upgrade critical road networks to support economic growth and sustainable development. The road serves as a key transport corridor for goods, agricultural produce, and passengers, linking Zomba and Mangochi, a major tourism destination, and supporting trade, agriculture, and social services.

Currently, the road is severely degraded, with extensive surface failures, substandard carriageway widths (5.0–7.0 m), and an insufficient 10 m Right-of-Way (RoW), which hinders safe upgrades. The situation is worsened by encroachments in busy trading centres like Machinga Boma, Malosa, and Domasi. Rehabilitating the road will restore compliance with SADC standards, facilitate regional economic integration, and improve access to tourism, health, and education services.

5.0 Objectives of the ESIA

The ESIA is intended to ensure that project implementation is carried out in an environmentally and socially responsible manner. The ESIA's objectives include: identifying and evaluating potential environmental and social impacts across all project phases; recommending mitigation measures based on the mitigation hierarchy; and ensuring compliance with national legislation such as the Environment Management Act, 2017 and Public Roads Act, as well as the World Bank safeguard policies, particularly OP/BP 4.01 (Environmental Assessment) and OP/BP 4.12 (Involuntary Resettlement).

6.0 Justification for the ESIA

The proposed project qualifies as a project requiring an Environmental and Social Impact Assessment (ESIA) under both the Environmental Management Act (2017) and the World Bank Environmental and Social Framework (ESF) due to its potential for significant environmental and social impacts. According to Malawi's Guidelines for Environmental Impact Assessment, such projects fall under List A (Annex 1, Section A4), which includes the construction or expansion of highways and feeder roads, mandating a full ESIA.

Additionally, the World Bank has classified the project as High Risk, reinforcing the need for a thorough assessment.

7.0 Methodology Used to Prepare the ESIA Report

The ESIA was prepared in accordance with the Environment Management Act, 2017 and the World Bank ESF. Conducted between May and July 2023 followed by an update between February and March 2025, by a multidisciplinary team of experts, the assessment applied a combination of desk research, field investigations, and stakeholder consultations. Data collection included land use classification, a Rapid Botanical Survey (RBS), fauna assessments, and socio-economic baseline surveys. Engineering and environmental inputs were sourced from the Main Detailed Engineering Design Report, which were then independently validated through literature reviews and field verification.

Stakeholder engagement was carried out through Focus Group Discussions (FGDs), Key Informant Interviews, and community socioeconomic surveys. Quantitative data were analyzed using Microsoft Excel, while qualitative data underwent thematic content analysis. The results were triangulated with field observations and secondary sources to ensure accuracy, reliability, and relevance in assessing project impacts and designing appropriate mitigation measures.

8.0 Summary of Impacts Identified

Detailed description of the risks, impacts and mitigation measures have been provided under section 6.2.

8.1 Positive Impacts and Enhancement Measures

(i) Improved Mobility and Access to Social Services

- Maintain road quality through routine and periodic maintenance activities.
- Facilitate integration with local and regional public transportation systems such as the Nacala Corridor.
- Construct and maintain access roads or footpaths linking communities to main road.
- Raise awareness among community members about safe and reliable transport services.

(ii) Creation of Employment

- Inform local communities about employment opportunities and prioritise the hiring of local workers to maximise local employment and community benefits.
- Engage local leaders and organisations in the recruitment process to achieve effective outreach and equitable access to job opportunities for community members.
- Treat all employees in compliance with Malawi Labour Regulations and the requirements of OP/BP 4.01 (Environmental Assessment) to uphold fair labour practices and protect workers' rights.
- Develop and implement a Labour Management Plan
- Prepare a labour accommodation strategy for non-local workers to meet required standards and enhance worker well-being and compliance.

(iii) Stimulation of Local and Regional Economies

- Develop roadside market infrastructure and promote small business incubation near trading centres.
- Support local councils in developing market zoning and road setback enforcement.
- Facilitate access to finance and training for small traders and transport operators.
- Encourage value-addition activities by linking farmers to processing facilities and organized markets.

8.2 Negative Impacts and Mitigation Measures

(i) Physical and Economic Displacement

- Undertake timely implementation of the RAP to ensure that compensation, livelihood restoration, and relocation support are in place before civil works commence.
- Compensate PAPs at full replacement cost, including allowances for relocation, transitional support, and livelihood restoration tailored to vulnerable groups.
- Engage PAPs and local leaders in site selection for resettlement, design of replacement structures, and monitoring of entitlements delivery.
- Support livelihood restoration initiatives, including cash grants, access to training, and facilitation of business re-establishment for traders and hawkers.
- Disclose the GRM (Grievance Redress Mechanism) widely and ensure accessibility, including anonymous reporting channels and timely resolution of complaints.
- Monitor post-relocation outcomes through periodic RAP implementation audits and integrate corrective actions as needed.

(ii) Exposure to Gender-Based Violence

- Develop and enforce a Labour Management Plan with a clear Code of Conduct prohibiting GBV and ensuring gender sensitivity in all project operations (see Annex 9).
- Institute a zero-tolerance policy towards all forms of GBV, with clear and public communication of expected behaviours.
- Provide mandatory GBV training for all workers and project stakeholders to build awareness and responsiveness.
- Promote gender parity in employment, prioritizing female hiring and leadership in community liaison roles.

(iii) Occupational Health and Safety Risks

- Provide training in safety, health, social, and environmental procedures to all construction workers.
- Develop and implement a detailed Health and Safety Management Plan, that includes emergency preparedness and response based on guidance provided in Annex 20. This plan should also cover the safe use and maintenance of machinery and equipment, including vehicles fitted with seatbelts for all passengers.
- Workers' camps shall comply with the recommendations from the section 2.1 General Facility Design and Operation from the WBG Environmental, Health, and Safety General Guidelines, 2.0 Occupational Health and Safety.
- Develop and enforce a comprehensive campsite and storage site plan, as guided by Annex 19, to ensure safety, operational efficiency, and secure living conditions, including clean canteens and cooking areas and adequate living space.

- Provide security at campsites and all satellite camps following a security risk assessment and following a security management plan. Ensure that security personnel adhere to World Bank requirements and receive training in the use of force. All security staff will be unarmed.
- Provide a campsite clinic to treat workers, at minimum, qualified medical personnel (a clinical officer, and a nurse).

(iv) Air Pollution

- Acquire and deploy equipment to monitor air quality throughout the construction phase to track pollutant levels and ensure compliance with air quality standards.
- Regularly sprinkle water during the construction phase, particularly during dry and windy periods, to suppress dust and mitigate its dispersion into the surrounding environment.
- Set and enforce moderate speed limits at construction sites and in passing areas such as trading centres, schools, and villages to minimise dust generation and reduce noise.
- Transport particulate or powdery construction materials with adequate load covering to prevent the dispersion of particulate matter and avoid overloading transport vehicles to minimise emissions.
- Use drop-height regulation equipment when unloading powdery materials to maintain the lowest possible drop-height, reducing dust emissions during these operations.
- Carry out necessary repairs, maintenance, and regular inspections of all machinery and vehicles used in construction, ensuring they are in good working order to mitigate gaseous emissions and noise, and reduce the risk of accidental spills.

(v) Increased Risk of HIV and Sexually Transmitted Infections

- Develop and implement an HIV and AIDS Management Plan, aligned with national policy and project-specific risks.
- Provide routine sensitisation sessions on HIV, STIs, GBV, SEAH, and respectful workplace conduct for both workers and host communities.
- Distribute male and female condoms regularly at campsites and outreach events.
- Partner with local health providers to offer Voluntary Counselling and Testing (VCT) services at mobile or static health clinics.
- Establish a confidential grievance mechanism for reporting GBV and SEAH.
- Promote financial literacy among workers to reduce expenditure on alcohol, gambling, or transactional sex.

9.0 Conclusion

The rehabilitation of the Liwonde–Matawale (M003) Road promises major benefits, including enhanced connectivity, reduced travel time, and improved access to markets and services in Zomba and Machinga Districts. It will boost local economies and create employment, especially for women and youth. However, the project also poses notable environmental and social risks such as vegetation loss, erosion, pollution, displacement, labour rights issues, and risks of GBV and SEA/SH. To address these, a comprehensive Environmental and Social Management Plan (ESMP) has been developed. With proper implementation and stakeholder coordination, the project's benefits are expected to outweigh its risks, supporting sustainable and inclusive development. The total budget required to implement environmental, social health and safety measures is estimated at US$ 884,200 with US$ 828,000 allocated to the

contruction phase US$56,200 for the operation phase. For Monitoring measures, the estimated budget is US$ 262,700 per year, of which, US$ 205,000 is for the construction phase while US$57,700 is for the operation and maintenance phase.

10.0 Recommendations

To ensure the successful implementation of the project, the following key recommendations are prioritized:

- Provide sufficient financial, human, and technical resources to implement the ESMP, RAP, and monitoring plans effectively throughout the project lifecycle.
- Embed environmental and social requirements such as stakeholder engagement, gender inclusion, labor standards, and health and safety into all bidding documents and contractor contracts, and ensure their enforcement.
- In collaboration with the Roads Authority and the Department of Forestry, the contractor must engage an independent entity to carry out reforestation intevrnetions to off-set impacts on vegetation clearance along the Liwonde Forest Reserve. The entity must have clear expertise in biodiversity conservation initiativess mainly in identification and replacmenent of the specific species cleared within the alignment (for specific specied identified in the study, as these perfom specific functions for the communities).
- Set up a transparent, accessible, and community-based GRM to handle concerns raised by Project-Affected Persons (PAPs), with ongoing support from District Councils for resolution.
- Facilitate continuous consultations, public awareness campaigns on road safety and HIV, STIs, and ensure inclusive participation of local communities and vulnerable groups.
- Conduct regular inspections to ensure compliance with labour laws, eliminate child labour, and uphold occupational health and safety standards.
- Conduct audits and require contractors and supervising consultants to submit quarterly E&S monitoring reports, including water quality assessments for Domasi, Lifani, and Chikupira rivers.
- Enforce traffic control measures, including speed limits, warning signage, and pedestrian safety, especially in densely populated trading centres.

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ACRONYMS AND ABBREVIATIONS

AIDS	Acquired Immunodeficiency Syndrome
BRHMS	Botanical Research and Herbarium Management System
CAC	Criteria Air Contaminants
CLO	Community Liaison Officer
C-ESMP	Contractor's Environmental and Social Management Plan
EIA	Environmental Impact Assessment
DG	Diesel Generator
EMA	Environment Management Act
ESCOM	Electricity Supply Commission
ESHS	Environment, Social, Health and Safety
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
GBV	Gender Based Violence
GoM	Government of Malawi
GRMs	Grievance Redress Mechanism
GVH	Group Village Head
HIV	Human Immunodeficiency Virus
IAS	Invasive Alien Species
ITCZ	Inter-Tropical Convergence Zone
MBS	Malawi Bureau of Standards
MEPA	Malawi Environment Protection Authority
MRA	Malawi Revenue Authority
NCIC	National Construction Industry Council
NE-SW	Northeast-Southwest
NSO	National Statistical Office
NTMP	National Transport Master Plan
NWRA	National Water Resources Authority
OSH	Occupational Safety and Health
PAP	Project Affected Persons
PPE	Personal Protective Equipment
RA	Roads Authority
RAP	Resettlement Action Plan
ROW	Right of way
SADC	Southern Africa Development Community
SATCP	Southern Africa Trade and Connectivity Project
SOPs	Standard Operational Procedures
SST	Sea Surface Temperature
TIP	Trafficking in Persons
STI	Sexually Transmitted Infections
TORs	Terms of Reference

USD	United States Dollar
VEC	Valued Environmental Components
WB	World Bank
WESM	Wildlife and Environmental Society of Malawi

GLOSSARY OF KEY TERMS USED IN THE REPORT

Term		Meaning in the Project Context
Biodiversity Conservation	:	Measures taken to protect and sustain flora and fauna in areas affected by the project.
Community Engagement	:	The process of consulting and involving local communities in decision-making related to the project.
Corridor of Influence	:	The geographic area directly and indirectly affected by the Liwonde–Matawale Road rehabilitation works. It includes the road reserve (60 m in Machinga and Zomba Districts, 46 m in Zomba City), the construction corridor and ancillary sites (e.g., camps, borrow pits, stockpiles), as well as a buffer zone of up to 1 km on either side of the road where environmental and social impacts such as resettlement, changes in land use, pressure on natural resources, and induced development may occur.
ESHS (Environment, Social, Health, and Safety)	:	Measures implemented to ensure the project adheres to environmental, health, and safety standards.
Encroachment	:	Unauthorized occupation or use of land within the designated road reserve.
ESIA (Environmental and Social Impact Assessment)	:	A systematic process to evaluate the environmental and social consequences of the Liwonde-Matawale (M003) Road Rehabilitation Project.
ESMP (Environmental and Social Management Plan)	:	A framework detailing mitigation measures to address environmental and social risks associated with the project.
GBV (Gender-Based Violence)	:	Any harmful act directed at an individual based on their gender, including physical, sexual, psychological, or economic harm or suffering. GBV includes threats, coercion, or arbitrary deprivation of liberty, whether occurring in public or private life. Within the project context, GBV risks may emerge in the workplace, at workers' camps, in host communities, and during interactions between workers and community members, particularly women, girls, and other vulnerable groups.
GRM (Grievance Redress Mechanism)	:	A system established to handle complaints and disputes arising from the project's implementation.
HIV and AIDS Mitigation	:	Interventions aimed at reducing the risks of HIV and AIDS transmission among workers and local communities during project implementation.
IAS (Invasive Alien Species)	:	Non-native species that may spread due to project activities, potentially disrupting local ecosystems.

MEPA (Malawi Environment Protection Authority)	:	The regulatory body overseeing compliance with environmental laws and regulations in Malawi.
NTMP (National Transport Master Plan)	:	A national policy guiding infrastructure development, including road projects like the Liwonde-Matawale rehabilitation.
OSH (Occupational Safety and Health)	:	Measures ensuring the safety and well-being of workers involved in the project.
PAP (Project-Affected Persons)	:	Individuals or communities whose land, property, or livelihoods are impacted by the road rehabilitation project.
RAP (Resettlement Action Plan)	:	A document outlining the procedures and compensation mechanisms for Project-Affected Persons (PAPs) displaced by the project.
Road Reserve	:	The total area of land legally set aside for road infrastructure, including the carriageway, drainage systems, footpaths, and space for future expansion or maintenance. It is established under the Public Roads Act and may be up to 60 meters wide, with its centre line aligned with the road's carriageway unless otherwise directed by the Minister.
ROW (Right of Way)	:	The legally defined corridor along which the road infrastructure is constructed, including a designated road reserve.
SOP (Standard Operating Procedures)	:	Defined protocols ensuring consistency and regulatory compliance in project execution.
Stormwater Management	:	The design and maintenance of drainage infrastructure to prevent flooding and erosion along the road corridor.

CHAPTER 1: INTRODUCTION

This is an Environmental and Social Impact Assessment (ESIA) for the rehabilitation of the Liwonde to Matawale (M003) Road which is in Machinga and Zomba Districts. This chapter provides background information of the project, details of the project proponent, project justification, objectives for conducting an ESIA, nature of the project, methodology employed, and the potential users of the ESIA.

1.1 Project Background Information

The Government of Malawi (GoM), through financing from the World Bank under the Southern Africa Trade and Connectivity Project (SATCP), seeks to rehabilitate the Liwonde-Matawale Road to stimulate private sector activity in Malawi and Mozambique. The project development objective is to reduce trade costs and time, improve road safety, and increase value chain development in targeted corridors of Malawi and Mozambique. The project has four components: i) reduce trade costs; ii) improve regional coordination and project implementation; iii) increase investments in value chains; and iv) strengthen transport infrastructure to improve market access. With a budget of USD 61.7 million, the rehabilitation will span 24 months starting December 2025.

The road improvement supports the Government's transport sector programme by upgrading the national road network and reinforcing cross-border connectivity. Benefits include improveed traffic efficiency, enhanced road safety, reduced travel and transport costs, lower operating costs, and improved access to agricultural markets and social services..

The road is gazetted with a 60-meter road reserve, with a right of way (RoW) of 15.5-20 meters allocated for road infrastructure. The corridor of impact, including the RoW and necessary diversions, extends 30 -35 meters within the road reserve. This ensures adequate space for construction, drainage, and safety features while prohibiting encroachments unrelated to road infrastructure.

1.2 Nature and scope of the Project

The project involves rehabilitation of a 47.9 km paved road along the the existing alignment of the Liwonde-Matawale Road. The pavement design comprises a double bituminous surfacing placed over a 150 mm base course and a 150mm subbase layer with the subgrade/embankment improved by a 150 mm selected layer.

Road design follows the "Low Volume Roads - Geometric Design and Road Safety Manaual (2020)" and the SATCC Code of Practice (Addendum) for trunk roads. The cross-section provides 6.8 m carriageway width with 1.5 m paved shoulders, on both sides. In trading centres, the design encorporates 2 m paved shoulders, an additional 1m unpaved shoulder for non-motorised traffic (NMT), footpaths, side drains, and street lighting.

Design speeds are set at 100 km/h for rural/normal sections and 50 km/h for trading centres/sections and built-up areas, ensuring both efficiency and safety for diverse road users.

1.3 Stage of the Project

The project is currently in the detailed design stage, which involves several key activities: (i) reviewing existing data on the road project as well as the social and economic activities in the project area; (ii) collecting essential social, environmental, and physical data to inform the road design; (iii) conducting preliminary engineering surveys and design work to determine optimal alignment and design standards; and (iv) performing an Environmental and Social Impact Assessment (ESIA) of the project area. Once all necessary approvals are granted, the upgrading of the road is expected to take 24 months, followed by a 12-month defects liability period after completion.

1.4 Project Proponent

The project name is "rehabilitation and operation of the Liwonde-Matawale (M003) Road in Machinga and Zomba districts". The contact details for the developer are as follows:

Proponent name:	Roads Authority
Postal Address:	Functional Building – Paul Kagame Road, Private Bag B346, Lilongwe 3, Malawi
Contact Person:	The Chief Executive Officer
Phone number:	+265 (0)882 08 90 43
Email:	ra@ra.org.mw

1.5 Location of the Proposed Project

The project is situated along a section of the M003 Road, known as the Liwonde-Matawale Road in Machinga and Zomba districts. The first 2 km of the road is within Liwonde Township, beginning at the Railway Overpass Bridge near the Liwonde Barrage. The road traverses the Machinga Hill Forest Reserves and passes through major trading centers, including Machinga Boma, Malosa, Namwera Turn-off, Domasi, Songani, and concluding at Matawale in Zomba City, with a total length of 47.9 km.



Naisi Trading Centre



Chinamwali Trading Centre



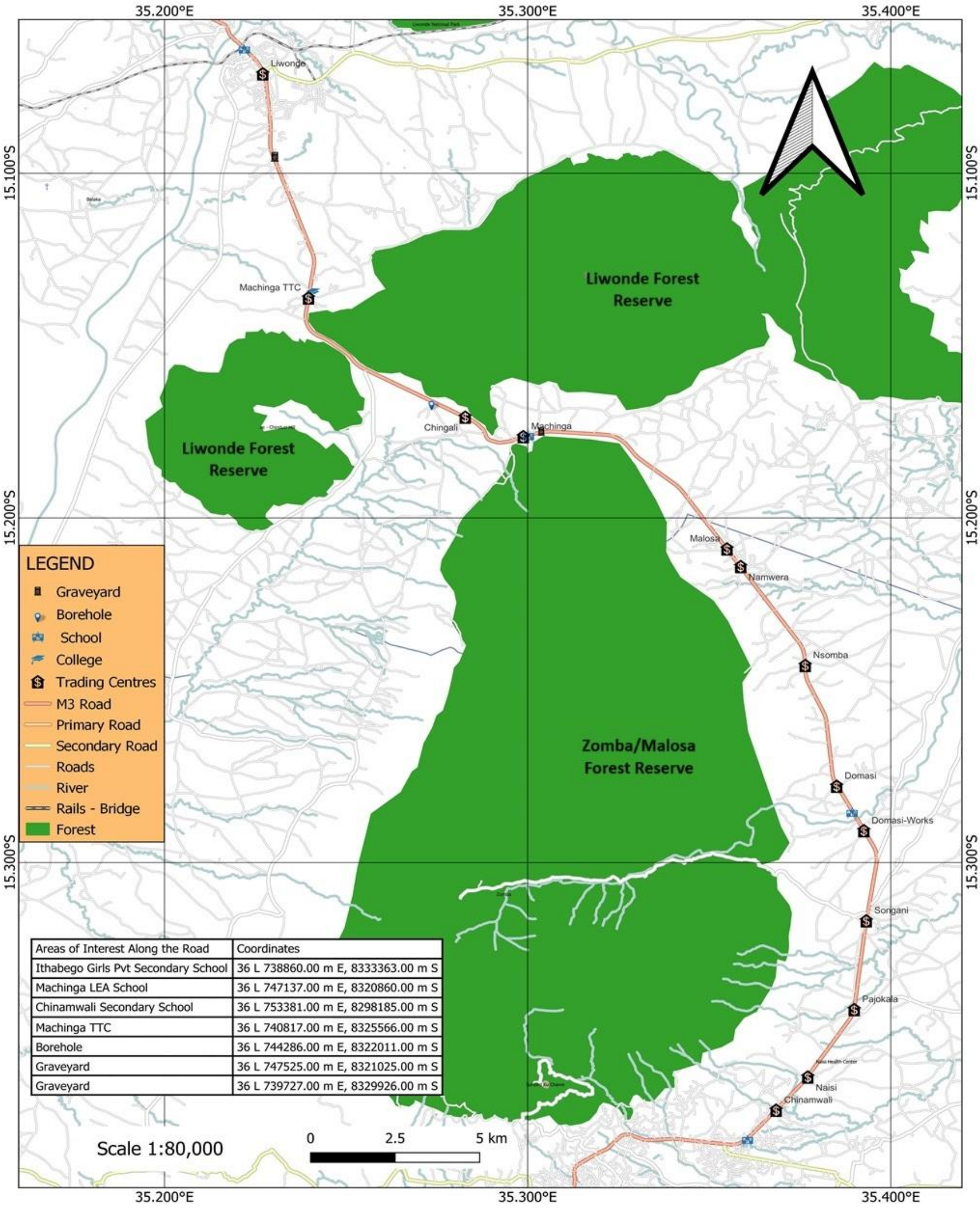


Chingale Turnoff Trading Centre Domasi Works Trading Centre

Figure 1-1: Selectred Trading Centres along the Road

Detailed maps of selected trading centres and the proposed climbing lane are included in Annex 26.

LOCATION MAP FOR PROPOSED REHABILITATION OF LIWONDE-MATAWALE ROAD PROJECT



Areas of Interest Along the Road	Coordinates
Ithabego Girls Pvt Secondary School	36 L 738860.00 m E, 8333363.00 m S
Machinga LEA School	36 L 747137.00 m E, 8320860.00 m S
Chinamwali Secondary School	36 L 753381.00 m E, 8298185.00 m S
Machinga TTC	36 L 740817.00 m E, 8325566.00 m S
Borehole	36 L 744286.00 m E, 8322011.00 m S
Graveyard	36 L 747525.00 m E, 8321025.00 m S
Graveyard	36 L 739727.00 m E, 8329926.00 m S

Figure 1-2: Location of the Proposed Project

1.6 Objectives of the Project

The primary objective of the Liwonde–Matawale (M003) Road Rehabilitation Project is to improve the safety, reliability, and efficiency of transportation connectivity between Liwonde and Matawale. This enhancement aims to promote regional integration, foster socio-economic development, and improve access to markets and services. Specifically, the project seeks to achieve the following:

- Upgrade and rehabilitate the existing road infrastructure to meet all-weather, bitumen standards.
- Enhance road safety for all users, including pedestrians, cyclists, and motorists.
- Facilitate the efficient movement of goods and people, thereby reducing travel time and transportation costs.
- Support local economic development by improving access to trading centers, healthcare facilities, and educational institutions.
- Create employment opportunities during both the construction and post-construction phases of the project.
- Promote climate resilience and environmental sustainability through the implementation of integrated engineering solutions and safeguard measures.

1.7 Justification of the Proposed Project

The NTMP (2017-2037) identifies road rehabilitation and maintenance as critical to addressing Maalawi's infrastructure gaps and promoting long-term growth. The Liwonde–Matawale (M003) is a strategic corridor that facilitates transport of food supplies, agricultural products, and construction materials, while also linking between Zomba and Mangochi, a key tourism hub. It plays a vital role in supporting trade, agriculture and trourism, underscoring its regional socioe-conomic significance.

The road's current state poses major challenges: its asphalt surface is severely degraded with potholes and cracks, widths of only 5-7.0 meters, and RoW narrowed to 10 meters, falling below SADC Regional Trunk Road Network standards. Encroachment by vendors and informal structures in trading centers such as Machinga Boma, Malosa, and Domasi further limits space for lanes, shoulders and drainage.

Rehabilitation will restore the 47.9 km road to modern standards, reducing travel costs and time, improving safety, enhancing economic integration, and strengthening access to essential services such as health, education, and tourism.

1.8 Objectives of the ESIA

The ESIA aims to guide the project's implementation in an environmentally and socially responsible manner. The specific objectives of the ESIA are to:

- Identify and evaluate potential environmental and social impacts associated with the project during its planning, construction, and operation phases.
- Design and recommend mitigation measures that avoid, reduce, or compensate for adverse environmental and social effects in accordance with the mitigation hierarchy.

- Align project planning and execution with relevant legal, policy, and institutional frameworks, including the Environment Management Act (2017), Public Roads Act (1962 as amended), and applicable international standards such as the World Bank Operational Policies, particularly OP 4.01 (Environmental Assessment), OP 4.12 (Involuntary Resettlement), OP 4.04 (Natural Habitats), OP 4.36 (Forests), and OP 4.11 (Physical Cultural Resources).
- Develop an Environmental and Social Management Plan (ESMP) that defines clear actions, responsible parties, timelines, monitoring indicators, and resource requirements for effective management of risks and impacts.
- Incorporate environmental and social considerations into project design and decision-making processes to enhance sustainability and community acceptability.
- Facilitate inclusive stakeholder engagement by documenting concerns, inputs, and expectations of affected communities, local authorities, and other stakeholders.

1.9 Justification of the ESIA

The rehabilitation of the Liwonde–Matawale (M003) Road requires ESIA under both national law and international safeguard standards. The Environmental Management Act, 2017, and Malawi's EIA Guidelies classify road construction and expansion as prescribed activities (Annex 1, Section A4), necessitating a full ESIA. Accordingly, the MEPA issued a directive on 30 January, 2023, confirming the mandatory requirement and approving the Terms of Reference (ToRs) for the study (Annex 1).

Under the World Bank's Operational Policies (notably OP/BP 4.01 on Environmental Assessment), the project is classified as Category A, reflecting the potential for significant, diverse, and possibly irreversible environmental and social impacts. These include biodiversity loss, land acquisition and resettlement, community safety risks, and impacts on air, water, and noise quality. This categorization underscores the requirement for a comprehensive ESIA to identify risks and define appropriate mitigation measures.

The ESIA serves as a decision-making tool to ensure that project design and implementation comply with Malawi's regulatory framework and the World Bank's sustainability objectives.

1.10 Land Tenure and land requirement for the Project

The Liwonde-Matawale (M003) Road is gazetted as a primary road under the Public Roads Act (1969) with a 60-meter (30 meters on each side). Construction will require about 350 hectares along the 47.9km stretch, already designated as public land, thus avoiding the need for new acquisition. However, up to 2 hectares may be required for a campsite, expected under the customary tenure and potentially subject to temporary acquisition.

According to the Resettlement Action Plan (RAP, August 2025), the project will impact 1,744 Project-Affected Persons (PAPs). This includes 488 permanent structures (such as dwellings, business premises, fences, signposts) and 553 temporary structures. Additionally, 769 PAPs will face economic displacement, those operating shops, kiosks (Airtel/TNM/Mukuru), sheds, garages, barber and butcher shops, and eateries. To mitigate these impacts, MWK 10,7 billion

(USD 6.1 milion) has been allocated for compensation, ensuring fair redress and livelihood restoration.

1.11 Methodology for the ESIA Study

The ESIA for the Liwonde-Matawale Road project was conducted in compliance with the Environment Management Act, 2017, and World Bank requirements, using a multidisciplinary team. The approach combined desk research, field investigations, stakeholder consultations, and baseline surveys to identify and evaluate potential environmental and social impacts.

The process was carried out in two phases: Phase I (May–July 2023) involved preliminary site visits, initial community and district consultations (Annex 2), and baseline data collection. Phase II comprised detailed environmental and social assessments, covering air quality, surface and groundwater quality, noise and vibration, and biodiversity. Technical reports were produced, ensuring compliance with Malawi's standards and international best practice (Annex 13)

Key assessment methodologies included:

- Land Use Assessment using surveys, remote sensing and GPS.
- Flora and fauna surveys at 43 sampling points, applying transects, direct observations, camera traps and acoustic monitoring.
- Stakeholder engagement through 524 FGDs, KIIs, and household surveys.
- Socioeconomic and business surveys with 278 households and 177 businesses within 100 m of the road.
- Air, water, and noise monitoring at multiple sites, benchmarked against Malawi Standards (MS737:2021 and MS173:2005).
- Seismic Activity analysis using seismometers and GPS-linked digitizers.

Data analysis used SPSS, Excel and NVivo, integrating quantitative and qualitative results through triangulation to validate findings. This ensured a robust baseline and impact assessment.

1.12 Potential Users of the ESIA Report

The Environmental and Social Impact Assessment (ESIA) Report for the Liwonde–Matawale Road Project is intended for a broad range of stakeholders involved in the planning, execution, monitoring, and financing of the project. The potential users include:

- Government Regulatory Authorities, including:
  - Malawi Environmental Protection Authority (MEPA)
  - Roads Authority (RA)
  - Ministry of Transport
  - Machinga District Council
  - Zomba District Council
  - Zomba City Council
  - Ministry of Labour
  - National Construction Industry Council (NCIC)
- Planners and Engineers responsible for the design, planning, and technical implementation of the road project.

- Contractors engaged in the construction and rehabilitation works of the project, using the ESIA to comply with environmental and social safeguards.
- Communities living around the project area for awareness and understanding of potential impacts, mitigation measures, and grievance redress mechanisms.
- Funding agencies such as the World Bank and other development partners for project appraisal, due diligence, and ongoing monitoring requirements.

CHAPTER 2: PROJECT DESCRIPTION

This chapter outlines the current status of the project as well as the primary activities involved in the development and implementation of the road construction project. In addition to detailing the project's status, this section covers several key elements, including access arrangements, types of plants and equipment to be utilized, nature and types of waste to be generated, facilities that will be established on site, waste management strategies, and the projected costs associated with the project.

2.1 Condition of the Existing Road

The existing road is paved with asphalt concrete but is in poor condition, with carriageway widths of 5.0 - 7.0 m. It traverses rolling terrain thjrough mountainous areas, agricultural land, trading centers, and residential areas. While alignment is generally fair, some sections suffer from inadequate sight distances.

From Liwonde (Machinga District) past Liwonde Barrage, the road shows extensive potholes, cracks, and worn shoulders (see Figure 2.1). Severe congestion occurs near the Petroda filling station (M003/S131 junction) due to heavy interaction between motorized traffic, non-motorized transport (NMT), and pedestrians (Figure 2.2). Trading centers, such as Songani lack parking and lay bays (Figure 2.4), while absent curbing creates serious pedestrian safety risks. Conditions improve near Matawale (M003/S143 junction).

Drainage infrastructure includes 180 structures; 3 major bridges (Lifani River, Domasi River, and Chikupira River), 131 pipe culverts, 33 box culverts, and 13 access slabs. Many are clogged by siltation or structurally damaged (broken headwalls, wing walls). Heavy rains, such as during Tropical Cyclone Freddy (March 2023), caused overtopping and flooding. Lined drains function variably, while unlined drains are often eroded due to inadequate protection.

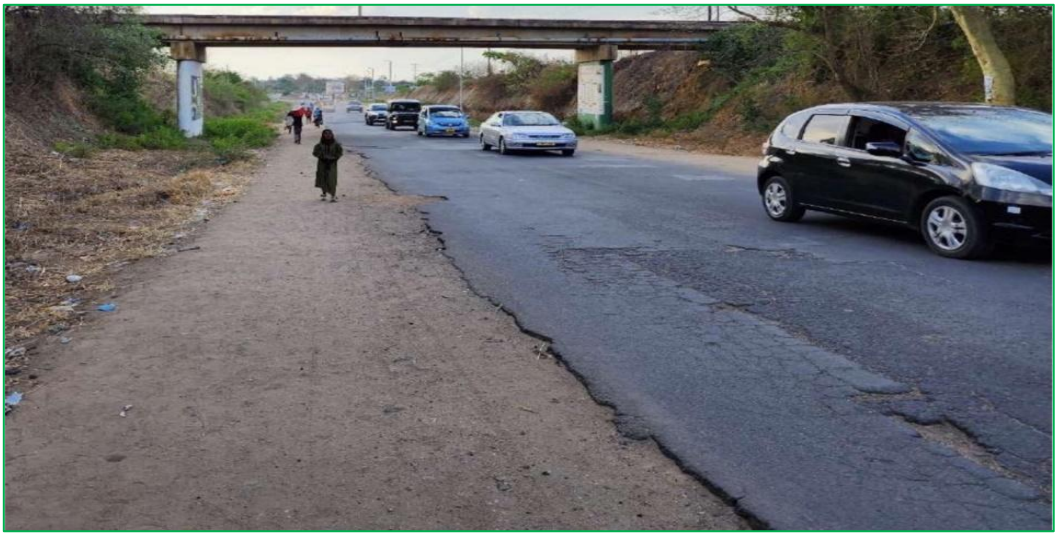


Figure 2-1: Railway Overpass Intersection with the Project Road at Liwonde



Figure 2-2: Petroda Filling Station at Liwonde [M003/S131 Junction] – Direction to Matawale



Figure 2-3: Cracking observed significantly on Project Road



Figure 2-4: Songani Business Centre – Approaching from Liwonde

2.2 Project Conceptual Design

The design of the Liwonde-Matawale Road is based on the Southern African Transport and Communications Commission (SATCC) design standards, as well as the Malawi Roads Authority's addendum to the SATCC Code of Practice for the Geometric Design of Trunk Roads. Adhering to these standards ensures consistency, safety, and an acceptable level of service across the entire road project.

The subsequent sections will provide a comprehensive overview of the key attributes of the road design, addressing important elements such as alignment, cross-section components, drainage provisions, pavement structure, and safety considerations.

2.2.1 Average Daily Traffic

The design report indicates that based on the Traffic Study results, the project road section has an Average Annual Daily Traffic of 8,639 vehicles per day. The motorised traffic was analysed group-wise regarding passenger and freight vehicles based on the kind of service rendered (Table 2-1). Passenger vehicles included cars (4WD, pickups, and minibuses) and small and large buses. The freight vehicles group comprises small, medium, heavy, and articulated trucks based on their loading capacity.

Table 2-1: Estimation of Average Daily Traffic

Road Section	Liwonde - Songani Road	Songani - Matawale Road
Length (KM)	34.6	10.5
Saloon Car	1393	2791
Pick-up Low Base	111	122
Land Rovers, Landcruiser, Twin Cab 4WD High Base	629	897
Minibus (<16 seats)	644	773
Medium Bus (>16<50 seats)	47	70
Large Bus (<50 seats)	15	16
Light Trucks (<3 ton)	140	170
Medium Trucks (2-axle), >3.0<16 ton	200	265
Heavy Trucks (2-4 axles), >16 ton	86	155
Semi-Trailer (ST)/ Full Trailer (FT) Count Axles (5,6,…)	60	54
Tractor or Tractor & Trailer	1	1
Total	3325	5314

Sight distance was also considered in the design interventions. A safe road needs satisfactory sight distance for a driver to perceive hazards and have sufficient time to initiate any evasive action safely. Table 2-2 indicates the object heights used to determine the different site

distances and their applicability in the road safety profile. The table is in accordance with the SATCC Code of Practice for the geometric Design of Trunk Roads.

Table 2-2: Sight Distances

Description	Required Standard (80km/h)	Height	
		From Eye Height	To Object Height
Stopping sight distance	115	1.05 m	0.15 m
Barrier sight distance	240	1.05 m	1.30M
Decision site distance	240	1.05 m	0.0M
Passing site distance	312m (Minimum) 540 m (Desirable)	N/A	N/A

*2.2.2 **Road Geometry of the Proposed Project***

The proposed alignment traverses rolling terrain with congested trading centres and sections of hilly terrain, designed separately for rural and urban environments. The road reserve remains 60 meters while the RoW will range between 15.5 and 20 meters, all within the gazetted road reserve. The current RoW is 20 m, though the existing carriageway measures 5.0 to 7.0 m.

The geometric design is ainformed by traffic volumes, road use, and other characteristics, with particular attention to the high presence of pedestrians and non-motorised traffic (NMT) such as bicycles. Cross-section schedules (Table 2-3) provide detailed dimensions for both rural and urban sections, ensuring the dsign accommodates mixed traffic safely and efficiently.

Table 2-3: Crossection schedule of the Road

Station		Length (m)	Cross-Section Type
From	To		
0+000	3+000	3000	TCS-1
3+000	9+500	6500	TCS-2, TCS-3 &TCS-4
9+500	11+400	1900	TSC-5
11+400	14+600	3200	TCS-2, TCS-3 &TCS-4
14+600	15+400	800	TCS-1
15+400	16+300	900	TSC-5
16+300	17+000	700	TCS-2, TCS-3 &TCS-4
17+000	17+900	900	TCS-1
17+900	24+200	6300	TCS-2, TCS-3 &TCS-4
24+200	26+500	2300	TCS-1
26+500	28+500	2000	TCS-2, TCS-3 &TCS-4
28+500	29+700	1200	TCS-1
29+700	33+300	3600	TCS-2, TCS-3 &TCS-4
33+300	35+400	2100	TCS-1

Station		Length (m)	Cross-Section Type
From	To		
35+400	37+600	2200	TCS-2, TCS-3 &TCS-4
37+600	39+000	1400	TCS-1
39+000	43+300	4300	TCS-2, TCS-3 &TCS-4
43+300	47+238	3938	TCS-1
Key			
TCS-1	Typical section in Rural Normal section		
TCS-2	Typical section in Town section		
TCS-3	Typical section in Rural Reconstruction section		
TCS-4	Typical section in Rural high fill & high cut section		
TCS-5	Typical section in Rural climbing lane section		

2.2.3 Climbing Lanes

The project proposes the construction of two climbing lanes along steep segments of the Liwonde–Matawale road corridor to improve traffic flow and enhance safety, especially for heavy vehicles navigating hilly terrain. These enhancements will be implemented in two critical locations within the Liwonde Forest Reserve, as depicted in the accompanying project map (Figure 2-5).

The first climbing lane is planned for the Mpata section, extending between chainage 9+300 and 11+200, covering approximately 1,900 meters and occupying around 3.79 hectares within the road reserve. The second climbing lane is proposed near Machinga Boma, positioned between chainage 15+200 and 16+940, with a length of about 1,282 meters and an estimated land utilization of 1.63 hectares within the road reserve boundary. In total, these two climbing lanes will encompass approximately 5.42 hectares.

To mitigate potential environmental impacts, particularly within these sensitive forested areas, the project will implement targeted interventions. These will include site-specific reforestation programs, habitat restoration initiatives, and erosion control measures (Guidelines in Annex 14). Through these actions, the project aims to minimize habitat disruption and maintain the ecological integrity of the Liwonde Forest Reserve.

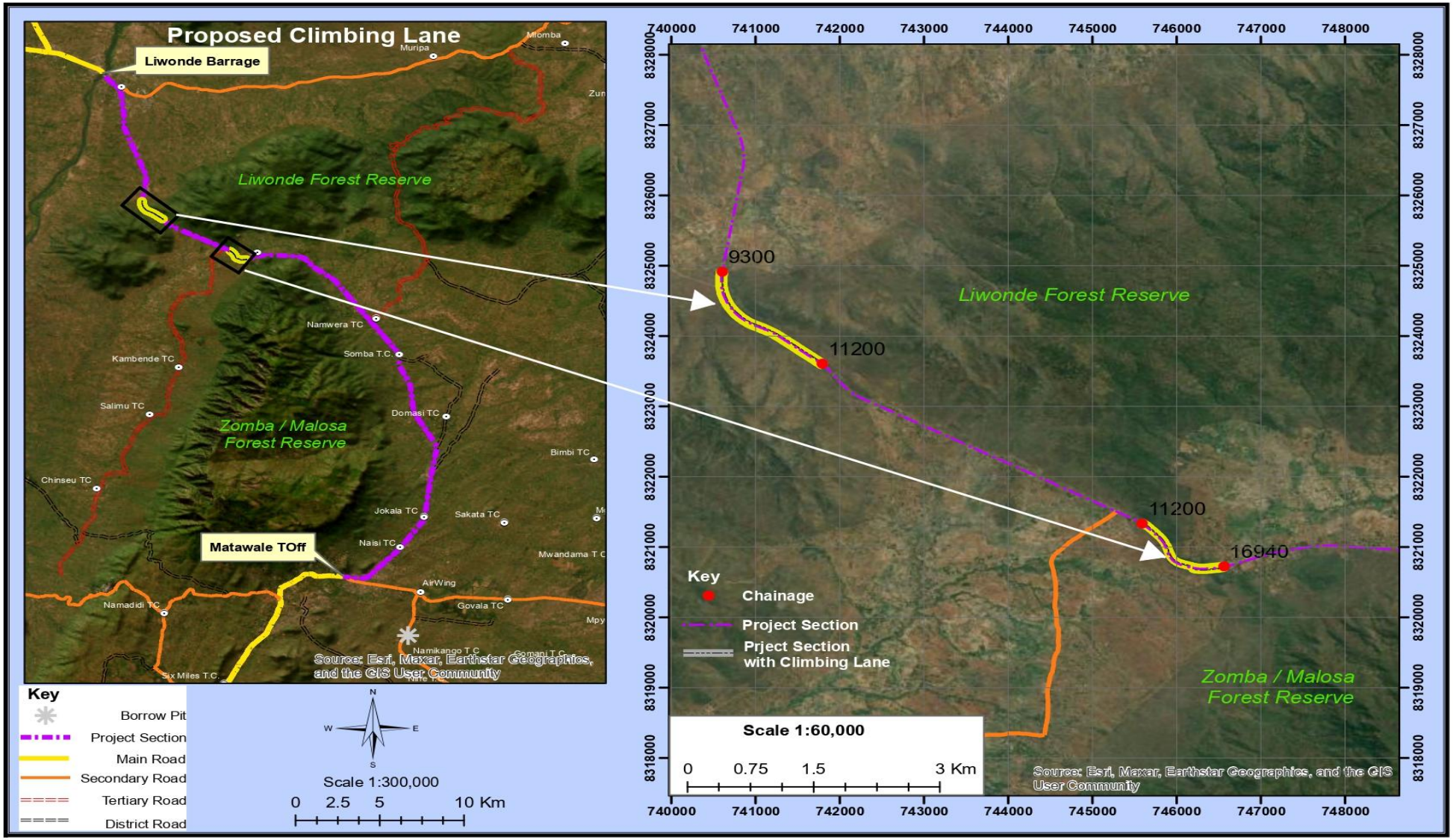


Figure 2-5. Climbing lane sections of the road

2.2.4 Rural Environment Geometrical Cross Section

Considering road marking and standard design requirements to accommodate the intended traffic volume, a carriageway width of 3.5 m is proposed (Figure 2-6). The carriageway will have a 50mm asphaltic concrete surfacing on the surface to be placed on a stabilised 100mm thick crushed stone base. This is also based upon careful examination of the prevailing traffic condition of the existing road. Regarding the shoulder width, the prevailing condition of the existing non-motorised traffic and pedestrians along the entire project road was considered. There are a lot of pedestrians along the entire stretch of the road except in the forest reserve section of Machinga. In addition, one can hardly miss seeing people pushing or riding their loaded bicycles along the road. Therefore, the design provides a 2.0m paved shoulder width and an outer earth shoulder (rollover) of 0.5m on either side of the road. The road will also maintain a right of way of 30 m on either side of the road.

2.2.5 Urban Environment Geometrical Cross Section

Considering road marking and standard design requirements to accommodate the intended traffic volume, a lane width of 3.5 m is proposed (Figure 2-7). The carriageway will have a 50mm Asphaltic concrete surfacing on the surface to be placed on a stabilised 100mm thick crushed stone base. Regarding the shoulder width, the prevailing condition of the existing non-motorised traffic, traders on the roadside and pedestrians found in these urban areas were considered. Therefore, the design provides a 2.0m paved shoulder for a temporary stop of vehicles, a 2.0 m raised walkway including a paved ditch, a 2.0m cycle lane, and a 0.5m curb channel combination. The road will also maintain a right of way of 30 m on either side of the road.

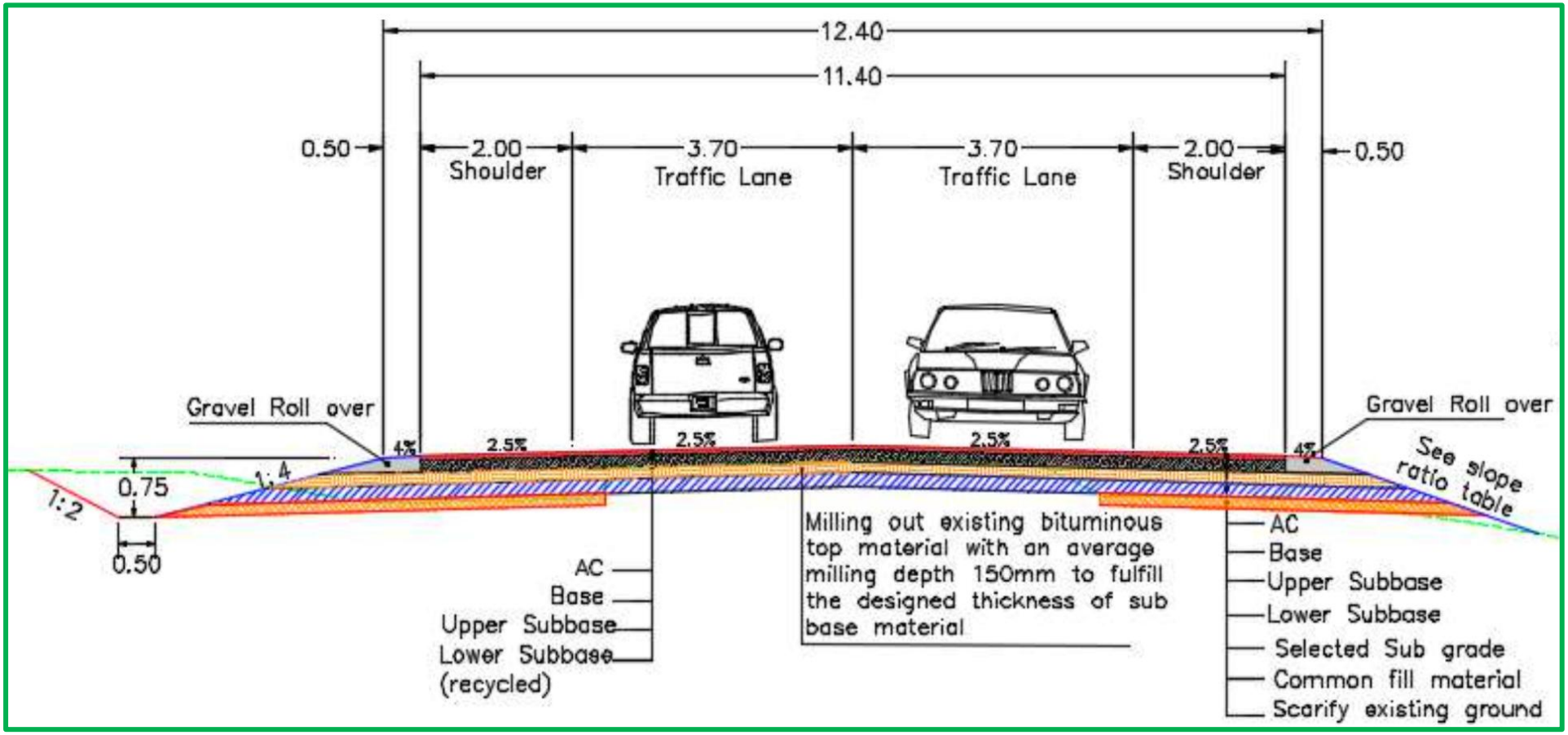


Figure 2-6: Cross-Sectional View in Rural Section

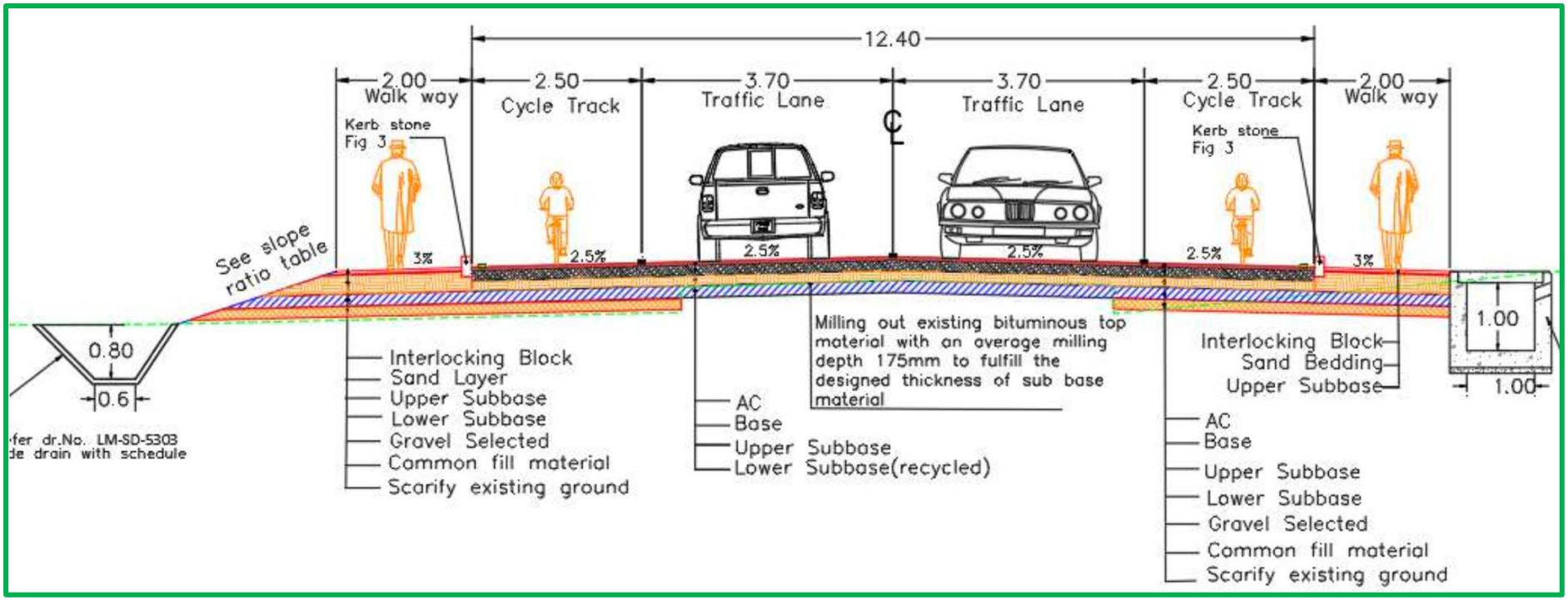


Figure 2-7: Cross-Sectional View in Urban Section

*2.2.6 **Design Speed***

The design speed for the road is set at 100 km/h in rural rolling terrain and 50 km/h in urban trading centres, consistent with the SATCC Code of Practice Addendum. Alignment analysis revealed that onearly all sections accommodate 100 km/h, except for one curve designed for 70 km/h This ensures efficiency in rural stretches while prioritising safety in built-up areas (Table 2-4).

Table 2-4: Road Terrain Classification and Design Speed

No.	Chainage	Terrain Classification	Design Speed
1	0+109	Urban	50
2	1+264	Urban	50
3	2+998	Urban	50
4	3+790	Rolling	100
5	7+582	Rolling	100
6	9+838	Rolling	100
7	10+459	Rolling	100
8	11+273	Rolling	100
9	11+721	Rolling	100
10	15+659	Mountainous	100
11	16+011	Mountainous	80
12	16+323	Mountainous	80
13	16+651	Mountainous	80
14	16+936	Urban	50
15	17+586	Urban	50
16	18+152	Rolling	100
17	20+253	Rolling	100
18	21+078	Rolling	100
19	22+650	Urban	50
20	29+024	Urban	50
21	29+965	Rolling	100
22	31+324	Rolling	100
23	33+326	Urban	50
24	36+072	Rolling	100
25	38+572	Urban	50
26	41+255	Rolling	50
27	43+844	Urban	50
28	46+641	Urban	50

2.2.7 Design Vehicle

In accordance with the SATCC manual in SADC member countries, two vehicles, passenger cars and single-unit trucks, are recommended for use in the design of rural roads. The passenger car should be used for speed-related standards, and the single-unit truck should be used for standards relating to manoeuvrability, typically at intersections.

2.2.8 Intersection Safety Features

The project road intersects with multiple local access roads, classified as Major and Minor Junctions. The design provides for 8 Major Junctions and 110 Minor/Private Access Junctions along the 47.3 km stretch. Major junctions are engineered to channelize traffic, minimize conflicts and ehnace safety, with access roads built to standard specifications. Location of the major junctions are detailed provided in Table 2-5.

Table 2-5: List of Major Junctions

No.	Chainage	Type of Junction	Side	Destination /to
1	0+300	T-Junction	LHS	To Shire Lodge
2	1+280	T-Junction	LHS	Liwonde National Park & Chiponde
3	15+320	T-Junction	RHS	Lirangwe
4	26+000	T-Junction	LHS	Namwera
5	33+560	T-Junction	LHS	Domasi College of Education
6	35+055	T-Junction	LHS	Domasi Development College
7	46+370	T-Junction	RHS	Local Road
8	47+050	T-Junction	LHS	Lake Chilwa/Phalombe

2.2.9 Pedestrian Crossings

Pedestrian volume and activities are higher in trading centres than in rural areas. In rural areas of the project, pedestrian volume and activities are also significant. Accordingly, pedestrians are considered one of the major road users in trading centres and rural areas. The proper pedestrian crossing shall be provided in trading centres and villages.

2.2.10 Bus Bays and Lay-by Areas

The designer has proposed bus bays in both directions at settlement locations and other important places. A total number of eleven (11) were proposed, and these are indicated in Table 2-6 and they include settlement areas and other important locations in both directions.

Table 2-6: Proposed Bus-bay Locations

No.	Start Station	End Station	Side
1	1+551.0	1+615.0	LHS
	1+765.0	1+829.0	RHS
2	8+431.0	8+495.0	LHS
	8+645.0	8+709.0	RHS
3	15+121.0	15+185.0	LHS
	15+665.0	15+729.0	RHS
4	17+121.0	17+185.0	LHS
	17+215.0	17+279.0	RHS
5	24+811.0	24+875.0	LHS
	24+905.0	24+969.0	RHS
6	29+471.0	29+535.0	LHS
	29+665.0	29+729.0	RHS
7	33+271.0	33+335.0	LHS
	33+645.0	33+709.0	RHS
8	38+541.0	38+605.0	LHS
	38+745.0	38+809.0	RHS
9	40+971.0	41+035.0	LHS
	41+145.0	41+209.0	RHS
10	43+571.0	43+635.0	LHS
	43+665.0	43+729.0	RHS
11	46+171.0	46+235.0	LHS
	46+665.0	46+729.0	RHS

2.2.11 Drainage

The drainage system is designed to manage stormwater from upstream catchments of Liwonde Forest Reserve, Malosa Forest Reserve, and Zomba Mountain Nature Reserve, as well as runoff from the road surface and right-of-way. Runoff will be safely conveyed across the road and discharged into suitable outlets to prevent adverse impacts.

Hydrological analysis recommended the construction of three new bridges at Lifani (27+115 km), Domasi (34+661 km), and Chikupira (45+004 km). Each bridge will feature 2.0 m-wide raised pedestrian footpaths on both sides (Figure 2-8 and Figure 2-9). Structural design includes reinforced concrete decks on pier caps with elastomeric bearings, 1000-millimetre diameter cast in-situ reinforced concrete piles, and scour protection using gabion boxes.

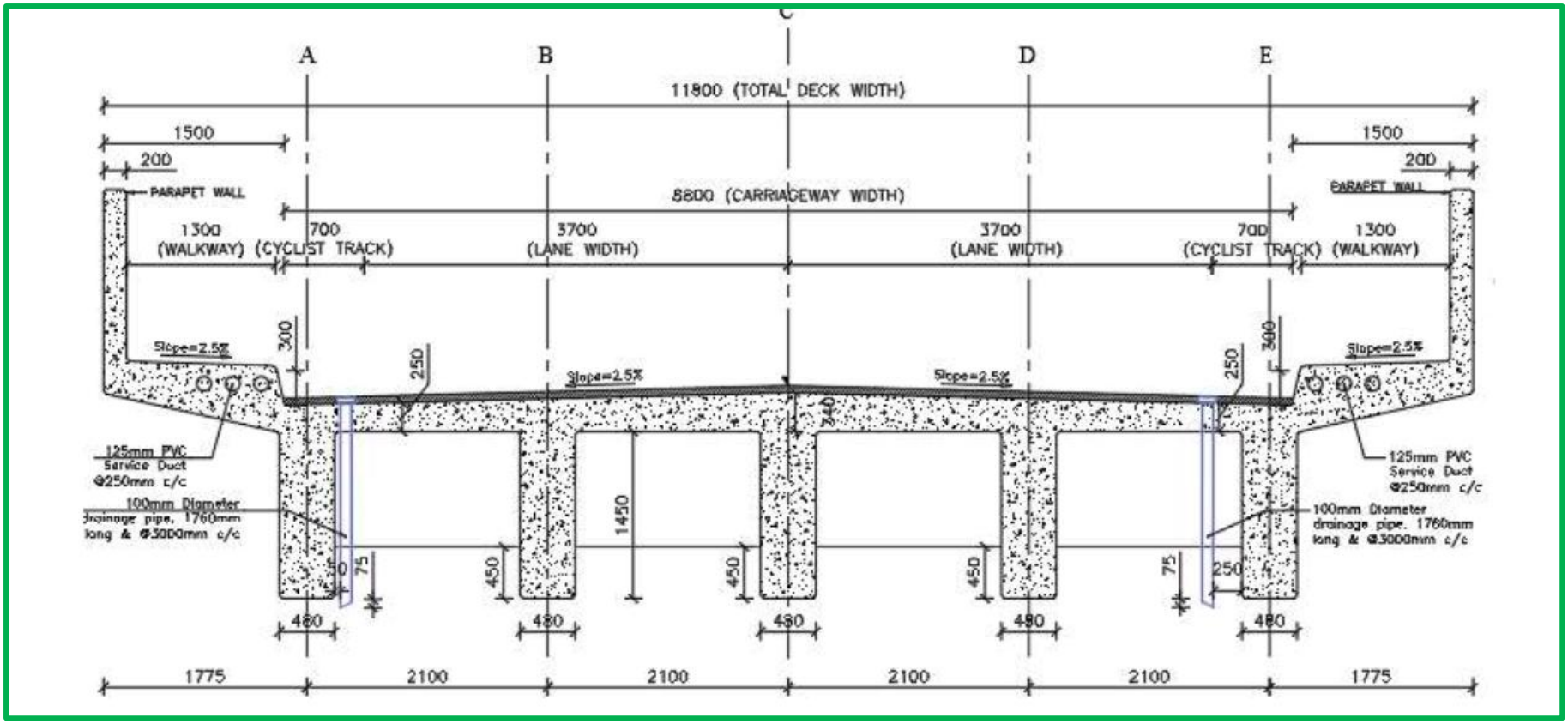


Figure 2-8: Proposed Cross Section for Lifani (27+115 km) Bridge.

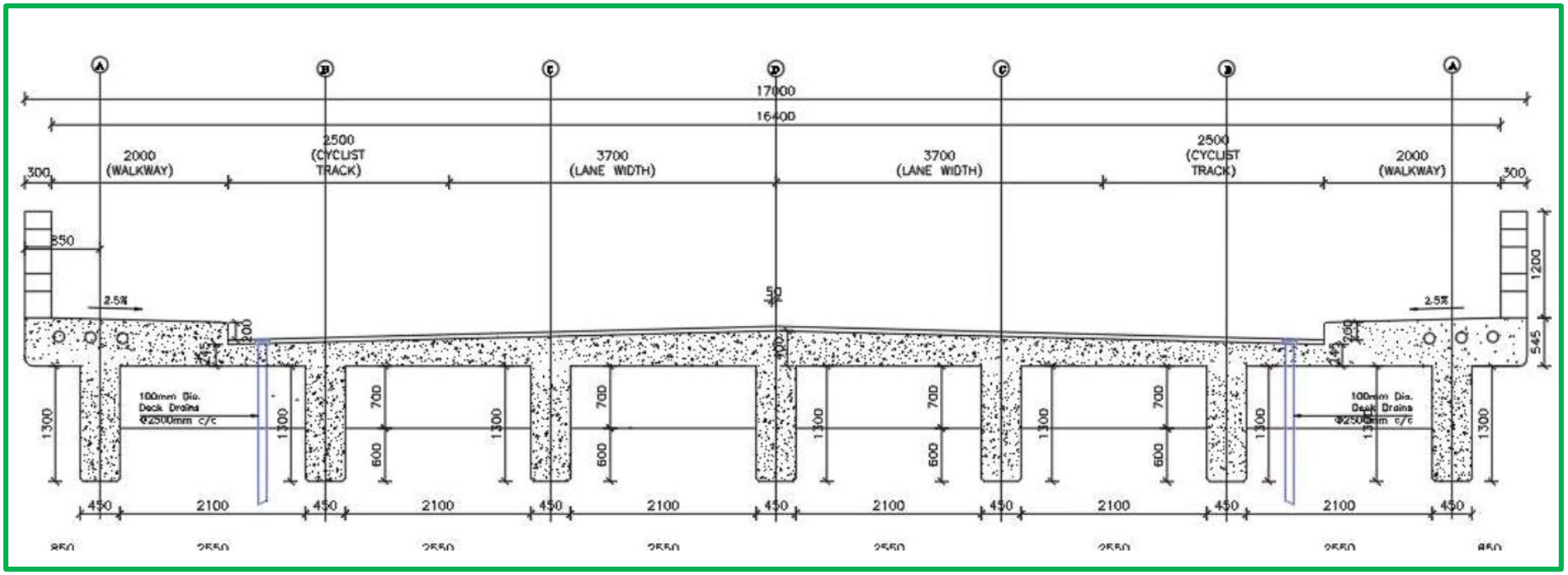


Figure 2-9: Proposed Cross Section for Domasi, and Chikupira Bridges

2.3 Main Project Phases and Activities

The Project activities include those during the pre-construction, construction, and operational phases of the proposed rehabilitation of Liwonde – Matawale (M003) Road Project. Each activity has likely adverse environmental and social impacts. The following works will form part of the activities that will have to be carried out:

- Widening of the road carriageway;
- improvements to the road and bridge quality;
- Improvement to drainage.

The project will be implemented as per the schedule provided in Table 2-7.

Table 2-7: Tentative Implementation Framework

Activity	Time frame
Design and tendering	2023 - 2025
Construction	2025 -2027
Post construction (operation and maintenance) and Defects Notification Period (DNP)	2027 - 2028

2.3.1 Pre-Construction Phase

This phase has already commenced with feasibility studies. The studies were mainly on the engineering preliminary designs of the road and the project's economic feasibility. The studies considered the feasibility of the road's route in terms of geometric suitability, geological conditions, settlement patterns, hydrology of the areas and other socio-economic factors. The economic feasibility focused on the proposed route's traffic counts. The studies also surveyed construction materials such as gravel and quarry stone availability.

(i) Preliminary design

The preliminary design phase focused on generating baseline technical and social data to inform the project's alignment and standards. Key activities included: reviewing existing road, social, and economic data; conducting topographical, hydrological, and hydraulic surveys; undertaking sub-surface soil and materials investigations (borrow pits, quarries, water sources); and completing field and laboratory tests. Additional tasks involved traffic analysis and the ESIA to integrate environmental and social considerations into the design.

(ii) Public consultation and disclosure

During the data collection for the engineering design and ESIA, the stakeholders were met, and the project's intention was promulgated to them. This consisted of communities and formal and informal discussions with the heads of various sectors at the local district councils (Attendance sheers and meeting results in Annex 2).

(iii) Securing the Road Reserve Boundary

The Liwonde-Matawale (M003) road is gazetted with a 60 m road reserve, but the project will secture 30 to 35 m corridor of impact required for civil works and safe road operation. Properties affected; residential, commercial and mixed-use buildings, fences, and utilities, are addressed through the RAP (August, 2025).

Activities include: demarcating the reserve and servitudes, surveying and marking the route, and chainage. Negotiations and agreements with Project-Affected Persons (PAPs) will guide the RAP's implementation, ensuring that only the corridor of impact is acquired, not the full reserve.

2.3.2 Construction Phase

Construction will be undertaken by two contractors, each responsible for half of the road. Key works include mobilization, camp establisment, excavation of borrow pits, drainage and cuvert construction, pavement and bituminous surfacing; ancillary facilities (bus bays, signage, guardrails), landscaping, and securing only the corridor of impact (30-35 m).

(iv) Establishment of Temporary Camps and Storage Areas

One main camp (≤2 ha) with possible satellite sites will be established through negotiated agreements, in line with Bank safeguards. Facilities will include safe water supply (boreholes), sanitation (septic tanks), stormwater drainage, clinic, sickbay, and worker welfare amenities. Criteria for siting of construction camps, storage areas, and establishment of facilities are given in Chapter 6 as part of the management and mitigation measures and further guidelines provided in Annex 19.

(v) Project Personnel and Working Conditions

About 150 workers per lot, with emphasis on local hiring (≥95 unskilled workers) and gender inclusion (30% women in unskilled roles). Camps will comply with World Bank worker accommodation standards.

(vi) Core Activities

- Setting out the alignment, chainage, and cross-sections.
- Clearance of vegetation, topsoil removal and storage, and demolition of obstructions.
- Earthworks, including embankment preparation, filling, compaction, landscaping, and erosion control.
- Excavations and filling for culverts, bridges, and gabion protection.
- Culvert and drainage works, replacing collapsed structures and improving outfalls.
- Stormwater management, with a contractor-prepared plan to protect ecological and social values.
- Traffic deviations and TMP, ensuring safe traffic flow during construction.

- Material handling, covering gravel, bitumen, cement, steel, and timber, with tracking via a materials data schedule.
- Concrete works and formwork, meeting specified engineering standards.
- Road furniture, including guardrails, signage, road markings, and studs.
- The contractor will also be required to provide and erect permanent road signs where instructed by the resident engineer and in accordance to special specifications. They will include:
- Warning signs
- Priority, prohibitory and mandatory signs
- Standard informatory signs
- Non-standard informatory signs
- Along with the physical signs, the contractor would be required mark the road as directed by the engineer.

2.3.3 Demobilization

Demobilization will include dismantling temporary structures, clearing waste, rehabilitation borrow pits, reusing stockpiled topsoil, and re-vegetating disturbed areas.

2.3.4 Operational and Maintenance Phase

Once operational, the road will undergo routine monitoring, repairs, and maintenance. A 12-month defects liability period is included to address construction defects and environmental rehabilitation.

2.4 Labour Requirement (Number of People to be Employed)

The construction works will be carried out by a contractor expected to employ approximately 267 workers at peak capacity, consisting of both skilled and unskilled labor. The workforce will include 197 males and 70 females, with a significant emphasis on providing employment opportunities for local workers.

A small number of international personnel (19 males and 5 females) are included to provide specialized expertise in engineering supervision, surveying, electrical and mechanical works, and environmental and safety compliance. Their role is mainly supervisory and short-term, ensuring adherence to international standards, use of contractor-specific technologies, and knowledge transfer to local staff.

Job distribution will cover various categories, including civil engineering, surveying, masonry, carpentry, mechanical work, drainage construction, pavement and asphalt work, traffic control, security, and environmental management. Skilled labor positions will account for 73 personnel, while 194 workers will fill unskilled roles (Table 2-8). The employment will follow the national Gender Policy of employing at least 40% of either gender category.

Table 2-8: Expected number of people to be employed

SN	Employee Category	Local	International	Total
1	Civil Engineering and Supervision	7	4	11
2	Surveying and Mapping	5	3	8
3	Masonry and Concrete Works	18	1	19
4	Carpentry and Formwork	12	1	13
5	Electrical Works	7	3	10
6	Mechanical Works	9	4	13
7	Drainage Construction	15	1	16
8	Pavement and Asphalt Works	18	2	20
9	Road Marking and Signage	7	3	10
10	Excavation and Earthworks	23	0	23
11	Manual Material Handling	27	0	27
12	Site Clearing and Preparation	21	0	21
13	Traffic Control and Safety	15	0	15
14	General Site Maintenance	17	0	18
15	Catering and Welfare Services	11	0	11
16	Security Services	14	0	14
17	Health and Safety Compliance	8	1	9
18	Environmental & Social Management	8	0	9
	Sub Total	**243**	**24**	**267**

2.5 Construction Plant and Equipment to be Used

To effectively carry out the construction activities, a variety of specialized machinery and equipment will be employed. These machines are crucial for tasks such as earthmoving, excavation, material transportation, compaction, and road surfacing. A detailed list of the primary construction equipment, including their required quantities and intended purposes, can be found in Table 2-9.

Table 2-9: Machinery to be used onsite

Equipment Type and Characteristics	Minimum Number Required	Purpose
Bulldozer (>D7)	4	Earthmoving, clearing and leveling ground
Excavator (>920HP)	6	Excavation, trenching, and material handling
Crushing and screening plant – mobile type at least 150 m3/h including rock material washing machinery	2	Processing and grading aggregates for construction
Chip spreader	2	Evenly distributing aggregate chips on road surfaces during paving

Equipment Type and Characteristics	Minimum Number Required	Purpose
Bitumen Distributor	2	Spraying bitumen on road surfaces before chip sealing or asphalt paving
Front end loader (>135HP)	2	Loading and transporting materials such as gravel and soil
Concrete batching plant (>60m3/hr)	2	Mixing and producing concrete for construction works
Motor grader (>135HP)	6	Leveling and shaping road surfaces before paving
Steel drum roller (>10T)	4	Compacting asphalt and granular materials for road durability
Sheep foot roller	2	Compacting soil, particularly for embankments and subgrade preparation
Pedestrian Roller	2	Compacting smaller areas and pathways
Pneumatic tire roller	2	Compacting asphalt layers and ensuring a smooth surface finish
Bitumen Storage Plant	2	Storing and heating bitumen for road construction applications
Tipper truck (10T)	15	Transporting construction materials such as sand, gravel, and debris
Water Bowsers (10 m3 capacity)	4	Spraying water to control dust and moisture soil for compaction
Concrete mixer	2	Mixing concrete at construction sites
Concrete truck	2	Transporting ready-mix concrete to construction sites
Mobile crane	2	Lifting and positioning heavy materials and equipment
Flat bed truck	2	Transporting construction materials and equipment
Low bed	2	Transporting heavy machinery and oversized loads
Pick up	8	General transportation of personnel and small tools onsite

2.6 Worker Welfare Facilities

To safeguard occupational health and safety and ensure decent working conditions, the project will provide welfare facilities for workers both at main campsites and strategically along the project corridor. These facilities will be adjusted as construction progresses and positioned near active work fronts, borrow pits, and batching plants.

Key provisions include:

- **Sanitation**: Mobile or temporary toilets will be provided at intervals not exceeding 2 km or at each major work cluster. Toilets will be serviced regularly by licensed operators. A ratio of 1 toilet per 20 workers will be maintained, consistent with ILO/IFC standards and national labour regulations. Waste generated from these facilities will be managed in line with the provisions outlined in Section 2.8 Waste Management.
- **Shelter**: Temporary shaded rest areas with seating will be installed at construction fronts, borrow pits, and batching plants to protect workers during breaks from sun and rain.
- **Drinking Water**: Safe potable water will be provided daily through storage tanks or dispensers at all welfare stations. A supply of at least 5 litres per worker per day will be maintained, in line with Malawi Bureau of Standards guidelines. Greywater from washing points will also be managed under Section 2.8.

*Table 2-10**: Prop**osed Worker Welfare Facilities a**long the Corridor***

Facility Type	Standard Provision	Strategic Arrangement	Responsible Party
Sanitation (toilets)	1 per 20 workers	Mobile toilets placed ≤ 2 km apart or at each major work cluster	Contractor, serviced by licensed waste operator
Shelters	Shaded rest structures with seating	At all major work sites, borrow pits, and batching plants	Contractor
Drinking Water	5 litres per worker per day	Safe storage tanks/dispensers refilled daily at welfare stations	Contractor, supervised by Supervision Consultant

Provision of welfare facilities will be implemented under the Contractor's Occupational Health and Safety Plan and monitored through the ESMP. Detailed health and safety measures relevant to worker welfare and site safety are provided in Annex 20: Health and Safety Management Guidelines.

2.7 Sources and Management of Main Construction Materials

2.7.1 Borrow Areas

Six borrow pits were identified (Table 2-11), with Mlombwa, Gelevulo, and Ajali confirmed suitable for gravel. Additional pits (Chichiri and Kasaulo) showed strong geotechnical properties. Gravel quantities total 233,069 m³, requiring stabilization (2–4% cement). Borrow areas lie on customary land, requiring RAP compliance, community consultation and MEPA/RA approval of ESMPs .

Table 2-11: Identified borrow pit locations

S/n	Name of Borrow Pit	Coordinates		Approximate Area (m^2)	Estimated quantities (m^3)
		X	Y		
1	Chichiri	-15.417464°	35.381411°	35,000	56,584
2	Ajali	-15.246924°	35.428190°	42,000	60,480
3	Mlomba	-15.239620°	35.391362°	13,000	19,500
4	Kazembe	-15.183095°	35.389050°	28,000	36,600
5	Gelevulo	-15.205724°	35.361974°	25,000	32,500
6	Kasaulo	-15.060016°	35.363224°	20,300	27,405
	Total estimated quantity				233,069

2.7.2 Water Sources

Daily water demand is 150 m^3 for works and 10 m^3 potable. Sources include Shire and Domasi Rivers for construction and boreholes for drinking, Potable water will be tested to Malawi standards, with approvals from the Malawi National Water Resources Authority.

2.7.3 Rock (Aggregate)

There are no commercial quarries nearby. Aggregates may be sourced from Njuli Quarry (55 km away), Balaka or potential local quarries (e.g. Domasi). Estimated requirements: 33,766m^3 (40 mm) 45,232 m^3 (20mm), 62,423 m^3 (10mm), and 15,341m^3 boulders The project will also require approximately 156,762 m^3 of natural gravel as base material. Quarry extraction requires a separate ESIA.

2.7.4 Sand

The project will use sand to produce concrete for bridges and drainage systems. Chinamwali River was identified as a sand source. The project will require an approximate amount of 3,132 m^3 of sand.

2.7.5 Cement

Approximately 1600 MT will be required, mainly from local suppliers in Blantyre and Zomba, with bulk imports from cement factories (e.g. from Mangochi). A batch plant covering approximately 0.04 ha will be included within the 2 ha camp.

2.7.6 Bitumen

Approximately 1416 MT of bitumen will be required, sourced from South Africa or the Middle East. About 9,500 drums will be required if the bitumen is not transported in bulk. The bitumen will be transported by road and directly delivered to the storage yard at the site camp. Storage and heating facilities at the camp will adopt strict health and safety measures.

2.7.7 Energy Sources

- Electricity from the grid and backup generators for tools, lighting, and batch plants.
- Diesel for machinery, transport, and water bowsers, with on-site storage under strict safety controls.
- Bitumen heating using diesel burners or electricity at site camps.

To maintain a continuous supply, the project will establish on-site fuel storage facilities, incorporating stringent safety measures and spill prevention protocols (including bunded areas in line with World Bank EHS guidelines).

2.8 Waste Management

The project is expected to produce different types of waste, including hazardous and non-hazardous waste. Table 2-12 shows the expected type of waste and proposed management measures. To manage solid waste effectively, the contractor must develop amd implement a Waste Management Plan (See Annex 10 for Guidelines). This includes constructing a temporary waste storage facility with sufficient capacity to store waste produced over 30 days. Specifically, each contractor must ensure that their facility has a minimum monthly storage capacity of 2,500 kilograms. For liquid waste, the contractor will construct a septic tank with a minimum capacity of 14,600 litres to cater for an estimated 70 people. This will ensure proper containment and treatment of liquid waste generated on-site, particularly sewage and other liquid effluents, to minimise environmental impact and maintain compliance with local regulations. Arrangements will be made to pump out the septic tank regularly for disposal at licensed treatment facilities. A chain of custody system will be used to ensure disposal of the waste has been done safely and to licensed treatment facilities.

Table 2-12: Main expected type of waste and proposed management measures

Waste Stream	Possible Sources	Unit Rate	Working Figure	Estimated Waste Amount	Proposed Waste Management Measures
Empty 200-Litre Bitumen Drums	Bitumen containers	1 drum per 200 liters of bitumen used	34,800 liters of bitumen	7,000 drums	Recycle the metal by a licensed waste handling and disposal private entity.
Used Batteries	Mobile equipment	1 battery per piece of equipment	160 pieces of mobile equipment	160 batteries	Collect and store in designated areas. Dispose of through certified hazardous waste contractors for recycling.
Metal Scrap	Construction and demolition activities	1 ton per large construction site	6 construction sites	6 tonnes	Recycle all scrap metal through certified recycling vendors. Temporary storage in designated areas.
Used Oils	Vehicle servicing and machinery maintenance	250 liters per large fleet unit, 50 liters per small equipment unit	50 large fleet units, 50 small equipment	28,000 liters	Collect in designated containers. Dispose of through certified hazardous waste contractors.
Cleaning Materials (Detergents)	Cleaning of site facilities and equipment	1.5 Liters per month per site	3 main sites	60 liters	Use eco-friendly detergents where possible. Collect and dispose of used containers in compliance with local regulations.
Excavated Soil/Debris	Earthworks, road widening, drainage installation	1 cubic meter per 10 square meters of excavation area	40.55 hectares (405,500 m^2)	40,550 m^3	Reuse on-site for landscaping or backfilling. Dispose of excess soil in approved council dumpsites or use as fill material.
Concrete Waste	Bridge construction, culvert	5% of 1,416 MT of cement	1,416 MT of cement	106 MT (approximately)	Recycle or crush for reuse as aggregate in new construction. Dispose of unusable portions in authorized facilities.

Waste Stream	Possible Sources	Unit Rate	Working Figure	Estimated Waste Amount	Proposed Waste Management Measures
	installations, pavement works				
Construction Rubble	Demolition of old structures, culvert installation	0.01 tons per 10 square meters of construction area	70.55 hectares (705,500 m²)	70.55 tons	Recycle or reuse rubble as fill material. Non-recyclable rubble to be sent to council approved disposal sites.
Packaging Waste (Cement Bags)	Cement bags	20 bags per MT of cement used	1,416 MT of cement	55,260 bags	Reuse where possible or recycle. Dispose of non-recyclable bags according to MEPA waste management regulations. Use of bulk delivery of cement instead of pockets to minimize waste.
Wood Waste	Temporary structures, scaffolding, formwork	0.02 tons per 100 square meters of construction area	2.5 hectares (25,000 m²)	5 tons	Reuse for construction or donate to local communities. Dispose of non-reusable wood safely.
Domestic Waste	Worker camps, site offices	0.2 kg per worker per day	250 workers for 24 months	36,000 kg (36 tons)	Segregate waste. Compost organic waste. Recycle or dispose of non-recyclables according to local regulations.
Plastic Waste	Bottles, packaging from consumables	0.5 kg per worker per month	250 workers for 24 months	3,000 kg (3 tons)	Recycle all plastic waste. Minimize single-use plastics. Dispose of non-recyclable plastics at designated facilities.
Sewage	Worker camps, site offices	15.6 m³ of potable water per day	24 months (720 days)	11,232 m³	Use septic tanks as there are no sewage systems in the area. Regular collection and treatment by licensed service providers.

2.8.1 Organic Waste Management

The project is expected to produce organic waste mainly from the campsites with the increased number of workers. Therefore, the project will have rubbish pits and use licensed waste management operators to collect the waste from campsites and dump it at an approved municipal dump site in Machinga or Zomba Districts. However, as much as possible, the project will promote the waste management hierarchy by having the waste composted off-site by a licensed waste operator. On-site waste dump sites will require land, at most 0.2 hectares.

2.8.2 Liquid Waste Management

During the construction phase, more than 15.6 cubic meters of wastewater are expected to be generated daily. As such, there is a need to consider how to properly manage and dispose of this volume of wastewater, considering that the project will be in a rural setup where there is no sewer system, options such as the use of septic tanks and the use of wastewater stabilisation ponds were the only ones considered. With the large volume of effluents that will be discharged from the project during operation, the septic tanks will need to be emptied time and again. However, the period of construction is not that long, and this makes the use of a septic tank the preferred option. However, the siting of the camps will need to adhere to campsite siting criteria to reduce impacts on groundwater quality. Additionally, the contractor will install and maintail concrete-lined sedimentation tanks at all concrete batching plants to capture and treat run-off and wash water, thereby preventing sediment, concrete residue and other pollutants from contaminating surrounding soils and water bodies.

2.8.3 Non-Hazardous Inorganic Solid Waste Disposal Methods

The project will generate a lot of non-hazardous solid waste, including inert plastic waste, glass, wastepaper, and scrap metals. Therefore, the project has considered two options for managing such waste. The first option is using a rubbish pit, complemented by the licenced waste collection, to dump the waste at an approved municipal dump site in Machinga or Zomba Districts. However, it is advantageous to use licensed operators because they will be requested to use a waste management hierarchy to minimise the waste dumped at the dump sites. The licensed operators might be able to identify waste reusing and recycling companies for other specific types of waste, e.g. scrap metals and wastepaper.

2.8.4 Hazardous Waste Management

The project is expected to produce different types of hazardous waste, namely, bitumen, engine oils, automobile batteries, solvents, and pesticides. Various options have been considered to manage the waste safely. The first option is to construct a hazardous waste pit that can contain the waste without contact with the surrounding environment by lining it. The advantage of this option is that the distance required to transport the waste is minimised, and the frequency of waste disposal is reduced. The disadvantage of this option is that it is costly to construct the waste dump site and might require approvals by the Malawi Environment Protection Authority

(MEPA), which might not be definite. However, the project must construct a hazardous waste storage facility, i.e., a lined shed. The total area for the facility is approximately 0.1 ha, which will form part of the total land allocated for a temporary waste disposal site.

Hazardous waste management will be complemented by licensed waste collectors who can identify the companies that recycle such waste. For the empty drums containing bitumen, the project will sell the used drums to recycling companies which recycle scrap metals. However, the project project will contract licensed waste management companies to handle the waste. For automobile batteries and other waste, the contractors will identify licensed waste collectors to recycle the mentioned waste. For comprehensive management of hazardous waste, a guideline has been provided in Annex 17.

CHAPTER 3: CONSIDERATION OF ALTERNATIVES

This chapter describes and analyses the important features of the components of alternatives that were evaluated with regards to the Project, considering environmental, social and economic variables. The Project alternatives were assessed with focus on defined criteria, and mostly considering project location, designs and technology, construction and operation procedures. This analysis does not consider the unselected alternative as unviable, but only presents it as the least favourable with respect to the other options.

3.1 No Project (Do Nothing) Option

The No-Go alternative ("Do nothing" option) considers non-development of the Project, which implies little or no improvement would be realised in the environmental and socio-economic setting or life of the area as it currently exists. The implication of this alternative is enormous as all the environmental and social benefits that would be derived from the road construction alternative would be lost.

The advantages (environmental and socio-economic) that the No-Go alternative presents are that the potential adverse environmental and social impacts such as dust emissions, noise and exhaust emissions, land expropriation, potential loss of flora and fauna, landscape alteration, etc. that may be associated with the road construction would be avoided. Also, the huge financial costs associated with the Project implementation will be avoided and money saved.
Nevertheless, the No-Go alternative also has a lot of environmental and socio-economic downsides. For instance, the local economy of the Project area is comprised mainly of agriculture and commerce / services; therefore, non-development of the Project would lead to the slowing down of the economic growth in the area as agricultural productivity and/or marketing of produce will no longer be boosted, given the poor nature of the road (which is a huge socio-economic drawback). Similarly, the potential for improving the scenic view, road condition and/or traffic situation with its associated cost (financial and travel time) to the public would all be lost. Other benefits which would be foregone as a result of non-construction of the roads include opportunities for improvements in drainage, employment opportunities for local residents along the road, boost in tourism and trading activities, poverty reduction, enhanced development and improvement in housing and other amenities, as well as gender empowerment opportunities.

Non-development of the project will also imply no improvements in all elements of the road's environmental and social safety features. For instance, the roads currently do not have adequate sight distance provisions for drivers to have sufficient time to identify and appropriately react to all elements of the road environment, including other road users and hazards. Meanwhile, it is important that the road reserve is clear of any obstructions that might restrict the sight of drivers, which includes keeping the road reserve clear of vegetation, especially at horizontal

curves and installing road safety features or traffic calming measures. Opportunities for dust management through improved road surfacing and drainage management would also be lost.

3.2 Re-Construction / Rehabilitation of Existing Road Alternative

The project implementation alternative will yield all the environmental and socio-economic benefits that would have been lost under the "Do nothing" option. The proposed road reconstruction or rehabilitation will follow the existing alignment of the roads. However, improvements will be made to the existing surface and geometric alignments of the existing roads, where necessary. This will also involve constructing or rehabilitating culverts to acceptable safety and environmental standards, as well as improving drainage. The proposed road upgrades from their existing standards will also require the provision of appropriate road signage so that motorists are warned of hazards such as culvert locations and speed reductions or increases, as well as the location of intersections and appropriate signs notifying motorists of traffic calming measures. To further improve the road user's safety, guardrails will also be provided at all bridges, and speed ramps and other road safety features will be fixed. Sidewalks are also considered in built-up areas to separate pedestrians and cyclists from motorised modes of transport, as well as the provision of bus laybys or stopping areas.

The Project implementation alternative is a more realistic option and would benefit communities along the roads and the general population. While some negative environmental and social impacts (disadvantages) will characterise this alternative, such as potential destruction of vegetation or landscape alteration, dust and noise emissions, and some potential displacement of people and properties or assets, these negative impacts (drawbacks) will be managed and reduced to as low as reasonably practicable levels by employing effective mitigation measures. The Project would limit the potential destruction of vegetation, avoiding vegetation of special ecological and economic significance at best. Similarly, the positive impacts of the Project would be enhanced.

In terms of construction materials, the project will require a mix of natural and processed materials, including gravel, sand, aggregates, cement, bitumen, and water. Gravel and sand will be sourced from designated borrow pits and riverbeds, while aggregates (10–40 mm) and boulders will be obtained from licensed quarries such as Njuli and Balaka. Cement will be supplied locally, with possible bulk imports, while bitumen will be procured from regional or international suppliers. Diesel and electricity will be the main energy sources for machinery and batching plants, with solar power supplementing camp and welfare facilities. These materials and energy sources will be managed carefully to minimize environmental impacts, ensure quality, and promote resource efficiency.

3.3 Inclusion of Climbing Lane

A comparative analysis was undertaken to evaluate the inclusion of a climbing lane within the Liwonde Forest Reserve, considering two alternatives: constructing the climbing lane (Option 1) and maintaining the existing road profile without it (Option 2). Option 1: With Climbing Lane presents clear transport-related benefits. It enhances safety and traffic flow on steep

gradients, reduces congestion, and minimizes wear and tear on vehicles, particularly benefiting heavy and slow-moving vehicles. However, this option involves protrusion into the Liwonde Forest Reserve, a sensitive ecological area. Such encroachment poses risks including loss of biodiversity, disturbance of wildlife habitats, and the introduction of a new environmental footprint. Moreover, it could invoke more stringent environmental licensing requirements and necessitate costly measures to mitigate biodiversity impacts. Although consultations with the Forestry Department and project engineers have led to a minimalist approach where only a limited section of the reserve, mainly comprising unprotected indigenous trees and small mammals, would be affected, the environmental implications are a concern and mitigation measures have been incorporated into the ESIA to minimise these impacts. .

In contrast, Option 2: Without Climbing Lane avoids ecological disturbance entirely. By maintaining the existing alignment, it minimizes vegetation loss, prevents habitat fragmentation, and reduces construction costs. While this option may result in traffic delays and decreased efficiency for uphill travel, especially for heavy vehicles, it upholds conservation priorities. Given the ecological sensitivity of the area, Option 2 is preferred, as it preserves the integrity of the forest reserve and aligns with environmental sustainability commitments. Moreover, road safety and traffic flow improvements can be achieved through alternative, non-intrusive interventions such as speed control measures, warning signage, and shoulder enhancements, thereby balancing mobility needs with environmental protection.

3.4 Alternative Design and Technology

This section evaluates alternative design and technology options considered during the planning and conceptual design of the project to minimise environmental and social impacts, reduce cost, enhance safety, and improve overall sustainability.

3.4.1 Geometric Design and Alignment Adjustments

While the project largely maintains the existing road alignment, adjustments were made in specific areas to minimise displacement and ecological disruption. In densely populated trading centres such as Liwonde, Namwera Turn-Off, Somba, Domasi, Songani, Naizi, Chinamwali, and Matawale, the design speed was reduced to 50 km/h, with traffic calming measures (e.g. pedestrian crossings, rumble strips, signage) integrated into the design. In smaller villages and constrained segments, the speed was further reduced to 40 km/h to accommodate geometric limitations and ensure safety.

Where geometric standards could not be maintained due to the proximity of buildings or natural features, the road width was narrowed, or minor re-alignments were proposed to preserve critical structures such as schools, mosques, churches, and sensitive ecosystems like the Liwonde Forest Reserve. In cases of substandard curves or gradients, realignment options were considered to meet design safety requirements while reducing environmental footprint.

3.4.2 Pavement Design Alternatives

Three pavement options were evaluated:

- Hot Mix Asphalt (HMA): Durable and suitable for high-traffic segments but costly and difficult to apply in remote areas.
- Concrete Block Paving: Labour-intensive and feasible in built-up areas; easy to maintain and suitable for confined spaces.
- Surface Dressing: Cost-effective and suitable for rural stretches; supports local labour but requires more frequent maintenance.
- A combination of asphalt surfacing in urban and trading centres and surface dressing in rural areas was selected to optimise performance and cost-efficiency.

3.4.3 Design for Climate Resilience and Drainage

The design approach for drainage and climate resilience incorporates both conventional engineering principles and customized measures tailored to address the increasing risks associated with climate change. Conventional drainage design typically involves standard culvert spacing, embankment elevation based on historical rainfall data, and use of engineered slope protection methods. While effective under normal conditions, such designs often fall short in the face of more intense and frequent climate-induced events such as flash floods, prolonged rainfall, and accelerated surface runoff.

To address these emerging challenges, the project integrates customized climate-resilient design elements. These include the use of raised embankments in flood-prone zones based on updated hydrological modelling that considers future rainfall intensity scenarios. Culverts and drainage channels are not only well-distributed but also dimensioned and located based on projections of peak flow volumes and localized flood risks. In areas with steep gradients, slope stabilization is reinforced using bioengineering techniques such as vetiver grass planting and geotextiles, complementing conventional retaining structures to prevent erosion, reduce slope failure risks, and enhance the long-term durability of the road.

Overall, the shift toward climate-responsive design ensures that the road corridor remains safe, functional, and structurally resilient under future climatic conditions. It also aligns with the project's objective to minimize environmental disruption while optimizing long-term socio-economic and infrastructural benefits.

3.5 Alternative Labour Sourcing Options

Labour sourcing for the project was assessed across three main models: full local recruitment, external skilled labour, and a hybrid approach combining both local and external labour sources. Each model was evaluated based on its socio-economic benefits, technical capacity, cost, and alignment with environmental and social standards.

3.5.1 Option 1: Local Recruitment Only

This option prioritises hiring all project workers from surrounding communities. The advantages include enhanced community ownership, reduced accommodation and transport costs, and economic stimulation within the project area. However, the disadvantages lie in the potential shortage of qualified personnel for specialised roles such as engineering, environmental management, and technical supervision. There may also be gaps in exposure to internationally recognised labour standards and health and safety practices.

3.5.2 Option 2: External Skilled Labour Only

This model assumes the deployment of an entirely external workforce with prior experience on similar infrastructure projects. While this ensures a high level of technical proficiency and efficient execution of tasks, it leads to limited local economic benefits, increased project costs (due to higher wages and logistics), and potential resentment from the host communities due to lack of local participation.

3.5.3 Option 3: Mixed Model (Preferred Option)

The mixed model adopts a dual strategy of engaging local workers for unskilled and semi-skilled roles, while sourcing specialised expertise externally for complex tasks. This approach promotes social inclusion, provides job opportunities to community members, ensures project efficiency, and facilitates skills transfer. It also aligns with the World Bank's operational policies on labour and working conditions, which encourages local employment and decent working conditions.

Under this model, the contractor will be required to maintain transparency in recruitment processes, ensure gender inclusivity, prohibit child and forced labour, and implement a functional Workers' Grievance Redress Mechanism (WGRM). The provision of training to local hires will be prioritised to enhance capacity and compliance with health, safety, and environmental standards.

Overall, the mixed labour sourcing model offers a sustainable balance between technical delivery and community empowerment, making it the preferred approach for the project.

3.6 Construction Materials

The selection of construction materials plays a critical role in determining the project's environmental footprint, cost-efficiency, and sustainability. Three primary alternatives were explored for sourcing construction materials:

3.6.1 Option 1: Locally Sourced Natural Materials (Preferred Option)

This approach involves sourcing laterite, gravel, sand, and rock from nearby licensed borrow pits, quarries, and rivers (e.g., Chinamwali River for sand). This option supports the local

economy, reduces transportation distances and emissions, and can be more cost-effective. However, it requires rigorous environmental and social screening to ensure minimal ecological disruption and compliance with national permitting requirements, including environmental clearance and agreements with local councils.

3.6.2 Option 2: Imported or Non-local Materials

This option considers sourcing materials from distant locations or importing certain aggregates and construction inputs. It may be necessary where local materials do not meet quality standards or are insufficient. While it ensures material quality, it significantly increases transport-related emissions, costs, and potential delays in supply chain logistics. It also reduces local economic participation and can raise concerns about sustainability.

3.6.3 Option 3: Use of Recycled and Reclaimed Materials

Where feasible, this option promotes the use of recycled aggregates from demolition waste, reclaimed asphalt pavement (RAP), and reused concrete for sub-base layers. This supports circular economy principles, reduces pressure on virgin natural resources, and minimizes construction waste. However, it may require additional processing, testing, and certification to ensure compliance with road engineering standards.

In conclusion, locally sourced natural materials remain the preferred option, provided that material quality, environmental mitigation, and regulatory compliance are assured. The use of recycled materials will be encouraged as a complementary strategy wherever practical, in line with sustainability goals and climate-resilient infrastructure development.

3.7 Energy Source Alternatives

An important consideration for the project is the choice of energy sources during construction and operation. Energy demand will mainly arise from equipment, batching plants, material processing, lighting, and welfare facilities. Two broad alternatives are considered:

Option 1: Non-renewable Energy Sources

Diesel and grid electricity remain the most practical sources for powering heavy equipment, lighting, and batching operations. Diesel is readily available in Malawi and supports mobility of equipment, while grid electricity is reliable in urban segments of the corridor. However, reliance on these sources increases greenhouse gas emissions and exposure to fuel price fluctuations.

Option 2: Renewable Energy Sources

Renewable options such as solar power can supplement non-renewables by providing energy for campsites, lighting of welfare facilities, and limited operation of site offices. Solar mini-grids or standalone units can reduce diesel dependency, cut costs in the long term, and align with Malawi's commitment under the National Energy Policy (2018) and global climate action

goals. However, renewables alone may not meet the high energy demands of heavy machinery and asphalt processing.

Option 3: Conclusion on Energy Alternatives
The project will adopt a hybrid approach, prioritizing renewable energy (solar for campsites, welfare facilities, and office lighting) while relying on non-renewables (diesel and grid power) for heavy construction equipment and batching plants. This approach balances practicality with sustainability, minimizes environmental impacts, and supports long-term energy transition objectives.

3.8 Waste Management Approaches

Effective waste management is critical for ensuring environmental protection and public health throughout the project lifecycle. The analysis considers solid and liquid waste generated during both construction and operational phases.

Option 1: Centralized Waste Management at Main Camp (Modified Approach – Preferred)

This approach entails establishing a centralized waste management system at the contractor's main camp, focusing on solid waste handling and partially centralized sanitation. Solid waste such as packaging materials, rubble, and scrap metal will be segregated at source, stored in designated bins, and regularly transported to authorized disposal sites through council-accredited waste handling agents. However, due to the absence of a centralized sewage network in the project area, liquid waste (sewage) will be managed using pit latrines and sealed septic tanks. When septic tanks require emptying, the project will engage licensed waste management contractors. This approach enables strong monitoring and compliance with both national and World Bank environmental requirements while addressing practical site constraints.

Option 2: Decentralized Waste Disposal at Multiple Satellite Camps

In this model, each satellite camp or work site manages its own waste. While this may reduce logistical burdens, it increases the likelihood of non-uniform waste handling, illegal dumping, and environmental degradation due to inconsistent supervision. It also presents challenges in managing sanitary and hazardous waste effectively and ensuring regulatory compliance.

Option 3: Fully Outsourced Waste Management

This option involves contracting licensed private waste management firms for full responsibility over collection, transport, and disposal. Although potentially more efficient and compliant, it may lead to increased costs and reduce the project's direct control over adherence to environmental standards. Regular third-party audits would be necessary to ensure proper service delivery.

Summary:

Option 1 (Modified Centralized Waste Management) is the preferred approach, as it balances practical realities (e.g., lack of centralized sewage infrastructure) with strong control, compliance, and environmental safety. It combines on-site solid waste segregation and licensed offsite disposal with the use of pit latrines and sealed septic tanks for liquid waste, backed by certified service providers for periodic maintenance.

Table 3-1 provides a summary of all the project alternatives assessed in this chapter, including their respective options, advantages, disadvantages, and the rationale behind the preferred option.

Table 3-1: Alternatives Analysis Matrix

SN	Attribute	Options	▪ Advantages	Disadvantages	Preferred Option & Justification
1	Project Development	Option 1: No Project ("Do Nothing")	▪ Avoids construction ▪ Related environmental and social impacts. ▪ Saves on financial cost.	▪ No road improvement. ▪ Lost opportunities for economic development. ▪ Continued safety risks and poor connectivity.	Not preferred. Long-term socio-economic disadvantages outweigh short-term environmental preservation.
		Option 2: Proceed with Project	▪ Enhances safety and access to markets. ▪ Facilitates economic growth and tourism. ▪ Improves stormwater management.	▪ Temporary environmental and social impacts. ▪ Requires resettlement and compensation.	Preferred. Strong socio-economic benefits justify project implementation alongside mitigation.
2	Road Alignment	Option 1: Rehabilitate Existing Road	▪ Uses existing corridor. ▪ Lower land acquisition and compensation costs. ▪ Faster implementation.	▪ Construction impacts in densely populated areas. ▪ Some structures may be affected.	Preferred. Cost-effective with manageable environmental and social risks.
		Option 2: New Alignment / Bypass	▪ Avoids dense settlements. ▪ Potential for improved road geometry.	▪ High land acquisition and compensation needs. ▪ New environmental disturbances. ▪ More costly and time-consuming.	Not preferred. Higher environmental/social footprint and cost.
3	Inclusion of Climbing Lane within Liwonde Forest Reserve	Option 1: With Climbing Lane	▪ Enhances safety and traffic flow on steep gradients. ▪ Reduces congestion and vehicle wear.	▪ Encroaches into a sensitive ecosystem (Forest Reserve). ▪ Localized tree losses (429 trees, incl. 5 red-listed). ▪ Potential disruption of wildlife and habitat.	Preferred**.** Following consultations with the Forestry Department and engineers, a minimalist design was adopted to reduce the footprint within the reserve. Only a limited section is affected, with mitigation measures including compensatory planting, slope stabilization, and biodiversity monitoring.

SN	Attribute	Options	▪ Advantages	Disadvantages	Preferred Option & Justification
		Option 2: Without Climbing Lane	▪ Avoids ecological disturbance. ▪ Minimizes vegetation loss and habitat fragmentation. ▪ Lower construction cost.	▪ May cause traffic delays and higher accident risk. ▪ Less efficient for heavy vehicle movement uphill.	Not Preferred. Would compromise traffic safety and efficiency, given high volumes of heavy vehicles expected on steep gradients.
4.1	Geometric Design and Alignment Adjustments	Option 1: Maintain Existing Geometry	▪ Avoids new land take. ▪ Fast and low-cost implementation.	▪ Limited improvement in safety and efficiency. ▪ Inadequate for high traffic volumes.	Not preferred. Falls short of design and safety standards.
		Option 2: Adjust Geometry and Realign in Critical Areas	▪ Enhances safety and vehicle movement. ▪ Avoids key social and environmental receptors.	▪ Minor land acquisition required. ▪ Additional design complexity.	Preferred. Balanced safety, cost, and displacement concerns.
4.2	Pavement Design	Option 1: Hot Mix Asphalt (HMA)	▪ Durable and suitable for high-traffic areas. ▪ All-weather service quality.	▪ Expensive. ▪ Requires asphalt plant and haulage. ▪ Less labour-intensive.	Preferred in urban/high-traffic sections. Durable and long-lasting.
		Option 2: Concrete Block Paving	▪ Easy to install. ▪ Labour-friendly. ▪ Good for confined urban areas.	▪ May deform under turning loads. ▪ Higher unit cost in some areas.	Preferred for trading centres and urban roads. Encourages local employment.
		Option 3: Surface Dressing	▪ Cost-effective for rural areas. ▪ Labour-based approach. ▪ Quick to apply.	▪ Frequent maintenance. ▪ Not ideal for high turning loads.	Preferred in rural, low-volume sections. Offers wide coverage within budget.
4.3	Drainage and Climate Resilience Design	Option 1: Conventional Design	▪ Standard design based on historical data ▪ Easier to implement using existing norms	▪ May not withstand extreme weather events ▪ Higher maintenance over time	Not preferred. Option 1 is not preferred because it lacks the capacity to handle future climate extremes, leading to higher maintenance and greater risk of drainage failure. It does not account for projected climate variability, making it less sustainable in the long term.
		Option 2: Customized	▪ Incorporates future climate projections	▪ Requires more advanced planning and technical input	Preferred. Ensures skills, inclusivity, and local ownership.Option 2: Customized Climate-Resilient

SN	Attribute	Options	▪ Advantages	Disadvantages	Preferred Option & Justification
		Climate-Resilient Design	▪ Enhances road longevity and resilience ▪ Includes bioengineering and adaptive measures	▪ Higher initial costs	Design Preferred for its proactive integration of future climate risks, reduced vulnerability to flooding and erosion, and improved sustainability of road infrastructure under changing climatic conditions.
5	Labour Sourcing	Option 1: Local Only	▪ Empowers communities. ▪ Promotes local economic growth.	▪ May lack technical skills and efficiency.	Not preferred alone. Capacity constraints.
		Option 2: External Only	▪ Technically efficient and skilled.	▪ Poor local support. ▪ Limited social benefit to host communities.	Not preferred. Lacks inclusivity.
		Option 3: Mixed Model	▪ Combines skill transfer and efficiency. ▪ Enhances community engagement and local benefits.	▪ Requires coordination between teams.	Preferred. Ensures skills, inclusivity, and local ownership.
6	Construction Materials	Option 1: Local Sourcing	▪ Supports local businesses. ▪ Lower transport costs. ▪ Environmentally friendly.	▪ Quality control needed. ▪ May not meet specs in all areas.	Preferred where materials meet standards. Sustainable and economical.
		Option 2: Importing	▪ May meet strict quality standards.	▪ Costly. ▪ Environmentally unfriendly due to haulage.	Not preferred. High cost and carbon footprint.
		Option 3: Recycled Materials	▪ Promotes sustainability. ▪ Reduces demand for virgin resources.	▪ Limited availability. ▪ May require special handling.	Preferred where applicable. Encourages reuse and green practices.
7	Waste Management	Option 1: Modified Centralised System	▪ Ensures regulatory compliance ▪ Allows better monitoring and control ▪ Compatible with council-authorised solid waste handling agents and licensed septic tank services	▪ Requires initial investment ▪ Limited by absence of centralized sewage infrastructure	Preferred. Most efficient and practical solution given local conditions. Balances compliance, monitoring, and feasibility using pit latrines, septic tanks, and licensed waste contractors.

SN	Attribute	Options	▪ Advantages	Disadvantages	Preferred Option & Justification
		Option 2: Decentralised Approach	▪ Flexible at satellite camps ▪ Lower immediate logistics costs	▪ High risk of inconsistent practices ▪ Weak oversight and potential environmental breaches	Not preferred. Lacks uniformity and complicates compliance monitoring.
		Option 3: Outsourced Services	▪ Utilizes specialist expertise ▪ Frees internal capacity	▪ Higher operational costs ▪ Risk of contractor underperformance or non-compliance	Not preferred. Outsourcing alone reduces project control and reliability, requiring additional oversight mechanisms.

3.9 Conclusion

The No-Go alternative was found to be unsustainable mainly because of the myriad of benefits that the Project implementation presents which far outweighs the advantages of non-development of the project (See Table 3-1). The No-Go alternative was therefore ignored and instead, the project implementation alternative was upheld as the most sustainable or best alternative. Where practicable, necessary design and technology options or recommendations will be implemented to complement the construction / rehabilitation of the roads and achieve desired service levels.

CHAPTER 4: POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

This chapter reviews the legal framework of the proposed project and indicates its impacts on the project. Reference has been made to several key legislations. Furthermore, the chapter provides an account of all regulatory licenses and approvals that must be obtained for the proposed project to ensure that they align with sound environmental management practices and are following relevant existing legislation.

4.1 National Policies and Strategies

4.1.1 Policy Framework

Table 4-1 presents key national policies that provide the strategic and regulatory framework for the planning, implementation, and monitoring of the proposed Project. These policies are aligned with Malawi's sustainable development agenda and outline obligations regarding environmental protection, land and water management, gender inclusion, climate resilience, sanitation, labour standards, and sectoral governance.

Table 4-1. Policies guiding the Project

Policy	Description	Implications of the policy on the project
Malawi 2063 (MW2063) and and First 10-Year Implementation Plan (MIP-1, 2021–2030)	MW2063 is Malawi's long-term vision to become an inclusively wealthy and self-reliant nation by 2063, built on three pillars: Agricultural Productivity and Commercialization, Industrialization, and Urbanization, and seven enablers including Economic Infrastructure and Environmental Sustainability. The Vision emphasises the importance of world-class, climate-resilient road infrastructure to support trade, tourism, regional integration, and socio-economic transformation. The MIP-1 (2021–2030) operationalises MW2063 through flagship programmes that prioritise transport and road network expansion as drivers of inclusive growth.	The Road Rehabilitation Project contributes directly to MW2063 and MIP-1 aspirations by strengthening Malawi's economic infrastructure. The Project enhances connectivity between rural and urban areas, improves access to markets and social services, supports tourism development, and creates employment and skills transfer opportunities. Its climate-resilient design and safeguards also align with the environmental sustainability enabler.

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Policy	Description	Implications of the policy on the project
National Environmental Policy (2004)	Provides the framework for sustainable development in Malawi by requiring integration of environmental management principles, such as environmental impact assessments, biodiversity protection, and resource conservation, into all project phases.	Adopt measures to ensure sustainable implementation of the road rehabilitation works.
Malawi National Land Policy (2002)	Emphasizes proper land administration, fair compensation, and environmental safeguards, ensuring that infrastructure projects balance development goals with community rights and natural resource protection.	Implement transparent land acquisition and compensation processes to comply with national requirements and strengthen the RAP and this ESIA
National Water Policy (2005)	Promotes sustainable management of water resources to ensure access to safe water, adequate sanitation, and protection of ecosystems.	Safeguard water bodies from degradation to ensure sustainable water use and management.
National Gender Policy (2015)	Aims to reduce gender inequalities by promoting equitable participation of women, men, and youth in development, while addressing barriers such as under-representation and GBV.	Carry out interventions have mainstreamed gender in planning and implementation, ensuring equal employment opportunities, women's involvement in decision-making, and equitable access to project benefits.
National Climate Change Management Policy (2016)	Provides measures for integrating mitigation and adaptation interventions, ensuring infrastructure is resilient to climate risks and minimizes its carbon footprint	Implement measures that have adopted sustainable materials, climate-resilient designs, and practices that reduce emissions while protecting ecosystems
National Sanitation Policy (2008)	Provides a vehicle to transform Malawi's hygiene and sanitation situation	Implement liquid and solid waste management measures following the waste management hierarchy to prevent, reuse, recycling, reduce and dispose, hence complying with the provisions of the policy
National HIV and AIDS	Seeks to control the epidemic by reducing new infections, improving care for PLHIV, and fostering	Adopt a workplace HIV policy, ensuring staff training, offering health services like testing and

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Policy	Description	Implications of the policy on the project
Policy (2022 to 2027)	supportive, inclusive workplace systems	counselling, and promoting non-discrimination and compliance with national guidelines.
National Transport Policy (2015)	Aims to develop a safe, efficient, and sustainable transport system that supports national development, emphasizes rural connectivity, and promotes inclusive community participation.	Meet safety standards, accommodate vulnerable groups, support local contractors, and incorporate climate-resilient and disaster-risk mitigation measures.
National Labor and Employment Policy (2017)	The policy promotes full employment, decent work, and poverty reduction by ensuring equitable access to job opportunities and reliable labor market information.	Implement intervention that prioritize local hiring, offering fair and safe working conditions, promoting gender and disability inclusion, and providing training to enhance the skills and employability of vulnerable groups
National Forest Policy (2016)	Promotes sustainable management, conservation, and restoration of forest resources to maintain ecological balance and support socio-economic development.	Implement intervention that will minimize deforestation, protecting existing forests, and implementing reforestation or tree-planting measures along the road corridor
National Wildlife Policy (2018)	Provides a framework for conservation, management, and restoration of wildlife resources inside and outside protected areas. It addresses poaching, illegal trade, and human–wildlife conflict	The road does not pass through a designated wildlife protected area, but Liwonde Forest Reserve may harbour wildlife populations that are important for biodiversity conservation. The project must: - Integrate wildlife considerations in the ESIA and mitigation plans. - Avoid habitat disturbance and support biodiversity conservation along the corridor. - Prevent poaching or illegal wildlife trade linked to project works.
National Decentralisation Policy (1998)	Seeks to devolve political and administrative authority to the district level, creating democratic institutions that facilitate grassroots participation,	Engage District Councils and committees in project planning, implementation, and monitoring; integrate community

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Policy	Description	Implications of the policy on the project
	promote accountability, and enhance service delivery for poverty reduction (Sections 3 and 6). Functions of District Councils include refuse disposal, environmental reclamation, environmental education, development planning, and community mobilisation.	participation at Area, Ward, and Village levels; support Councils in delivering environmental services (waste management, reclamation, environmental education); coordinate safeguards with Councils to align with by-laws and development priorities; build capacity of local governance structures on E&S safeguards; and facilitate resource mobilisation and partnerships to strengthen environmental management and socio-economic benefits.

4.1.2 Legislative Framework

Table 4-2 outlines the national legislative framework governing the implementation of the proposed Project. These laws provide the legal basis for environmental protection, land acquisition, occupational health and safety, labour rights, gender equality, public health, and infrastructure development.

Table 4-2. Legislation guiding the Project

Act	Description	Implications of the Act on the project
Constitution of the Republic of Malawi, 1995	(Sections 5, 12(e), and 13(d)) describe it as the supreme law, requiring all policies and acts to align with its provisions on human rights, gender equality, and environmental protection.	Carry out an ESIA, which will be implemented, including obtaining MEPA approval to ensure compliance with constitutional principles
Environment Management Act, 2017	Principal legislation for environmental protection, management, and sustainable utilization of natural resources in Malawi, requiring that any law inconsistent with its provisions is invalid to that extent (Section 6).	Approval of the ESIA by the Director General and the Authority before project implementation (Sections 26(3) and 31; EMA, 2017). The ESIA will also be implemented.
Public Roads Act, 2023 (Act No. 7 of 2023)	Provides a legal framework for classification, construction, maintenance, and management of public roads, including environmental, social, and safety considerations such as stormwater	Adhere to road classification standards, proper land acquisition, and integration of environmental and social considerations, minimizing legal and operational risk

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Act	Description	Implications of the Act on the project
	management, access control, and encroachment removal (Sections 3, 4, 10, 11, 12, 18, 27, 44, and 45).	
Land Related acts (Land Act, 2016, Land Act Amendment, 2022, Customary Land Act, 2016, Land Acquisition and Compensation Act, 2017)	Provides the legal framework for land administration, categorization, acquisition, and compensation in Malawi, distinguishing public, private, and customary land and requiring fair compensation for any disturbance, loss, or damage to affected landowners or users (Land Act, 2016, Sections 13; Customary Land Act, 2016, Sections 17, 20; Land Acquisition and Compensation Act, 2017, Sections 4, 9, 10).	Follow legal procedures for acquiring public, customary, or private land, and implement a Resettlement Action Plan to ensure timely notification, fair compensation at full replacement cost, and support to all affected persons in line with national laws and World Bank Environmental and Social Standards
Water Resources Act, 2013	Provides a legal framework for the management, conservation, and sustainable use of water resources in Malawi, including the control of pollution and regulation of water abstraction, impoundment, and drainage (Sections 4, 8, 39).	This requires obtaining all necessary water use licenses from the National Water Resources Authority, implementing pollution control measures for storage, treatment, and disposal of waste, and managing water resources responsibly to minimize environmental harm
Occupation Safety Health and Welfare Act, 1997	Provides the legal framework for ensuring safe, healthy, and welfare-compliant workplaces in Malawi, including registration of workplaces and regulation of plant, machinery, and work conditions (Sections 6 and 7)	Register all project workplaces with the Ministry of Labour, implement safe work systems, ensure proper handling of materials, maintain safe access and welfare facilities, and continuously monitor the adherence to OSH standards throughout the project phases.
Employment Act, 2000	Establishes minimum employment standards in Malawi, prohibiting forced labour, discrimination, and unequal pay, and providing remedies for infringements of fundamental employment rights (Sections 4–7).	Ensure that all employment is voluntary, implement anti-discrimination and equal pay policies, and strictly prevent the employment of children under eighteen (Sections 21–22).
Gender Equality Act, 2013	Promotes gender equality, prohibits sex discrimination, harmful practices, and sexual harassment, and applies to all persons and institutions in Malawi, including workplaces (Sections 2 and 7)	Implement gender equality policies, prevent discrimination and harmful cultural practices, and enforce workplace measures that ensure a safe, harassment-free environment for all employees.
HIV and AIDS (Prevention and	Povides for the prevention and management of HIV and AIDS, protects the rights of persons living with or	Prohibits mandatory HIV testing for recruitment, protects employees from termination or discrimination based

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Act	Description	Implications of the Act on the project
Management) Act, 2018	affected by HIV, and requires employers to implement workplace policies supporting these rights (Sections 6, 9, 26–28, 32).	on HIV status, and will establish a comprehensive workplace HIV and AIDS policy to guide prevention, management, and support measures
Public Health Act, 1948	This is a legal framework for environmental and occupational health, including waste management, sewage, drainage, and sanitation (Sections 79–88)	Provide adequate waste disposal facilities, proper stormwater drainage, and separate sanitary toilets for male and female workers, including temporary facilities during construction.
Environment Management (Chemicals & Toxic Substances) Regulations, 2008	This governs the handling, transport, storage, and disposal of chemicals and toxic substances in Malawi, requiring licensing and proper management to prevent harm to human health or the environment (Sections 3, 4, 26)	Obtain all necessary licences from the Malawi Environment Protection Authority and ensuring that any chemical wastes are treated according to internationally approved methods before disposal.
Environment Management (Waste Management & Sanitation) Regulations, 2008	Governs the management of solid and liquid waste in Malawi, requiring waste separation, safe storage, proper collection, and treatment of hazardous waste in accordance with international standards (Sections 7, 8, 10, 11, 23, 36).	Pomote waste separation at source, providing adequate storage and receptacles, coordinate with Zomba and Machinga District Councils for collection and disposal, and ensure that hazardous waste is treated and disposed of only at licensed, approved facilities.
Forestry Act, 2020	Provides the legal framework for the conservation, management, and sustainable use of forest resources in Malawi, including the protection of forest reserves, biodiversity, and soil stability, and regulating tree felling, land use, and encroachment (Sections 22, 26, 38, 39, 42, 46, 50, 64, 65, 81).	Avoid encroachment on forest reserves, obtain permits for tree or vegetation removal, implement erosion control and fire management measures, prevent illegal settlements, ensure sustainable handling of forest products, and engage local communities in participatory reforestation and conservation initiatives.
National Parks and Wildlife Act, 2017	Provides for protection of national parks, reserves, and endangered species; regulates activities in protected areas; requires ESIA for projects affecting wildlife (Part IV; Secs. 22A, 23–25, 27–41, 42–44, 74–80).	The road does not pass through a park or reserve, but Liwonde Forest Reserve may host protected species. The project must: ▪ Address wildlife impacts in the ESIA. ▪ Avoid disturbing habitats and species. ▪ Prohibit hunting/poaching by workers.

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Act	Description	Implications of the Act on the project
		▪ Prevent waste, fires, and invasive species. ▪ Work with communities and authorities on conservation.
Local Government Act, 1998	Empowers local councils to promote participatory development, mobilize resources, acquire/dispose of land, and protect the environment, including waste management, sanitation, and pollution control (Sections 3, 6, 24, 34–35; Second Schedule, Clause 2).	Engage District Councils and communities in participatory consultations; integrate project activities into District Development Plans (DDPs); secure lawful land acquisition approvals through Councils; collaborate on waste management, sanitation, and pollution control; support Council roles in environmental protection and service provision; and cooperate with Councils to maintain social stability, prevent conflicts, and enhance community benefits.
Mines and Minerals Act, 2018	Regulates mineral exploration, extraction, and management in Malawi, ensuring sustainable development, environmental protection, and community rights (Sections 270–301)	Where applicable, minimize environmental impacts during quarry operations, conduct and obtain approval for an ESIA, develop and implement a rehabilitation and mine closure plan with financial assurance, and engage local communities through structured consultation and grievance mechanisms
Childcare, Protection and Justice Act, 2010	Provides a legal framework for safeguarding the rights, welfare, and protection of children under sixteen in Malawi (Sections 2, 23, 36, 37)	Prohibit child labour, establish mechanisms for reporting potential child rights violations, and cooperate with child protection authorities to ensure appropriate care and legal protection for any affected children
Trafficking in Persons Act, 2017	Criminalizes the recruitment, transportation, or exploitation of people through force, coercion, fraud, or deception and establishes a National Coordination Committee to oversee prevention, prosecution, and victim protection (Sections 14, 16, 21)	Implement strict labour due diligence, avoid any links with traffickers, train personnel on legal responsibilities, establish monitoring systems, and collaborating with authorities to prevent and respond to trafficking risks.
Physical Planning Act (2016) and Physical Planning	Provides the legal framework for orderly and progressive development of land in Malawi, including preparation and enforcement of national, district, and local physical development plans. Sections 45	The Project must obtain Development Permission from Machinga and Zomba District and City Councils prior to construction. Project designs must align with

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Act	Description	Implications of the Act on the project
(Amendment) Act 2022	and 46 require that no development, including road infrastructure, may proceed without obtaining a Development Permission from the relevant local authority. The Amendment Act (2022) strengthens compliance by placing responsibility on District Councils and planning committees to regulate development within their jurisdictions.	approved physical development plans and comply with local authority requirements for land use, layout, and environmental safeguards.
National Construction Industry Act, 1996	Establishes National Construction Industry Council to regulate and develop Malawi's construction sector, ensuring registration, safety, quality, and adherence to environmental and social standards.	The contractors will be required to comply by registering with the council, implement safety, quality, and environmental/social safeguard requirements, following standardized procedures for procurement, impact assessments, and quality control, while being subject to Council oversight and inspections
Liquid Fuels and Gas (Production and Supply) Act (2004), Regulations (2009), and Amendment Regulations (2010)	Provides for the regulation, production, importation, storage, distribution, and sale of liquid fuels and gas in Malawi. Section 7 and Regulation 27 require that all private storage facilities exceeding 400 litres be registered and licensed by the Malawi Energy Regulatory Authority (MERA). The 2010 Amendment clarifies that even end-consumers storing fuel for their own use must have duly licensed storage capacity.	Given the anticipated use of fuel for heavy construction equipment, the Project will require MERA storage licences for any on-site storage facilities exceeding 400 litres. The Contractor must apply for a Storage Registration Certificate for each construction site/camp and pay the applicable annual fee (currently MK280,000 per site).

4.2 The World Bank Safeguard Policies

4.2.1 Environmental and Social operational policies

World Bank operational policies set out the World Bank's commitment to sustainable development through a Bank Policy and a set of Environmental and Social policies designed to support Borrowers' projects to end extreme poverty and promote shared prosperity[1].

The Environmental and Social operation policies that have been triggered by the project have been provided in Table 4-3.

[1] This Project continues to apply the World Bank's Operational Policies (OP/BPs)In line with the Bank's transitional arrangements, all environmental and social instruments for the Project have therefore been developed to comply with the applicable OP/BPs as stipulated in the Financing Agreement.

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Table 4-3: World Bank Environmental and Social Operation Policies triggered by the project

Safeguard Policy	Main requirements and conducted activities to meet them
Environmental Assessment (OP/BP 4.01)	This policy requires environmental assessment (EA) of projects/programs proposed for Bank financing to ensure that they are environmentally sustainable, and also to inform decision making. The EA process takes into account the natural environment (air, water, and land); human health and safety; social aspects (involuntary resettlement, indigenous peoples, and cultural property); and trans-boundary and global environmental aspects. Therefore, the project has developed this ESIA report to mitigate the potential negative impacts and enhance the positive impacts.
Forests (OP/BP 4.36)	This policy aims to reduce deforestation, enhance the environmental contribution of forested areas, promote afforestation, and reduce poverty among forest-dependent people. It prohibits financing projects that would involve significant conversion or degradation of critical forest areas. The Liwonde–Matawale Road traverses a section of the Liwonde Forest Reserve (about 3.4 km) where climbing lanes will be constructed. Approximately 7 hectares of forest land will be impacted.
Natural Habitats (OP/BP 4.04)	The project area does not have critical habitats. However, part of the section of the road wit happroximatelenght of 3.4 kilometers will span through the Liwonde Forest Reserve. Within the site, about 7 hactors of land will be required for Road rehabilitation and construction of the climbing lanes.
Physical Cultural Property (OP/BP 4.11)	Cultural property includes sites having archaeological (prehistoric), paleontological historical, religious, and unique natural significance. During the Environmental and social impact assessment, no any cultural properties were identified. However, a chance find procedure has been developed for the project in case of any encounter to cultural resources.
Involuntary Resettlement (OP/BP 4.12)	This policy has been triggered and a RAP has been developed to mitigate the negative impact and enhance the psootive impacts.

4.2.2 Environmental, Health and Safety Guidelines

The World Bank Group Environmental, Health and Safety (EHS) Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP). Industry sector ESHS guidelines are designed to be used together with the general EHS guidelines document, which provides guidance to users on common EHS issues potentially applicable to all industry sectors. The EHS guidelines for toll roads include information relevant to the construction, operation and maintenance, as well as decommissioning of large sealed road projects, including associated bridges and overpasses; while the general guidelines are applicable to facilities or projects that generates emissions to air at any stage of the project lifecycle. The general guidelines provide GIIP advice relating to the following elements, to protect human health and the environment:

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- Air Emissions and Ambient Air Quality;
- Wastewater and Ambient Water Quality;
- Water Conservation;
- Hazardous Materials Management;
- Waste Management;
- Noise; and
- Contaminated Land.

Occupational Health and Safety

- General Facility Design and Operation;
- Communication and Training;
- Hazards - Physical, Chemical, Biological and Radiological;
- PPE Usage; and
- Monitoring.

Community Health and Safety

- Water Quality and Availability;
- Structural Safety of Project Infrastructure o Life and Fire Safety;
- Traffic Safety; and
- Emergency Preparedness and Response.

The IFC EHS General Guidelines are relevant to the proposed project as they provide applicable GIIP for handling relevant EHS issues. Also relevant is the World Bank's General Environmental Management Conditions for Construction Contracts.

4.2.3 Guidelines for Incorporating Social Dimensions Into Bank-Supported Projects

According to the World Bank's Social Analysis in Transport Projects: Guidelines for Incorporating Social Dimensions into Bank-Supported Projects, social analysis in the World Bank has grown over the years from focusing largely on adverse impacts and compliance with safeguard policies to a more comprehensive framework – a broader focus on opportunities, constraints and risks to development that arise from the social context. Transport is an integral part of any country's economy and assists the poor in gaining access to services and employment opportunities. At the same time, the provision of transport infrastructure often disproportionately affects the poor through unmitigated adverse impacts.

Social analysis in Bank-supported Projects is a tool that enhances the following:

- Assessment of project feasibility
- Understanding the project environment
- Project responsiveness to community needs
- Maximization of project benefits
- Sensitivity to potential project related risks
- Efficiency of project implementation
- Evaluation of project outcomes and impacts

Transport sector covers a wide array of social issues that span products, processes and outcomes. Transport has important linkages with poverty, gender, inclusiveness of the elderly and people with disabilities, HIV and AIDS, access to social services (health, education` market, employment etc.). Transport is integral to the World Bank's mission of poverty reduction. Without good transport, many other sectorial interventions may be ineffective as poor people cannot reach them. Transport concerns differ for rural and the urban poor and also for men, women and children.

In the development and improvement of road infrastructure, it is important to consider the gender characteristics and variations evident in the given locality or project area. The designing and planning of any road infrastructure should allow for inclusions and exclusions of the design that will highlight the unique features of each gender.

4.3 Institutional Framework

4.3.1 Malawi Environment Protection Authority

The Malawi Environment Protection Authority (MEPA) is the administrative authority of the ESIA as provided in Part VI Section 31 (1), (2), and (3) of the Environment Management Act (2017) and Guidelines for Environmental Impact Assessment (EIA) of 1997. Section 31 subsections (1), (2), and (3), including (4), provide for environmental planning and the need for Environmental and Social Impact Assessment (ESIA) for some described projects. The authority, therefore, is responsible for administrating the ESIA process and issuing licenses and/or permits to enable developers to proceed with their planned project activities if the projects are deemed not detrimental to the environment and human health. The authority is also responsible for conducting routine monitoring through its inspectorate unit to ensure compliance with recommendations made in the ESIA report.

4.3.2 Roads Authority

Roads Authority will be responsible for managing and overseeing road construction activities and the safety of the workers. The Authority will collaborate with engineers and planners during the design of the road layout, alignment, and specifications and ensure that construction adheres to quality standards, safety protocols, and environmental regulations. The authority will also coordinate with MEPA and other stakeholders, contractors, and local communities to ensure the project is properly executed. At the operational stage, the authority will develop plans for ongoing maintenance after construction.

4.3.3 Ministry of Lands

The Ministry of Lands plays a central role in supporting land-related aspects of road infrastructure development. Through its relevant departments, such as the Department of Lands and the Department of Physical Planning, the Ministry is responsible for land administration, spatial planning, and the enforcement of land use policies. The Ministry will facilitate the acquisition of land required for road expansion and resettlement activities, ensure the

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declaration and protection of road reserves, and guide the integration of road development within broader land use frameworks. It also plays a vital role in sensitizing communities along the road corridor about road reserve boundaries and permissible land uses, while addressing environmental and planning concerns related to land use changes.

4.3.4 Ministry of Local Government, Unity and Culture

The Ministry of Local Government, Unity and Culture oversees the functioning of local authorities, including Zomba District Council, Machinga District Council, and Zomba City Council, all of which are directly involved in the implementation of this Project. Through these councils, the Ministry is responsible for community engagement, ensuring that local concerns, feedback, and priorities are adequately captured and addressed throughout the project lifecycle.

The local authorities will support land acquisition processes for road expansion or realignment by working closely with affected communities. They will also participate in public sensitization efforts to manage traffic flow and promote road safety during construction. Furthermore, they will monitor construction progress within their jurisdictions, coordinate with the contractor and relevant stakeholders, and assist in resolving grievances from affected parties to facilitate smooth project implementation.

4.3.5 Summary of Licences and 4.3 Regulatory Licenses and Approvals Required for the Project

Table 4-4 summarises all the regulatory licenses, approvals and standards that must be obtained or met for the proposed project to ensure that the project activities align with sound environmental management practices and comply with relevant legislation.

Table 4-4: Regulatory licenses and approvals relevant for the project

SN	List of approvals/licenses to be obtained	Applicable legal and regulatory framework	Issuing institution	Actor responsible for obtaining the license	Approximate time required for approval
1	ESIA Certificate	EMA, 2017	Malawi Environment Protection Authority (MEPA)	Roads Authority	Three months
2	Approval of disposal of waste	a) Local Government Act, 1998 b) EMA, 2017	a) Machinga and Zomba District and City Councils b) MEPA	Contractor	Two Weeks
3	Approval for sand mining from proposed rivers	Local Government Act, 1998	Machinga and Zomba District and City Councils	Contractor	Two Weeks

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SN	List of approvals/licenses to be obtained	Applicable legal and regulatory framework	Issuing institution	Actor responsible for obtaining the license	Approximate time required for approval
4	Mining Approval (Quarry, Gravel, and Sand)	Mines and Minerals Act, (2018)	Department of Mines	Contractor	Three Months
5	Workplace Registration Certificate	The Occupational Safety, Health, and Welfare Act (1997)	Ministry of Labour	Contractor	Two Weeks
6	Water abstraction approval	The Water Resources Act (2013)	National Water Resources Authority	Contractor	Two Weeks
7	Development Persmission	Local Government Act, 1998, Physical Planning Act (2016) as amended (2022)	Machinga and Zomba District and City Councils	Roads Authority	Two Weeks
8	Fuel storage Licence/Permit	Liquid Fuels and Gas (Production and Supply) Act (2004), Regulations (2009), and Amendment Regulations (2010)	Malawi Energy Regulatory Authority (MERA)	Roads Authority	3 months

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CHAPTER 5: ENVIRONMENTAL AND SOCIAL SETTING OF THE PROJECT AREA

This chapter contains a description of the environmental setting and is given in only enough detail to allow for an understanding of the analysis and assessment of impacts. It describes the spatial and temporal boundaries within which the environmental setting was considered. It also considers the existing condition of the physical and biological environments of the project area, as well as trends and the anticipated future environmental conditions, should the project go ahead.

5.1 Area of Influence

Consistent with World Bank OP 4.01 on Environmental Assessment, the Area of Influence (AoI) of the proposed project refers to the geographic area that may be directly or indirectly affected by the project's activities during both construction and operational phases (Figure 5-1). The AoI includes:

- **Project Footprint**: Areas directly affected by the works, including the entire road reserve (60 m in Machinga and Zomba Districts, 46 m in Zomba City), the construction corridor, and ancillary facilities such as construction camps, borrow pits, stockpile areas, and waste disposal sites.
- **Indirect Impact Zone**: Areas within approximately 1 km of the road alignment (1,902.86 hectares) where secondary impacts occur, such as roadside trading, informal settlements, induced development, and associated pressures on land use and natural resources.
- **Sensitive Receptors**: Residential zones, trading centres, schools, clinics, places of worship, wetlands, rivers, forests, and other ecologically important habitats that may be affected directly or indirectly.

Both primary data field surveys and stakeholder consultations) and secondary data (government and published sources) were used to establish the baseline within this AoI. This definition supports the application of the smitigation hierarchy (avoidance, minimization, mitigation, and compensation) under OP 4.01.

Table 5-1. Land Use Categories within the AoI

Land Use Type	Area (hectares)	Description
Riparian Zones	12.04	Associated with wetlands and water bodies intersecting the road. Requires consideration for maintaining ecological balance and water quality.
Settlements	395.44	Home to numerous communities near the road, necessitating planning to prevent social disruption, especially regarding access and resettlement.

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Land Use Type	Area (hectares)	Description
Forest Areas	252.69	Significant for biodiversity, these areas may need protection from deforestation and degradation during construction activities.
Water Bodies	4.57	Critical for both environmental and community needs, highlighting the importance of managing sedimentation and pollution risks during construction.
Agricultural Land and Bareland	1,187.11	Agriculture is vital for the local economy, with extensive land devoted to it, highlighting the need to minimize disruptions to livelihoods.
Bridges	0.54	The project crosses multiple rivers, requiring proper structural integrity and environmental protection to safeguard waterways.
Roads	47.27	Existing roads within the project area are essential for mobility and economic activities, connecting communities and businesses.
Rivers	3.20	The project intersects several rivers, requiring sustainable water management practices to maintain environmental flow and prevent disruption.

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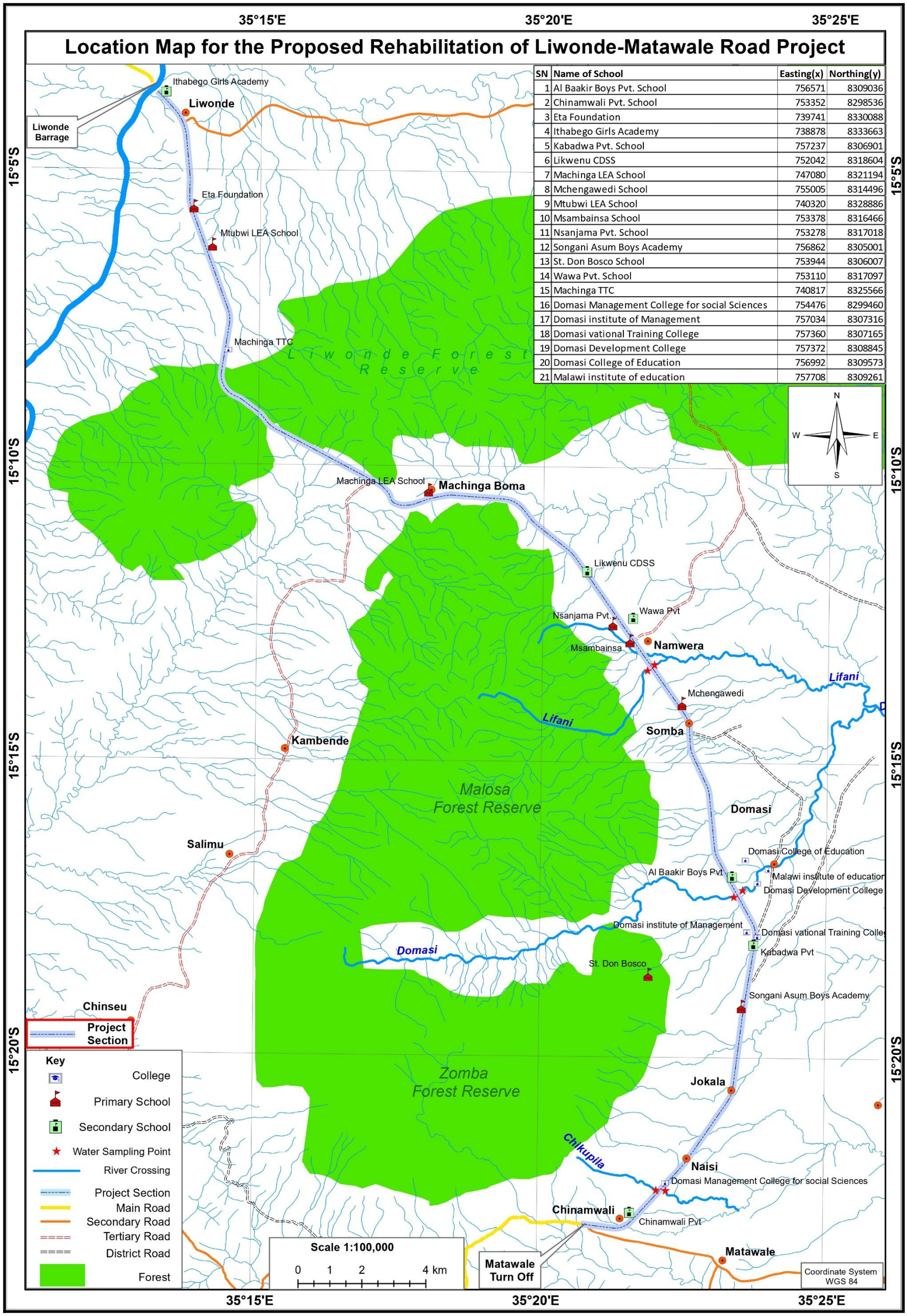


Figure 5-1: Area of Influence

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5.2 Physical Environment

5.2.1 Climatic and Climate Change Risks

(i) General Climate Conditions

The project area lies within Malawi's sub-tropical climatic zone, which is characterized by two principal seasons: a rainy season extending from November to April and a dry season from May to October. These seasonal variations are fundamental in understanding the environmental setting in which the project will operate. They influence construction scheduling, soil moisture content, vegetation cycles, and overall project planning and implementation.

(ii) Temperature Pattern

Historical temperature data from 1991 to 2021 indicates that the area receives an annual average temperature of approx. 20.6°C. November is typically the hottest month, with mean temperatures around 23.9°C, while July is the coolest, with an average of 16.4°C (Figure 5-2). These temperature patterns may have implications for material performance, thermal expansion of road surfaces, and worker health and safety during construction, especially during peak temperature periods.

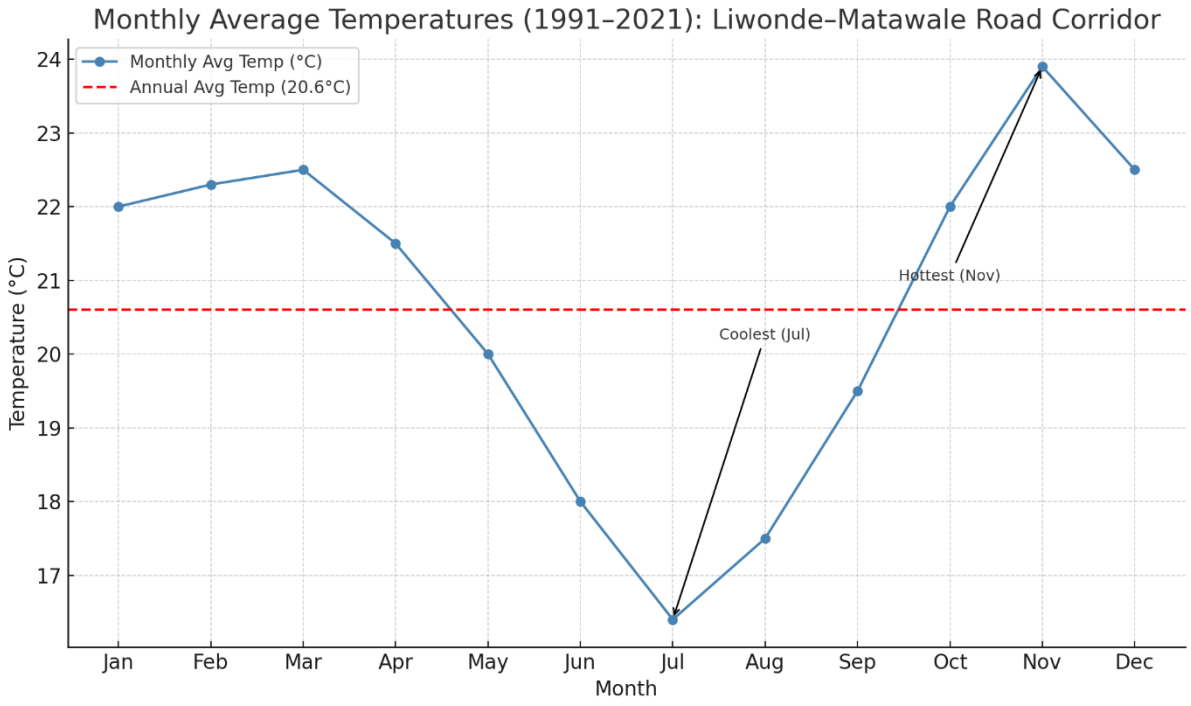


Figure 5-2. Monthly Average Temperatures (1991–2021): Liwonde–Matawale Road Corridor

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(iii) Rainfall distribution

Rainfall in the project area follows a seasonal pattern, with January being the wettest month, receiving an average of 272 mm of rainfall spread over about 19 rainy days. In contrast, August is the driest month, often recording negligible or no rainfall (Figure 5-3). These rainfall dynamics are critical in informing the design of drainage structures, erosion control measures, and scheduling of earthworks to minimise runoff-related damage and delays.

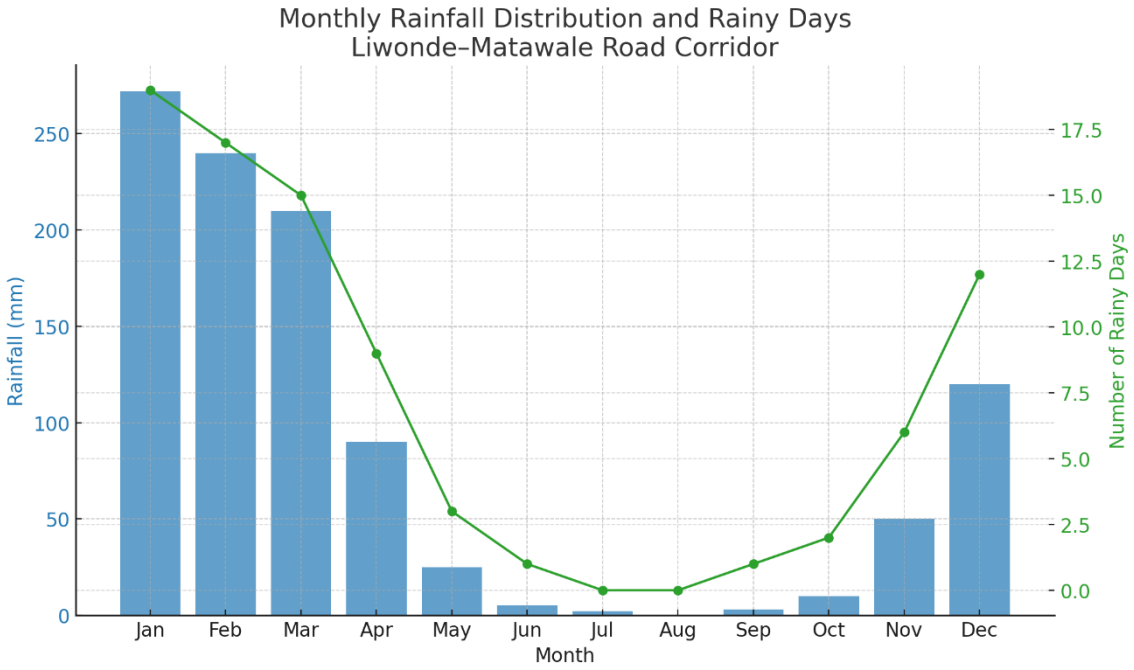


Figure 5-3. Monthly Rainfall Distribution and Rainy Days for the Liwonde–Matawale Road Corridor

(iv) Sunshine Duration

The area receives a substantial amount of sunshine throughout the year, averaging 3,009 hours annually. October registers the highest daily sunshine duration, averaging 10 hours per day, while January experiences the lowest, with about 8.4 hours per day. This variation in solar exposure influences productivity on-site, especially for outdoor construction tasks, and may also be relevant for the planning of solar-powered equipment, if applicable.

(v) Humidity Trends

Humidity levels in the project area exhibit a clear seasonal pattern, with higher humidity recorded during the rainy season (especially in January) and lower levels observed in the dry months. Elevated humidity can affect the storage and curing of construction materials such as cement and may also impact worker comfort and health, necessitating appropriate occupational health and safety measures.

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(vi) Wind Speed and Direction

Wind patterns are another important climatic variable in the project area. Peak wind speeds occur between August and November, ranging from 12.9 to 16.3 km/h, with October typically being the windiest month. The prevailing wind direction varies seasonally, blowing predominantly from the south during the cooler months (January to July) and from the east during the hotter season (July to January). These wind conditions are relevant for site layout planning, particularly the positioning of temporary structures, dust control measures, and safety protocols for equipment handling and material storage.

(vii) Climate Risks

National climate projections (Government of Malawi, 2022) indicate that Malawi, including its Southern Region, is increasingly facing climate-related risks as a result of global warming. The key risks impacting the Zomba-Machinga area include:

- *Rainfall Variability*: It is anticipated that rainfall patterns will become more variable, with shorter yet more intense rainfall events. This change raises the risk of flash floods, particularly affecting road infrastructure and nearby river systems, such as the Domasi and Likangala rivers.
- *Extreme Weather Events*: The frequency and intensity of extreme weather events, including cyclones, storm surges, and prolonged dry spells, are projected to increase. These events pose a risk of direct damage to transport infrastructure and may result in elevated maintenance costs.
- *Flooding and Erosion*: Due to the project area's topography and proximity to rivers, it is vulnerable to erosion and surface runoff during intense rainfall. Such conditions threaten road stability and public safety.
- *Health and Social Impacts*: Rising temperatures and humidity levels can exacerbate the spread of vector-borne diseases (e.g., malaria) and waterborne illnesses, especially in areas where drainage systems are inadequate.

5.2.2 Topography

The Liwonde-Matawale region, which spans the corridor from Liwonde Town through Machinga to Zomba City along the M003 Road, exhibits a complex topography shaped by both sedimentary processes and tectonic activity. In several areas adjacent to Machinga, the landscape is characterized by superficial deposits that are prone to instability; these deposits often underlie steep slopes, frequently exceeding 60°, that comprise a mixture of loam clay, boulders, and debris, conditions conducive to landslides (Chimimba et al., 2024).

In contrast, near Zomba City, the region is markedly influenced by tectonic structures associated with the Malawi Rift system. Notably, the Zomba Graben and its west-dipping fault have played a pivotal role in defining the local geomorphology, resulting in pronounced fault scarps, deep valleys, and steep slopes that reflect the incipient stages of rift development (Wedmore et al., 2019). Further contributing to this complex landscape is the inherited lithospheric heterogeneity of the Southern Section of the Malawi Rift. Reactivation of Mesoproterozoic-Neoproterozoic rocks along border faults has led to additional structural

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segmentation, thereby reinforcing the region's varied and dynamic topography (Laó-Dávila et al., 2015).

Overall, the Liwonde-Matawale region presents a dual character: on the Liwonde side, relatively flat areas marked by sedimentary superficial deposits and, on the Machinga to Zomba side, rugged, fault-controlled terrains that exhibit significant slope variations and tectonic features. This topographic diversity imposes challenges for infrastructure development along the M003 Road, particularly in relation to slope stability and the mitigation of geological hazards.

5.2.3 Soils

Approximately 85% of Liwonde Township and surrounding areas near Mtumbwi, including the vicinity of Machinga Teachers Training College, are underlain by superficial deposits classified as expansive soils. These soils primarily consist of clays, including smectite, montmorillonite, and bentonite, which exhibit a high shrink-swell potential. As these soils absorb moisture, they expand significantly, and when they dry, they contract. This cycle can lead to structural damage over time.

The behavior of expansive soils is influenced by various factors, such as moisture content, vegetation cover, and topography. Continuous changes in volume can result in ground movement, leading to the development of cracks and surface deformation in infrastructure. In the Liwonde–Mtumbwi section of the M003 Road, these characteristics have manifested as persistent potholes and cracks, which necessitate expensive rehabilitation efforts by the government. Local residential structures are also impacted, displaying similar evidence of structural distress (see Figures 5-4; and 5-5).

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Figure 5-4: Expensive soils along the M003 Road.

Although the shrink-swell process occurs gradually and may not be immediately visible, its long-term effects on buildings and roads can be profound if not adequately addressed. Unfortunately, this geotechnical risk is often neglected during road construction along the M003 and in other regions of Malawi where montmorillonite-rich soils exist but are not well-mapped.

Moreover, expansive soils may indirectly contribute to road safety hazards due to surface deterioration, thereby increasing the likelihood of accidents. They can also disrupt critical infrastructure, such as power lines, railways, and bridges, even if the damage is localized.

A significant example of the adverse effects of expansive soils can be observed at Liwonde LEA Primary School and Liwonde Community Day Secondary School, located approximately 900 meters from the M003 Road. Both schools, built in 2001 and 2002, exhibit extensive cracking in their structures, mirroring the fissures present in the surrounding ground (see Figure 5.3). At the secondary school, nearly all buildings have sustained damage, leading to the abandonment of several restrooms and classrooms. Even a classroom constructed in 2020 by UNICEF has been compromised, illustrating a lack of consideration for the physical and chemical properties of the underlying soils during the design and construction phases.

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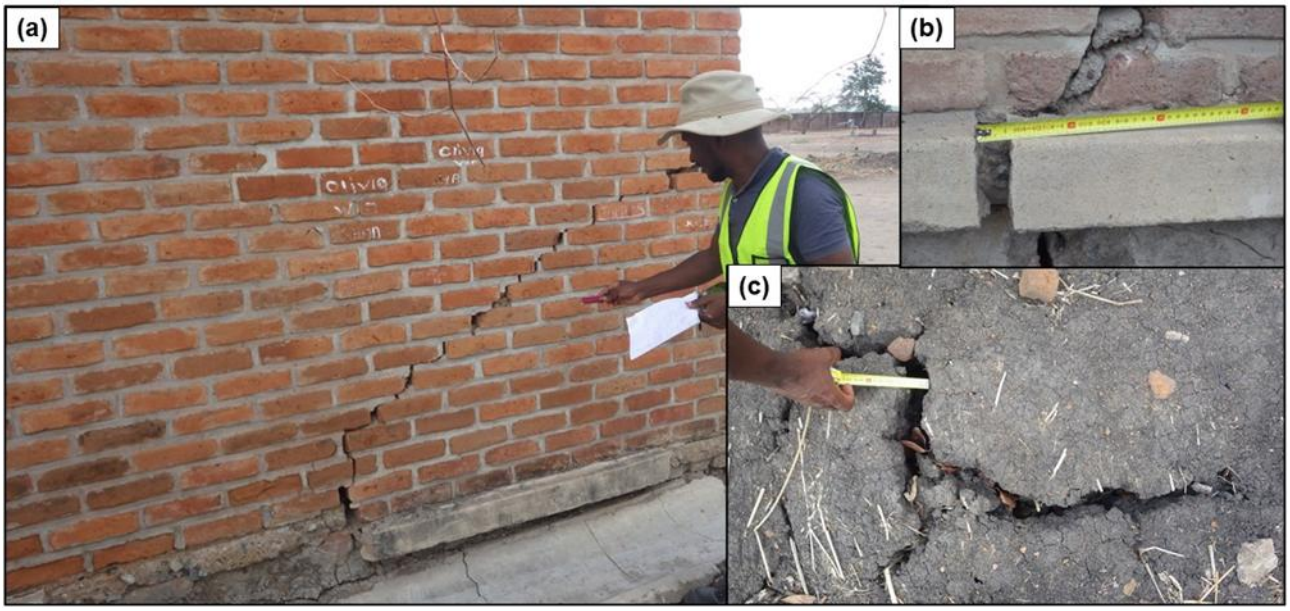


Figure 5-5: (a) and (b) view of the classroom crack (c) soil exhibiting typical desiccation-cracking when drying.

5.2.4 Geology

(i) Geological Setting

On a regional scale, the Zomba-Machinga area is underlain by rocks of two Mesoproterozoic subdomains of the South Irumide Domain, with the Unango Subdomain making up 90% of the rocks and the southern segment of the Lilongwe Subdomain impinging on the western part of the sheet, (Thomas et al. 2022). The rocks of both subdomains are made up of (by definition) juvenile ~1 Ga (arc-related) rocks deformed and metamorphosed to high grade during the Irumide orogeny (Andreoli,1984. Johnsen et al. 1999, and Thomas et al. 2022). The supracrustal gneisses of the Unango and Group are intruded by relatively small volumes of sheet-like granite, and one large body of mafic rocks, of the Mwanza Suite (absent from this part of the Lilongwe Subdomain). The sheet also contains several intrusions of Blantyre Suite granite and syenite. The intrusive includes the large bodies of alkaline rocks of the Cretaceous Chilwa Suite, including the famed Zomba-Malosa syenite and the Mongolowe complex, with under saturated nepheline syenite plugs. Also, there are quaternary sediments of varying thickness.

(ii) Observed Geology

The geology along the Liwonde–Matawale road is characterised by various rock formations and superficial sediments. The area lies along rift faults, expressed in the steep escarpments west of Zomba. The primary geological unit is quartzo-feldspathic gneiss or granulite, with mafic bands, dominant from Domasi to Matawale-Zomba, and outcropping near a quarry 500m from M003 Road. Quartzo-feldspathic biotite gneiss, rich in quartz and feldspar, is common around Mchedweka and the Chalamwini River. Quartz veins are resistant to weathering, particularly near Liwonde Railway Bridge, while syenite is found near Likwenu Bridge, with

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variations in mineralogy. Microsyenite dykes occur near Machinga, and pegmatite dykes crosscut gneisses in both Machinga and Zomba. The region also contains quaternary sediments, including reddish-brown soils and sands, with unknown thickness in parts of Machinga and Zomba.

(iii) Road Geohazards

The Zomba-Liwonde Road (M003) has the following road geohazard which should be considered before road implementation or design; rockfall, landslide, and erosion (river erosion). Solheim et al., (2005) define road geohazards as events caused by geological, geomorphological, and climatic conditions or processes that represent serious threats to human lives, property, and the natural and built environment.

5.2.4.1.1 Potential Slope Failure (Landslides, Rockfall, and Erosion)

Slope failure (landslide, rockfall, and erosion) is a common geohazard along many roads in Malawi due to unprotected slopes, poor drainage by the intense rainfall, and the hilly topography of the area. During the field excursion, it was observed that roadside cuttings between Machinga Police and Chingale Turn-off lack slope safety measures. Figures 5-6 and 5-7 show the example of a shallow slope failure and rock fall that occurred in February 2023 due to Tropical cyclone Freddy. This road cut section road geohazard has been categorised as debris flow and rockfall. In February 2023, half of a lane was impassable because of the debris and mudflow. The engineers should take into consideration the mitigation measures in terms of slope protection for this road section cut for example, by using gabion baskets or geosynthetics etc. along the M003 Road.



Figure 5-6: Slope failure (mudflow).

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Figure 5-7: Slope failure (Rockfall) along the M003 Road.

5.2.4.1.2 River Erosion and Embankment Slope

Erosion of the embankment slope and the river along the M003 Road is common geohazard. This study has established that most of the embankment slopes along the M003 Road are not protected. Figures 5-8 and 5-9 show the erosion over the bridge or culvert drain that occurred due to Tropical Cyclone Freddy. For culvert and bridges, engineers should consider estimating peak floods, this is the flood that the curvet or bridge must be able to carry safely.

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Figure 5-8: Mafufuni Bridge river erosion, a) Distant view of the Zomba Mountain showing the source of water that eroded the Mafufuni Bridge (bounded by the dotted section), b) The road was cut due to heavy rains, it was backfilled with sand, soils and rock boulders.

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Figure 5-9: Chiwinja River erosion, a) Distant view from Chiwinja facing Zomba side, a depression characterised by having thick sediments cover and also mafic granulite gneisses.

5.2.5 Hydrology

The Liwonde–Matawale road corridor experiences significant hydrological challenges due to its proximity to various catchments, hillsides, and low-lying areas. The road traverses several key watercourses, including contributions from catchments in the Liwonde, Machinga, and Zomba regions. Notable contributors to stormwater runoff include the hillsides of the Liwonde Forest Reserve, Malosa Forest Reserve, and Zomba Mountain Nature Reserve. Runoff is generated from natural landscapes and road surfaces, with the major receiving water bodies being the Shire River(from Liwonde to Machinga) and Lake Chilwa (from Machinga to Zomba).

The road passes over a variety of rivers and streams, many of which exhibit seasonal flow patterns. These rivers are primarily ephemeral or intermittent, meaning they experience flow only during and shortly after rainfall events, typically during the wet season. The hydraulic performance of these rivers can fluctuate dramatically, and flooding is common during periods of intense rainfall, particularly during tropical storms such as Tropical Cyclone Freddy, which recently caused severe overbank flooding along the corridor.

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A total of 180 drainage structures were assessed along the project road, including major bridges over the Lifani, Domasi, and Chikupira Rivers, as well as a combination of pipe and box culverts. Many structures have been compromised by siltation, clogging, and erosion, significantly reducing their capacity to handle stormwater during heavy rains. As a result, several sections of the road are prone to overtopping and flooding, particularly in low-lying areas. This issue highlights the need for properly sized drainage structures to prevent future flooding.

The condition of the drainage infrastructure varies, with many culverts and channels exhibiting damage such as broken headwalls and eroded embankments. The road's natural and constructed drainage channels, while functional in some areas, are eroded or inadequate in others due to insufficient lining. The seasonal flash floods common in the area—exacerbated by poor drainage—necessitate improvements in road embankment height and the installation of larger and more resilient drainage structures. Ensuring the drainage system can handle varying flow rates, especially during peak rainfall events, will be crucial to avoiding future road closures and flood risks.

5.2.6 Ambient Water Quality

Baseline water quality assessments were conducted at six sampling locations along the Domasi, Lifani, and Chikupira rivers, both upstream and downstream of the Liwonde–Matawale road corridor. Water samples were analyzed at the Malawi Bureau of Standards (MBS) laboratory for a comprehensive suite of physical, chemical, and microbiological parameters.

The physical and chemical analyses revealed low concentrations of heavy metals and acceptable levels of pH, electrical conductivity, total dissolved solids (TDS), and sulphates. These findings suggest that chemical contamination in the area is minimal. In contrast, the microbiological tests indicated significantly elevated concentrations of total coliforms, E. coli, and faecal coliforms at all sampling sites, with particularly high levels at Chikupira (Table 5-2; Figure 5-10). This widespread microbial contamination is most likely attributed to poor sanitation practices in areas adjacent to these water sources.

Table 5-2. Microbiological Water Quality Results (cfu/100 mL)[2]

Sampling Site	Total Coliforms	E. coli	Faecal Coliforms
Domasi Upstream	>300	142	105
Domasi Downstream	>300	151	167
Lifani Upstream	>300	73	<1.0
Lifani Downstream	>300	31	24
Chikupira Upstream	**>300**	**>300**	**>300**
Chikupira Downstream	**>300**	**>300**	**>300**

[2] CFU stands for Colony-Forming Unit.. It is a unit used in microbiology to estimate the number of viable bacteria or fungal cells in a sample. Each CFU represents a single microorganism (like E. coli or coliform) that is capable of growing into a visible colony on a culture medium.

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These results highlight the urgent need for the implementation of effective drainage and wastewater management systems. Such measures are essential to protect surface water quality from further degradation during both the road construction and operational phases.

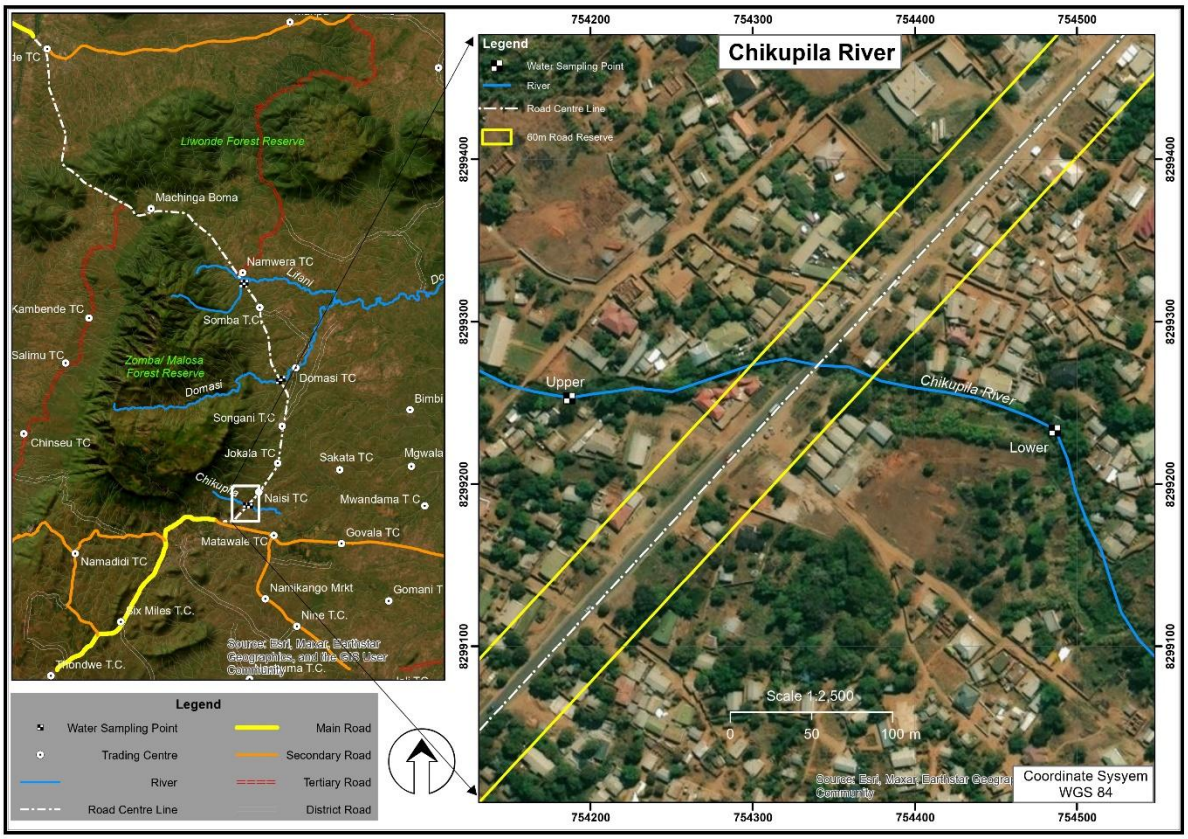


Figure 5-10. Location of Chikupira River in Chinamwali Township, Zomba

5.2.7 Ambient Air Quality

Ambient air quality was monitored at eight strategically selected locations along the Liwonde–Chinamwali Road corridor using a QS-AQMS (Air Quality Monitoring Station). The parameters measured included particulate matter (PM2.5, PM10, and TSP), carbon monoxide (CO), nitrogen dioxide (NO_2), and sulphur dioxide (SO_2). Overall, most pollutants were found to be within the permissible limits established by Malawi Standard MS737:2021. Notably higher concentrations of particulate matter were recorded in high-traffic and commercial zones, especially in Liwonde, where $PM_{2.5}$ levels reached 43.2 µg/m³, significantly exceeding the Malawi standard limit of 25 µg/m³ (24-hour average). This elevation is attributed primarily to vehicular emissions and dust re-suspension, as well as ground-level dust blown by wind.

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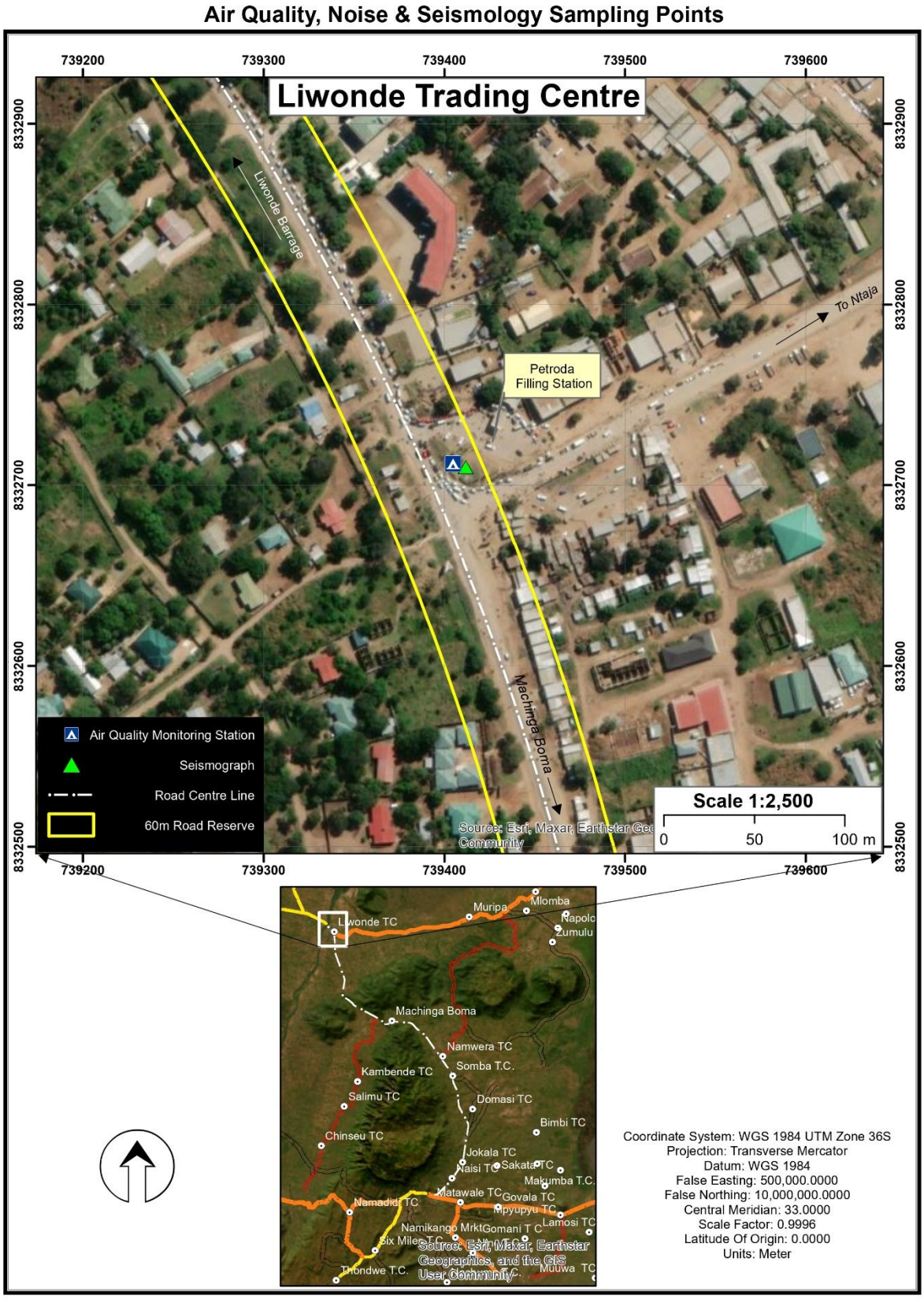


Figure 5-11. STA1. Liwonde Township showed higher particulate matter concentrations and seismic activity

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5.2.8 Noise and Seismic Activitiy

(i) Noise

Baseline ambient noise levels were measured at eight monitoring points along the Liwonde–Chinamwali Road corridor (Liwonde, Machinga Boma, Namwera Turn-Off, Somba, Domasi, Songani, Naisi, and Chinamwali). Measurements were conducted in March 2025 by the Malawi Bureau of Standards (MBS) using a Brannan Sound Level Meter operating on the A-weighted scale (dBA) in accordance with MS697:2005.

At each site, readings were recorded during three sampling periods (morning, mid-day, and evening) to capture daily variability in human and traffic activity. Instruments were positioned within the road reserve but away from reflective surfaces to minimize distortion. The monitoring duration at each station was not less than 30 minutes, with readings logged continuously.

The recorded baseline levels ranged from 37.9 dBA to 48.4 dBA, which are all below the 55 dBA daytime threshold established by Malawi Standard MS173:2005 for residential areas. These values reflect a corridor with moderate background noise levels typical of peri-urban and rural environments where traffic volumes are relatively low.

(ii) Seismic (Vibration)

A near-surface seismic assessment was conducted at the same eight monitoring stations (STA0–STA7). The survey utilized RefTek RT130-B data loggers with 151A seismometers, supported by GPS clocks, batteries, and solar panels. Sensors were installed 12–30 metres from the road centreline on either side to capture representative subsurface responses.

Data were sampled at a frequency of 50 Hz with recording windows of approximately 30 minutes per site. Analysis applied the Horizontal-to-Vertical (H/V) spectral ratio method on ambient seismic noise (Nakamura, 1989), a standard approach for identifying resonance frequencies in near-surface geological formations.

The results indicated dominant ambient vibration frequencies ranging between 1 Hz and 12 Hz, with occasional peaks up to 18 Hz. These frequency bands fall within the resonance range of low-rise buildings, highlighting a potential risk to structural integrity if vibration-sensitive design measures are not applied. For example, station STA0 in Liwonde recorded a peak frequency of 9.2 Hz, while STA1 in Machinga registered a lower peak of 3.1 Hz, reflecting variability in subsurface conditions (See Figures 5-12 and 5-13 for these locations).

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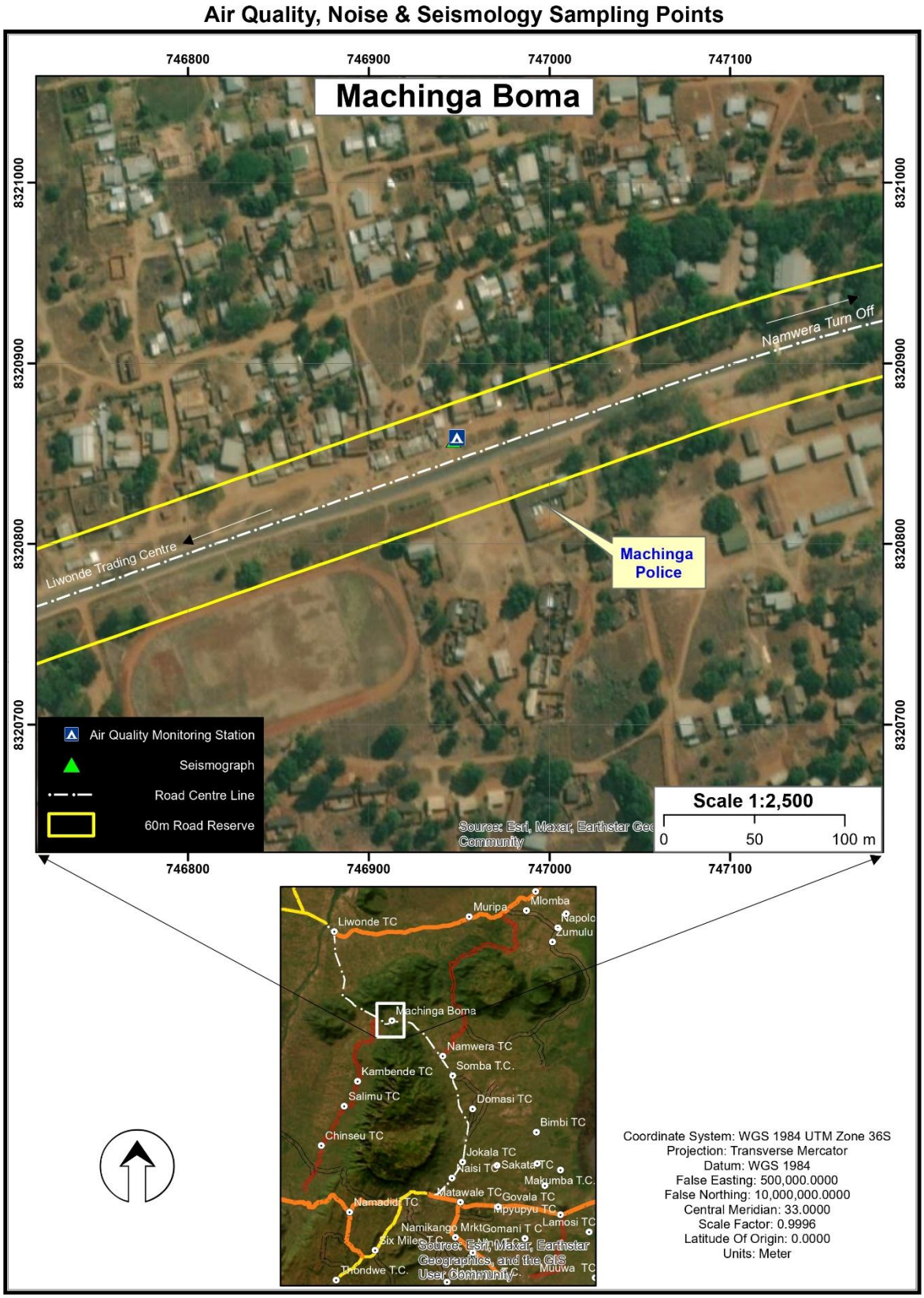


Figure 5-12. STA1, Machinga Boma

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(iii) Implication for the Project

Although the measured baseline noise levels are below national thresholds, construction activities will temporarily elevate ambient noise, requiring mitigation measures such as equipment mufflers, work-hour restrictions near sensitive receptors, and community notification. With respect to vibration, the presence of resonance frequencies overlapping with the natural frequencies of low-rise buildings necessitates careful consideration during design and construction. Recommended measures include vibration monitoring, selection of low-impact equipment, and the application of vibration-sensitive structural designs in accordance with OP/BP 4.01 and national guidelines.

5.3 Biological Environment

5.3.1 Flora (vegetation) baseline status

(i) Zone 1: Liwonde Barrage to the Base of Liwonde Forest Reserve (Chainages 0+000 to 9+499)

This section delineates the initial segment of the Liwonde–Matawale Road corridor, beginning at the Liwonde Barrage and extending to the foot of the Liwonde Forest Reserve. The chainage for this zone ranges from 0+000 to 9+499. The topography is characterized by gently rising elevations within a predominantly lowland ecosystem, with altitudes varying from approximately 490 to 610 meters above sea level.

The vegetation in this area is primarily a degraded form of dry savanna woodland, interspersed with informal settlements, smallholder agricultural plots, roadside commerce activities, and linear utility infrastructure. Notable native species present in this zone include *Faidherbia albida*, *Combretum molle*, various *Vachellia* species, alongside scattered specimens of *Cordyla africana* and *Adansonia digitate (*Figure 5-13*)*. The latter two species can frequently be found in home gardens or along the edges of agricultural fields. Additionally, these native plants are commonly mixed with introduced or naturalized species such as *Eucalyptus camaldulensis* (river red gum), *Mangifera indica* (mango), and *Psidium guajava* (guava), which are typically cultivated for shade, fruit, or as a source of fuelwood.

The herbaceous layer of vegetation is predominated by disturbance-tolerant species, which include *Sida cordifolia*, *Bidens pilosa*, *Portulaca oleracea*, and *Tridax procumbens*. These species thrive particularly well along road margins and in areas of ecological degradation.
Furthermore, the presence of invasive alien species (IAS) is prevalent in this zone, particularly within disturbed and open areas adjacent to the road. The most common invasive species include *Tithonia diversifolia* (Mexican sunflower), *Calotropis procera* (giant milkweed), and *Ricinus communis* (castor bean plant). These species rapidly colonize exposed soils and compete aggressively with native flora, especially in regions near informal waste disposal sites and areas characterized by loose sandy soils.

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Figure 5-13. Remnants of Acacia and Combretum thickets along the road

Land use within this segment is diverse and includes subsistence agriculture, roadside habitation, charcoal production, and sand mining, especially in the lower-lying areas. While some remnants of natural woodland still exist, particularly along riverbanks, much of the original vegetation has been substantially altered, leading to decreased biodiversity and diminished ecological functionality. The clearance of roadside vegetation for the installation of ESCOM (Electricity Supply Corporation of Malawi) power lines has compounded the issue, resulting in further removal of mature trees and fragmentation of the canopy.

From a conservation standpoint, Zone 1 exemplifies a landscape that has experienced significant modifications, exhibiting limited ecological integrity. Nevertheless, the ongoing presence of keystone species such as *Cordyla africana* and *Adansonia digitata*, alongside the community's dependence on trees for shading, fruit production, and other vital ecosystem services, presents opportunities for implementing integrated greening initiatives and roadside restoration.

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(ii) Zone 2: Liwonde Forest Reserve (Chainages 9+500 to 11+400; and 15+500 to 16+800)



Figure 5-14. Road section proposed for Climbing Lane 1 at Chainage 9+500 to 11+500

Zone 2 encompasses a vital section of the Liwonde–Matawale Road corridor, extending from chainage 9+500 to 11+400 and 15+500 to 16+800. It accommodates both climbing lanes of the road, ascending to altitudes ranging from 610 to 750 meters above sea level. This segment of the corridor crosses the ecologically rich Liwonde Forest Reserve, one of the most intact examples of mature miombo woodland in the project area. The forest is characterized by a multi-layered canopy dominated by species of the genera *Brachystegia, Julbernardia*, and *Uapaca*, alongside a diverse understory composed of grasses, herbs, and legumes. Key canopy species identified include *Brachystegia bussei*, *B. spiciformis, Julbernardia globiflora, Combretum molle, Bauhinia thonningii*, and *Uapaca kirkiana*. In the ground layer, robust herbaceous vegetation such as *Hyparrhenia hirta, Panicum maximum*, and *Indigofera hirsuta* thrives in the relatively undisturbed interior patches of the forest.

Floral assessments conducted along both Climbing Lane 1 and Climbing Lane 2 revealed a high diversity of species, including several of particular conservation concern. Notably, *Dalbergia melanoxylon* (African blackwood), *Pterocarpus angolensis* (Wild teak), *Khaya anthotheca* (African mahogany), and *Stereospermum kunthianum* (Pink jacaranda) were recorded (Figure 5-15). These species are protected under Malawi's National Plant Red List and Forestry Regulations (1997) and are categorized on the IUCN Red List as follows:

- *Dalbergia melanoxylon*: Near Threatened (IUCN)[3], Protected (Malawi)

[3] Barstow, M. 2020. Dalbergia melanoxylon. The IUCN Red List of Threatened Species 2020: e.T32504A67798379. https://dx.doi.org/10.2305/IUCN.UK.2020-3.RLTS.T32504A67798379.en. Accessed on 19 May 2025.

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- *Khaya anthotheca*: Vulnerable (IUCN)[4], Protected (Malawi)
- *Pterocarpus angolensis*: Least Concern (IUCN), Protected (Malawi)



Figure 5-15. Dalbergia melanoxylon (Top Left), Khaya anthotheca (Top Right)and Pterocarpus angolensis (bottom) are prevalent in Liwonde Forest Reserve

In total, more than 90 woody and herbaceous species were documented across the climbing lanes, including at least 10 species that are nationally protected. These include *Burkea africana*,

[4] Hawthorne, W. 1998. Khaya anthotheca. The IUCN Red List of Threatened Species 1998: e.T32235A9690061. https://dx.doi.org/10.2305/IUCN.UK.1998.RLTS.T32235A9690061.en. Accessed on 19 May 2025.

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Brachystegia manga, *Parinari curatellifolia*, *Pericopsis angolensis*, *Bridelia micrantha*, *Pseudolachnostylis maprouneifolia*, *Zanha africana*, among others.

Construction of the climbing lanes within the Liwonde Forest Reserve will result in the loss of approximately 429 indigenous trees, including 5 nationally red-listed individuals [3 *Dalbergia melanoxylon* (African ebony), and 2 *Pterocarpus angolensis* (African teak)]. While the loss of these individuals is considered negligible compared to populations outside the impact zone (17 African ebony and 13 African teak safeguarded), the project will implement a 10:1 replacement planting program and ensure strict protection of remaining populations in line with OP/BP 4.04 on Natural Habitats.

Encouragingly, the presence of invasive alien species is low, likely due to the closed canopy and the reserve's regulated protection status. However, the occurrence of *Lantana camara* along forest edges and disturbed roadside patches indicates a potential early-stage invasion that merits monitoring.

Zone 2 functions as a critical ecological node within the corridor, not only due to its species richness and structural integrity but also because of its roles in hydrological regulation and soil protection. The prevalence of threatened and nationally protected tree species underscores the need for stringent mitigation measures during road construction.

A comprehensive list of these species, along with their national and IUCN conservation statuses, is provided in Annex 5 of this report.

(iii) Zone 3: Machinga Boma to Matawale Turn-Off (Chainage 11+401 to 47+328)

Zone 3 is the longest and most multifaceted segment of the Liwonde–Matawale Road corridor. It begins immediately after the Liwonde Forest Reserve and extends to the Matawale Turn-Off in Zomba, traversing a mixed-use landscape characterized by smallholder agriculture, dense human settlements, and interspersed trading centers. Elevations in this zone gradually increase from approximately 610 to 950 meters above sea level as the terrain slopes upward toward the highlands surrounding Zomba.

Floristically, the region is diverse though markedly altered by extensive human activity. The dominant vegetation is a patchwork of secondary miombo woodland, cultivated fields, fallow lands, and riparian strips. Indigenous tree species, including *Julbernardia globiflora*, *Brachystegia spiciformis*, *Combretum molle*, *Terminalia sericea*, *Faidherbia albida*, and *Albizia antunesiana*, are sporadically distributed throughout the landscape, especially along farm margins, in woodlots, and in relatively undisturbed areas. Secondary shrub species, such as *Bauhinia thonningii* and *Dichrostachys cinerea*, are prevalent in regenerating fallows.

A notable feature within Zone 3 is Mandevu Farm, a privately conserved woodland enclave situated between Machinga Boma and the Namwera Turn-Off. Mandevu Farm exhibits markedly better conservation status than its surroundings, retaining mature miombo species

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and maintaining an intact canopy. This suggests active management practices and relatively low levels of disturbance compared to the adjacent agricultural landscape.

The zone also contains seven major trading centers, which create interruptions in the rural matrix at regular intervals. These trading centers are located at the following chainages:

- Machinga Boma (17+140 to 17+540)
- Namwera Turn-Off (25+780 to 26+300)
- Somba TC (29+100 to 29+540)
- Domasi TC (33+320 to 33+820)
- Songani TC (38+060 to 38+480)
- Naizi TC (43+400 to 43+920)
- Chinamwali TC (46+080 to 46+560)

Within these centers, urban development is pronounced and ecological degradation is evident. Vegetation is limited to isolated ornamental and exotic trees, roadside shrubs, and ruderal herbaceous plants. Common species in these urban fringe areas include *Mangifera indica*, *Psidium guajava*, and *Eucalyptus camaldulensis*. Invasive alien species, such as *Tithonia diversifolia*, *Calotropis procera, Ricinus communis*, and *Lantana cam*ara, proliferate along road verges, abandoned spaces, and on the urban–rural boundaries (Figure 5-16).

(a) (b)



Figure 5-16: Some of the Invasive Alien Species (IAS) encountered (a) Calotropis procera (Aiton) R.Br and (b) Ricinus communis L.

Hydrologically, Zone 3 is intersected by three major rivers:

- Lifani River, located near Namwera Turn-Off;
- Domasi River, which flows through the Domasi TC; and

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- Chikupira River, adjacent to Chinamwali TC.

These rivers and their riparian zones offer some of the most ecologically sensitive habitats within the corridor. Although pressures from farming and sand mining persist, these watercourses support species such as *Syzygium cordatum, Ficus sycomorus, Phoenix reclinata*, and *Tamarindus indica*. Their riverbanks, often lined with reed beds, facilitate small-scale irrigation and gardening practices. Consequently, these riparian corridors act as biodiversity refuges and serve as linear ecological buffers within an otherwise fragmented landscape.

(iv) Monumental tree species.

Two monument tree species were recorded along the passage of the road. These are *Khaya anthotheca* and *Breonardia salicina* trees at the bridge near Domasi roadblock.

5.3.2 Fauna (Animal) baseline status

(i) Fauna Species of Liwonde Forest Reserve (Climbing Lanes 1 & 2)

The fauna of the Liwonde Forest Reserve, covering both Climbing Lanes 1 and 2, is characterized by a wide array of species, reflecting the ecological richness and diversity of this protected landscape. The surveys undertaken in both right-of-way and residual project areas collectively documented the presence of mammals, birds, reptiles, amphibians, and macro-invertebrates.

Mammals
A total of 23 small mammal species were recorded, including species such as *Tatera leucogaster* (bushveld gerbil), *Dendromus mystacalis* (chestnut climbing mouse), *Cryptomys hottentotus* (common mole rat), *Steatomys pratensis* (fat mouse), and *Petrdromus tetradactylus* (four-toed elephant shrew). Other species include *Herpestes ichneumon* (large grey mongoose), *Mus triton* and *Mus musculus* (mice), *Lepus saxotilis* (scrub hare), *Paraxerus cepapi* (tree squirrel), *Felis silvestris cafra* (African wild cat), *Paragalago nyasae* (Malawi bushbaby), and *Varanus albigularis* (rock monitor), among others. Importantly, none of these mammal species has been classified as threatened or protected under the IUCN Red List or national legislation. Additionally, no endemic or invasive alien mammal species were recorded.

Birds
A combined total of 74 bird species were documented, including common and abundant species such as *Nectarinia manoensis* (miombo double-collared sunbird), *Euplectes orix* (red bishop), *Laniarius aethiopicus* (tropical boubou), *Ploceus cucullatus* (village weaver), *Vidua chalybeate* (village indigo bird), *Serinus mosambicus* (yellow-fronted canary), *Streptopelia capicola* (cape turtle dove), and *Passer domesticus* (house sparrow). The majority of these species are not listed as threatened or protected. However, *Passer domesticus* is noted as an invasive alien species, known to outcompete native species for nesting and food resources. No endemic bird species were identified.

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Reptiles

Eighteen reptile species were recorded, with representatives including *Lygodactylus capensis capensis* (common dwarf gecko), *Bitis arietans* (puff adder), *Acanthocercus atricollis atricollis* (southern tree agama), *Chamaeleo dilepis-dilepis* (flap-necked chameleon), *Naja mosambicus* (Mozambique spitting cobra), *Psammophis mossambicus* (olive green snake), *Trachylepis margaritifer* (rainbow skink), and *Python natalensis* (southern African rock python). These species were all indigenous, with none classified as threatened, endemic, or invasive.

Amphibians

Amphibian diversity was represented by six species, notably *Bufo gutturalis* (Guttural Toad), *Amietophrynus gutturalis* (Square-marked Toad), *Breviceps mossambicus* (Mozambique Rain-frog), and *Ptychadena anchietae* (Savanna Ridged Frog). All species are considered Least Concern and are indigenous to the region. No endemic or invasive amphibians were reported.

Macro-invertebrates

A total of 22 macro-invertebrate species were documented across both climbing lanes. Key species include *Hamanumida daedalus* (Guineafowl Butterfly), *Apis mellifera* (honey bee), *Pilodeudorix caerulea* (grey-winged butterfly), *Danaus chrysippus* (African Monarch), *Delta emarginatum* (Potter wasp), *Neptis saclava* (small spotted sailor), *Zonocerus elegans* (Elegant grasshopper), and *Xylocopa latipes* (Carpenter bee). All species are indigenous, with no listings as threatened, endemic, or invasive (Figure 5-17).



Figure 5-17. Neptis saclava (Small spotted sailor) and Zonocerus elegans (Elegant grasshopper)

In summary, the Liwonde Forest Reserve supports a rich and ecologically significant array of fauna species across various taxonomic groups. While none of the species identified have been classified as threatened or endemic, the presence of invasive species such as the house sparrow underscores the importance of continued monitoring and ecological management within the reserve, especially in light of proposed development activities.

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(ii) Faunal Species of Mixed Use and Riverine Areas (Borrow Pit Areas, Built Environments and Agriculture Fields)

The mixed-use and riverine landscapes intersected by the Matawale–Liwonde Road project corridor, including borrow pits, built environments, agricultural fields, and seasonal and perennial watercourses, support a diversity of fauna species. While these areas generally exhibit lower biodiversity richness than forest reserves, they remain ecologically important due to their connectivity with natural systems and their role in supporting adaptable and aquatic species.

Mammals

Faunal surveys recorded a limited range of small mammals inhabiting these areas, including *Mus musculus* (house mouse), *Rattus rattus* (black rat), *Tatera leucogaster* (bushveld gerbil), and *Lepus saxotilis* (scrub hare), commonly observed near agricultural plots and settlements. These generalist species have adapted well to anthropogenic landscapes. No mammal species recorded were listed as threatened or protected, and none were identified as endemic or invasive alien species.

Birds

A variety of bird species, particularly granivores and insectivores, were documented across the landscapes. Common species included *Passer domesticus* (house sparrow), *Streptopelia senegalensis* (laughing dove), *Ploceus cucullatus* (village weaver), *Euplectes orix* (red bishop), and *Vidua macroura* (pin-tailed widow). Riverine zones also supported species such as *Halcyon chelicuti* (striped kingfisher) and *Butorides striata* (green-backed heron). While most birds are native and not threatened, *Passer domesticus* is an invasive alien species known to displace native species. No endemic bird species were recorded.

Fish

Riverine environments, especially along perennial and seasonal streams intersecting the corridor, were found to support a diversity of fish species. Sampling was conducted in the Lifani, Domasi, and Chikupira Rivers, which flow across the road alignment. Commonly observed species included *Oreochromis shiranus* (Shire tilapia), *Tilapia rendalli*, *Clarias gariepinus* (African sharptooth catfish), *Barbus paludinosus* (straightfin barb), and *Oreochromis mossambicus* (Mozambique tilapia) (Figure 5-18). These species are known to inhabit shallow, slow-moving waters and seasonal floodplains. No fish species recorded were classified as threatened, endemic, or invasive alien species.

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Figure 5-18. Straightfin barb and Shire Tilapia are were found in the sampled rivers

Reptiles

Reptile presence was noted both in built-up and aquatic transition zones. Species included *Agama armata* (Peter's ground agama), *Trachylepis striata* (striped skink), and *Naja mossambicus* (Mozambique spitting cobra). Riverbanks occasionally hosted *Varanus niloticus* (Nile monitor). These species are adaptable and resilient to disturbed habitats. None were classified as threatened, endemic, or invasive.

Amphibians

Amphibians were mainly recorded from flooded borrow pits, low-lying agricultural fields, and riverine wetlands. Species included *Bufo gutturalis* (guttural toad), *Amietophrynus gutturalis* (square-marked toad), *Ptychadena anchietae* (savanna ridged frog), and *Breviceps mossambicus* (Mozambique rain-frog). These species are dependent on temporary and permanent water bodies for breeding. All were indigenous and not threatened or endemic.

Macro-invertebrates

These areas also supported a variety of macro-invertebrates, including *Apis mellifera* (honey bee), *Zonocerus elegans* (elegant grasshopper), *Xylocopa caffra* (carpenter bee), *Danaus chrysippus* (African monarch), and *Trichoptera* spp. (caddisflies) found near flowing streams. These organisms play crucial ecological roles in pollination, decomposition, and maintaining the health of aquatic ecosystems. All species recorded were indigenous and not classified as threatened, endemic, or invasive.

In summary, the mixed-use and riverine environments within the project corridor host a suite of adaptable, resilient, and aquatic-dependent fauna. These zones function as ecological buffers and corridors between natural and built environments and warrant management consideration in project planning and implementation.

5.3.3 Natural Habitats (OP/BP 4.04)

Under the World Bank's OP/BP 4.04 – Natural Habitats, critical natural habitats are those areas recognized for their high biodiversity value, including legally protected areas, officially

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proposed protected areas, and sites identified as particularly important for the survival of threatened species or for unique ecological functions.

Habitat Characterization:

The dominant habitat along the Liwonde–Matawale corridor is miombo woodland, composed mainly of *Brachystegia* species (*B. boehmii, B. floribunda, B. longifolia, B. manga, B. spiciformis, B. tamarindoides, B. utilis*) together with *Julbernardia globiflora*, *Albizia versicolor*, *Acacia polyacantha*, and *Burkea africana*. These habitats are under pressure from charcoal burning, firewood collection, and agriculture. Most species are listed as Least Concern (IUCN) and remain widespread in Malawi. A few species: *Khaya anthotheca*, *Dalbergia melanoxylon* (African ebony), and *Pterocarpus angolensis* (African teak), are nationally listed as Vulnerable/NT, but occur more broadly beyond the road corridor.

Tree Losses Due to Project:

The climbing lanes within Liwonde Forest Reserve will lead to the loss of about 429 indigenous trees, including 5 nationally red-listed individuals (3 *Dalbergia melanoxylon*, 2 *Pterocarpus angolensis*). These losses are considered localized and not significant under OP/BP 4.04, given the wider distribution of these species outside the impact zone.

In line with OP/BP 4.36 (Forests), which requires that Bank-financed projects avoid significant conversion or degradation of forest resources and promote sustainable forest management, the project has integrated mitigation measures. These include compensatory planting with native species, slope stabilization, erosion control, and collaboration with the Forestry Department to ensure long-term conservation and sustainable management of the affected section of the reserve.

Invasive Alien Species:

IAS such as *Lantana camara* and *Tithonia diversifolia* were also recorded, which degrade native ecosystems. Their presence underscores the need for active vegetation management during and after construction.

Fauna Assessment:

Surveys recorded 74 bird species, 23 mammals, 18 reptiles, 6 amphibians, and 22 macro-invertebrates. No Critically Endangered or Endangered species (IUCN) were observed. Species of concern include the African Rock Python (*Python natalensis*, NT) and the locally significant Malawi Bushbaby (*Paragalago nyasae*). Other fauna were either generalists (e.g., *Mus musculus*, *Passer domesticus*) or woodland/riverine associates such as the miombo double-collared sunbird (*Nectarinia manoensis*) and Shire tilapia (*Oreochromis shiranus*).

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Conclusion:

While ecologically valuable, the Liwonde–Matawale road corridor does not have irreplaceable habitat features or populations of globally threatened or highly restricted species. Nonetheless, the project will implement mitigation measures, including:

- 10:1 tree replacement program for all trees cut.
- Strict protection of remaining *Dalbergia melanoxylon* and *Pterocarpus angolensis* outside the impact zone.
- Control of invasive species.
- Monitoring of faunal populations during construction.

5.3.4 Implication Statement – Biophysical Environment

The baseline biophysical assessment indicates that the Liwonde–Matawale (M003) Road traverses a landscape of varying ecological integrity, from heavily modified savanna woodlands and agricultural mosaics (Zone 1), through intact miombo woodland of high conservation value within the Liwonde Forest Reserve (Zone 2), to mixed-use and fragmented agro-ecological systems interspersed with trading centres and riparian corridors (Zone 3). While most of the corridor is already degraded and supports disturbance-tolerant species, Zone 2 presents heightened ecological sensitivity due to the presence of nationally protected and IUCN Red-Listed species such as *Dalbergia melanoxylon* (Near Threatened), *Khaya anthotheca* (Vulnerable), and *Pterocarpus angolensis*.

The project will result in the loss of approximately 429 indigenous trees, including five individuals of conservation concern. However, these losses are localized, with viable populations of the affected species existing outside the impact zone. In line with OP/BP 4.04 (Natural Habitats) and OP/BP 4.36 (Forests), the project has incorporated mitigation measures including a 10:1 tree replacement program, slope stabilization, and collaboration with the Forestry Department for sustainable management of the Liwonde Forest Reserve. Additionally, invasive alien species such as *Tithonia diversifolia* and *Lantana camara* require active management to avoid further ecological degradation.

Overall, while the project is not expected to significantly affect critical natural habitats, its location through a legally protected reserve and reliance on disturbed ecosystems underscores the need for robust ecological safeguards, biodiversity monitoring, and restoration interventions to maintain ecosystem functionality and secure compliance with national conservation frameworks and World Bank OP/BP safeguards.

5.4 Social and Economic Environment

The socio-economic baseline information was collected using household survey and business survey guided by questionnaires. Information from the surveys was further supported by that provided by key informants and community consultations. The sample population for the household survey included all the villages that are within the road project area of impact.

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Table 5-3. -3 shows the number of households per village that were interviewed. The Mlangala which covers Liwonde town and Chinamwali-Matawale in Zomba City had 19.1% and 15.1% of the total respondents which are the highest. This is the case because the two areas have large populations compared to the other areas.

Table 5-3. Number of Households per village

SN	Name of Village/Area	Frequency	Percent
1	Mlangala	53	19.1
2	Chibwana	19	6.8
3	Chabwera	33	11.9
4	Malindima	1	.4
5	Mliwo	11	4.0
6	Chingoli	28	10.1
7	Lipongo	8	2.9
8	Ndaje	1	.4
9	Kalanje	4	1.4
10	Nkalo	9	3.2
11	Minama	25	9.0
12	Mtogolo	14	5.0
13	Kapyepye	9	3.2
14	Masambuka	10	3.6
15	Chopi	11	4.0
16	Chinamwali-Matawale	42	15.1
	Total	278	100.0

5.4.1 Demographic Information

According to the 2018 Population and Housing Census, Machinga and Zomba districts had populations of 735,438 and 746,724 people, respectively. The key informants from the Village Development Committees (VDCs), a community development institution at the village level, provided a number of households in the affected villages. The VDC data showed that the affected villages under Machinga and Zomba Districts had a total of 30,855 households, with the exclusion of Chinamwali and Matawale residential areas, which are in Zomba City (Table 4-4).

Table 5-4: Estimated number of households

SN	Name of Village/Area	Estimated Number of Households
1	Mlangala (Liwonde)	1,512
2	Chibwana	500
3	Chabwera	2,100
4	Malindima	1,300
5	Mliwo	1,333

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SN	Name of Village/Area	Estimated Number of Households
6	Chingoli	2,750
7	Lipongo	1,500
8	Ndaje	3,750
9	Kalanje	583
10	Nkalo	365
11	Minama	4,742
12	Mtogolo	3,900
13	Kapyepye	1,072
14	Masambuka	1,888
15	Chopi	3,560
	Total	30,855

(i) Sex Distribution and Ratio

The survey results in Table 5-5 indicate that males were 772 (49.8%) of the population and females were 778 (50.2%). The sex ratio for this sample stands at 99.2 % which is higher than that recorded in the 2018 Population and Housing census for Machinga and Zomba which stood at 91.2 and 91.5 respectively.

Table 5-5: Number of people disaggregated according to their sex

Sex of the PAP	Frequency	Percent
Female	778	50.2
Male	772	49.8
Total	1550	100.0

(ii) Age distribution of the sample population

The survey results show that the youngest and oldest ages in the households range from months old to ninety-three years. The average age is twenty-one years, and the median age is eighteen years. This shows that the area has a growing type of population (Figure 5-19). The survey also found that 49% of the population was aged between eighteen and sixty, which is a range of people that are likely to offer labour force. The project may, potentially, utilise this population through provision of labour during construction phase of the project.

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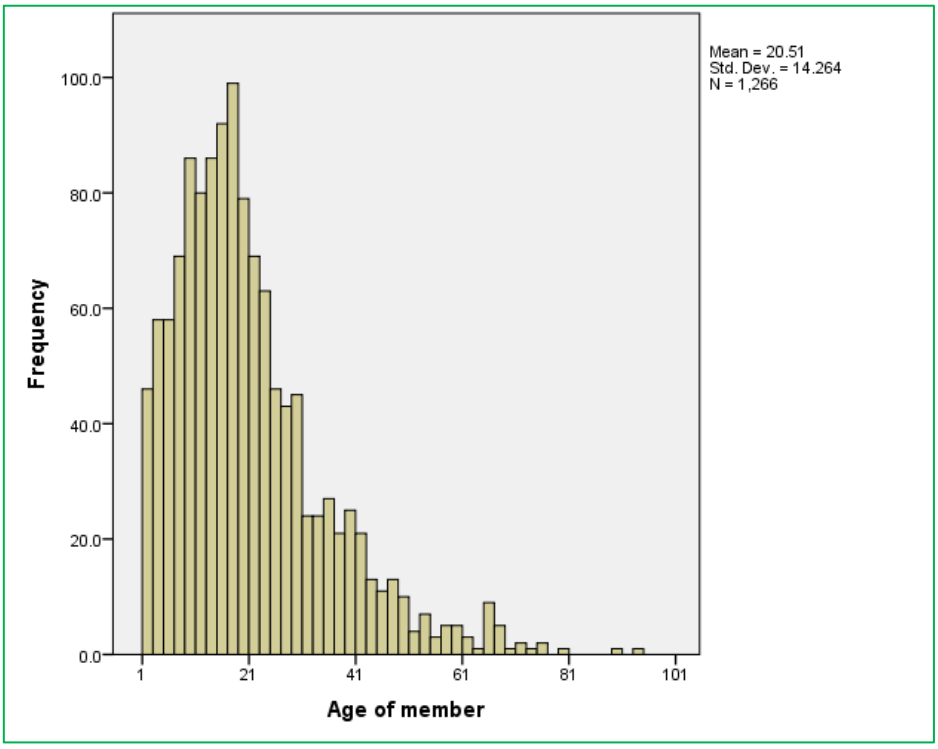


Figure 5-19: Age distribution of the sampled population

(iii) Marital Status of the Respondents

The survey results show that 75% of the respondents were married, and 12% were widows and widowers (Figure 5-20). A total of 9% of the respondents were divorced and 4% of them had never married before.

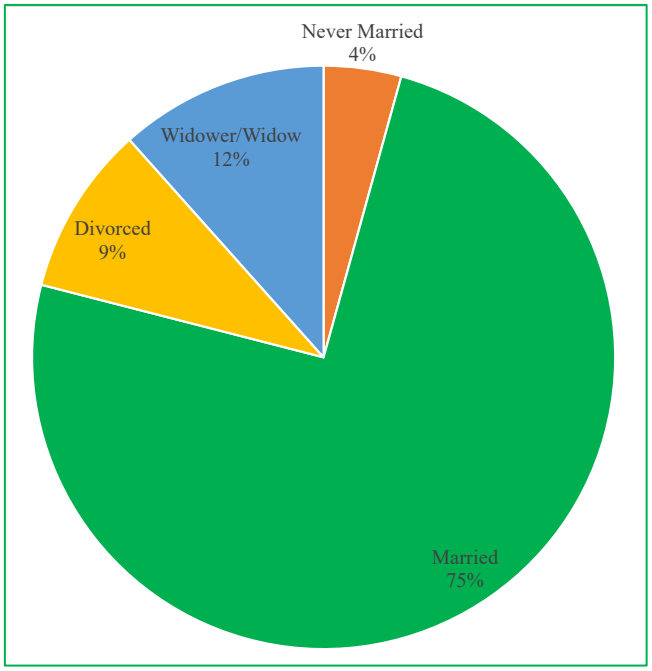


Figure 5-20: Marital status of the respondents

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(iv) Population Density

The Liwonde–Matawale (M003) Road passes through densely populated regions in Machinga and Zomba districts, encompassing significant settlements such as Liwonde, Machinga Boma, Domasi, Songani, Chinamwali, and Matawale. According to the 2018 Malawi Population and Housing Census, the populations of Machinga and Zomba districts were recorded at 735,438 and 746,724, respectively. In terms of population density, Machinga District exhibits a density of 244 individuals per square kilometer, while Zomba Rural has an even higher density of 315 individuals per square kilometer—both significantly above the national average of 186 individuals per square kilometer.

Within the project corridor, the road alignment traverses Traditional Authorities (TAs) such as TA Malemia, which had a population of 22,437 in 2018. These population levels indicate intense settlement patterns along the road, where linear growth of communities is closely linked to the proximity of essential services and trading activities.

The corridor is characterized by dense clusters of residential houses, informal trading stalls, schools, and public institutions developed alongside the existing road reserve. Trading centers, especially those with better access to markets and public services, such as Liwonde and Domasi, exhibit more urbanized characteristics and support higher population concentrations.

This high population density presents both opportunities and challenges for road improvement works. While the demand for upgrades justifies investment in infrastructure, it also raises risks related to resettlement, congestion, and potential disruptions during the construction phase

(v) Migration

Migration within the Liwonde–Matawale Road corridor is predominantly internal and circular, reflecting broader rural-urban and rural-rural migration trends observed in Malawi. According to the 2018 Malawi Population and Housing Census, both Zomba and Machinga districts experience moderate levels of in-migration driven by factors such as access to education, employment opportunities, trading centers, and fertile agricultural land.

Urbanizing centers along the M003 road corridor, including Liwonde, Domasi, Songani, Chinamwali, and Matawale, attract migrants from surrounding rural areas. These areas are particularly appealing due to their secondary schools, training institutions (such as Machinga TTC), public services, and economic opportunities. Liwonde, in particular, serves as a regional growth center, drawing internal migrants not only from within Machinga but also from districts like Balaka and Mangochi. This influx has resulted in a growing peri-urban population residing along the road reserve in informal settlements, where many engage in small-scale businesses and trading activities.

Conversely, out-migration occurs in more remote or agriculturally marginal areas, particularly among youth seeking employment or educational opportunities in urban centers like Zomba

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City and Blantyre. Seasonal migration is also prevalent, with some residents temporarily relocating to tobacco-growing estates or commercial farms during peak agricultural seasons.

5.4.2 Trafficking in Persons

The Liwonde–Matawale (M003) Road Project traverses areas in Zomba and Machinga districts that are increasingly exposed to trafficking in persons (TIP), with roadside trading centres (e.g., Liwonde, Domasi, Songani, and Matawale) hosting large populations of informal workers, women, and children who are disproportionately at risk. According to Malawi's Trafficking in Persons Act (2015), TIP is defined as the recruitment, transportation, transfer, harboring, or receipt of individuals through coercion, abduction, fraud, deception, or abuse of power for the purpose of exploitation. Nationally, Malawi remains classified as a Tier 2 country in the 2024 U.S. Trafficking in Persons Report, reflecting significant but insufficient efforts to eliminate trafficking. In 2023, the government investigated 46 cases, prosecuted 80 alleged traffickers, and convicted 11, while NGOs identified 325 victims, of whom 132 were referred to care (United States Department of State, 2024). This context underscores the need for the Project to integrate prevention, protection, and accountability measures into its design and implementation.

(i) Local Context and Vulnerabilities

The road corridor features a high concentration of informal businesses and roadside trading, particularly in market centers such as Liwonde, Domasi, Songani, and Matawale, where women and girls dominate the workforce. Socio-economic challenges, including poverty, limited employment opportunities, and low literacy rates among females, heighten the risk of TIP (US Department of State, 2024; Yoneco, 2024). Community consultations indicate that many men in these areas frequently consume alcohol, often neglecting household responsibilities. Consequently, women and girls are compelled to seek alternative income through vending and seasonal work, making them more vulnerable to exploitation, including trafficking and transactional sexual abuse.

(ii) Reported Incidents and Legal Actions

Although formal reports of TIP cases within the immediate road corridor are limited, broader assessments suggest that road construction projects may increase TIP risks, particularly for adolescent girls and young women. These risks are compounded by labor influxes, inadequate monitoring of informal labor, and weak enforcement of legal protections. Studies have highlighted that roads can become sites of exploitation; for example, past research has documented instances of abuse involving girls under the age of 18.

One notable case involved the Zomba Chief Resident Magistrate Court sentencing a 28-year-old man to 15 years of hard labor for attempting to traffic two children to Mozambique. The perpetrator had lured the children with promises of money, intending to exploit them for labor on tobacco estates (Nyasa Times, 2024). This case underscores the prevalence of child

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trafficking in the region and highlights the critical need for vigilance and effective legal enforcement to combat such exploitation.

5.4.3 Settlement Patterns

Legally, the Road Reserve refers to the total area of land set aside for road infrastructure, which includes the road itself, drainage systems, and space for future expansion or maintenance. The Right of Way (RoW), refers specifically to the portion of the road reserve used for road construction and associated activities, such as carriageways and footpaths. It is a subset of the road reserve, where structures or activities are not allowed except those directly related to road infrastructure. Despite this being public land, survey findings show that the majority (63%) of the properties in the road reserve were bought by the owners of the property using their financial resources (Figure 5-21). However, some owners just inherited (19%) and others were gifted (12 %) the properties. Only 7% of the respondents were renting the property, not the property owners. The findings show that private resources were used to develop the properties. In terms of usage of the properties, 66% reported that they use them for commercial purposes (Figure 5-21), and this includes, among others, retail shops, wholesale shops, restaurants, lodges and pharmacies. Only 16 % of households use their properties for residential purposes, and these mostly include houses. Survey results also show that 18% of the households use their properties for both commercial and residential purposes, and these mostly include houses for rent. The findings show that the project will most likely affect business activities in these areas and will also affect the living conditions of some of the people.

(a) (b)

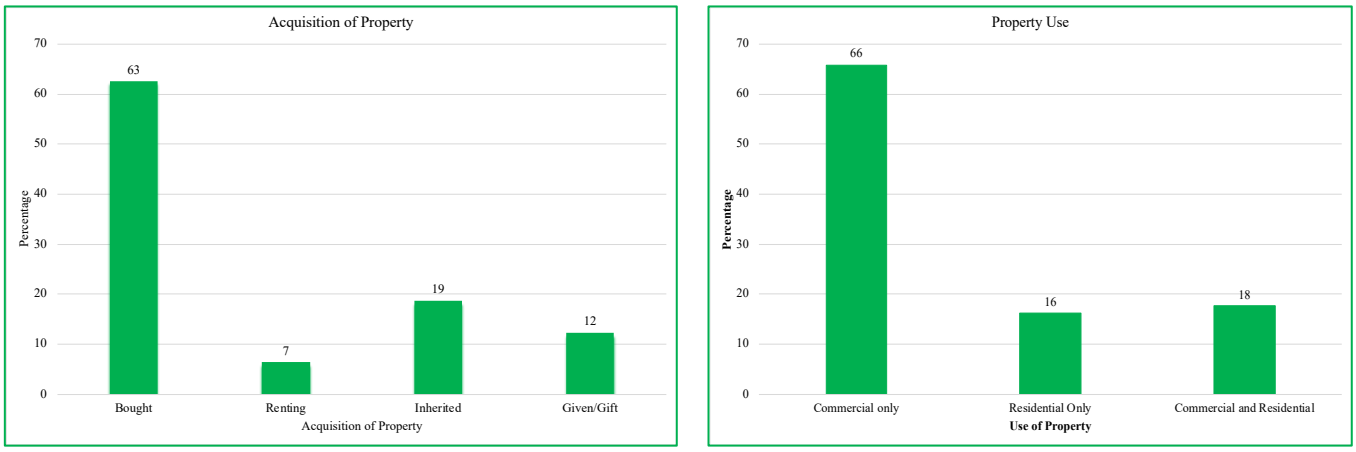


Figure 5-21: Property ownership status

5.4.4 Education and Literacy

(i) Literacy

Literacy levels along the Liwonde–Matawale Road corridor vary geographically but generally demonstrate moderate to high rates, influenced by the availability of educational infrastructure and urban-rural dynamics. According to the 2018 Malawi Population and Housing Census,

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Zomba District, including its rural areas such as Traditional Authority (TA) Malemia, reported a literacy rate of approximately 68.6%. In contrast, Machinga District, which encompasses Liwonde, recorded a lower literacy rate of 57%, making it one of the lowest in the country. However, it is important to consider these statistics within the context of local conditions.

Recent field data collected during the ESIA indicate that Liwonde and its surrounding areas within Machinga District exhibit higher literacy rates than the district average. This increase is likely attributable to their semi-urban character and the concentration of schools in and around Liwonde Township. Evidence of this can be seen in the wide availability of educational institutions, which include both primary and secondary schools—public and private—distributed across villages such as Mlangala, Chabwera, Kalanje, and Chinamwali. In Zomba City, areas like Chinamwali and Matawale, which constitute a small portion of the corridor, show particularly high literacy levels, aligning with the city-wide average of 90%.

Overall, only 5% of the surveyed adult population was found to be illiterate, while 3% were considered literate without having undergone formal schooling—indicating a strong presence of functional literacy among residents.

(ii) Education

The educational attainment along the project corridor reflects positive trends. The presence of a diverse network of schools ranging from public to private institutions, including community day secondary schools (CDSS) along the road corridor has significantly contributed to higher enrollment and improved literacy outcomes. Areas such as Liwonde, Songani, Domasi, and Matawale are particularly well-served, featuring both primary and secondary educational institutions (Table 5-6).

Table 5-6: Education facilities along the Liwonde-Matawale Road

SN	Name of Village/Area	Education facilities
1	Mlangala and Chibwana (Liwonde)	St Tereza Primary School, Liwonde LEA Primary School, Liwonde Secondary School, Machinga CDSS, Mawira Secondary School, Mawira Pvt Secondary School
2	Chabwera	Chabwera Primary School (public), Liwonde LEA Primary, (Public), Eta Private School (Private), Machinga Secondary School (Public) and Liwonde CDSS
3	Malindima	Ntubwi Primary School, M'bawa Primary School, Liwonde CDSS, Machinga Secondary School, Liwonde Secondary School, Mawira Private Secondary School
4	Mliwo	Mtubwi Primary and Mombe Primary
5	Chingoli	Bisa Primary School
6	Lipongo	Machinga LEA
7	Ndaje	

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SN	Name of Village/Area	Education facilities
8	Kalanje	Milala Primary, Likwenu Primary Machinga LEA, Likenu CDSS, Machinga CDSS, Luso Secondary School, Mawilo Secondary School, Nsanjama Secondary School
9	Nkalo	Likwenu Primary; Milala Primary; Salabani Primary; Sambaisa Primary
10	Minama	Msambaisa Primary School, Mchengawedi Primary School, Mchilingano Primary School, Likwenu Primary School, Semijo Private School, Fair View Private School, Domasi Demonstration Secondary School, Likwenu CDSS, Asaalam Private Secondary School, Mawilo Private Secondary School
11	Mtogolo	
12	Kapyepye	Mtondowamwala Primary School, Songani Primary School, Sumasi Private School, Songani CDSS, Kabadwa Private Secondary School, Favour Private Secondary School
13	Masambuka	Songani Primary School, Mtondowamwala Primary School, Mwanje Private School, Sumaisi Academy, Songani CDSS, Kabadwa Private Secondary School, Chiwema Private Secondary Schol
14	Chopi	Chipiupila Primary; Namingazi Primary kmNaisi Primary, Sambaisa Primary, Naisi CDSS; Namingazi CDSS
15	Chinamwali-Matawale	Chikamveka Primary School, Ndangopuma Primary School, Matiti Primary School, Chikupira Primary School, Wisdom Private School Naming'azi CDSS, Likangala CDSS, Chichiri CDSS, Mulunguzi Secondary School, Chilunga CDSS, Masongola Secondary School

Level of education of people over eighteen years of age shows that 45% of the people have secondary education as the highest level of education followed by primary education which stands at 36%. An estimated 5% were recorded to be illiterate having not attained any level of education and 3% of the people were found to be literate even though they did not attain formal education (Figure 5-22).

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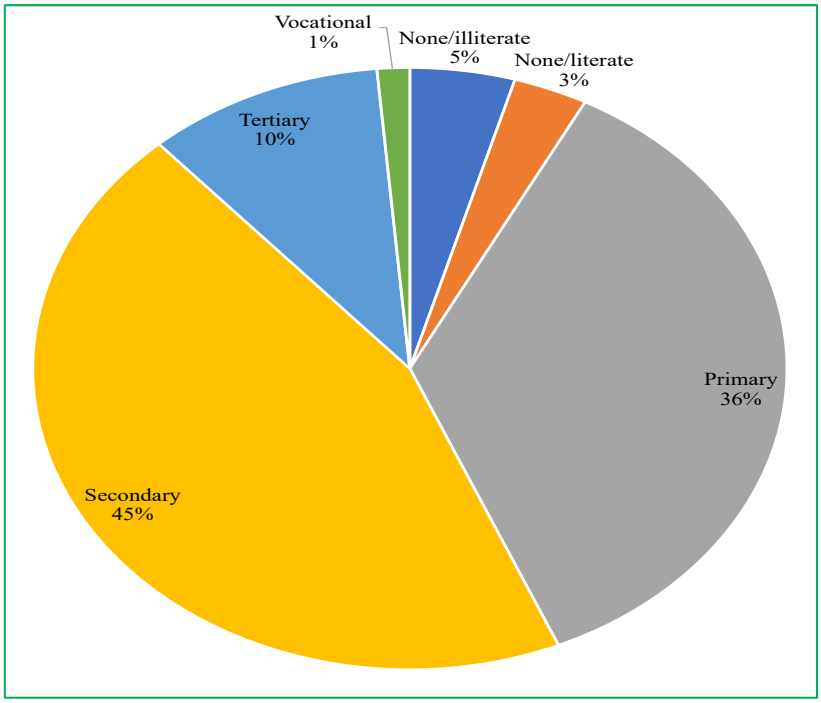


Figure 5-22: Level of education of people over 18 years of age

In terms of the school going population (6-17 years), 450 children out of 482 attended school representing 93.4% of the total, and only thirty-two children did not go to school. Amongst the children that attend school 81% attended primary education, 18% were attending secondary school, and 1% attended tertiary education. For those that did not attend any school, the main reasonrecorded was a lack of interest (33%), lack of fees for secondary education (29%), having a disability (17%) and early pregnancy (9%) (Figure 5-23).

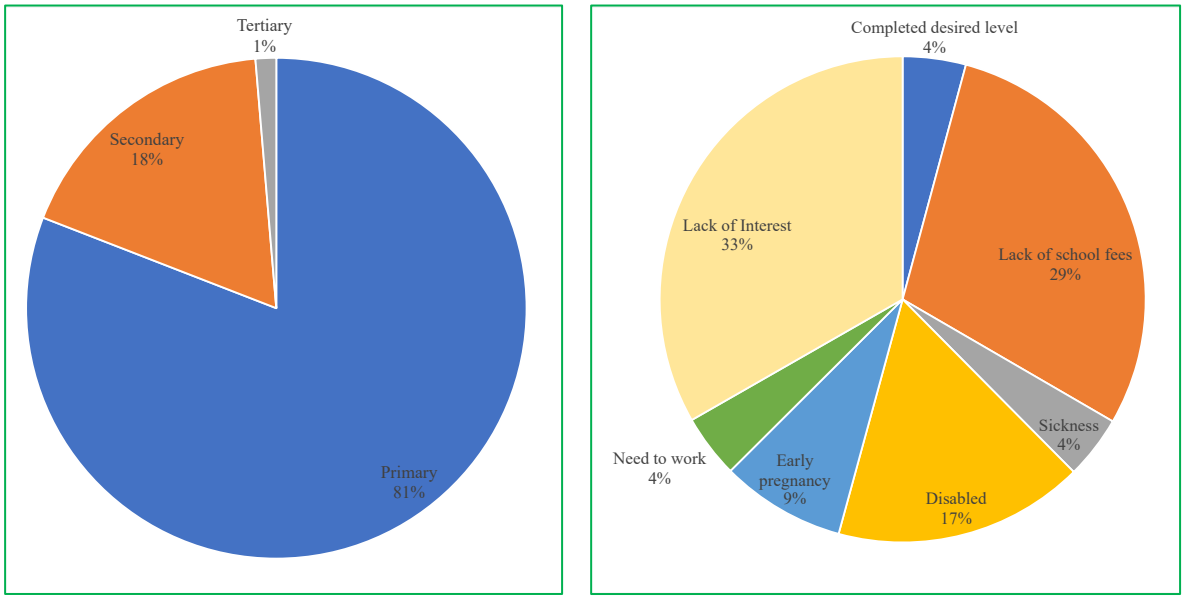


Figure 5-23: Current level of education for (a) school going age population, and (b) reasons for not attending school (b).

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(iii) School Dropout Rates

School dropout along the Liwonde–Matawale (M003) Road corridor presents a persistent challenge, with notable gender disparities. In Machinga, Chabwera Primary recorded the highest attrition, with 95 boys (18.6%) and 75 girls (12.1%) dropping out, mostly due to truancy. Similarly, St. Therese Primary showed significant attrition, with 25 boys (1.9%) and 34 girls (2.2%) leaving school largely because of poverty and child labour. At secondary level, Liwonde CDSS registered 18 boys (4.9%) and 42 girls (11.1%) dropping out, primarily linked to school fees and early marriages, while Machinga Secondary School reported comparable male (7.3%) and female (7.8%) dropout rates driven by inability to pay fees (Table 5-6).

In Zomba, dropout levels were comparatively lower but still evident. Domasi Government Primary reported 8 boys (1.1%) and 8 girls (0.9%) leaving school, while Chikupira Primary showed 3 boys (0.2%) and 10 girls (0.5%) leaving for unspecified reasons. Other schools such as Songani Primary and Domasi Demonstration reported no dropouts at all (Table 5-7).

These patterns confirm broader literature findings that girls are disproportionately affected, often leaving school due to early marriages and pregnancies, while boys are more likely to drop out due to truancy, poverty, or pressure to contribute to household income (Sunny et al., 2019; Pike & Grant, 2022; Boyes et al., 2017; Zeb et al., 2021). Health-related vulnerabilities, including HIV/AIDS stigma, further exacerbate risks (Kip et al., 2022). The data underscores the need for targeted interventions, such as bursary schemes, gender-sensitive retention programs, and school-community awareness initiatives, to reduce attrition and ensure that improved road access contributes to educational attainment rather than exacerbating dropout risks.

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Table 5-7. School Enrolment, Dropout Numbers and Rates

School Name	Total Enrolment (M)		Dropouts (M)		Dropout Rate (M %)		Main Dropout Reasons
	M	F	M	F	M	F	
St Therese Primary (Machinga)	1309	1569	25	34	1.9	2.2	Employment, poverty
Liwonde LEA Primary (Machinga)	1298	1350	4	3	0.3	0.2	Employment, marriage
Liwonde CDSS (Machinga)	366	379	18	42	4.9	11.1	School fees, marriages
Machinga SS (Machinga)	206	204	15	16	7.3	7.8	School fees
Chabwera Primary (Machinga)	512	619	95	75	18.6	12.1	Truancy
Chinduzi Primary (Machinga)	483	585	18	21	3.7	3.6	Long distance
Domasi Government Primary (Zomba)	746	863	8	8	1.1	0.9	Not known
Chikupira Primary (Zomba)	1792	1941	3	10	0.2	0.5	Not known
Domasi CCAP Primary (Zomba)	372	349	9	10	2.4	2.9	Not known
Naming'azi Primary (Zomba)	369	428	3	1	0.8	0.2	Not known
Ntondo Primary (Zomba)	745	826	0	2	0.0	0.2	Not known
Songani Primary (Zomba)	1863	2048	0	0	0.0	0.0	—
Mwanje Primary (Zomba)	740	834	0	4	0.0	0.5	Not known
Matiti Primary (Zomba)	1364	1464	1	0	0.1	0.0	—
Mchilingano Primary (Zomba)	354	373	0	5	0.0	1.3	Not known

5.4.5 Health Condition, Facilities and Disease Prevalence

(i) Disease Prevalence

According to the Malawi Demographic Health Survey of 2018, the most common diseases in Zomba and Machinga districts (Figure 5-24) were acute respiratory infections (51 %), malaria (39%), diarrhoea (14%), malnutrition (5%), skin disorders (4%), sexually transmitted infections (STIs) (4%), common injuries and wounds (2%), Eye infection (1.5%) and ear infections (0.6%). During the consultations with the VDCs and community members it was reported that malaria is the common disease that people in the areas suffer from.

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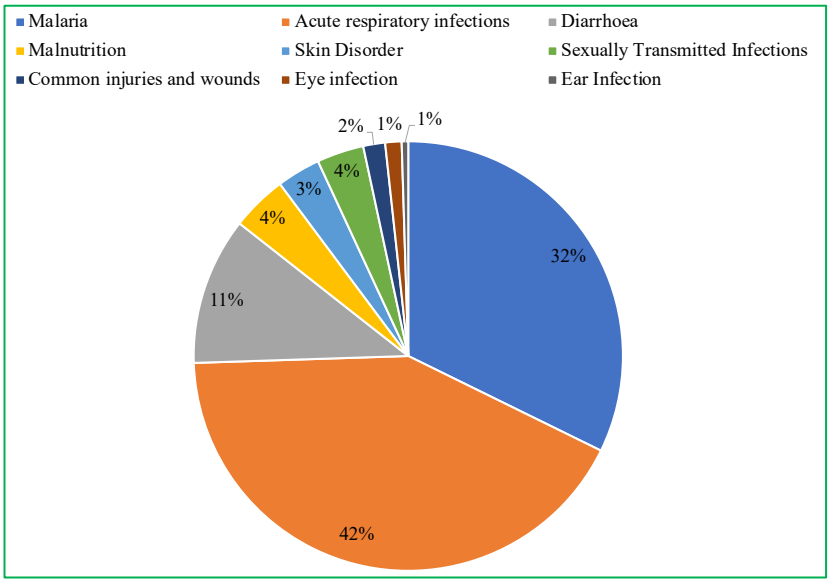


Figure 5-24: Common diseases in Zomba and Machinga districts

The socioeconomic survey found that thirty-nine people had chronic diseases, which is 5% of the sample size. Amongst those with chronic diseases it was observed that 46% suffered from heart disease, 33% had HIV and AIDS, 13% had diabetes and 8% had mental illness (Figure 25).

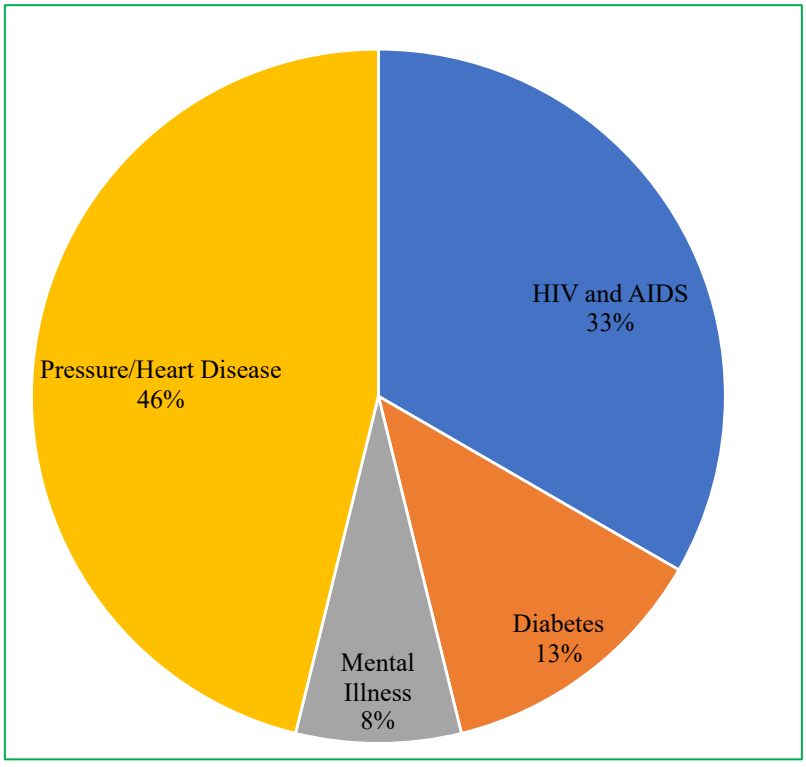


Figure 5-25: Cases of chronic illness in the project area

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(ii) Health and Safety in Construction Work Environments

(a) Labour Conditions and Employment Practices

Labour conditions on construction sites in the project districts, as in most parts of Malawi, present significant challenges. Many workers, especially those hired for temporary or casual labour, are recruited without formal contracts. This informality makes it difficult to enforce rights related to minimum wage, overtime, and social protection. Delays in wage payments are common, undermining workers' economic security, and there are often no functional grievance mechanisms to address unfair treatment.

(b) Occupational Health and Safety Risks

Construction sites frequently lack adequate occupational health and safety measures. Personal Protective Equipment (PPE)—such as helmets, gloves, and protective footwear—is often not provided, exposing workers to accidents and long-term health hazards. While some contractors adhere to safety regulations, many do not, resulting in unsafe working environments. Moreover, structured health and safety training is rare, particularly on smaller, community-based projects where enforcement of regulations is weak.

(c) Vulnerabilities of Informal and Female Workers

Informal workers are especially vulnerable, as they lack access to social protections such as pensions, health insurance, or compensation for workplace injuries. Arbitrary termination, unpaid overtime, and underpayment are common risks. Women face further disadvantages, often confined to the lowest-paid and most precarious roles. Without contracts, they are exposed to wage discrimination, gender-based inequality, and unsafe conditions.

(d) Incidence of Accidents and Health Emergencies

Worksite accidents are frequent, caused by a lack of safety gear, poor practices, and absence of emergency preparedness. Informal daily labourers are rarely trained in safety procedures and lack access to workers' compensation schemes. In many cases, medical care for injuries sustained on-site is inadequate or non-existent, further exacerbating risks.

(e) Access to Health Facilities and Emergency Measures

The road corridor is relatively well-served by health facilities. These include Liwonde Hospital (within 2 km of the starting section), Machinga District Hospital (approximately 5 km from Machinga Boma), Domasi Rural Hospital (about 3 km from the road), and Zomba Central Hospital (within 4 km of the Matawale end point). These facilities provide primary and secondary health services to surrounding communities and would also be the referral points for construction-related medical emergencies.

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5.4.6 Energy Sources

(i) Cooking Energy Sources

Field consultations along the Project Road corridor indicate that firewood is the primary cooking energy source for most households, particularly in rural areas. This preference is largely due to firewood's affordability and ease of access compared to other alternatives. In contrast, households in semi-urban centers such as Liwonde, Machinga Boma, Chinamwali, and Matawale report a higher frequency of using charcoal and electricity for cooking.

These localized observations align with national trends documented in the 2019–2020 Integrated Household Survey (IHS5). The IHS5 found that 90.9% of rural households in Malawi rely on firewood for cooking, whereas only 7.5% use charcoal and a mere 0.2% utilize electricity. In urban areas, there is a greater reliance on alternative sources: 74.5% of urban households use charcoal, 18.9% use firewood, and 6.1% utilize electricity. This disparity highlights the urban-rural divide in energy access, which is also evident along the project corridor.

(ii) Lighting Energy Sources

Regarding lighting, the majority of households in the project area especially those in rural zones—report using battery-powered torches as their primary source of lighting. This reliance is mainly attributed to limited access to the national electricity grid, which primarily serves trading centers and urban areas like Liwonde and Zomba.

National data from the IHS5 reinforces these findings. Across Malawi, 87.9% of rural households use torches for lighting, followed by 7.4% using candles and only 4.5% utilizing electricity. In urban areas, access to lighting is comparatively better: 45.5% of households use electricity, 37.6% use torches, and 13.2% use candles. In the project districts, the situation mirrors national statistics: in Machinga District, 92.6% of households rely on torches while only 5.5% use electricity; in Zomba District, 89.3% use torches and 8.7% use electricity.

5.4.7 Water Supply

According to the socio-economic survey conducted along the Liwonde–Matawale Road corridor, only 25% of respondents reported having direct access to a piped water supply, while 75% indicated that they do not have such a connection (Figure 5-26). This data, as illustrated in the accompanying pie chart, reinforces the earlier observation that, although piped water is available in urban centers and some larger villages through the Southern Region Water Board (SRWB) and Water Users Associations (WUAs), a significant majority of households still rely on boreholes, shallow wells, and rivers to meet their water needs.

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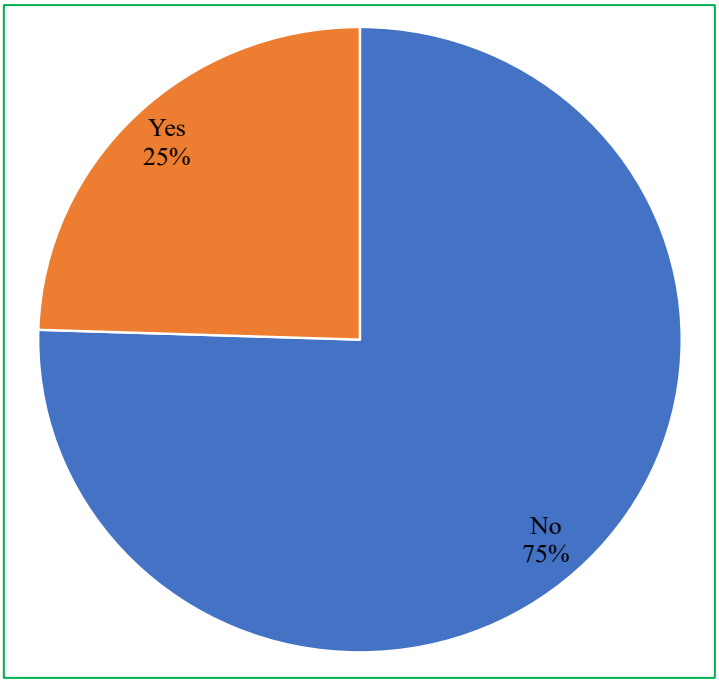


Figure 5-26: Water supply connection to property in the road reserve

5.4.8 Waste management

Households in the areas dispose their refuse by crude dumping behind homes or any open spaces available. The proposed project will also generate some solid waste, refuse bins will be provided to avoid nuisance and littering around the working sites.

5.4.9 Main Livelihood Sources

Based on information obtained during public consultation and key informant interviews, the main economic activities that sustain livelihood in the proposed project area include agricultural activities, small-scale businesses, and casual work.

(iii) Average income

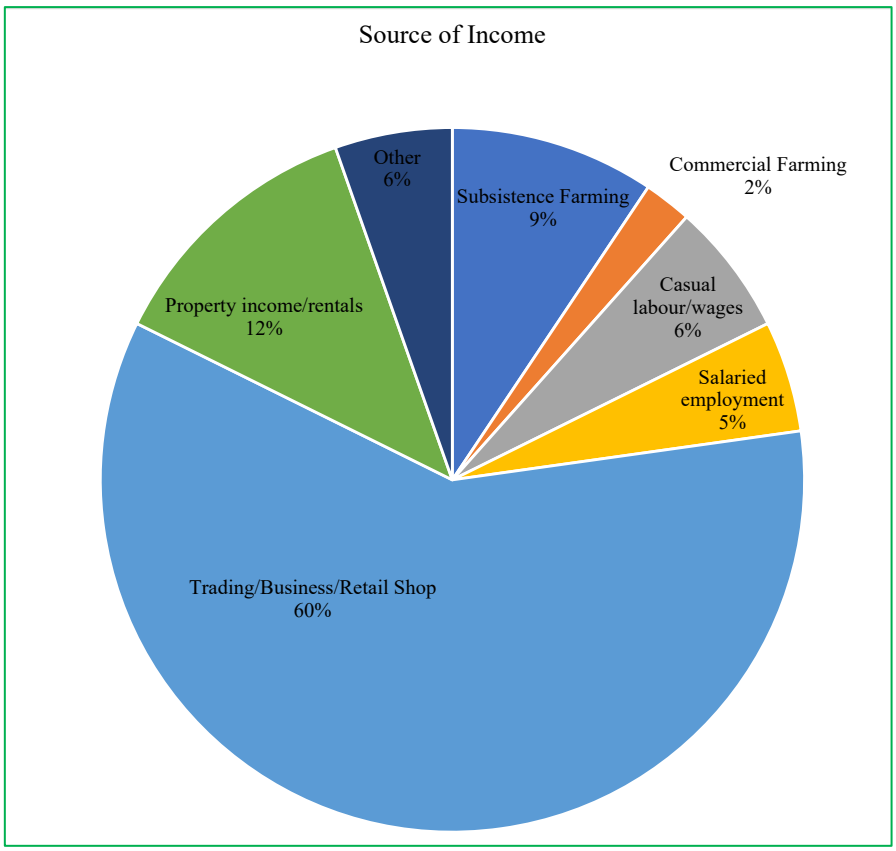
According to the Malawi National Statistical Office (NSO) Integrated Household Survey (IHS) 2019-2020 report, Machinga and Zomba districts, located along the Liwonde–Matawale road corridor, face significant poverty challenges, which are emblematic of the broader economic issues affecting Malawi. Both districts rank among the poorest in the country, with most of their populations relying heavily on subsistence agriculture and facing limited access to essential services. Machinga is considered one of the poorest districts in Malawi, with over 70% of the population living below the poverty line. The high poverty rate is largely attributed to the district's dependence on subsistence agriculture, which provides minimal income and is vulnerable to environmental shocks. Households in Machinga primarily grow crops such as maize, cassava, and groundnuts. Still, these small-scale farming activities are often hindered by erratic weather patterns, poor soil fertility, and limited access to irrigation systems. As a result, food insecurity is a persistent issue in the district, exacerbating the poverty levels.

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While Zomba District fares slightly better than Machinga, poverty remains a critical issue, with 60-65% of the population living below the poverty line. The district's poverty rates vary significantly between its rural and urban areas. In rural Zomba, poverty levels are high due to the dominance of subsistence farming and the limited availability of infrastructure. In contrast, the areas around Zomba City benefit from better economic opportunities, primarily due to the city's proximity to markets, developed infrastructure, and better access to services. Like Machinga's, Zomba's economy is heavily reliant on agriculture. Farmers grow maize, rice, and tobacco as their main crops.

(iv) Main source of income

The survey results show that 60% of the households relied on business as the main source of income followed by property income for 12%. Subsistence farming was the main source of income for 6% of the households, and only 2% relied on commercial farming (Figure 27). The survey also found that 6% of the households had casual labour as the main source of income. From the community consultations, the people in the project area expect to benefit from the job opportunities available on the road project. On the effects of the Project on their sources of income, the survey results show that 81.7% of the households will be affected by the Project as they have their businesses within the road reserve, and 17.6% of the households pointed that the Project will not affect their main source of income (Figure 27).



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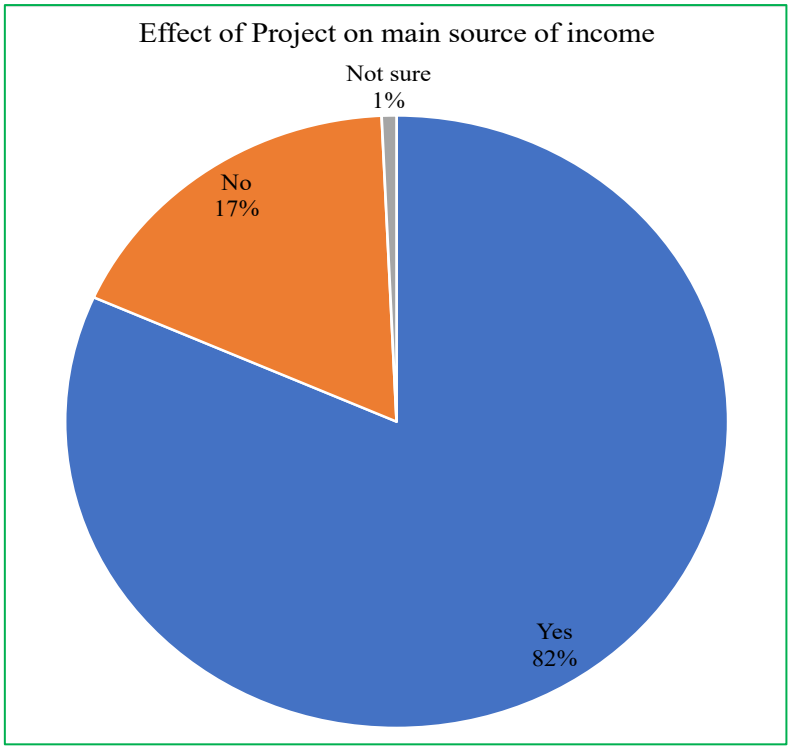


Figure 5-27: Project effect on income sources

5.4.10 Transport and Communication

Telekom Networks Malawi Limited (TNM) and Airtel are the main providers of mobile phone services in the two districts hence cellular network in the district is widespread (Social-Economic Profiles: 2017-2022). During site visit and interviews with local people, it was established that the network connectivity for both providers is excellent.

The existing road network in the project area plays a critical role in connecting rural communities to urban centres and services. The Liwonde–Matawale (M003) Road is a primary road connecting the eastern region of Malawi to the southern districts, including the important cities of Zomba and Blantyre. It is a vital link for transporting goods, agricultural produce, and passenger traffic. Several secondary roads branch off from the M003, connecting nearby villages and agricultural areas. These roads are typically unpaved and can become impassable during the rainy season. They provide critical access to markets, schools, and healthcare facilities for local communities. However, they often lack proper maintenance, contributing to the isolation of communities, particularly during severe weather events. Local access roads leading to villages, schools, and farms are in varying conditions. Some access roads are well-maintained, while others suffer from poor drainage and erosion, impacting local mobility and access to services.

5.4.11 Land Use

The project area is mainly dotted by small-scale agriculture, shops, hawkers, vending stalls and business buildings, most of which are in a linear settlement pattern along the road. Some

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infrastructure also includes utility services such as electricity poles, as well as social infrastructure such as local markets, and settlements in close proximity to the business buildings. A RAP is yet to be developed and it will quantify the number and type structures as well as the people affected by the prposed development.

5.4.12 Agriculture

Agriculture is the dominant livelihood activity along the Liwonde–Matawale (M003) Road corridor, particularly in the rural sections traversing Machinga and Zomba districts. The majority of households practice smallholder, rain-fed subsistence farming, typically on customary landholdings of less than 2 hectares. Land is cultivated mainly for household food security, although surplus produce is often sold in local markets situated at trading centres such as Namwera Turn-Off, Domasi, and Songani.

The main crops include maize, cassava, sweet potatoes, rice, and legumes (groundnuts, beans, pigeon peas), complemented by small-scale horticulture (tomatoes, vegetables) in dambo areas. Tobacco and cotton are also grown in some pockets, reflecting cash crop orientation in certain households. Livestock rearing (goats, poultry, pigs, and a few cattle) supplements crop production, though herd sizes are small. Seasonal dependence on rainfall makes households vulnerable to climate variability, with recurrent dry spells and floods affecting yields.

Agriculture provides both subsistence and income: survey data and consultations indicate that farming is the primary livelihood source for over 70% of households along the road alignment. Agricultural produce is often marketed in roadside markets and trading centres, where transport access directly influences farmers' ability to sell perishable goods quickly and at better prices.

The project's impacts on agriculture will be twofold: (i) positive impacts through improved road access, lowering transport costs and facilitating market integration for farmers, and (ii) negative impacts through loss of cultivated land and crops within the road reserve, as identified in the RAP (August 2025), which recorded crop losses and economic displacement of 769 PAPs engaged in farming and agri-related businesses. Compensation has been budgeted to cover these losses, and livelihood restoration measures will be implemented to safeguard agricultural households.

5.4.13 Trade and Industry

The Liwonde-Matawale road has several trading centres where most business activities take place and these include Liwonde, Chingale, Machinga Boma, Malosa and Namwera turn-off, Domasi, Songani and Chinamwali trading centres. Business survey results show that business was the main source of income for 156 respondents representing 90%.

(i) Demographic Characteristics of the business owners

The survey results show that 67.2% of the total study population were male and 32.8% were female (Table 5-8). The age of the businesspeople range from sixteen years to seventy-two

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years, and the average and median age is thirty-five years old (Figure 5-28). The results indicate that 72.3% of the businesspeople's ages range from eighteen to forty years, which shows that most of those doing business are young. Further results show that 80% of these businesspeople are household heads and the average size of the households is five people, and the minimum and maximum household size is two and fifteen people respectively.

Table 5-8: Sex of businesspeople

Sex	Frequency	Percent
Female	58	32.8
Male	119	67.2
Total	177	100.0

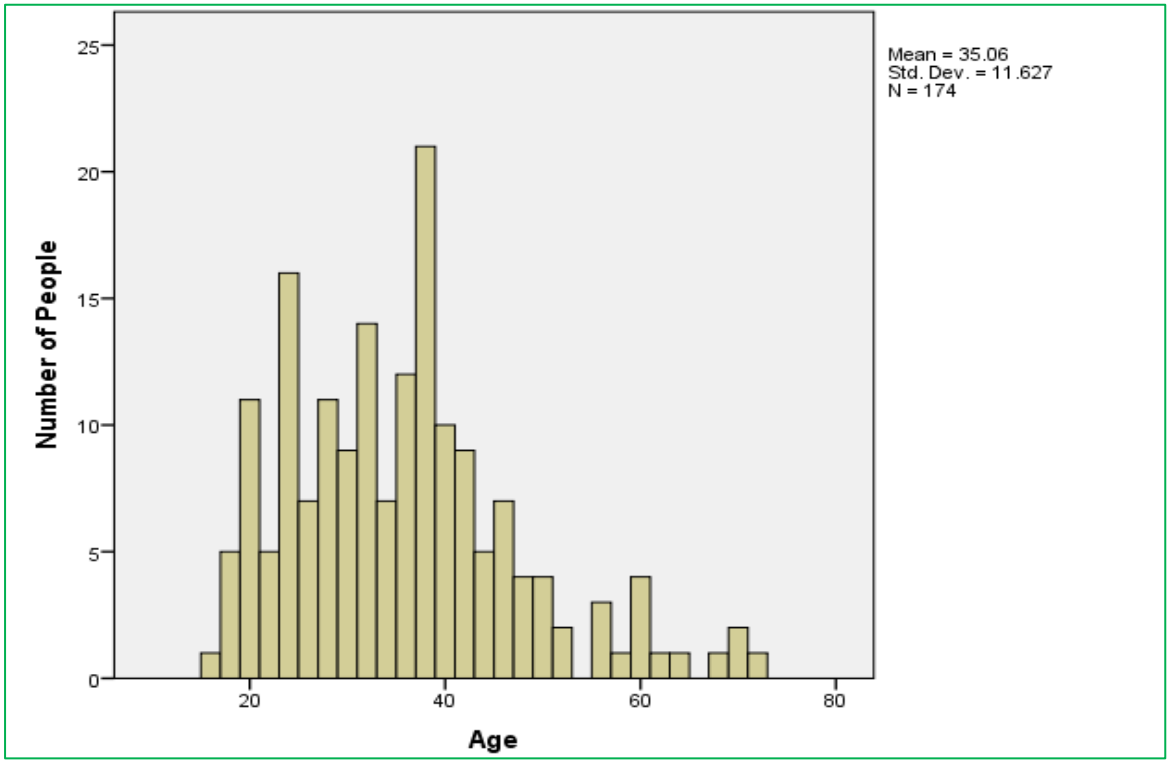


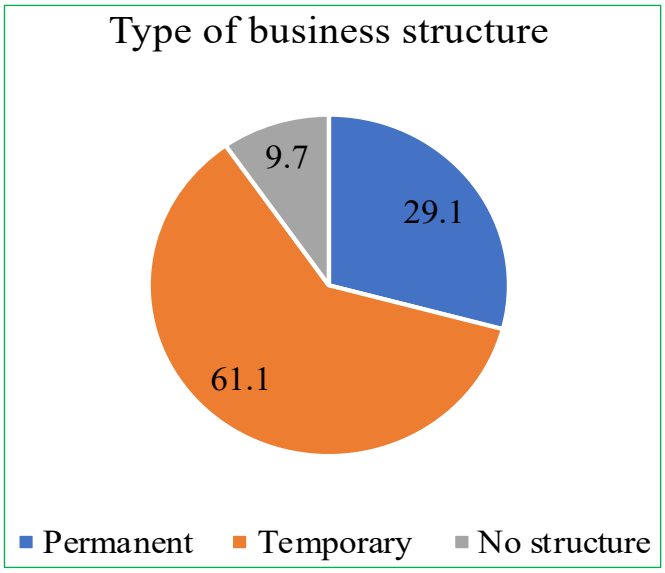
Figure 5-28: Age distribution of business people

(ii) Nature of businesses

The results from the business survey show that 61.1% of the businesses have temporary structures and 29.1% have permanent structures (Figure 5-29 (a)). Permanent structures were those built using bricks, iron sheets, and other materials like cement and timber and thus are constructed for long-term use. The temporary structures were made of timber, bamboo, grass thatched and thus were constructed for short-term use and were easy to relocate. A total of 9.7% had no structure and included the mobile vendors. The survey results show that 11% of the businesses were registered with the Registrar of Businesses whereas the remaining 89% were not registered.

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(a)



(b)

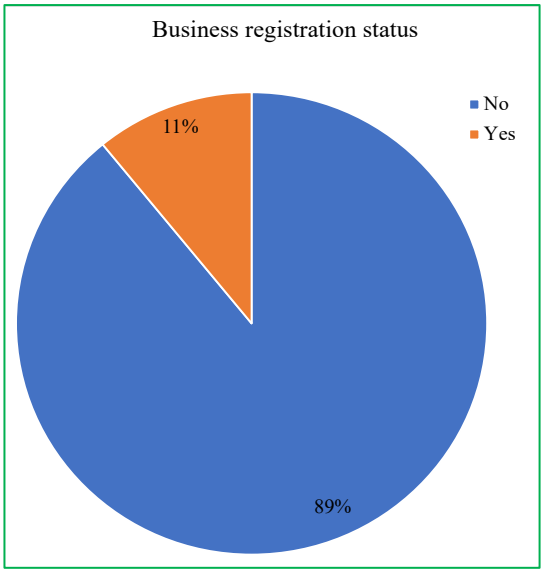


Figure 5-29: Nature of business

(iii) Ownership of the Business

The survey found that out of 158 businesses that had business structures, 108 (68%) of them owned the structures whereas 50 (32%) were renting the place of business. A total of 48.3% of all businesspeople also indicated that they have operated on the business between one to five years, 18% said they had operated between 6 to 10 years and 14.5% indicated that they have operated the business for less than a year (Figure 5-30). According to the NSO's Labour Force Survey of 2020, unemployment pushes many individuals in Machinga and Zomba to seek alternative means of income due to the scarcity of formal employment opportunities. The lack of jobs in the formal sector compels people to start their own businesses as a way to generate income and support their families. Starting a small business in the informal sector often requires minimal capital and has fewer regulatory hurdles, making it an accessible option for many. However, challenges such as limited access to credit, inadequate infrastructure, and bureaucratic obstacles can hinder the growth and sustainability of these businesses. As a result, there is a high turnover rate, with many businesses operating for only a short period before closing. This cycle leads to a continuous emergence of new businesses, which is reflected in the survey findings showing a significant number of enterprises less than five years old.

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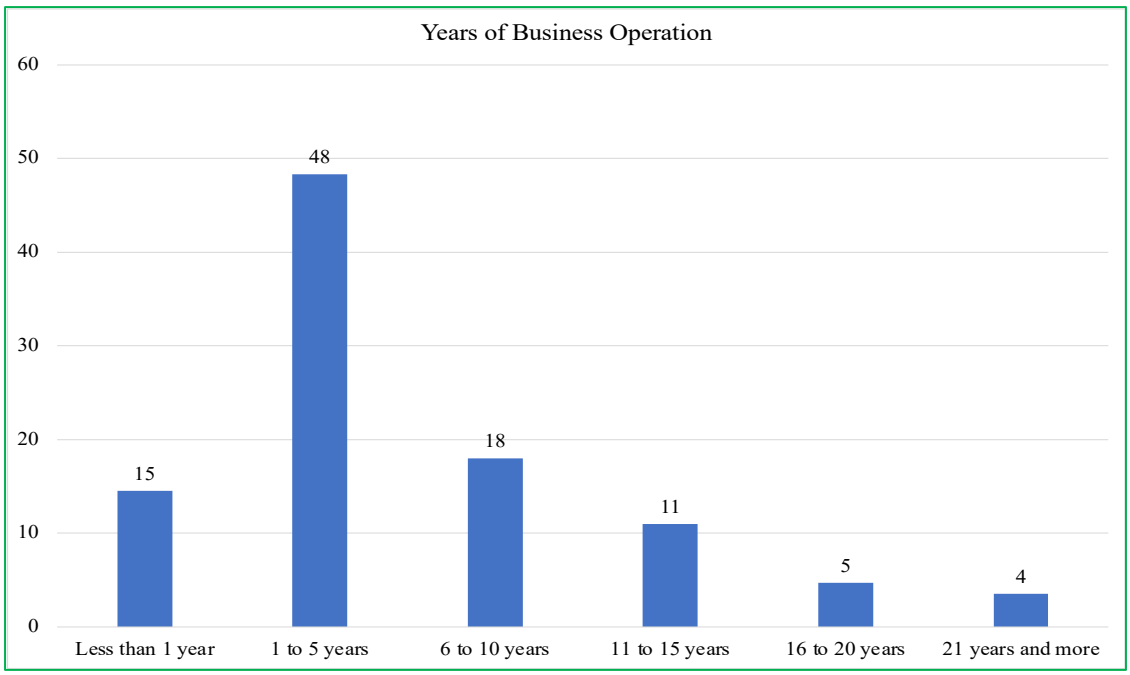


Figure 5-30: Years of business operation

(iv) Income and Profitability of Businesses

The survey findings indicate that the main customers of the business along the road are local people from the surrounding areas, with a proportion of 50% (Figure 5-31). 44% of the responses showed that travellers or passers-by are also one of the main customers of the businesses. In terms of sales, the results show that sales value varies from MK1,500 to MK3,000,000 depending on the type of business and location. The profits of the businesses range from MK500 to MK500,000, which again depends on the type and location of the business. Business operators also reported significant differences in operating hours, ranging from 3 to 24 hours per day depending on the type of business. Retail shops, for example, generally operate 10 to 14 hours a day, while lodges remain open 24 hours to accommodate overnight guests and provide continuous services. This variation in business hours highlights the diverse economic activities along the Liwonde–Matawale road and indicates that the road rehabilitation project could significantly impact these businesses.

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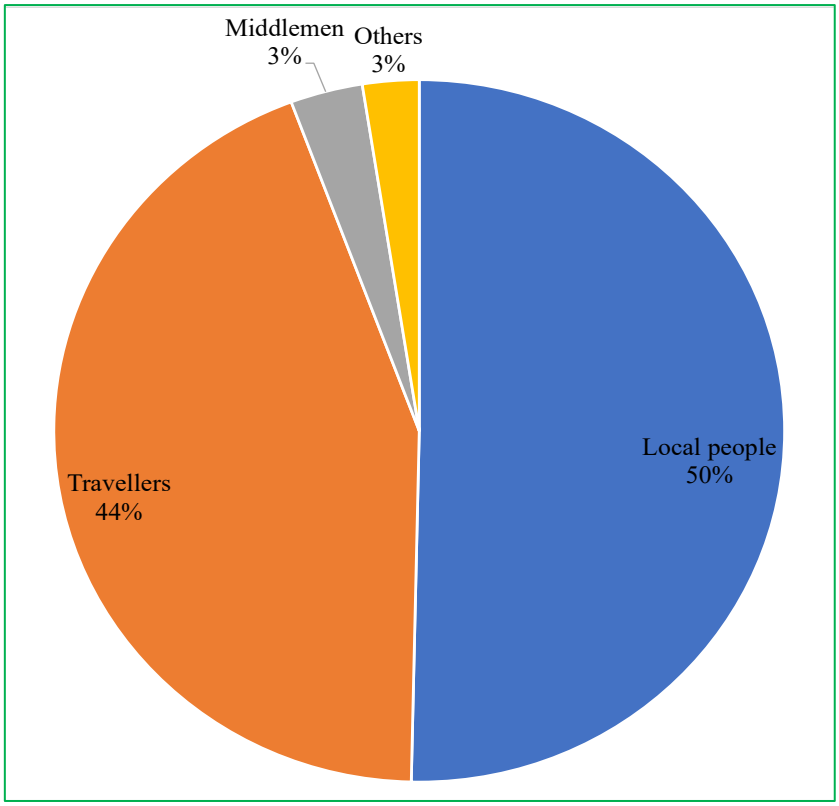


Figure 5-31: Main Customers for the businesses

5.4.14 Gender and Inequality

This section utilizes insights gleaned from key informant interviews, focus group discussions (FGDs), and pertinent national literature, particularly the Gender Equality, Social Inclusion, and Resilience in Malawi report (BRACC, 2021), to evaluate the gender dynamics and issues of inequality relevant to the corridor.

While statistical data on sexual and gender-based violence (SGBV) in the project area are lacking, community consultations consistently indicate a high prevalence of domestic violence, with women and girls identified as the primary victims. Physical assault was reported as the most common form of abuse, followed by verbal abuse and defilement. Despite a general disapproval of violence against women and girls among community members, fears of stigma, social criticism, and retaliation often discourage survivors from reporting incidents. This finding is consistent with the BRACC study, which highlights the social acceptance of domestic violence in rural Malawi, where entrenched gender norms contribute to both underreporting and the normalization of such abuse.

Despite shifts in attitudes regarding gender roles, significant practical inequalities persist. While there is an emerging consensus that household chores should be shared between girls and boys, girls continue to disproportionately bear the burden of domestic work. This observation aligns with the BRACC's finding that, although gender norms are beginning to shift, cultural expectations and social pressures still reinforce unequal domestic workloads.

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In the project area, women and girls function as active economic agents, particularly within informal trade and subsistence farming. Markets along the road, such as those in Songani, Domasi, and Chinamwali, are predominantly populated by female vendors. FGDs revealed that women often serve as primary breadwinners in households where men struggle with alcohol abuse and neglect family duties. This resonates with BRACC's assessment that many rural women encounter increased economic pressures due to the unreliability of male income earners, often exacerbated by alcohol misuse.

Women's access to essential services, including education, healthcare, water, and markets, is constrained by their multiple roles as caregivers, homemakers, and income generators. Many women and girls begin their days early to prepare meals, carry out housework, and assist with agricultural activities before attending school or heading to the market. BRACC confirms that time poverty is a significant barrier to women's participation in economic, political, and social spheres. These gendered time constraints diminish women's and girls' capacity to engage in education, decision-making, and livelihood activities outside the home.

Education statistics from national sources, including the 2018 Census and BRACC (2021), indicate that women and girls in Zomba and Machinga Districts have lower literacy rates and educational attainment compared to men. A greater number of women than men have not received any formal education, reflecting the historical gender bias in educational access. Opportunities for post-primary, vocational, or life-skills training are especially limited for young women.

In terms of power and decision-making, the project area mirrors broader national trends where men predominantly occupy leadership positions within communities and households. The limited involvement of women in governance structures—such as Area Development Committees (ADCs), market associations, and water user groups—was highlighted during consultations. This exclusion affects their ability to influence project decisions and benefit equitably from development initiatives.

Given that the project intersects both rural and peri-urban zones, implementing gender-responsive measures is critical for ensuring equitable benefit sharing and risk mitigation. Key areas of focus should include preventing GBV, enhancing access to reproductive health services, and facilitating women's participation in road-related decision-making and economic opportunities. Addressing these gender gaps will necessitate deliberate efforts to strengthen women's voices and agency within the project area, expand access to essential services, promote equitable workloads, and mitigate risks associated with construction-related activities.

5.4.15 Religion and Culture

The project corridor traverses culturally diverse regions within Zomba City, Traditional Authority (TA) Malemia (Zomba District), Machinga Boma, and TA Liwonde (Machinga District). These areas are characterized by a rich tapestry of religious affiliations and ethnic

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identities, which significantly shape community structures, governance, and socio-cultural dynamics.

(v) Religion

According to the 2018 Malawi Population and Housing Census, Christianity is the predominant religion in Zomba City and TA Malemia, with notable denominations including Roman Catholic, Church of Central Africa Presbyterian (CCAP), and various Evangelical/Pentecostal churches. In contrast, Islam is particularly prevalent in Machinga Boma and TA Liwonde, largely due to the strong presence of the Yao ethnic group, which traditionally adheres to the Islamic faith. In all four areas encompassed by the project, religious institutions serve as important centers for education, community organization, and conflict resolution. This religious diversity highlights the necessity of incorporating faith-based engagement in project consultations, particularly when addressing sensitive social issues or potential project-induced displacements.

(vi) Culture

Cultural identity along the road corridor is predominantly influenced by the Yao and Lomwe communities. In TA Liwonde and Machinga Boma, the Yao people maintain distinct Islamic cultural traditions and customary leadership structures. Important rites of passage, such as initiation ceremonies (jando for boys and chinamwali for girls), play a central role in their cultural practices. Conversely, in Zomba City and TA Malemia, the population consists of Lomwe, Chewa, and Ngoni groups, who blend Christian traditions with indigenous cultural expressions, including gule wamkulu (masked dances) and communal land-based ceremonies.

The presence of sacred sites, such as community graveyards near GVH Chibwana and GVH Ndaje, holds cultural significance and necessitates that roadworks either avoid these sites or follow culturally appropriate relocation protocols.

5.4.16 Security

The Liwonde-Matawale Road has several police stations and units that serve the proposed Project areas. Table 5-9 shows all the police institution available and the areas they serve. The main potential safety and security issues that the area might face are common assault, petty theft, gender-based violence, and road accidents. Therefore, the Project will need to ensure that all installed equipment is secured for example provision of perimeter fencing and having security guards on camp sites.

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Table 5-9: Police Institutions along Liwonde-Matawale Road

SN	Name of institution	Areas (Villages) they serveyed
1	Liwonde Police Station	Liwonde, Chabwera, Malindima, Mliwo
2	Machinga Police Station	Chingoli, Lipongo, Machinga Boma, Ndaje, Kalanje and Nkalo
3	Domasi Police Station	Domasi, Mtogolo, Songani, Masambuka, Kapyepye
4	Malosa Police	Malosa, Minama
5	Zomba Police Station	Chopi, Chinamwali, Matawale

5.4.17 Archaelogical Resources

The field survey consisted of interviews with communities of the villages along the road. No fossil records, monuments and buildings, and other archaeologically valuable resources were discovered or known within the road reserve. The communities attributed this to fatc that the road had been in existence for decades and as such not ideal to have archaeological valuable resources close to the road.

5.4.18 Implication Statement – Social and Economic Environment

The Liwonde–Matawale (M003) Road corridor traverses densely populated areas of Machinga and Zomba, where livelihoods are shaped by a mix of smallholder agriculture, petty trade, and informal businesses clustered along the road reserve. The socio-economic baseline highlights a young and growing population, high poverty levels (over 70% in Machinga and 60–65% in Zomba), and limited access to essential services such as piped water, waste management, and reliable energy. The corridor also demonstrates gender inequalities, with women heavily engaged in informal vending and subsistence farming, while facing disproportionate risks of gender-based violence, time poverty, and exclusion from decision-making structures.

Educational access is high, but dropout rates, particularly for girls, remain significant due to truancy, poverty, early marriages, and pregnancy. Health risks are dominated by malaria, respiratory infections, and HIV/AIDS, while labour informality and weak occupational safety standards make workers vulnerable to exploitation during construction. Settlement patterns are linear, with most business and residential properties situated within the road reserve, which increases resettlement and livelihood disruption risks.

The project thus carries both opportunities and risks: it can enhance market access, improve service delivery, create employment, and stimulate urbanisation, but also risks exacerbating displacement, congestion, TIP (trafficking in persons), and gender inequalities if not well managed. Effective safeguards, including fair compensation, gender-responsive programming, HIV/TIP prevention, and livelihood restoration, are therefore critical to ensure that the road rehabilitation translates into inclusive socio-economic transformation rather than social vulnerability.

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CHAPTER 6: IDENTIFICATION AND ANALYSIS OF ENVIRONMENTAL AND SOCIAL IMPACTS

This chapter describes predicted beneficial and adverse environmental impacts, direct and indirect effects. The section discusses the analytical methods used to forecast the impacts and the methods and criteria used to judge impact severity and significance. The chapter concludes with a summary of those impacts of most tremendous significance. The assessment of potential environmental effects resulting from project-related activities has been carried out per EMA (2017) and the World Bank Operational Policies, specifically OP/BP 4.01 on Environmental Assessment and OP/BP 4.04 on Natural Habitats.

Impact assessment focused on both positive and negative impacts associated with the road construction project on the environment's bio-physical, social, economic, and cultural components. Impacts were identified from the project description, analysis of project alternatives, project location, stakeholder engagement and the project's existing biophysical and socioeconomic environment.

6.1 Evaluation of Environmental and Social Impacts

The key objective of the impact evaluation methodology was to identify any potential environmental and social issues likely to arise from the proposed project and propose a significant ranking. Issues or aspects were reviewed and ranked against a series of significant criteria to identify and record interactions between activities and aspects, resources, and receptors to provide a detailed discussion of impacts. The significance of environmental aspects was determined and ranked by considering the criteria presented in Table 6-1.

Table 6-1: Impact Assessment Criteria and Scoring System

CRITERIA	SCORE 1	SCORE 2	SCORE 3	SCORE 4	SCORE 5
Impact Magnitude (M) The degree of alteration of the affected environmental receptor	Very low: No impact on processes	Low: Slight impact on processes	Medium: Processes continue but in a modified way	High: Processes temporarily cease	Very High: Permanent cessation of processes
Impact Extent (E) The geographical extent of the impact on a given environmental receptor	Site: Site only	Local: Inside activity area	Regional: Outside activity area	National: National scope or level	International: Across borders or boundaries
Impact Reversibility (R) The ability of the environmental receptor to rehabilitate or restore after the activity has caused environmental change	Reversible: Recovery without rehabilitation		Recoverable: Recovery with rehabilitation		Irreversible: Not possible despite action
Impact Duration (D) The length of permanence of the impact on the environmental receptor	Immediate: On impact	Short term: 0-5 years	Medium term: 5-15 years	Long term: Project life	Permanent: Indefinite

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CRITERIA	SCORE 1	SCORE 2	SCORE 3	SCORE 4	SCORE 5
Probability of Occurrence (P) The likelihood of an impact occurring in the absence of pertinent environmental management measures or mitigation	Improbable	Low Probability	Probable	Highly Probability	Definite
Significance (S) is determined by combining the above criteria in the following formula:	$[S = (E + D + R + M) \times P]$ $Significance = (Extent + Duration + Reversibility + Magnitude) \times Probability$				
IMPACT SIGNIFICANCE RATING					
Total Score	4 to 15	16 to 30	31 to 60	61 to 80	81 to 100
Environmental Significance Rating (Negative (-))	Very low[5]	Low	Moderate	High	Very High
Environmental Significance Rating (Positive (+))	Very low	Low	Moderate	High	Very High

The impact significance without mitigation measures is assessed with the design controls. The residual impact remains following the application of mitigation and management measures and is thus the final level of impact associated with the development. Residual impacts also serve as the focus of management and monitoring activities during project implementation to verify that actual impacts are the same as predicted in this report.

6.2 Description of Environmental and Social Impacts

There are three main project stages: feasibility and design, construction, and operation phases, which have been analysed to have anticipated impacts. No negative impacts were identified during the planning phase, as this phase has and will mainly involve getting relevant licences and approvals. However, in the construction and operation phases, anticipated negative impacts have been identified and ranked moderate to low significance. The sections that follow outline the different positive and negative impacts that have been identified during the study.

6.2.1 Identified Positive Impacts During Pre-Construction Phase

(i) Creation of Short-Term Employment

The pre-construction phase of the proposed project will require the mobilization of a workforce to support various preparatory activities such as socio-economic surveys for the RAP, biophysical assessments for the ESIA, preliminary engineering surveys, pegging and beaconing of the corridor of impact, and logistical arrangements for stakeholder consultations. This stage will create short-term employment opportunities for skilled esperts, and unskilled and semi-skilled community members such as local guides, enumerators, transporters, translators, cooks, and security personnel. Additionally, temporary hires from surrounding villages may support tasks such as vegetation clearing and support for RAP/RAP committee facilitation.

[5] Anticipated impacts with very low significance rating before mitigation were considered negligible.

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The significance of the impact without any enhancement measures is moderate (Table 6-2), but with targeted hiring practices and fair labor standards, the impact is expected to be high.

Table 6-2. Impact Assessment Table on creation of short-term employment

	Impact Assessment Criteria and Scoring					
Impact	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	Significance
Before Enhancement	2	2	2	2	4	Moderate (32)
After Enhancement	3	3	2	3	5	High (55)

Enhancement Measures:

- Engage local experts (nationals), and communities along the corridor, especially youth and vulnerable persons, for all support roles during pre-construction.
- Engage local leadership such as GVHs and Village Developmemnt Committes to ensure transparent recruitment that avoids nepotism, discrimination, or political interference.
- Enforce fair labour practices including payment of fair wages, timely payment of wages, safe working conditions, clear work contracts and formal briefing before work begins.
- Prohibit gate hiring, establish designated office/desk for recruitment.
- Prioritize recruitment of women targeting a 30% of hires to be women and where possible, support women in supervisory or coordination roles for logistics and data collection.
- Maintain a register of local people employed, including gender, village of origin, work type, and wage paid for monitoring social performance.
- Establish a Grievance Redress Mechanism (GRM) where employment concerns (e.g., harassment, underpayment) can be reported and addressed promptly.

6.2.2 Identified Negative Impacts During Pre-Construction Phase

(i) Community anxiety and speculative encroachment

The proposed project poses a potential impact in the form generating anxiety among community members about the potential loss of their land and property. Similarly, the announcement of the road project and the marking of the Right of Way (RoW) often raises community anxiety and triggers speculative behavior. In the case of the proposed development, consultations with Machinga and Zomba District Councils revealed that some individuals had deliberately begun to erect temporary structures or plant trees within the projected RoW in anticipation of compensation, even after the cut-off date was announced.

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Table 6-3. Impact Assessment Table for Community anxiety and speculative encroachment

Impact	Impact Assessment Criteria and Scoring					Significance
	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	
Before Enhancement	3	2	2	2	4	Moderate (36)
After Enhancement	2	2	2	2	2	Low (24)

Mitigation measures:

- Launch comprehensive public awareness campaigns to inform the community about the project's objectives, scope, and potential impacts;
- Conduct targeted community sensitization programs addressing the potential loss of assets and related compensations. This involves engaging with local communities to provide detailed information, address concerns, and create an open forum for dialogue between project stakeholders and residents; and
- Integrate asset loss considerations into the Resettlement Action Plan to ensure a structured approach in addressing community concerns. Develop clear guidelines and protocols for asset valuation, compensation, and the overall resettlement process.

6.2.3 Identified Positive Impacts During Construction and Demobilization Phase

(i) Creation of Employment

At peak periods, the project is expected to employ 150 people, comprising a skilled and unskilled labour force. At least 95 unskilled workers (with a target of 30% females) will be employed, and these workers are anticipated to be from the local communities around the project area. The main activities that will likely create employment include site establishment, campsite management, site clearance, excavation, haulage of materials (within the project site, across the country and international haulage), road works, and site demobilisation. Employment of unskilled workforce will reduce unemployment and boost people's incomes in the project area. The local workers will be identified with the aid of the traditional authorities along the corridor.

With any employment and recruitment, there is a risk of poor labour conditions, breaches of labour rights, child labour, labour exploitation and forced labour. The project will also have vulnerable workers, and labour conditions and interactions with the local population can negatively affect well-being, health, and security. Vulnerable workers or those who may create vulnerabilities in others are workers from outside the project area who may not be used to local cultural norms, night shift workers (although the road works are not anticipated to take place at night), subcontracted workers whose companies may be less familiar with social and labour standards, low skilled workers who are less familiar with formal work environments and unaware of their rights, young workers less experienced with potential site risks, women who may receive different treatment from male workers, and workers with disabilities who may need adaptive conditions to complete tasks. Unskilled workers are often more vulnerable than

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the skilled labour force because they have less experience in labour laws. Even with these risks (considering the many and varied management measures), the impact is positive and highly significant (Table 6.4).

Table 6-4: Impact Assessment on Creation of Employment

Impact	Impact Assessment Criteria and Scoring					Significance
	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	
Before Enhancement	4	2	3	2	3	Moderate (39)
After Enhancement	4	3	5	4	5	High (80)

Enhancement measures:

- Inform local communities about employment opportunities and prioritise the hiring of local workers to maximise local employment and community benefits.
- Engage local leaders and organisations in the recruitment process to achieve effective outreach and equitable access to job opportunities for community members.
- Treat all employees in compliance with Malawi Labour Regulations and the requirements of OP/BP 4.01 (Environmental Assessment) to uphold fair labour practices and protect workers' rights.
- Develop and implement a Labour Management Plan, following the guidance in Annex 9, to: (a) Identify and implement a recruitment strategy that informs local communities about job opportunities and fosters a non-discriminatory and equal-opportunity recruitment process, promoting inclusivity and fairness in employment; and (b) include an accommodation strategy that guarantees any required housing is completed before workers arrive on-site, providing safe and adequate living conditions for the workforce.
- Prepare a labour accommodation strategy for non-local workers to meet required standards and enhance worker well-being and compliance.
- Pay all workers performing similar tasks equally, irrespective of gender or origin, to promote equity and prevent discrimination in the workplace.
- Mandate all workers to sign a code of conduct to uphold standards of behaviour and responsibility, ensuring a respectful and safe working environment.
- Conduct sensitisation sessions for workers on the full range of risks (occupational health and safety, labour rights, public health, community safety, sexual harassment, and engagement risks) to heighten awareness and reduce the likelihood of incidents.
- Provide equal opportunities for men and women during recruitment and actively enhance benefits for women and vulnerable groups to promote gender equality and social inclusion. Aim for at least 30% female representation in the workforce.
- Develop and implement a regular and detailed labour monitoring schedule to uphold ongoing compliance with labour standards and promptly address any issues.
- Provide monthly reports on the workforce profile, labour grievances, labour incidents, and workforce management activities and outcomes to maintain transparency, demonstrate accountability, and align with best practices in labour management.

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(ii) Creation of New Opportunities for Local Business

The construction phase of the Project will be executed by contractors registered by the National Construction Industry Council (NCIC). The main contractor will also be encouraged to subcontract works to local contractors, benefiting the local construction industry. For instance, the project might purchase construction materials from local suppliers, e.g. cement, aggregate stones, food items, groceries, and oils. Project activities that will create business opportunities include hauling materials, providing specialised services, purchasing aggregate stones, managing camp, and performing general maintenance of equipment and machinery. The significance of the impact without any enhancement measures is moderate (Table 6-5) but is expected to be high with the implementation of the proposed enhancement measures.

Table 6-5: Impact Assessment on Creation of New Opportunities for Local Business

Impact	Impact Assessment Criteria and Scoring					Significance
	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	
Before Enhancement	3	3	3	2	3	Moderate (33)
After Enhancement	4	4	5	4	4	High (68)

Enhancement measures:

- Mandate the contractor to conduct a comprehensive supply chain review in accordance with the World Bank OP/BP to identify opportunities for local procurement and to ensure compliance with ethical and sustainable sourcing practices.
- Develop a detailed procurement plan that outlines goods and services that can be sourced locally. The plan should be strictly adhered to and should include: (i) Environmentally friendly construction materials that comply with the laws of Malawi. (ii) Cement, paint, and other materials that are manufactured or processed in Malawi. (iii) Food items, groceries, and other related products that can be sourced from local markets to support local businesses.
- Purchase all construction materials from Malawi Revenue Authority (MRA) registered suppliers and sourced only from approved, licensed, and tax-compliant vendors. Where it is not practical to get licensed suppliers (e.g., sand and gravel) the contractor must seek written permission from the District Council through the Environmental District Officer before extracting these resources.
- Adhere to prompt payment terms for building materials and services, ensuring payments are made within the agreed timelines and contract conditions, to support their cash flow.
- Produce an annual report detailing the use of local content to monitor and evaluate the project's contribution to the local economy, including the proportion of goods and services procured locally and the impact on local businesses.

(iii) Transfer of skills to local workers

Employment of local people from within the Project's impact area will facilitate capacity enhancement and the acquisition of specific skill sets through on-the-job and formal training. These skill sets may be readily replicated after employment termination in other construction-

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related projects. The significance of the impact without any enhancement measures is moderate (Table 6-6) but is expected to be high with the implementation of enhancement measures that create an environment where unskilled labourers can learn from those with artisanal skills.

Table 6-6: Impact Assessment on transfer of skills to local workers

Impact	Impact Assessment Criteria and Scoring					Significance
	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	
Before Enhancement	2	2	1	2	3	Low (21)
After Enhancement	4	3	3	4	4	Moderate (56)

Enhancement measures:

- Maximise the employment of local people, particularly focusing on the unskilled labour force, aiming for at least 30% female representation, to promote gender equality and community development.
- Pair skilled and unskilled workers during various construction assignments to facilitate direct skills transfer and practical learning for unskilled labourers.
- Formalise on-the-job training for local unskilled labourers by including comprehensive induction sessions, toolbox talks, structured learning activities, and performance monitoring within the Labour Management Plan, ensuring consistent skills development (Guidleines in Annex 9).
- Coordinate with local partners to raise workers' awareness of employment and training opportunities with contractors, enhancing community engagement and access to these opportunities.
- Provide targeted training for skilled and unskilled workers to promote effective on-the-job skills transfer and ensure equal training opportunities for female and male workers, supporting an inclusive and skilled workforce.

6.2.4 Identified Negative Impacts During Construction and Demobilization Phase.

(i) Physical and Economic Displacement

The Resettlement Action Plan (RAP) report for the Road project, dated August 2025, anticipates that the project will affect a total of 1,744 PAPs. In terms of structures, the project will affect 488 permanent structures (signpost, walls/fences, incomplete structure, dwelling houses and business structures) and 553 temporary structure. It is expected that 769 PAPs will be economically displaced, mainly affecting shops, airtel/TNM/Mukuru kiosks, chips/meat/farm produce selling sheds, bicycle repair shops, garage, printing and compact disks burning shops, barbershops, butcher shops and eateries. To address these effects, an estimated MWK 10,716,678,785.10 (USD 6,100,000.00) has been allocated for compensation. The RAP aims to ensure that affected individuals receive fair compensation and the necessary support to restore their livelihoods.

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The intensity of the impact is moderate since the built environment within the road reserve will not simply be removed or destroyed; it will be either relocated or compensated according to the agreement reached with the owner. The extent of the impact is local since it will occur within the whole road reserve and other sites like borrow pit areas. The impact duration is considered long since houses and buildings will be relocated for the project's lifetime. The impact is thus considered of moderate importance. The probability of occurrence of the impact is high because a portion of the built environment and habitations within the project area will certainly be displaced due to construction activities. It is assumed that all the affected properties and social services will be compensated and avoided, resulting in a low significance of the impact after implementing the recommended mitigation measures.

Table 6-7: Impact Assessment on Physical and Economic Displacement

Impact	Impact Assessment Criteria and Scoring					Significance
	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Probability of Occurrence	
Before Mitigation	5	2	3	5	5	High (75)
After Mitigation	2	2	1	5	3	Low 21

Mitigation measures:

- Execute compensation in strict accordance with the Resettlement Action Plan (RAP) before commencing construction activities to ensure that Project-Affected Persons (PAPs) receive adequate, fair, and prompt compensation and resettlement support.
- Directly pay PAPs to guarantee transparency, fairness, and timely compensation delivery, reducing the risk of disputes and delays.
- Construct and hand over new structures as per the agreements with PAPs.
- Proceeds with relocation only when agreed-upon conditions are met.

(ii) Disruption of Access to Properties and Social Services

The Liwonde-Matawale Road will use an approach where most of the construction activities are expected to be undertaken in the road reserve. However, during the construction works, it is anticipated that access to properties such as farming land, business structures, and other community facilities, schools, service infrastructure (e.g. SRWB water pipelines and electricity poles) and places of worship will be disrupted. The project will likely sink high-yielding boreholes for use at the campsites. These might affect the groundwater yield for the surrounding boreholes within the communities.

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In addition, road construction will disrupt business activities because detours may not be feasible or significantly longer, impacting daily activities and access to markets[6], healthcare, and education. This can profoundly impact small businesses, especially women, who own most roadside businesses. Disturbance of women's subsistence activities is expected, considering that within the project area, traditional cultural norms play an important role in women's and girls' education, gainful employment, and other social benefits. Women are also responsible for subsistence activities and struggle to provide for the household when crops are limited. This was evident from the number of women traders at the trading centre markets. Additionally, the project will affect small-scale businesses as the road works entail that the business people who trade along the road must be relocated to other places.

There are also graveyards located close to the road reserve, although no any physical displacement is expected as all graveyards are located outside the road corridor. Howevr, during construction phase, access to graveyards might be affected.

The disruption of access to properties and social services is assessed as a negative impact (Table 6-8), with a very high magnitude considering the vulnerability of the communities in the area. The impact extent has the potential to extend outside the activity area, but the impact is reversible with appropriate rehabilitation. The probability of this impact is considered as definite. It is assumed that all the affected properties and social services will be compensated and avoided, resulting in an impact of low significance after implementing the recommended mitigation measures.

Table 6-8: Impact Assessment on Disruption of Access to Properties and Social Services

Impact	Impact Assessment Criteria and Scoring					Significance
	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Probability of Occurrence	
Before Mitigation	5	3	3	3	5	High (70)
After Mitigation	2	2	1	2	3	Low 21

Mitigation measures:

- Develop and implement a comprehensive traffic management plan following the guidelines provided in Annex 11 to ensure safe and efficient traffic movement during construction.
- Communicate project activity schedules to PAPs well in advance to enable them to adjust their livelihood plans and minimise disruptions including the access to graveyard.
- Clear demarcation of the road reserve to prevent accidental encroachment during works to avoid affecting graveyard access.

[6] High-density areas along the road include Liwonde, Malosa, Namwera Turn-Off, Domasi, Songani, Chinamwali, and Matawale. These centres are characterized by linear settlements with a high concentration of shops, hawkers, informal markets, and social infrastructure within the road reserve.

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- Traffic and access management plans to avoid blocking driveways, entrances, or access to the structures to avoid affecting graveyard access.
- Establish responsive mechanisms to address the needs of PAPs, especially regarding impacted infrastructure such as schools, ensuring continuity of access and services.
- Identify and establish temporary alternative locations for market activities in all trading centres to minimise the disruption of local businesses during construction.
- Provide adequate alternative pathways to ensure continued accessibility and mobility during construction, as guided by Annex 18. Submit all traffic diversion plans to the relevant authority for approval before implementation to ensure compliance and safety.
- Consult with communities to plan and agree on the location of stockpiling areas and access routes during construction, minimising disruption and ensuring community buy-in.
- Restore all existing community access routes upon completion of construction and provide convenient alternative routes during the construction period to maintain access to essential services and properties.

(iii) Expososure to Gender-Based Violence (GBV)

Large-scale infrastructure projects, such as the proposed road rehabilitation, can lead to an increase in Gender-Based Violence (GBV), particularly in areas where economically vulnerable communities interact with a male-dominated and transient workforce. The term gender-based violence (GBV) is used to describe any harmful act perpetrated against a person based on socially ascribed/gender differences between males and females. It includes acts of causing physical, sexual or mental harm or suffering, or threats of such acts, and other deprivations of liberty[7].

In the project area, GBV may occur within households due to shifting power dynamics from project-related employment, or in the broader community, where women and girls may face increased risks of domestic abuse, intimidation, and violence. These impacts are often exacerbated by pre-existing gender inequalities, limited access to justice, poor reporting systems, and inadequate support services for survivors.

Causes of GBV in the Project Context include the following:
- Economic stress and displacement-induced vulnerability
- Breakdown of traditional community structures
- Reinforcement of harmful gender norms
- Inadequate grievance redress mechanisms
- Absence of targeted GBV awareness and prevention measures

Table 6-9: Impact Assessment on Increase in Cases of GBV

Impact	Impact Assessment Criteria and Scoring					Significance
	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	
Before Mitigation	4	3	3	2	4	Moderate (48)

[7] https://www.unicef.org/serbia/sites/unicef.org.serbia/files/2021-02/Eng_GBV_web.pdf

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Impact	Impact Assessment Criteria and Scoring					Significance
	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	
After Mitigation	2	1	1	1	3	Low (18)

Mitigation Measures:

- Develop and enforce a Labour Management Plan with a clear Code of Conduct prohibiting GBV and ensuring gender sensitivity in all project operations (see Annex 9).
- Institute a zero-tolerance policy towards all forms of GBV, with clear and public communication of expected behaviours.
- Provide mandatory GBV training for all workers and project stakeholders to build awareness and responsiveness.
- Establish community-based reporting and referral systems, linked with trained service providers and law enforcement.
- Expand and operationalize the Grievance Redress Mechanism (GRM) to include gender-sensitive protocols and designated GBV focal points (see Annex 8).
- Engage local CSOs and women's groups in ongoing sensitization and survivor support services.
- Promote gender parity in employment, prioritizing female hiring and leadership in community liaison roles.

(iv) Sexual Exploitation, Abuse, and Harassment (SEA/SH)

Sexual Exploitation, Abuse, and Harassment (SEA/SH) are specific and severe forms of GBV involving abuse of power and trust, often linked to unequal relationships between workers and vulnerable individuals. Sexual abuse means the actual or threatened physical intrusion of a sexual nature, whether by force or under unequal or coercive conditions. Any sexual activity with children (persons under the age of 18 years) constitutes sexual abuse. Sexual exploitation means any actual or attempted abuse of a position of vulnerability, differential power, or trust, for sexual purposes, including, but not limited to, profiting monetarily, socially, or politically from the sexual exploitation of another. It includes but is not limited to exchanging money, employment, goods or services for sex. This includes transactional sex regardless of the legal status of sex work in the country. It also includes any situation where sex is coerced or demanded by withholding or threatening to withhold goods or services or by blackmailing. Sexual harassment is any unwelcome conduct of a sexual nature that might reasonably be expected or be perceived to cause offence or humiliation[8].

In the context of this road project, SEA may manifest in the form of transactional sex, coercive relationships, or harassment, particularly affecting adolescent girls, single women, and economically disadvantaged households. Common locations for SEA/SH include worker camps, informal markets, trading centres such as Chinamwali, Naizi, Jokala, Liwonde and Domasi; water points, schools, and areas where there is frequent contact between workers and

[8] https://www.unhcr.org/what-we-do/protect-human-rights/tackling-sexual-exploitation-abuse-and-harassment/defining-sexual

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community members. Vulnerable individuals may be manipulated into exploitative relationships in exchange for money, goods, or job opportunities. SEA/SH not only violates the rights of victims but can also result in unwanted pregnancies, psychological trauma, and loss of dignity, with community-wide consequences.

Causes of SEA/SH in the Project Context include the following:

- Power imbalances between project workers and community members
- Lack of supervision and disciplinary mechanisms at worker camps
- Economic vulnerability and social marginalization of women and girls
- Cultural stigma and fear of reporting abuse

Table 6-10: Impact Assessment on Increase in Cases of SEA/SH

Impact	Impact Assessment Criteria and Scoring					Significance
	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	
Before Mitigation	4	3	3	2	4	Moderate (48)
After Mitigation	2	1	1	1	3	Low (18)

Mitigation Measures:

- Implement strict code of conduct addressing SEA/SH and ensure all workers receive induction training (sample contractor code of conduct included in Annex 6).
- Establish confidential and secure SEA/SH reporting channels with survivor-centred protocols.
- Partner with local health centres and NGOs to provide access to counselling, medical care, and legal support.
- Enforce sanctions for SEA/SH perpetrators, ranging from dismissal to legal prosecution.
- Implement camp management standards (lighting, security, access control) that reduce risk of abuse.
- Use anonymous third-party monitoring to oversee SEA/SH prevention efforts and independently investigate complaints.

(v) Poor Labour Conditions and Rights Violations

The project carries the risk of exposing workers to poor labour conditions, particularly through the use of informal or casual employment arrangements without written contracts. Such arrangements undermine the enforcement of labour rights, including access to minimum wage, overtime compensation, health and safety standards, and social protection. Additionally, delayed payment of wages and lack of effective, fair, and accessible grievance mechanisms could increase worker dissatisfaction, vulnerability, and potential labour unrest.

The intensity of this impact is high due to the potential for widespread violations of labour rights, especially among unskilled, seasonal, or migrant workers. The extent of the impact is localized to project sites, including camps, work zones, and associated facilities. The impact is

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reversible if appropriate mitigation measures are implemented early, including the formalization of contracts, training of workers, and establishment of functional grievance redress systems. The duration is considered medium-term, as these risks are mostly concentrated during the construction phase of the project. The probability of occurrence is high in the absence of proactive labour management planning and enforcement mechanisms.

Overall, the impact is assessed as high before mitigation, but can be significantly reduced through structured interventions under OP/BP 4.01 on Environmental Assessment and relevant provisions of OP/BP 4.12 on Involuntary Resettlement and labour-related requirements.

Table 6-11: Impact Assessment on Poor Labour Conditions and Rights Violations

Impact	Impact Assessment Criteria and Scoring					Significance
	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	
Before Enhancement	4	2	2	3	5	Moderate (55)
After Enhancement	2	1	1	2	3	Low (18)

Mitigation Measures:

- Develop and implement a Labour Management Plan (LMP) that outlines labour rights, responsibilities, and contract obligations for all categories of workers (LMP Guidelines in Annex 9).
- Issue all workers written contracts that clearly specify wages, roles, hours, grievance mechanisms, and rights to social protection.
- Provide timely and transparent payment of wages, with documented payroll systems and routine compliance checks.
- Establish and operationalize a Workers' Grievance Redress Mechanism (WGRM) accessible to all site workers, including anonymous reporting options.
- Conduct regular labour audits to monitor compliance with labour standards and resolve emerging issues promptly.
- Provide awareness training for workers and supervisors on fair treatment, occupational rights, and protection from abuse or discrimination.

(vi) Occupational Health and Safety Risks and community health and safety risks

Occupational Health and Safety deals with the welfare of workers in the workplace through a strong component in hazard prevention. Sometimes, workers are exposed to risk factors; those risks may lead to cancers, accidents, musculoskeletal diseases, respiratory diseases, hearing loss, circulatory diseases, stress-related disorders, communicable diseases, and others (WHO, 2015)[9]. Construction workers will spend time on elevated structures above the ground,

[9] While pandemics such as COVID-19 and cholera are primarily national public health issues and not direct impacts of the road project, the risk of communicable disease spread may increase with labour influx and community interactions during construction. To address this, contractors will be required to cooperate with local

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especially during bridge construction. Falling from heights is one of the most common causes of injuries in construction sites. Falling objects from higher levels can cause severe injuries to the workers below. Accidents with heavy machinery may cause serious injuries and, in some cases, the loss of limbs or even death. Cranes, for example, represent one of the equipment that, when handled incorrectly, lead to serious accidents. The presence of workers might also lead to a high increase in crimes, and some of them might include theft.

Road traffic at a construction site is a danger for the workers. With the increasing volume of vehicles circulating and the lack of defined road structures, extreme caution and security measures will be considered, such as implementing safety signs. Working under extreme conditions may cause exhaustion or dehydration, leading to a lack of focus that may cause various mishaps on the construction site. The impact probability is considered very high (Table 6-12) before mitigation measures are implemented because the project will use a large proportion of unskilled labour that has yet to learn safety requirements at construction sites.

The projectmight have direct risks on the community health and safety. Key health issues include; spread of communicable diseases, respiratory diseases among others. Safety issues includel traffic related accidents, violence due to disagreemnts with the communities, among others.

Table 6-12: Impact Assessment on Exposure of Workers to Occupational Health and Safety Hazards and community health and safety risks

Impact	Impact Assessment Criteria and Scoring					Significance
	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	
Before Mitigation	4	3	5	2	5	High (70)
After Mitigation	2	2	3	2	2	Low (18)

Mitigation measures:

- Provide comprehensive training in safety, health, social, and environmental procedures to all construction workers, and extend relevant training to local villagers where appropriate. Supply personal protective equipment (PPE) to all workers free of charge, and ensure proper training, supervision, and enforcement of its use. Regularly monitor PPE usage through audits and inspections.
- Develop and implement a detailed Health and Safety Management Plan, that includes emergency preparedness and response based on guidance provided in Annex 20. This plan should also cover the safe use and maintenance of machinery and equipment, including vehicles fitted with seatbelts for all passengers.
- Employ and train sufficient health and safety officers and first aiders to ensure swift responses to incidents. Monitor on-site health and safety practices and working

health authorities, provide adequate water, sanitation and hygiene (WASH) facilities on site, and adhere to prevailing public health guidelines during any outbreaks.

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conditions through regular observation, worker interviews, document reviews, and discussions with worker representatives.

- Install and maintain first aid kits and medical facilities at each project site, ensuring they are proportionate to the site's size and workforce. Obtain medical insurance for all workers to cover any health issues or injuries sustained on the job and compensate injured workers per the Workers' Compensation Act of 2000.
- Workers' camps shall comply with the recommendations from the section 2.1 General Facility Design and Operation from the WBG Environmental, Health, and Safety General Guidelines, 2.0 Occupational Health and Safety.
- Develop and enforce a comprehensive campsite and storage site plan, as guided by Annex 19, to ensure safety, operational efficiency, and secure living conditions, including clean canteens and cooking areas and adequate living space.
- Provide security at campsites and all satellite camps following a security risk assessment and following a security management plan. Ensure that security personnel adhere to World Bank requirements and receive training in the use of force. All security staff will be unarmed.
- Provide education both to the local community and camp workers on STDs and HIV/AIDS using aids such as video shows, pamphlets, talks, etc.
- Establish and communicate flexible working hours, including rest breaks, rotational work practices, and scheduling heavy tasks during suitable weather and temperatures, to reduce the risk of heat-related illnesses. Clearly outline these practices in employment contracts and site management procedures.
- Provide adequate quantities of clean drinking water, ablution facilities, and satisfactory welfare facilities, such as shaded areas for resting and eating, in line with international standards. Ensure these facilities are accessible to all workers, including those with disabilities, and are provided on-site for both women and men.
- Ensure safe passage at the construction site to facilitate the unobstructed movement of nearby residents and implement auxiliary safety measures for the public in the vicinity of the project site, including advance notice of work commencement, installing safety barriers, and using safety signs to mark work areas.
- Prohibit fuelling and vehicle maintenance near wetlands and construction sites to prevent environmental contamination.
- Report regularly on workforce profiles, labour grievances, labour incidents, and workforce management activities adhering to government requirements and international best practices.
- Provide a campsite clinic to treat workers, at minimum, qualified medical personnel (a clinical officer, land technician and a nurse).

(vii) Risk of Child and Forced Labour

The construction phase of the project may expose the Contractor and subcontractors to the risk of engaging child labour or forced labour, particularly among vulnerable groups such as unskilled, migrant, or economically desperate workers. These risks arise from non-compliance with national labour laws and as well as the requirements of OP/BP 4.01 (Environmental Assessment) to address social risks and OP/BP 4.12 (Involuntary Resettlement) with regard to safeguarding vulnerable groups. This risk is heightened in subcontracted, informal, or unregulated parts of the labour supply chain. In the absence of strict monitoring, underage

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individuals may be recruited unknowingly, or workers may be coerced into work through threats, debt bondage, or misinformation.

The magnitude of this impact is high, given the serious human rights violations associated with child and forced labour and the reputational and legal consequences for the project. The extent is local, as the risk is confined to worksites and associated facilities within the project corridor. The impact is recoverable with rehabilitation and enforcement of labour controls, but may result in severe socio-economic consequences for affected individuals. The impact duration is considered medium-term, aligned with the construction period, but the probability of occurrence is moderate to high if proactive safeguards are not applied. Overall, the impact is rated as moderate before mitigation and low after implementation of structured control measures.

Table 6-13: Impact Assessment on Temporary Air Quality Deterioration

Impact	Impact Assessment Criteria and Scoring					Significance
	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	
Before Mitigation	4	2	2	3	4	Moderate (44)
After Mitigation	1	1	3	1	2	Very Low (12)

Mitigation Measures:

- Enforce a zero-tolerance policy on child and forced labour, clearly articulated in the project's Labour Management Plan (LMP) and Code of Conduct.
- Mandate all contractors and subcontractors to screen and verify the age and identity of all workers through national Identify Card before recruitment.
- Conduct periodic audits and inspections to detect any cases of underage or coerced labour.
- Raise awareness among workers and community members about the prohibited nature of child and forced labour, their rights, and available grievance redress mechanisms.
- Integrate clauses on child and forced labour prohibition in all contracts with service providers and suppliers.
- Strengthen the Workers' Grievance Redress Mechanism (WGRM) to allow anonymous reporting of abuse or coercion, with guaranteed protection for whistleblowers.

(viii) Risk of Discrimination and Unequal Treatment

During the construction phase, women may be marginalised in hiring and may experience sexual harassment on the job. Women in the community may also be harassed by workers who are not accountable to community norms.

Mitigation Measures:

- Prioritise employment opportunities for women and individuals with disabilities, ensuring inclusivity and diversity in the workforce.

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- Offer flexible working hours to accommodate the childcare needs of breastfeeding women, thereby supporting their participation in the workforce.
- Make deliberate efforts to employ women by conducting a comprehensive skills analysis of female candidates before recruitment begins, ensuring their capabilities are fully recognised and utilised.
- Encourage the recruitment of female workers for roles equivalent to those of male workers and guarantee equal pay for equal work, regardless of gender.
- Provide essential amenities at all campsites, including shops, medical clinics, and leisure facilities, to reduce the need for workers to leave the site, thereby minimising their interaction with the local community.
- Strategically locate campsites away from villages to limit the interaction between workers and the community, reducing the potential for harassment and other negative impacts.
- Implement and rigorously monitor a Grievance Redress Mechanism (GRM) with clear and accessible channels for reporting and investigating incidents of workplace harassment, ensuring that complaints are handled promptly and fairly.

(ix) Social Disruption and Risk of conflicts between contractor workers and community people

The construction of the Liwonde-Matawale Road project involves the mobilisation of contractors and labourers, as well as the establishment of construction and labour camps. If not properly managed, these activities can lead to significant social disruption within local communities. The potential impacts include conflicts between workers and residents, increased pressure on local resources, and the potential for unauthorised access to sensitive areas, which could result in negative social outcomes.

Mitigation measures:

- Establish labour camps before mobilising workers to the construction sites to ensure orderly accommodation and reduce conflicts.
- To minimise social disruption, camps should be located at least 500 metres away from settlements, water bodies, and sensitive receptors, in agreement with local communities.
- Provide comprehensive orientation and induction to all labourers, focusing on the Code of Conduct and sensitisation to local cultural and social issues.
- To ensure proper documentation and accountability, detailed records of all labourers, including personal information such as addresses, identity cards, and age proof, must be maintained.
- Implement measures to control workers' activities outside the work site, reducing the potential for conflicts with local communities.
- Appoint a liaison officer to serve as a point of contact between the contractor, local communities, and elders, facilitating communication and conflict resolution.
- Provide adequate safety signage and security at site offices and work yards to prevent unauthorised entry, especially by children.
- Record all visitors and implement strict measures to prevent unauthorised access to work areas to strengthen site security.
- Prioritise the hiring and training of local workers to foster positive relationships with the community and reduce the risk of conflicts.
- Establish in-house stores and shops within labour camps to provide workers with daily necessities, reducing the pressure on local resources.

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- Adhere strictly to the guidelines outlined in Annex 9, Annex 19, and Annex 24 regarding the siting, management, and development of construction and labour camps.
- Wherever possible, hire local unskilled and skilled labourers to integrate the workforce with the local community and mitigate potential conflicts.
- Accommodate non-local workers in contractor-provided camps to minimise their impact on the local housing market.
- Discourage the provision of housing allowances by promoting the use of designated worker camps or personal lodging to avoid competition for local housing.

(x) Air Quality Deterioration

The construction works involve actions that will affect ambient air quality, including (i) movement of vehicles and machinery at construction sites, borrow pits, and other support areas, with the subsequent emission of combustion gases and (ii) clearing and ground clearance operations, earthworks in construction sites. Emission of particulate matter is the key factor in the degradation of local air quality. Another factor that alters the ambient air quality locally is the emission of combustion gases generated by vehicles and machinery in to and from construction sites. Among them are carbon monoxide, nitrogen oxides and particulate matter. The emission of the pollutants will depend not only on the heavy vehicle expected but also on other relevant aspects, such as the carried load, type and maintenance condition of the vehicles and the circulation speed. Combining the mentioned factors can temporarily increase atmospheric pollutants' concentration on the immediate border of the used road accesses.

The deterioration of air quality is assessed to have a high probability (Table 6-14), especially because the project will involve earthworks that will result in dust generation and, therefore, an increase in particulate matter. Implementing mitigation measures that involve water sprays and other measures to limit dust generation will reduce the significance of the impact to a low score.

Table 6-14: Impact Assessment on Temporary Air Quality Deterioration

Impact	Impact Assessment Criteria and Scoring					Significance
	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	
Before Mitigation	3	3	3	1	5	Moderate (50)
After Mitigation	1	1	3	1	2	Very Low (12)

Mitigation measures:

- Acquire and deploy equipment to monitor air quality throughout the construction phase to track pollutant levels and ensure compliance with air quality standards.
- Regularly sprinkle water during the construction phase, particularly during dry and windy periods, to suppress dust and mitigate its dispersion into the surrounding environment.
- Set and enforce moderate speed limits at construction sites and in passing areas such as trading centres, schools, and villages to minimise dust generation and reduce noise.

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- Transport particulate or powdery construction materials with adequate load covering to prevent the dispersion of particulate matter and avoid overloading transport vehicles to minimise emissions.
- Use drop-height regulation equipment when unloading powdery materials to maintain the lowest possible drop-height, reducing dust emissions during these operations.
- Implement measures to reduce greenhouse gas (GHG) emissions and provide additional strategies for enhancing carbon sinks
- Locate concrete production facilities and raw material storage areas as far away from human settlements as possible to minimise the impact of emissions on local communities.
- Install pollution control equipment at batching plants and hot-mix plants, ensuring that these plants are not operated if the pollution control equipment is non-functional.
- Carry out necessary repairs, maintenance, and regular inspections of all machinery and vehicles used in construction, ensuring they are in good working order to mitigate gaseous emissions and noise, and reduce the risk of accidental spills.

(xi) Noise Pollution/Elavation of Noise Levels

The principal noise source during the road construction will be the operation of equipment, machinery, and vehicles. Earth-moving machinery, e.g. excavators, graders, and vibratory rollers, have the potential to generate high noise levels. These machinery can produce noise levels of more than 70 dB (A), which could cause disturbance to those living or working adjacent to the carriageway. Since settlement along the road is frequently sparse, the severity of the impact is expected to be insignificant. The presence of the construction machinery and equipment provides a high probability of occurrence of the impact (Table 6-15); however, the magnitude and extent are expected to affect those on-site mainly. With noise and vibration mitigation measures in place and routinely implemented, the impact is expected to be of low significance.

Table 6-15: Impact Assessment on Temporary elevation of Noise Levels

Impact	Impact Assessment Criteria and Scoring					Significance
	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	
Before Mitigation	3	2	1	1	5	Moderate (35)
After Mitigation	2	1	1	1	2	Very Low (10)

Mitigation measures:

- Restrict construction activities to daytime hours (07:00 – 17:00) when working near populated areas and apply the same restriction to moving heavy construction vehicles and machinery. If construction must extend beyond these hours, inform local authorities and the affected population in advance.
- Conduct regular maintenance of machinery, equipment, and vehicles to minimise noise levels, ensuring that all machinery adheres to a set maintenance schedule as specified by the contractor.
- Develop and implement a Noise and Vibration Control Management Plan, following the guidelines in Annex 21, to mitigate noise impacts throughout the construction process.

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- Deploy equipment to monitor noise levels, particularly at sensitive receptors such as schools, health centres, and churches, ensuring that noise levels remain within acceptable limits.
- Provide appropriate personal protective equipment (PPE), such as earplugs, earmuffs, or ear defenders, to workers exposed to high noise levels to protect their hearing.

(xii) Soil and Land Degradation

Several activities during the road construction phase will increase soil erosion and contribute to the siltation of surface water bodies. This is especially important because most of the intervention area is surrounded by cultivated fields, and soil erosion contributes to siltation and degradation of the river's water quality. Additionally, the project will abstract sand from the local rivers. Activities promoting soil erosion and land degradation include vegetation clearance, excavations, compaction, and soil surplus piling. Processes of erosion and siltation are mostly dependent on the occurrence of precipitation and surface run-off (allowing the transport of eroded soil particles to water bodies, promoting an increase of siltation); since the construction is expected to last for 24 months, this impact is likely to occur. Soils can be contaminated during construction by accidental oil/fuel spills from heavy machinery at storage yards or work sites. In the case of accidental spills from heavy machinery, the extent of soil contamination will depend on the magnitude of these accidental events. However, establishing equipment storage yards and maintenance areas on adapted surfaces and implementing the Emergency Response Plan will help manage accidental spills correctly.

Soil erosion and siltation are highly likely (Table 6-16) because the project area has wetlands and other rivers. If left uncontrolled, the impact would alter the ecological systems of these habitats.

Table 6-16: Impact Assessment on Soil and Land Degradation

Impact	Impact Assessment Criteria and Scoring					Significance
	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	
Before Mitigation	3	3	3	1	4	Moderate (40)
After Mitigation	2	2	3	1	2	Low (16)

Mitigation measures:

- Remove and safely store the fertile topsoil layer before beginning excavation and earthworks and ensure that stockpiles are located outside drainage lines and protected to prevent erosion. Follow the guidance provided in Annex 11.
- Implement and adhere to mitigation and enhancement measures outlined in the ESMP and further specified in the C-ESMP, particularly regarding the management of batch plants, borehole drilling and use of groundwater, bulk material storage, quarries, borrow sites, and equipment maintenance areas.

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- Avoid significant earthworks during periods of high precipitation to prevent soil erosion due to run-off. Take proper precautions to ensure slope and trench stability and prevent landslides.
- Install erosion and run-off control barriers along excavation and embankment areas, using silt fences or check dams to manage soil movement.
- Redistribute collected soil to the areas most affected by construction activities to aid in site rehabilitation and prevent long-term soil degradation.
- Restrict the movement of heavy machinery to designated areas to minimise soil compaction and avoid damage to privately owned land.
- Minimise vegetation clearance and follow an approved method statement to protect the local environment and reduce the risk of soil erosion.
- Continuously monitor embankments during construction for signs of erosion, and take immediate action to address any issues.
- Confine heavy equipment operations within the road reserve wherever possible to avoid unnecessary soil compaction and damage to private land. If private lands must be disturbed, promptly inform the owner and agree on remedial actions in line with national laws.
- Construct designated, signposted wash bays at each campsite, ensuring they are fully contained and regularly maintained, with treated water released to natural water bodies.
- Rehabilitate compacted sites by ripping, levelling, and re-vegetating disturbed areas, restoring them to a stable and sustainable condition.
- Reuse excavation products for backfilling used borrow pits, planting native vegetation on top to stabilise the soil. If excess material remains, store it in suitable alternative deposit sites.
- Follow specific guidelines when collecting borrowed soil, ensuring that: the soil is sourced from nearby locations to minimise transportation impacts; and not sourced from riverbeds, flood-prone areas, protected sites, or agricultural land, nor from sites near urban, touristic, or culturally sensitive areas.

(xiii) Increased Risk of Slope Failure leading to siltation

The construction of the Liwonde-Matawale Road involves significant site clearance, digging, and excavation activities, which pose environmental and social risks, particularly related to slope failure. If not properly managed, these activities could lead to severe environmental degradation, including the destabilisation of slopes, erosion, and the pollution of nearby watercourses. The potential impacts include increased risk of landslides, sedimentation in rivers and streams, and loss of agricultural and forested land, which could negatively affect local communities and ecosystems. As indicated in Table 6-17, The scale of environmental disruption is considerable, with the potential for significant slope destabilisation and erosion. The effects, especially on slopes and watercourses, are likely to persist throughout the construction phase and beyond if not properly managed. The probability of occurrence is high due to the nature of the construction activities.

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Table 6-17: Impact Assessment on Increased Risk of Slope Failure

Impact	Impact Assessment Criteria and Scoring					Significance
	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	
Before Mitigation	3	3	3	1	4	Moderate (40)
After Mitigation	2	2	3	1	2	Low (16)

Mitigation Measures:

- Prohibit clearance, cutting, and excavation activities beyond the proposed toe line to prevent slope destabilisation and reduce landslide risks.
- Remove and properly stockpile topsoil and low-quality materials near the site, and cover them adequately to prevent erosion and degradation.
- Eliminate stagnant water accumulation during quarry and borrow site operations to reduce slope instability and erosion risks.
- Ban all quarrying activities within 500 metres of rivers and streams to protect water quality and aquatic habitats from sedimentation and pollution.
- Prohibit spoil dumping into watercourses including rivers, streams, drainage areas, wetlands, or marshy areas to avoid contamination and ecological disruption.
- Avoid spoil disposal on fragile slopes, floodways, wetlands, farmlands, forests, religious sites, culturally sensitive areas, or areas essential for local livelihoods.
- Locate spoil disposal sites at least 50 metres from surface watercourses and stabilise them through grassing and grading to avoid steep slopes (refer to Annex 23)..

(xiv) Increased Risk of River and Embankment Erosion

The proposed road construction faces increased risk of river and embankment erosion, particularly at bridge and culvert crossings that are lacking in protective measures. This geohazard is largely driven by intense rainfall events, such as those experienced during Tropical Cyclone Freddy, which have previously caused severe erosion and structural damage at sites like Mafufuni and Chiwinja Rivers. The erosion undermines embankments, compromises structural stability, and can lead to partial or complete road washouts, posing a danger to road users and increasing maintenance costs. These impacts are further exacerbated by poorly sized or maintained culverts and inadequate drainage infrastructure.

Table 6-18. Impact Assessment on Increased Risk of River and Embankment Erosion

Impact	Impact Assessment Criteria and Scoring					Significance
	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	
Before Mitigation	3	3	3	1	4	Moderate (40)
After Mitigation	2	2	3	1	2	Low (16)

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Mitigation Measures:

- Protect embankments with riprap, gabion mattresses, or revetments at river crossing points.
- Install energy dissipators (e.g., plunge pools or stilling basins) at culvert outlets to reduce scouring.
- Design culverts and bridges using hydrological modelling to accommodate peak flood discharge.
- Plant native grasses on embankment slopes to reduce erosion.
- Regularly desilt and maintain drainage structures (culverts and side drains) to ensure free flow of water.
- Provide cutoff walls or wing walls on bridge abutments to prevent undermining.

(xv) Water Quality Degradation

The road construction activities are expected to lead to temporary water quality degradation due to increased turbidity, organic and faecal contamination, and oil spills. These impacts arise from soil erosion during earthworks, uncontrolled runoff from construction sites, and accidental spillage of hazardous materials. Such activities threaten to degrade water quality in nearby wetlands and other water bodies. Water contamination might harm the people in the project area, and the impact probability is high (Table 6-19).

Table 6-19: Impact Assessment on Water Quality Degradation

Impact	Impact Assessment Criteria and Scoring					Significance
	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	
Before Mitigation	3	3	3	3	4	Moderate (48)
After Mitigation	2	2	3	2	2	Low (18)

Mitigation measures:

- To prevent contamination, temporary facilities (such as construction campsites, storage areas, and fuel storage) should not be placed within 50 metres of wells and boreholes. Additionally, machinery should not be fuelled, washed, or maintained near drains or watercourses.
- Develop and implement a comprehensive Waste Management Plan, as guided by Annex 10, to manage all waste generated during construction. This plan should cover waste identification, classification, and proper disposal methods.
- Regularly monitor water quality at abstraction points (upstream, at the point of abstraction, and downstream) to confirm that water quality parameters remain within acceptable limits.
- Properly store all waste produced during construction, according to its type and local regulations, to prevent runoff or spills from reaching water bodies.
- Provide sheltered storage facilities for hazardous substances, equipped with safety and spill control measures, to prevent contamination.
- Store used oils, lubricants, fuels, paints, glues, resins, and other hazardous substances in sealed containers for proper disposal to avoid environmental contamination.

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- Promptly clean up all chemical spills using appropriate absorbent materials and ensure proper disposal of the collected materials.
- Install and maintain adequate collection and storage/treatment facilities for domestic wastewater at construction yards, using septic tanks or properly sealed latrines to prevent contamination.
- To effectively manage water runoff, develop and implement a stormwater and water management plan, following the guidance provided in Annex 12.
- Restrict vegetation clearance, excavations, and soil compaction to approved sites only to minimise the impact on surrounding environments.
- Obtain all necessary permits for water abstraction and comply with all relevant regulatory standards to ensure sustainable water use.

(xvi) Disruption of Riparian Ecosystems

The installation of infrastructure such as culverts and bridges is likely to alter natural water flows, disrupting the area's hydrological stability. This alteration may lead to excessive drying or flooding within riparian ecosystems, adversely affecting their ability to provide critical ecosystem services.

Table 6-20: Impact Assessment on Disruption of Wetland Ecosystem Services

Impact	Impact Assessment Criteria and Scoring					Significance
	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	
Before Mitigation	3	3	3	3	3	Moderate (36)
After Mitigation	2	2	3	2	2	Low (18)

Mitigation measures:

- Schedule construction works in riparian areas during the dry season (June to November) to avoid the most critical periods for local fauna.
- Apply erosion control techniques, such as silt fences and sedimentation basins, to prevent sediment from entering wetlands during and after construction.
- Increase the riparian sections' span to maintain the ecological functions and avoid disrupting their services.
- Ensure the maintenance of environmental flow (e-flow) at all wetland crossings during the construction phase to sustain the wetlands' natural functions.
- Implement stormwater management systems that capture and treat road runoff before it enters riparian ecosystems, reducing the risk of water contamination.
- Adopt best management practices to prevent pollution from construction activities and road use, including proper waste disposal and minimising the use of harmful chemicals.

(xvii) Increased Risk of Accidents due to Change in Traffic Flow

During the construction phase, heavy trucks and construction machinery can create temporary disturbances (e.g., increase of circulation, pavement degradation and more accidents between vehicles and walkers) in everyday life. Accessibility and mobility problems can also affect

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human and economic activities like commerce and agriculture. Typically, construction work involves accidents because of the operation of machinery, heavy traffic, or movement of heavy loads, amongst others. Typically, construction work involves accidents because of the operation of machinery, heavy traffic, or movement of heavy loads, amongst others. In Malawi, over 90 % of motorcycle operators have never attended formal lessons on road traffic and safety rules, making them very vulnerable to road accidents. Some of the accidents might also involve regular vehicles and construction vehicles. These accidents can affect workers and the local population. Pedestrians and motorcyclists are at greatest risk of serious injury from collisions with moving vehicles. Children will generally be the most vulnerable due to due to the large number of schools along this road, and a lack of experience and knowledge of traffic-related hazards, their behaviour while at play, and their small size, making them less visible to motorists. Some are associated with the driver's behaviour or the vehicle's quality, while others are linked to the road design or construction and maintenance issues. Within the project impacts, there were over ten schools, meaning that these form part of the pedestrians on the road.

Table 6-21: Impact Assessment on Increased Risk of Accidents due to Change in Traffic Flow

Impact	Impact Assessment Criteria and Scoring					Significance
	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	
Before Mitigation	4	3	3	2	5	High (60)
After Mitigation	1	1	3	2	2	Very Low (14)

Mitigation measures:

- Develop and implement a traffic management plan, as guided by Annex 11, to manage traffic disruptions and enhance safety.
- Enforce compliance with safety and signalling standards on public roads, prioritising the safety of the local population and minimising disruptions to their daily activities.
- Implement pedestrian safety management strategies, including the provision of safe corridors, side roads, and bridges, to protect pedestrians and livestock from traffic hazards during construction and operation.
- Install barriers, such as guardrails and fencing, to prevent unauthorised pedestrian and livestock access to the roadway, except at designated crossing points.
- Secure and signal houses near the construction site that do not require resettlement to prevent accidental damage or injury.
- Conduct regular road safety awareness and sensitisation programmes targeting pedestrians, motorcycle operators, and small vehicle drivers.
- Install speed calming structures at strategic locations, including trading centres, villages, schools, hospitals, and public service areas, to reduce vehicle speeds and enhance safety.
- Develop and implement a traffic circulation plan for construction sites to minimise the passage through densely populated areas and near sensitive receptors, such as schools and trading centres.

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- Prepare an emergency preparedness and response plan, as guided by Annex 18, in coordination with the local community and emergency responders, to provide timely first aid and hazardous materials response in the event of accidents.
- Conduct a dedicated road safety programme for schools with tailored messages for students and staff.

(xviii) Increased Risk of Sexually Transmitted Infections and Spread of Communicable Diseases

The presence of workers from outside the local area, (during the construction phase, without their families, tends to promote occasional sexual relations with local women. Consequently, STIs can increase. Additionally, there are STIs that occur when men who live in the village with their families start working on the project and spend their pay packet on sex workers or extramarital relationships. Additionally, GBV and SEAH cases also exacerbate the cases of STDs because the victims do not have any voice to protect themselves and some workers are afraid of losing their jobs due to power imbalance and high incomes enticing the poor. This has a negative impact, to a local and regional extent, and with long-term consequences. Additionally, communicable diseases (e.g., diarrhoea, cholera, and bilharzia) can be spread more quickly due to the lack of sanitary conditions in mobile workers' houses. Some physical characteristics of the territory can also promote mosquito proliferation and be associated with other diseases, like malaria.

The assessment of the impact (Table 6-22) indicates a high probability, because of the poverty levels in the area, that would expose workers to having multiple sexual partners as they will have high incomes. The presence of both genders on the construction sites, with the promotion of females in the workforce, can increase casual sex. The impact is expected to be managed through sensitisation of workers and linkages with existing health providers in the project area.

Table 6-22: Impact Assessment on Increase of STDs and Communicable Diseases

Impact	Impact Assessment Criteria and Scoring					Significance
	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	
Before Mitigation	4	3	3	2	4	Moderate (48)
After Mitigation	2	1	1	1	2	Very Low (10)

Mitigation measures:

- Develop an HIV and AIDS prevention and management plan, following the guidance provided in Annex 16, to address the risks associated with STIs and HIV and AIDS.
- Prioritise recruiting local workers to reduce the influx of non-local workers and increase income for local families.
- Conduct regular health awareness campaigns for workers and the local population to educate them on disease transmission, prevention and treatment, in line with Malawi's HIV and AIDS prevention programme.
- Distribute condoms regularly to minimise the risk of spreading STIs, and HIV and AIDS.

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- Establish a campsite clinic and arrange with local health service providers to offer regular Voluntary Counselling and Testing (VCT) services.
- Conduct frequent sensitisation/toolbox talks for workers on money management, encouraging them to invest in their families rather than spending on alcohol, gambling, or sex workers.
- Eliminate pools of stagnant water created by construction activities to control mosquito proliferation and prevent insect-borne diseases such as malaria.

(xix) Introduction and Spread of Alien of Invasive Alien Species (IAS)

Disturbances to the ecosystems can compound alien and invasive species through land clearance. Clearing land disturbs the soil and alters the existing habitats, creating new niches that invasive species can exploit. The IAS often thrive in disturbed environments where competition from native species has been reduced. Five Alien plant species were recorded along the corridor. Invasive plants suffocate the growth of native species, and some have the potential to degrade soil fertility. The construction process itself can introduce invasive species to an area. Machinery and vehicles can carry seeds or plants from one location to another, planting seeds of invasive species in the newly cleared land. Considering that the project area has known IAS, there is a high likelihood for the spread if left uncontrolled (Table 6-23). The project must implement mitigation measures to remove and continuously monitor the spread of the IAS mechanically.

Table 6-23: Impact Assessment on Increased Spread of IAS

Impact	Impact Assessment Criteria and Scoring					Significance
	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	
Before Mitigation	4	3	3	2	3	Moderate (36)
After Mitigation	1	1	3	2	2	Very Low (14)

Mitigation measures:

- Develop an invasive plant removal and management protocol using the guidance provided in the Biodiversity Management Protocol in Annex 15, to control and eliminate IAS.
- Avoid transporting materials that may contain foreign seeds into the project area to prevent the introduction of new invasive species.
- Remove all invasive species mechanically within the project area to prevent their spread.
- Monitor construction areas and adjacent wetlands for invasive species and implement management plans to control or eradicate them before they become established.

(xx) Loss of Trees

The construction of the Road, including two climbing lanes within the Liwonde Forest Reserve, will lead to the loss of approximately 429 indigenous trees, notably, three *Dalbergia melanoxylon* (African ebony) and two *Pterocarpus angolensis* (African teak), both nationally

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red-listed. These species are, however, more widely distributed outside the impact zone. The affected trees are mainly part of miombo woodlands, which provide habitat for terrestrial fauna. Losses will arise from road clearance, campsite establishment, borrow pits, and diversions. With compensation and replanting measures in place, the impact is considered of low magnitude, reversible, and low probability.

Table 6-24: Impact Assessment on Loss of Trees

Impact	Impact Assessment Criteria and Scoring					Significance
	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	
Before Mitigation	2	3	3	2	3	Moderate (36)
After Mitigation	1	1	1	1	2	Very Low (8)

Mitigation measures:

- Carry out selective tree-cutting in necessary areas, avoiding unnecessary removal at locations such as campsites or borrow pit areas.
- Develop and implement a biodiversity management and restoration protocol as part of the ESMP guided by Annex 15 to mitigate the impact on local flora and fauna.
- Replant trees at a rate of ten saplings for every tree cut under an afforestation plan
- Prohibit the purchase of firewood or charcoal from unlicensed suppliers to discourage illegal logging and charcoal production, and protect local forests.
- Utilise renewable energy sources for cooking at campsites to reduce reliance on firewood.
- Provide packed meals to workers at all construction sites to minimise the demand for firewood and reduce pressure on local resources.

(xxi) *Risk of disturbance of Chance Finds*

Although the field survey and community consultations revealed no known archaeological sites, fossil records, or monuments along the road reserve, the potential for unearthing previously undiscovered cultural heritage remains a residual risk during excavation, site clearance, or borrow pit operations. The road corridor has existed for several decades, which communities believe reduces the likelihood of heritage proximity. However, experience from similar infrastructure projects suggests that unrecorded graves, ritual sites, or artifacts may still be encountered, posing compliance, reputational, and community-related risks if not managed appropriately.

The magnitude of this impact is moderate, as damage to undiscovered heritage can be significant and irreversible if not detected and addressed in time. The extent is local, affecting only work areas where ground disturbance occurs. The impact is considered recoverable if heritage protocols are triggered promptly, allowing for documentation or relocation. The duration is typically short-term, limited to the construction phase. The probability is low to moderate given current knowledge, but the consequences warrant preparedness. Thus, the risk

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of chance finds is assessed as moderate before mitigation and very low after implementing contingency measures through a Chance Find Procedure.

Table 6-25: Assessment of conflicts between contractor's workers and the community

Impact	Impact Assessment Criteria and Scoring					Significance
	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	
Before Mitigation	3	2	2	2	3	Moderate (27)
After Mitigation	1	1	1	1	2	Very Low (8)

Mitigation Measures:

- Implement and operationalize a Chance Find Procedure, in compliance with the Monuments and Relics Act and the requirements of OP/BP 4.11 (Physical Cultural Resources), covering discovery protocols, reporting, site protection, and expert consultation (See Procedure in Annex 22).
- Train all site workers and supervisors on how to recognize and respond to potential archaeological finds.
- Secure and isolate any chance find location immediately, stopping work until the Department of Antiquities provides clearance.
- Engage a qualified archaeologist or cultural heritage expert to assess any find and recommend appropriate action.
- Budget for contingency actions, including investigation, documentation, or respectful relocation of cultural materials.

(xxii) Disruption of utilities and social services (e.g. water and electricity supply, social services like markets, clinics etc)

Construction activities for the rehabilitation of Liwonde- Matawale Road project will lead to the temporary or permanent disruption of essential utilities and social services. These include:

- Water supply systems: Possible damage to underground or overhead pipes during excavation or realignment activities.
- Electricity infrastructure: Relocation or accidental disruption of poles, transformers, or overhead lines.
- Telecommunication lines: Interference with buried or aerial phone/internet cables.
- Access to social services: Temporary closure or restricted access to markets, and community centers due to construction activities or road diversions. Additionally, the increased number of people will lead to increased pressure to other social services like local health centres.

Such disruptions can lead to inconveniences, economic losses, safety risks, and public discontent, particularly for vulnerable groups such as women, children, the elderly, and people with disabilities who heavily depend on these services.

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Table 6-26: Assessment of disruption of utilities and social services (e.g. water and electricity supply, social services like markets, clinics etc)

Impact	Impact Assessment Criteria and Scoring					Significance
	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	
Before Mitigation	3	3	3	1	4	Moderate (40)
After Mitigation	2	2	3	1	2	Low (16)

Mitigation Measures:

- Conduct a detailed mapping and inventory of existing utilities and social services prior to construction (detailed in the RAP report)
- Engage with service providers (e.g. ESCOM, water boards, telecom companies) to coordinate and plan utility relocation or protection.
- Develop and implement a Utility Relocation and Management Plan under the RAP.
- Notify communities and service users in advance of any planned disruptions (at least 7 days' notice).
- Install and provide temporary service alternatives where possible (e.g., water tanks, backup generators, temporary market stalls).
- Carry out continuous access to critical services, especially clinics and schools, by planning appropriate detours and signage.
- Assign a Grievance Redress Mechanism (GRM) to handle complaints related to service disruptions promptly.
- Provide alternative sites for marketing activities prior to works close to the market in liaison with the district and city councils in all identified markets along the corridor.
- Include utility protection clauses in contractor contracts, with penalties for negligence.
- Rehabilitate affected infrastructure promptly and to pre-project standards or better.
- Provide a fully approved clinic at the camp sites to handle cases related to construction works in order to reduce pressure on existing government health facilities.

(xxiii) Impacts on Fauna (Disturbance, Habitat Loss, and Poaching Pressure)

Construction activities for the rehabilitation of the Liwonde–Matawale Road project may affect local fauna through several pathways:

- Disturbance from noise, vibration, and increased human activity, which may displace small mammals, reptiles, and birds from roadside habitats, riparian areas, and forest edges.
- Loss of habitat due to clearance of trees and vegetation along the road reserve, particularly in areas adjoining Liwonde Forest Reserve and riparian zones (e.g., Lifani, Domasi, and Chikupira Rivers).
- Increased poaching and bushmeat consumption risk linked to the presence of construction workers, who may create a market for illegal hunting of small animals in surrounding areas.
- Secondary risks such as traffic-related disturbance to local fauna during material haulage and construction works.

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While the road does not traverse Liwonde National Park or other formally designated wildlife corridors, opportunistic impacts on fauna in the project's wider landscape are plausible and require precautionary management.

Table 6-27. Impact Assessment of fauna-related impacts

Impact	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	Significance
Before Mitigation	3	3	2	2	3	Moderate (36)
After Mitigation	2	2	2	1	2	Low (16)

Mitigation Measures:

- Restrict vegetation clearance to the approved road reserve and avoid unnecessary disturbance to riparian habitats.
- Enforce a "no hunting/no bushmeat" policy through the Contractor's Code of Conduct, with penalties for violations.
- Conduct worker sensitisation campaigns on biodiversity conservation and wildlife laws.
- Implement tree replanting and greening programs with native species to restore roadside habitats.
- Schedule noisy activities (blasting, heavy machinery) during daylight hours only, to minimise wildlife disturbance.
- Collaborate with the Department of Forestry and Department of National Parks and Wildlife (DNPW) to monitor and respond to any reported poaching incidents.

6.2.5 Identified Positive Impacts During Operation Phase

(i) Improved Mobility and Access to Social Services

The upgraded road will enhance access to essential public services such as healthcare facilities, educational institutions, administrative offices, and local markets for communities along the Liwonde–Matawale corridor. Improved mobility will benefit rural households, persons with disabilities, and vulnerable groups who often face challenges accessing critical services. Faster and more reliable transportation will reduce travel times and increase efficiency for both passenger and goods transport. The project will also improve access to ambulatory and referral health services and facilitate school attendance for students living in remote areas. The impact on access to services is expected to be highly beneficial and enduring, particularly if supported by sustained road maintenance and integration with public transport services.

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Table 6-28. Impact Assessment on Improved Mobility and Access to Services

Impact	Impact Assessment Criteria and Scoring					Significance
	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	
Before Enhancement	4	3	5	3	5	High (75)
After Enhancement	5	4	5	4	5	Very High (90)

Enhancement Measures:

- Maintain road quality through routine and periodic maintenance activities.
- Facilitate integration with local and regional public transportation systems such as the Nacala Corridor.
- Construct and maintain access roads or footpaths linking communities to main road.
- Raise awareness among community members about safe and reliable transport services.

(ii) Stimulation of Local and Regional Economies

The operation of the improved road is expected to stimulate economic activity along the corridor by facilitating easier and faster movement of agricultural goods, manufactured products, and services. Improved road conditions will reduce transport costs, enhance market accessibility, and promote value chain participation for local producers and traders. Economic opportunities are expected to expand in roadside trading centres such as Machinga Boma, Domasi, Songani, Chinamwali, and surrounding rural areas. Small-scale businesses, including agribusinesses and informal trade, will benefit from improved customer reach and reduced spoilage of perishable goods. The road will also encourage private investment in transport, logistics, and roadside services such as retail, repair, and hospitality.

Table 6-29. Impact Assessment on Economic Stimulation

Impact	Impact Assessment Criteria and Scoring					Significance
	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	
Before Enhancement	4	3	5	3	5	High (75)
After Enhancement	5	4	5	4	5	Very High (90)

Enhancement Measures:

- Develop roadside market infrastructure and promote small business incubation near trading centres.
- Support local councils in developing market zoning and road setback enforcement.
- Facilitate access to finance and training for small traders and transport operators.
- Encourage value-addition activities by linking farmers to processing facilities and organized markets.

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(iii) Enhanced Road Safety and Reduced Accidents

The upgraded road design will integrate safety improvements such as wider shoulders, signage, pedestrian crossings, and designated loading/offloading areas. These measures are expected to reduce the frequency and severity of road accidents, particularly in high-traffic areas and trading centres such as Liwonde, Songani and Chinamwali. The improved road condition will minimize hazardous driving conditions such as potholes, uneven surfaces, and blind curves, which currently contribute to road crashes. The provision of dedicated pedestrian pathways and traffic-calming features in populated areas will protect vulnerable road users, including children and the elderly. In turn, fewer accidents will lower the burden on local health facilities and enhance public safety.

Table 6-30. Impact Assessment on Road Safety and Accident Reduction

Impact	Impact Assessment Criteria and Scoring					Significance
	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	
Before Enhancement	3	2	4	3	4	Moderate (60)
After Enhancement	5	4	5	4	5	High (90)

Enhancement Measures:

- Install and maintain road signage, speed bumps, and guardrails in trading centres and near schools.
- Conduct road safety awareness campaigns for drivers, cyclists, and pedestrians.
- Collaborate with traffic enforcement agencies to ensure compliance with speed limits and road use regulations.
- Monitor road safety performance through traffic incident reporting systems and stakeholder feedback.

6.2.6 Identified Negative Impacts During Operation Phase

This section provides a discussion of the impacts and the associated mitigation measures.

(i) Air Pollution

Gaseous emissions from vehicles using the road will be a main air pollutant. The operation of vehicles will result in emissions of carbon monoxide, sulphur dioxide, and oxides of nitrogen. Most commercial vehicles driven with diesel fuel are often used in Malawi. The greatest impact on air quality due to emissions from vehicles and plants will be in the areas immediately adjacent to site access. These air pollutants can contribute to regional and global climate change. Mitigation of climate change involves reducing the flow of heat-trapping greenhouse gases into the atmosphere, either by reducing sources of these gases or enhancing the "sinks" that accumulate and store these gases (such as forests). The goal of mitigation is to avoid significant human interference with the climate system and "stabilise" greenhouse gas levels

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in a timeframe sufficient to allow ecosystems to adapt naturally to climate change, ensure that food production is not threatened and enable economic development to proceed sustainably.

Table 6-31: Impact Assessment on Air Pollution

Impact	Impact Assessment Criteria and Scoring					Significance
	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	
Before Mitigation	3	3	3	1	5	Moderate (50)
After Mitigation	1	1	3	1	2	Very Low (12)

Mitigation measures:

- Plant trees of various species within the project areas and within the road corridor, at the extent of the Right of Way, at ten metres from each other on either side of the road.
- Encourage communities traversed by the road to replant trees in their areas in collaboration with local and national authorities.
- Enforce vehicle fitness tests are done at annual intervals for all vehicles using the road, and based on a certificate of fitness, only fit vehicles will be allowed to operate on the road.
- Adhere to occupational hygienic practices throughout the entire project life cycle of the road.

(ii) Increased risk of traffic-related accidents

The movement of vehicles along the newly commissioned road may increase the risk of traffic-related accidents, particularly in the initial months as road users adjust to the new infrastructure. To mitigate this risk, the road's design incorporates enhanced safety features such as strengthened pavements, improved road geometrics, and the installation of grade separators. Further, the implementation of service lanes near marketplaces and schools, better road crossings, clear signalling, and comprehensive signboards are planned. To address potential gaps in road-use awareness, traffic safety programs will be conducted in nearby schools and community centres, focusing on the specific aspects and regulations of the new road.

Table 6-32: Impact Assessment on Increased incidence of motor vehicle accidents

Impact	Impact Assessment Criteria and Scoring					Significance
	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	
Before Mitigation	4	3	3	2	3	Moderate (36)
After Mitigation	1	1	3	2	2	Very Low (14)

Mitigation measures:

- Provide proper road signs and warnings.

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- Provide service roads, junctions, and safe passages at appropriate locations to ensure safe and efficient access.

(iii) Noise Pollution/Elevation of Noise Levels

The study expects increased noise during the operation stage of the project due to the high speed and raving of motor vehicles including trucks along the road since its design speed is 100km/hr.

Table 6-33: Impact Assessment on Noise Pollution/Elevation of Noise Levels

Impact	Impact Assessment Criteria and Scoring					Significance
	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	
Before Mitigation	3	2	1	1	5	Moderate (35)
After Mitigation	2	1	1	1	2	Very Low (10)

Mitigation measures:

- Enforcement of Traffic Act regulations to ensure that all vehicles using the road are in good condition all the time to avoid excessive noise generation.
- Install speed control measures such as bumps and rumble strips in the villages and towns where the road traverses10.
- Install no hooting signs in sensitive areas such as near hospitals, schools, churches, mosques etc.

(iv) Inadequate Stormwater Drainage and Flooding of Road Shoulders

If not routinely maintained, the project's stormwater infrastructure (culverts, lined drains, and bridges) may become clogged with debris, sediment, or waste particularly during the rainy season. Poor drainage can cause ponding, shoulder erosion, and bridge overtopping, especially in low-lying flood-prone areas mainly for the bridges draining from the Zomba Mountain. These effects can compromise road safety and reduce the lifespan of the infrastructure.

Table 6-34: Impact Assessment on Inadequate Stormwater Drainage

Impact	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	Significance
Before Mitigation	4	3	3	3	4	High (52)
After Mitigation	2	1	3	2	2	Low (16)

[10] Enforce speed restrictions in accordance with the Road Traffic Act: a maximum of 30 km/h near schools, health facilities, and markets/trading centres, 50 km/h in other built-up areas, and 80 km/h in rural stretches outside built-up areas, unless otherwise reduced for safety reasons. Appropriate road signage, speed calming measures, and contractor supervision will ensure compliance.

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Mitigation Measures:

- Establish a routine road and drainage maintenance programme post-construction.
- Train district council staff and communities on identifying and reporting blocked drains or culverts.
- Include budget provisions for emergency de-silting and maintenance.
- Ensure roadside vegetation is cleared seasonally to prevent blockage of outlets and culverts.

(v) Proliferation of Informal Roadside Trading along the corridor

Improved road infrastructure often attracts informal vendors and roadside markets, particularly near bridge crossings, bus stops, and trading centres. While this can enhance livelihoods, unregulated trading may obstruct pedestrian paths and shoulders, increase risk of traffic accidents, and damage the road edge through encroachment or poor waste disposal.

Table 6-35: Impact Assessment on Informal Roadside Trading

Impact	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	Significance
Before Mitigation	3	2	3	4	4	Moderate (48)
After Mitigation	2	1	2	2	2	Low (14)

Mitigation Measures:

- Work with local councils to designate and plan formal market spaces near bridge approaches.
- Install signage and roadside barriers to prevent unsafe informal vending near the carriageway.
- Conduct community sensitisation on safety risks and legal limits of roadside trading.
- Enforce local by-laws against encroachment of the road reserve and drainage structures.

(vi) Risk of Illegal Settlements Along the Road Reserve

The improved road corridor may attract illegal construction or land use within the road reserve due to increased economic activity. This could include temporary kiosks, houses, or workshops that encroach on the buffer zone or drainage space. Such encroachments may obstruct maintenance access, damage infrastructure, or cause disputes during future road expansion.

Table 6-36: Impact Assessment on Illegal Settlement Pressures

Impact	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	Significance
Before Mitigation	3	2	3	4	4	Moderate (48)
After Mitigation	1	1	2	2	2	Very Low (12)

Mitigation Measures:

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- Enforce strict compliance with the 36m road reserve boundary in partnership with local authorities.
- Erect permanent beacons and demarcations to prevent land grabbing or informal construction.
- Conduct awareness campaigns on the legal status of the road reserve and its purpose.
- Develop a grievance mechanism for handling disputes over land use or forced relocations.

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6.2.7 Site Specific environmental and social impacts and risks, and Mitigation Measures

Table 6-37 presents a chainage-based summary of key biophysical and socio-economic conditions along the Liwonde–Matawale (M003) road corridor. The table consolidates site-specific impacts and corresponding mitigation measures to provide a clear and practical reference for implementation. By linking impacts to defined chainages, the table guides project planners, contractors, the Supervising Consultant, and the Roads Authority in systematically addressing environmental and social risks. This approach ensures that mitigation is both location-specific and aligned with safeguard requirements, thereby supporting sustainable project delivery and effective monitoring during construction and operation.

Table 6-37. Site Specific environmental and social impacts and risks, and Mitigation Measures

No.	Chainage	Location Name	Biophysical Characteristics	Socio-economic Characteristics	Main Impacts and Risks	Mitigation Measures
1	0+100	Liwonde Barrage	Built-up area, near Shire River; existing drainage structures	Overhead railway crossing, Road intersections, High level motorized and non-motorized traffic, private infrastructure including lodge and private school.	▪ Physical & economic displacement of shops, kiosks, fences; ▪ High pedestrian/vehicle conflict, accident risks; ▪ Air quality and noise deterioration; Wastewater runoff into Shire River	· Implement RAP and compensate PAPs before works; · Design and enforce traffic calming & pedestrian crossings; Regular dust suppression and enforce speed limits; · Maintain stormwater drains to prevent water pollution
2	1+260 - 3+000	Liwonde TC	Highly disturbed roadside vegetation, paved surfaces	Busy trading centre with shops, hawker stalls, schools, dense pedestrian & bicycle use	▪ Encroachment into RoW; Disruption of businesses; GBV/SEAH risks due to labour influx; ▪ Road safety hazards for pedestrians and cyclists	· RAP implementation for businesses and structures; Provide alternative market sites during construction; · Worker Code of Conduct and GBV/SEAH awareness campaigns; · Install pedestrian crossings, signage, and guardrails
3	3+800 - 7+580	Mtubwi Area	Disturbed areas, non-listed vegetation (trees, grass, etc.)	Sporadic smallholder cultivation, sparse settlement	▪ Loss of farmland; ▪ Soil erosion from cut and fill; ▪ Noise and dust affecting scattered homesteads	· Topsoil conservation; · Erosion control (silt fences, check dams); · Schedule high-risk earthworks outside rainy season; · Regular dust suppression

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No.	Chainage	Location Name	Biophysical Characteristics	Socio-economic Characteristics	Main Impacts and Risks	Mitigation Measures
4	9+840 - 11+720	Machinga TTC Area	Climbing lane area near hills, moderate slopes	Low settlement, subsistence farming, bicycle transport	▪ Vegetation clearance; ▪ Increased slope instability; ▪ Safety risk for cyclists on steep terrain	· Limit clearing; · Construct climbing lanes with slope stabilization (gabions, terracing); · Install signage and barriers; · Dust suppression
5	15+700 – 16+700	Liwonde Forest Reserve	Forest reserve, natural thickets (Acacia, Combretum, Brachystegia, Pterocarpus, Julbernardia, Terminalia); steep slopes, erosion risk	Sparse settlement; forest with limited human activity	▪ Loss of ~429 trees including 3 *Dalbergia melanoxylon* (NT/IUCN; VU/National) and 2 *Pterocarpus angolensis* (LC/IUCN; VU/National) ▪ Soil erosion & slope failure ▪ Habitat fragmentation	· Restrict clearing to minimum corridor · Implement Biodiversity Management Protocol · Replant 10 seedlings of same species per tree cut · Reforestation with indigenous species · Strict protection of species outside project footprint · Slope stabilization
6	16+920 - 17+580	Machinga Boma	Built-up area, roadside drains, disturbed vegetation	Dense settlement, shops, institutions, roadside trading, institutional infrastructure including a primary school and police station.	▪ Displacement of structures; Congestion; ▪ Increased risk of accidents; ▪ GBV/SEAH risks	· RAP compensation; · Provide temporary market relocation; · Traffic calming (speed humps, signage); · GBV awareness and enforcement of Code of Conduct
7	18+140 – 22+700	Malosa – Namwera	Predominantly built environment with cultivated plots and remnant roadside vegetation interspaced by trading areas.	Dense built-up trading corridor with roadside housing, shops, schools (e.g., Likwenu CDSS, Nsanjama Pvt., Wawa Pvt.), fuel station, health facility nearby, and high NMT use	▪ Disruption of access to schools, shops, and health centres ▪ Dust and noise pollution ▪ Pedestrian and NMT safety risks ▪ Increased risk of traffic accidents in trading centre areas	· Construct pedestrian crossings and footpaths · Provide alternative access routes during works · Dust suppression near schools, shops, and clinics · Install signage and speed calming measures in trading centres · Ensure access to businesses and fuel station is maintained
8	29+020 – 38+480	Domasi – Songani Stretch	Riparian areas near Domasi River; disturbed vegetation; mixed farmland and river valleys; roadside trees	Adjoining trading centres at Domasi, Works, and Songani; Domasi College of Education, Malawi Institute of Education, Domasi Development	▪ Displacement of roadside businesses and vendors ▪ Bridge works at Domasi affecting water quality and riverbank stability ▪ Risk of GBV, SEAH	· Implement RAP for affected businesses and vendors · Maintain environmental flows in Domasi River and apply erosion/sediment control at crossings

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No.	Chainage	Location Name	Biophysical Characteristics	Socio-economic Characteristics	Main Impacts and Risks	Mitigation Measures
				College, Domasi Training College, and several private schools; roadside businesses and markets; moderate human settlements; heavy MT and NMT traffic, especially at Songani which hosts a major agricultural commodities market on Mondays and Thursdays	▪ High pedestrian and traffic accident risks due to busy trading centres and Songani market days ▪ Soil erosion and farmland loss in cultivated patches ▪ Dust generation from haul roads and construction activities	· Construct pedestrian crossings, guardrails, and traffic calming near schools, markets, and trading centres · Implement measures specifie in the ESMP matrix. · Provide safe access to Songani market during peak trading days · Store and reuse topsoil; compensate for farmland loss · Apply dust suppression near markets, schools, and settlements; avoid wet-season earthworks
9	43+400 – 43+920	Naizi TC	Moderately disturbed roadside vegetation; semi-urban environment with expanding settlement	Upcoming trading centre, moderately built-up with shops; part of Zomba's city outgrowth from Chinamwali; growing roadside businesses and housing	▪ Encroachment into road reserve by shops ▪ Moderate increase in NMT and MT traffic risks ▪ Dust and noise impacts on residents and businesses	· Demarcate and protect road reserve boundaries · Provide pedestrian crossings and speed calming measures · Suppress dust near shops and residences · Ensure access to local businesses during works
10	46+640 – 47+240	Chinamwali TC – Matawale Turn-Off	Built-up environment; riparian zone at Chikupira River (city boundary, disturbed by nearby settlements); foot of hilly terrain prone to erosion	Very busy trading centre (Chinamwali Market); dense roadside shops; private medical facilities (clinics) among shops; private schools nearby; heavy roadside vending; high pedestrian/NMT traffic	▪ Displacement of vendors and loss of business frontage ▪ Impacts on Chikupira River (siltation, bank disturbance from settlements) ▪ Accident risks due to heavy NMT and market congestion ▪ Increased erosion risk on hilly side of settlement	· Implement RAP for affected vendors/shops · Install silt fences and sediment traps at Chikupira River crossing · Construct guardrails, pedestrian crossings, and speed calming near market and schools · Ensure safe access to clinics and schools · Stabilize slopes/roadside embankments to reduce erosion

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CHAPTER 7: ENVIRONMENTAL AND SOCIAL MANAGEMENT, AND MONITORING PLANS

7.1 Environmental and Social Management Plan

An Environmental and Social Management Plan (ESMP) has been developed to assist the proponent in mitigating and managing environmental impacts associated with the project's life cycle. It is noteworthy that critical factors and processes may change through the life of the project, and considerable provisions have been made for the dynamism and flexibility of the ESMP. As such, the ESMP will be subject to a regular regime of periodic review during project implementation. Table 7-1 forms the core of this ESMP for the Project phases of the proposed Project. In general, the Table outlines the potential environmental and social risks associated with the project and details all the necessary mitigation measures, their financial costs, as well as the persons responsible for their implementation. The ESMP is to support the development of a contractor, site-specific ESMP (C-ESMP), which will serve as the controlling document on contractors' performance for avoiding, minimising, and mitigating impacts. That document will be the basis for auditing environmental and social risk/impact management, not this ESMP.

7.2 Cost of mitigation

The budget required to implement environmental, social health and safety measures is estimated at US$ 884,200. Out of this, US$ 828,000 is for the construction phase (inclusive of pre-construction, contruction and demobilization phases) while US$ 56,200 is for the operation phase. Based on this budget guideline, a comprehensive work program, budget estimates, schedules, staffing and training requirements, and other necessary support services to implement the mitigating measure will be prepared.

7.3 Bidding and Contract Documents

The Roads Authority will ensure:

- The ESMP is a contractual requirement that will be part of the Supervising Consultant, which will require the Contractor and the Supervising Consultant during bidding.
- The Contracts and bidding documents contain all required mitigation measures to be implemented during the construction period and the obligation for the Contractor to implement the ESMP through preparation and execution of C-ESMP during the construction period.
- Construction permits and licenses are obtained before granting any civil works contract.
- Monitoring ESMP implementation is undertaken regularly as required.
- Semi-annual reports on ESMP implementation will be well documented and submitted routinely to the Malawi Environment Protection Authority.
- Coordinate with other parties and government agencies to implement the ESMP effectively at all project stages.
- Remedial actions are undertaken for unpredicted environmental impacts.

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Table 7-1: Environmental and Social Management Plan for the project

REF.	Impacts & Risks	Impact and Risk Enhancement and Mitigation Measures	Schedule of Implementation	Responsible Institution	Implementation Cost (USD)
6.2.1	**Positive Impacts During Pre-construction Phase**				
6.2.1.1	Creation of short-term employment	Engage local experts (nationals), and communities along the corridor, especially youth and vulnerable persons, for all support roles during pre-construction.	Preconstruction	Contractor, Local Authorities	None
		Engage local leadership such as GVHs and Village Developmemnt Committes to ensure transparent recruitment that avoids nepotism, discrimination, or political interference.	Preconstruction	Contractor, Local Authorities	500
		Enforce fair labour practices including payment of fair wages, timely payment of wages, safe working conditions, clear work contracts and formal briefing before work begins.	Preconstruction and throughout construction	Contractor	None
		Prohibit gate hiring, establish designated office/desk for recruitment.	Preconstruction and throughout construction	Contractor	None
		Prioritize recruitment of women targeting a 30% of hires to be women and where possible, support women in supervisory or coordination roles for logistics and data collection.	Preconstruction and on-going	Contractor, Gender and Social Inclusion (GESI) Officers	500
		Maintain a register of local people employed, including gender, village of origin, work type, and wage paid for monitoring social performance.	Preconstruction and throughout construction	Contractor, Supervising Engineer	None

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REF.	Impacts & Risks	Impact and Risk Enhancement and Mitigation Measures	Schedule of Implementation	Responsible Institution	Implementation Cost (USD)
		Establish a Grievance Redress Mechanism (GRM) where employment concerns (e.g., harassment, underpayment) can be reported and addressed promptly.	Preconstruction and throughout construction	Contractor, GRM Committee	500
6.2.2	**Negative Impacts During Pre-construction Phase**				
6.2.2.1	Community anxiety and speculative encroachment	Launch comprehensive public awareness campaigns to inform the community about the project's objectives, scope, and potential impacts;	Preconstruction	Contractor, RA, District Councils	2,000
		Conduct targeted community sensitization programs addressing the potential loss of assets and related compensations. This involves engaging with local communities to provide detailed information, address concerns, and create an open forum for dialogue between project stakeholders and residents; and	Preconstruction and throughout construction	Contractor, Resettlement Consultants, Local Leaders	3,000
		Integrate asset loss considerations into the Resettlement Action Plan to ensure a structured approach in addressing community concerns. Develop clear guidelines and protocols for asset valuation, compensation, and the overall resettlement process.	Preconstruction	Resettlement Consultant, Roads Authority	Cost included under RAP implementation
6.2.3	**Positive Impacts During Construction and Demobilization Phase**				
6.2.3.1	Creation of Employment	Inform local communities about employment opportunities and prioritise the hiring of local workers to maximise local employment and community benefits.	Construction Phase	Contractor; Supervision Consultant	2,000

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REF.	Impacts & Risks	Impact and Risk Enhancement and Mitigation Measures	Schedule of Implementation	Responsible Institution	Implementation Cost (USD)
		Engage local leaders and organisations in the recruitment process to achieve effective outreach and equitable access to job opportunities for community members.	Construction Phase	Contractor; Supervision Consultant	1,000
		Treat all employees in compliance with Malawi Labour Regulations and WB ESS 2 to uphold fair labour practices and protect workers' rights.	Construction Phase	Contractor; Supervision Consultant	None
		Develop and implement a Labour Management Plan, following the guidance in Annex 6, to: (a) Identify and implement a recruitment strategy that informs local communities about job opportunities and fosters a non-discriminatory and equal-opportunity recruitment process, promoting inclusivity and fairness in employment; and (b) include an accommodation strategy that guarantees any required housing is completed before workers arrive on-site, providing safe and adequate living conditions for the workforce.	Construction Phase	Contractor; Supervision Consultant	1,500
		Prepare a labour accommodation strategy for non-local workers to meet required standards and enhance worker well-being and compliance.	Construction Phase	Contractor; Supervision Consultant	Cost included above
		Pay all workers performing similar tasks equally, irrespective of gender or origin, to promote equity and prevent discrimination in the workplace	Construction Phase	Contractor; Supervision Consultant	None

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REF.	Impacts & Risks	Impact and Risk Enhancement and Mitigation Measures	Schedule of Implementation	Responsible Institution	Implementation Cost (USD)
		Mandate all workers to sign a code of conduct to uphold standards of behaviour and responsibility, ensuring a respectful and safe working environment.	Construction Phase	Contractor; Supervision Consultant	None
		Conduct sensitisation sessions for workers on the full range of risks (occupational health and safety, labour rights, public health, community safety, sexual harassment, and engagement risks) to heighten awareness and reduce the likelihood of incidents.	Construction Phase	Contractor; Supervision Consultant	1,000
		Provide equal opportunities for men and women during recruitment and actively enhance benefits for women and vulnerable groups to promote gender equality and social inclusion. Aim for at least 30% female representation in the workforce.	Construction Phase	Contractor; Supervision Consultant	None
		Develop and implement a regular and detailed labour monitoring schedule to uphold ongoing compliance with labour standards and promptly address any issues.	Construction Phase	Contractor; Supervision Consultant	None
		Provide monthly reports on the workforce profile, labour grievances, labour incidents, and workforce management activities and outcomes to maintain transparency, demonstrate accountability, and align with best practices in labour management	Construction Phase	Contractor; Supervision Consultant	None

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REF.	Impacts & Risks	Impact and Risk Enhancement and Mitigation Measures	Schedule of Implementation	Responsible Institution	Implementation Cost (USD)
6.2.3.2	Creation of New Opportunities for Local Businesses	Mandate the contractor to conduct a comprehensive supply chain review in accordance with the World Bank ESF to identify opportunities for local procurement and to ensure compliance with ethical and sustainable sourcing practices.	Construction Phase	Contractor; Supervision Consultant	2,000
		Develop a detailed procurement plan that outlines goods and services that can be sourced locally. The plan should be strictly adhered to and should include: (i) Environmentally friendly construction materials that comply with the laws of Malawi. (ii) Cement, paint, and other materials that are manufactured or processed in Malawi. (iii) Food items, groceries, and other related products that can be sourced from local markets to support local businesses.	Construction Phase	Contractor; Supervision Consultant	None
		Purchase all construction materials from Malawi Revenue Authority (MRA) registered suppliers and sourced only from approved, licensed, and tax-compliant vendors. Where it is not practical to get licensed suppliers (e.g., sand and gravel) the contractor must seek written permission from the District Council through the Environmental District Officer before extracting these resources.	Construction Phase	Contractor; Supervision Consultant	None
		Adhere to prompt payment terms for building materials and services, ensuring payments are made within the agreed timelines and contract conditions, to support their cash flow.	Construction Phase	Contractor; Supervision Consultant	None

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REF.	Impacts & Risks	Impact and Risk Enhancement and Mitigation Measures	Schedule of Implementation	Responsible Institution	Implementation Cost (USD)
6.2.3.3	Transfer of skills to local workers	Maximise the employment of local people, particularly focusing on the unskilled labour force, aiming for at least 30% female representation, to promote gender equality and community development.	Construction Phase	Contractor; Supervision Consultant	None
		Pair skilled and unskilled workers during various construction assignments to facilitate direct skills transfer and practical learning for unskilled labourers.	Construction Phase	Contractor; Supervision Consultant	None
		Formalise on-the-job training for local unskilled labourers by including comprehensive induction sessions, toolbox talks, structured learning activities, and performance monitoring within the Labour Management Plan, ensuring consistent skills development.	Construction Phase	Contractor; Supervision Consultant	1,000
		Coordinate with local partners to raise workers' awareness of employment and training opportunities with contractors, enhancing community engagement and access to these opportunities.	Construction Phase	Contractor; Supervision Consultant	1,000
6.2.4	**Negative Impacts During Construction and Demobilization Phase**				
6.2.4.1	Physical and Economic Displacement	Execute compensation in strict accordance with the Resettlement Action Plan (RAP) before commencing construction activities to ensure that Project-Affected Persons (PAPs) receive adequate, fair, and prompt compensation and resettlement support.	Construction Phase	Contractor; Supervision Consultant; SATCP	Budget included in the implementation of RAP

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REF.	Impacts & Risks	Impact and Risk Enhancement and Mitigation Measures	Schedule of Implementation	Responsible Institution	Implementation Cost (USD)
		Directly pay PAPs to guarantee transparency, fairness, and timely compensation delivery, thereby reducing the risk of disputes and delays.	Construction Phase	Contractor; Supervision Consultant; SATCP	Budget included in the implementation of RAP
		Construct and hand over new structures as per the agreements with PAPs.	Construction Phase	Contractor; Supervision Consultant; SATCP	Budget included in the implementation of RAP
		Proceed with relocation only when agreed-upon conditions are met	Construction Phase	Contractor; Supervision Consultant; SATCP	None
6.2.4.2	Disruption of Access to Properties and Social Services	Develop and implement a comprehensive traffic management plan following the guidelines provided in Annex 11 to ensure the safe and efficient traffic movement during construction.	Construction Phase	Contractor; Supervision Consultant; SATCP	1,000
		Communicate project activity schedules to PAPs well in advance to enable them to adjust their livelihood plans and minimise disruptions including the access to graveyard.	Construction Phase	Contractor; Supervision Consultant; SATCP	1,000
		Clear demarcation of the road reserve to prevent accidental encroachment during works to avoid affecting graveyard access.	Construction Phase	Contractor; Supervision Consultant; SATCP	1,000
		Traffic and access management plans to avoid blocking driveways, entrances, or access to the structures to avoid affecting graveyard access	Construction Phase	Contractor; Supervision Consultant; SATCP	1,000
		Establish responsive mechanisms to address the needs of PAPs, especially regarding impacted infrastructure such as schools, ensuring continuity of access and services.	Construction Phase	Contractor; Supervision Consultant; SATCP	1,000

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REF.	Impacts & Risks	Impact and Risk Enhancement and Mitigation Measures	Schedule of Implementation	Responsible Institution	Implementation Cost (USD)
		Identify and establish temporary alternative locations for market activities in all trading centres to minimise the disruption of local businesses during construction.	Construction Phase	Contractor; Supervision Consultant; SATCP	14,000
		Provide adequate alternative pathways to ensure continued accessibility and mobility during construction, as guided by Annex 18. Submit all traffic diversion plans to the relevant authority for approval before implementation to ensure compliance and safety.	Construction Phase	Contractor; Supervision Consultant; SATCP	2,000
		Consult with communities to plan and agree on the location of stockpiling areas and access routes during construction to minimise disruption and ensure community buy-in.	Construction Phase	Contractor; Supervision Consultant; SATCP	3,000
		Restore all existing community access routes upon completion of construction and provide convenient alternative routes during the construction period to maintain access to essential services and properties.	Construction Phase	Contractor; Supervision Consultant; SATCP	Budget included in works
6.2.4.3	Exposure to GBV such as 16+920 - 17+580, 1+260 - 3+000, 29+020 – 38+480 (refer to table 6-37).	Develop and enforce a Labour Management Plan with a clear Code of Conduct prohibiting GBV and ensuring gender sensitivity in all project operations (see Annex 9).	Construction Phase	Contractor; Supervision Consultant	3,000
		Institute a zero-tolerance policy towards all forms of GBV, with clear and public communication of expected behaviours.	Construction Phase	Contractor; Supervision Consultant	None

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REF.	Impacts & Risks	Impact and Risk Enhancement and Mitigation Measures	Schedule of Implementation	Responsible Institution	Implementation Cost (USD)
		Provide mandatory GBV training for all workers and project stakeholders to build awareness and responsiveness.	Construction Phase	Contractor; Supervision Consultant	2,000
		Establish community-based reporting and referral systems, linked with trained service providers and law enforcement.	Construction Phase	Contractor; Supervision Consultant	2,000
		Expand and operationalize the Grievance Redress Mechanism (GRM) to include gender-sensitive protocols and designated GBV focal points (see Annex 8).	Construction Phase	Contractor; Supervision Consultant	2,000
		Engage local CSOs and women's groups in ongoing sensitization and survivor support services.	Construction Phase	Contractor; Supervision Consultant	40,000
		Promote gender parity in employment, prioritizing female hiring and leadership in community liaison roles.	Construction Phase	Contractor; Supervision Consultant	None
6.2.4.4	Sexual Exploitation, Abuse, and Harassment (SEA/SH)	Implement strict code of conduct addressing SEA/SH and ensure all workers receive induction training (sample contractor code of conduct included in Annex 6).	Construction Phase	Contractor; Supervision Consultant	3,000
		Establish confidential and secure SEA/SH reporting channels with survivor-centred protocols.	Construction Phase	Contractor; Supervision Consultant	5,000
		Partner with local health centres and NGOs to provide access to counselling, medical care, and legal support.	Construction Phase	Contractor; Supervision Consultant	10,000 (partnership MoUs, referral costs)

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REF.	Impacts & Risks	Impact and Risk Enhancement and Mitigation Measures	Schedule of Implementation	Responsible Institution	Implementation Cost (USD)
		Enforce sanctions for SEA/SH perpetrators, ranging from dismissal to legal prosecution.	Construction Phase	Contractor; Supervision Consultant	None (policy enforcement)
		Implement camp management standards (lighting, security, access control) that reduce risk of abuse.	Construction Phase	Contractor; Supervision Consultant	20,000 (included in camp works)
		Use anonymous third-party monitoring to oversee SEA/SH prevention efforts and independently investigate complaints.	Construction Phase	Contractor; Supervision Consultant	15,000
6.2.4.5	Poor Labour Conditions and Rights Violations	Develop and implement a Labour Management Plan (LMP) that outlines labour rights, responsibilities, and contract obligations for all categories of workers (LMP Guidelines in Annex 9).	Construction Phase	Contractor; Supervision Consultant	5,000
		Issue all workers written contracts that clearly specify wages, roles, hours, grievance mechanisms, and rights to social protection.	Construction Phase	Contractor; Supervision Consultant	None (contractor compliance)
		Provide timely and transparent payment of wages, with documented payroll systems and routine compliance checks.	Construction Phase	Contractor; Supervision Consultant	None (contractor compliance)
		Establish and operationalize a Workers' Grievance Redress Mechanism (WGRM) accessible to all site workers, including anonymous reporting options.	Construction Phase	Contractor; Supervision Consultant	3,000
		Conduct regular labour audits to monitor compliance with labour standards and resolve emerging issues promptly.	Construction Phase	Contractor; Supervision Consultant	5,000

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REF.	Impacts & Risks	Impact and Risk Enhancement and Mitigation Measures	Schedule of Implementation	Responsible Institution	Implementation Cost (USD)
		Provide awareness training for workers and supervisors on fair treatment, occupational rights, and protection from abuse or discrimination.	Construction Phase	Contractor; Supervision Consultant	4,000
6.2.4.6	Occupational health and safety risks	Provide comprehensive training in safety, health, social, and environmental procedures to all construction workers, and extend relevant training to local villagers where appropriate. Supply personal protective equipment (PPE) to all workers free of charge, and ensure proper training, supervision, and enforcement of its use. Regularly monitor PPE usage through audits and inspections.	Construction Phase	Contractor; Supervision Consultant	10,000
		Develop and implement a detailed Health and Safety Management Plan, that includes emergency preparedness and response based on guidance provided in Annex 20. This plan should also cover the safe use and maintenance of machinery and equipment, including vehicles fitted with seatbelts for all passengers.	Construction Phase	Contractor; Supervision Consultant	5,000
		Employ and train sufficient health and safety officers and first aiders to ensure swift responses to any incidents and monitor on-site health and safety practices and working conditions through regular observation, worker interviews, document reviews, and discussions with worker representatives.	Construction Phase	Contractor; Supervision Consultant	24,000

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REF.	Impacts & Risks	Impact and Risk Enhancement and Mitigation Measures	Schedule of Implementation	Responsible Institution	Implementation Cost (USD)
		Install and maintain first aid kits and medical facilities at each project site, ensuring they are proportionate to the site's size and workforce. Obtain medical insurance for all workers to cover any health issues or injuries sustained on the job, and compensate injured workers per the Workers' Compensation Act of 2000.	Construction Phase	Contractor; Supervision Consultant	20,000
		Develop and enforce a comprehensive campsite and storage site plan, as guided by Annex 19, to ensure safety, operational efficiency, and secure living conditions, including clean canteens and cooking areas and adequate living space.	Construction Phase	Contractor; Supervision Consultant	5,000
		Provide security at campsites and all satellite camps following a security risk assessment and following a security management plan. Ensure that security personnel adhere to IFC requirements and receive training in the use of force. All security staff will be unarmed.	Construction Phase	Contractor; Supervision Consultant	10,000
		Establish and communicate flexible working hours, including rest breaks, rotational work practices, and scheduling heavy tasks during suitable weather and temperatures, to reduce the risk of heat-related illnesses. Clearly outline these practices in employment contracts and site management procedures.	Construction Phase	Contractor; Supervision Consultant	3,000

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REF.	Impacts & Risks	Impact and Risk Enhancement and Mitigation Measures	Schedule of Implementation	Responsible Institution	Implementation Cost (USD)
		Provide adequate quantities of clean drinking water, ablution facilities, and satisfactory welfare facilities, such as shaded areas for resting and eating, in line with international standards. Ensure these facilities are accessible to all workers, including those with disabilities, and are provided on-site for both women and men.	Construction Phase	Contractor; Supervision Consultant	10,000
		Ensure safe passage at the construction site to facilitate the unobstructed movement of nearby residents and implement auxiliary safety measures for the public in the vicinity of the project site, including advance notice of work commencement, installing safety barriers, and using safety signs to mark work areas.	Construction Phase	Contractor; Supervision Consultant	3,000
		Prohibit fuelling and vehicle maintenance near wetlands and construction sites to prevent environmental contamination.	Construction Phase	Contractor; Supervision Consultant	None
		Report regularly on workforce profiles, labour grievances, labour incidents, and workforce management activities, and adhering to government requirements and international best practices.	Construction Phase	Contractor; Supervision Consultant	3,000
		Provide a campsite clinic to treat workers, at minimum, qualified medical personnel (a clinical officer, land technician and a nurse).	Construction Phase	Contractor; Supervision Consultant	Provided under works within Minimum costs of at least 300,000

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REF.	Impacts & Risks	Impact and Risk Enhancement and Mitigation Measures	Schedule of Implementation	Responsible Institution	Implementation Cost (USD)
6.2.4.7	Risk of Child and Forced Labour	Enforce a zero-tolerance policy on child and forced labour, clearly articulated in the project's Labour Management Plan (LMP) and Code of Conduct.	Construction Phase	Contractor; Supervision Consultant	None
		Mandate all contractors and subcontractors to screen and verify the age and identity of all workers through national Identify Card before recruitment.	Construction Phase	Contractor; Supervision Consultant	5,000
		Conduct periodic audits and inspections to detect any cases of underage or coerced labour.	Construction Phase	Contractor; Supervision Consultant	10,000
		Raise awareness among workers and community members about the prohibited nature of child and forced labour, their rights, and available grievance redress mechanisms.	Construction Phase	Contractor; Supervision Consultant	3,000
		Integrate clauses on child and forced labour prohibition in all contracts with service providers and suppliers.	Construction Phase	Contractor; Supervision Consultant	None
		Strengthen the Workers' Grievance Redress Mechanism (WGRM) to allow anonymous reporting of abuse or coercion, with guaranteed protection for whistleblowers.	Construction Phase	Contractor; Supervision Consultant	3,000
6.2.4.8	Risk of Discrimination and Unequal Treatment	Prioritise employment opportunities for women and individuals with disabilities, ensuring inclusivity and diversity in the workforce.	Construction Phase	Contractor; Supervision Consultant	None
		Offer flexible working hours to accommodate the childcare needs of breastfeeding women, thereby supporting their participation in the workforce.	Construction Phase	Contractor; Supervision Consultant	None

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REF.	Impacts & Risks	Impact and Risk Enhancement and Mitigation Measures	Schedule of Implementation	Responsible Institution	Implementation Cost (USD)
		Make deliberate efforts to employ women by conducting a comprehensive skills analysis of female candidates before recruitment begins, ensuring their capabilities are fully recognised and utilised.	Construction Phase	Contractor; Supervision Consultant	None
		Encourage the recruitment of female workers for roles equivalent to those of male workers and guarantee equal pay for equal work, regardless of gender.	Construction Phase	Contractor; Supervision Consultant	None
		Provide essential amenities at all campsites, including shops, medical clinics, and leisure facilities, to reduce the need for workers to leave the site, thereby minimising their interaction with the local community.	Construction Phase	Contractor; Supervision Consultant	Specified above
		Strategically locate campsites away from villages to limit the interaction between workers and the community, reducing the potential for harassment and other negative impacts.	Construction Phase	Contractor; Supervision Consultant	None
		Implement and rigorously monitor a Grievance Redress Mechanism (GRM) with clear and accessible channels for reporting and investigating incidents of workplace harassment, ensuring that complaints are handled promptly and fairly.	Construction Phase	Contractor; Supervision Consultant	10,000
6.2.4.9	Social Disruption and Risk of conflicts between	Establish labour camps before mobilizing workers to construction sites to ensure orderly accommodation and reduce conflicts.	Construction Phase	Contractor; Supervision Consultant	Included under works budget

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REF.	Impacts & Risks	Impact and Risk Enhancement and Mitigation Measures	Schedule of Implementation	Responsible Institution	Implementation Cost (USD)
	contractor workers and community people	Locate camps at least 500 metres away from settlements, water bodies, and sensitive receptors, in consultation with local communities, to minimize social disruption.	Construction Phase	Contractor; Supervision Consultant	Included under works budget
		Provide orientation and induction to all labourers, with emphasis on the Code of Conduct and sensitization to local cultural and social norms.	Construction Phase	Contractor; Supervision Consultant	Specified above
		Maintain detailed records of all labourers, including personal information such as addresses, identity cards, and age verification, to ensure proper documentation and accountability, and ensure protection of such data in accordance with national personal data protection law.	Construction Phase	Contractor; Supervision Consultant	None
		Implement measures to monitor and control workers' activities outside the work site to minimize the potential for conflict with local communities.	Construction Phase	Contractor; Supervision Consultant	1,000
		Appoint a liaison officer to act as the point of contact between the contractor, local communities, and elders, facilitating regular communication and dispute resolution.	Construction Phase	Contractor; Supervision Consultant	None
		Install safety signage and security infrastructure at site offices and work yards to prevent unauthorized entry, especially by children.	Construction Phase	Contractor; Supervision Consultant	Budgeted under OHS
		Record all visitors and enforce strict access control measures to enhance site security and prevent unauthorized access to work areas.	Construction Phase	Contractor; Supervision Consultant	None

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REF.	Impacts & Risks	Impact and Risk Enhancement and Mitigation Measures	Schedule of Implementation	Responsible Institution	Implementation Cost (USD)
		Prioritize the hiring and capacity-building of local workers to strengthen community relationships and reduce conflict risk.	Construction Phase	Contractor; Supervision Consultant	None
		Establish in-house stores and a tuck-shop within the labour camp to supply daily necessities and reduce pressure on local markets and resources.	Construction Phase	Contractor; Supervision Consultant	Included under works budget
		Comply fully with the siting, management, and development guidelines provided in Annex 9, Annex 19, and Annex 24 for construction and labour camps.	Construction Phase	Contractor; Supervision Consultant	None
		Engage local unskilled and skilled labourers wherever feasible to promote integration and minimize community tensions.	Construction Phase	Contractor; Supervision Consultant	None
		Accommodate non-local workers in contractor-managed camps to reduce their impact on the local housing market.	Construction Phase	Contractor; Supervision Consultant	3,000
		Discourage the provision of housing allowances by promoting the use of designated worker camps or personal lodging to avoid competition for local housing.	Construction Phase	Contractor; Supervision Consultant	None
6.2.4.10	Air Quality Deterioration	Acquire and deploy equipment to monitor air quality throughout the construction phase to track pollutant levels and ensure compliance with air quality standards.	Construction Phase	Contractor; Supervision Consultant	20,000
		Regularly sprinkle water during the construction phase, particularly during dry and windy periods, to suppress dust and mitigate its dispersion into the surrounding environment.	Construction Phase	Contractor; Supervision Consultant	50,000

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REF.	Impacts & Risks	Impact and Risk Enhancement and Mitigation Measures	Schedule of Implementation	Responsible Institution	Implementation Cost (USD)
		Set and enforce moderate speed limits at construction sites and in passing areas such as trading centres, schools, and villages to minimise dust generation and reduce noise.	Construction Phase	Contractor; Supervision Consultant	3,000
		Develop and implement an Air Emissions Management Plan, as outlined in Annex 22, to manage and mitigate air quality impacts during construction.	Construction Phase	Contractor; Supervision Consultant	3,000
		Transport particulate or powdery construction materials with adequate load covering to prevent the dispersion of particulate matter, and avoid overloading transport vehicles to minimise emissions.	Construction Phase	Contractor; Supervision Consultant	20,000
		Use drop-height regulation equipment when unloading powdery materials to maintain the lowest possible drop-height, reducing dust emissions during these operations.	Construction Phase	Contractor; Supervision Consultant	None
		Implement measures to reduce greenhouse gas (GHG) emissions and provide additional strategies for enhancing carbon sinks.	Construction Phase	Contractor; Supervision Consultant	None
		Locate concrete production facilities and raw material storage areas as far away from human settlements as possible to minimise the impact of emissions on local communities.	Construction Phase	Contractor; Supervision Consultant	None
		Install pollution control equipment at batching plants and hot-mix plants, ensuring that these plants are not operated if the pollution control equipment is non-functional.	Construction Phase	Contractor; Supervision Consultant	10,000

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REF.	Impacts & Risks	Impact and Risk Enhancement and Mitigation Measures	Schedule of Implementation	Responsible Institution	Implementation Cost (USD)
		Carry out necessary repairs, maintenance, and regular inspections of all machinery and vehicles used in construction, ensuring they are in good working order to mitigate gaseous emissions and noise, and reduce the risk of accidental spills.	Construction Phase	Contractor; Supervision Consultant	None
6.2.4.11	Noise Pollution	Restrict construction activities to daytime hours (07:00 – 17:00) when working near populated areas, and apply the same restriction to moving heavy construction vehicles and machinery. If construction must extend beyond these hours, inform local authorities and the affected population in advance.	Construction Phase	Contractor; Supervision Consultant	None
		Conduct regular maintenance of machinery, equipment, and vehicles to minimise noise levels, ensuring that all machinery adheres to a set maintenance schedule as specified by the contractor.	Construction Phase	Contractor; Supervision Consultant	None
		Develop and implement a Noise and Vibration Control Management Plan, following the guidelines in Annex 21, to mitigate noise impacts throughout the construction process.	Construction Phase	Contractor; Supervision Consultant	3,000
		Deploy equipment to monitor noise levels, particularly at sensitive receptors such as schools, health centres, and churches, ensuring that noise levels remain within acceptable limits.	Construction Phase	Contractor; Supervision Consultant	5,000

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REF.	Impacts & Risks	Impact and Risk Enhancement and Mitigation Measures	Schedule of Implementation	Responsible Institution	Implementation Cost (USD)
		Provide appropriate personal protective equipment (PPE), such as earplugs, earmuffs, or ear defenders, to workers exposed to high noise levels to protect their hearing.	Construction Phase	Contractor; Supervision Consultant	30,000
6.2.4.12	Soil and Land Degradation	Remove and safely store the fertile topsoil layer before beginning excavation and earthworks, and ensure that stockpiles are located outside drainage lines and protected to prevent erosion. Follow the guidance provided in Annex 11.	Construction Phase	Contractor; Supervision Consultant	15,000
		Implement and adhere to mitigation and enhancement measures outlined in the ESMP and further specified in the C-ESMP, particularly regarding the management of batch plants, bulk material storage, quarries, borrow sites, and equipment maintenance areas.	Construction Phase	Contractor; Supervision Consultant	3,000
		Avoid significant earthworks during periods of high precipitation to prevent soil erosion due to run-off. Take proper precautions to ensure slope and trench stability and prevent landslides.	Construction Phase	Contractor; Supervision Consultant	None
		Install erosion and run-off control barriers along excavation and embankment areas, using silt fences or check dams to manage soil movement.	Construction Phase	Contractor; Supervision Consultant	15,000
		Redistribute collected soil to the areas most affected by construction activities to aid in site rehabilitation and prevent long-term soil degradation.	Construction Phase	Contractor; Supervision Consultant	None

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REF.	Impacts & Risks	Impact and Risk Enhancement and Mitigation Measures	Schedule of Implementation	Responsible Institution	Implementation Cost (USD)
		Restrict the movement of heavy machinery to designated areas to minimise soil compaction and avoid damage to privately owned land.	Construction Phase	Contractor; Supervision Consultant	None
		Minimise vegetation clearance and follow an approved method statement to protect the local environment and reduce the risk of soil erosion.	Construction Phase	Contractor; Supervision Consultant	None
		Continuously monitor embankments during construction for signs of erosion, and take immediate action to address any issues.	Construction Phase	Contractor; Supervision Consultant	3,000
		Confine heavy equipment operations within the road reserve wherever possible to avoid unnecessary soil compaction and damage to private land. If private lands must be disturbed, promptly inform the owner and agree on remedial actions in line with national laws.	Construction Phase	Contractor; Supervision Consultant	None
		Construct designated, signposted wash bays at each campsite, ensuring they are fully contained and regularly maintained, with treated water released to natural water bodies.	Construction Phase	Contractor; Supervision Consultant	10,000
		Rehabilitate compacted sites by ripping, levelling, and re-vegetating disturbed areas, restoring them to a stable and sustainable condition.	Construction Phase	Contractor; Supervision Consultant	Included under works
		Reuse excavation products for backfilling used borrow pits, planting native vegetation on top to stabilise the soil. If excess material remains, store it in suitable alternative deposit sites.	Construction Phase	Contractor; Supervision Consultant	None

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REF.	Impacts & Risks	Impact and Risk Enhancement and Mitigation Measures	Schedule of Implementation	Responsible Institution	Implementation Cost (USD)
		Remove and safely store the fertile topsoil layer before beginning excavation and earthworks, and ensure that stockpiles are located outside drainage lines and protected to prevent erosion. Follow the guidance provided in Annex 11.	Construction Phase	Contractor; Supervision Consultant	5,000
		Follow specific guidelines when collecting borrowed soil, ensuring that the soil is sourced from nearby locations to minimise transportation impacts, and that it is not sourced from riverbeds, flood-prone areas, protected sites, agricultural land, or sites near urban, touristic, or culturally sensitive areas.	Construction Phase	Contractor; Supervision Consultant	None
6.2.4.13	Increased Risk of Slope Failure Leading to Siltation such as 9+840 - 11+720 15+700 – 16+700 (refer to table 6-37).	To prevent slope destabilisation and reduce the risk of landslides, clearance, cutting, and excavation activities beyond the proposed toe line should be prohibited.	Construction Phase	Contractor	None
		Remove and properly stockpile topsoil and low-quality materials near the site, ensuring they are adequately covered to prevent erosion and degradation.	Construction Phase	Contractor	None
		Prevent the accumulation of stagnant water during quarry and borrow site operations, as standing water can contribute to slope instability and erosion.	Construction Phase	Contractor	None
		To protect water quality and aquatic habitats from sedimentation and pollution, quarrying activities must be strictly prohibited within 500 metres of rivers and streams.	Construction Phase	Contractor	None

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REF.	Impacts & Risks	Impact and Risk Enhancement and Mitigation Measures	Schedule of Implementation	Responsible Institution	Implementation Cost (USD)
		Under no circumstances should spoil be dumped into watercourses, including rivers, streams, drainage areas, wetlands, or marshy areas, to prevent contamination and ecological disruption.	Construction Phase	Contractor	None
		To avoid further environmental and social harm, spoil should not be disposed of on fragile slopes, floodway's, wetlands, farmlands, forests, religious sites, culturally sensitive areas, or areas critical for local livelihoods.	Construction Phase	Contractor	None
		Locate spoil disposal sites at least 50 metres away from any surface watercourses and protect them from erosion by grassing and avoiding the creation of steep slopes (see Guidelines in Annex 23).	Construction Phase	Contractor	None
6.2.4.14	Increased Risk of River and Embankment Erosion	Protect embankments with riprap, gabion mattresses, or revetments at river crossing points.	Construction Phase	Contractor	15,000
		Install energy dissipators (e.g., plunge pools or stilling basins) at culvert outlets to reduce scouring.	Construction Phase	Contractor	10,000
		Design culverts and bridges using hydrological modelling to accommodate peak flood discharge.	Construction Phase	Contractor	None
		Plant native grasses on embankment slopes to reduce erosion.	Construction Phase	Contractor	20,000

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REF.	Impacts & Risks	Impact and Risk Enhancement and Mitigation Measures	Schedule of Implementation	Responsible Institution	Implementation Cost (USD)
		Regularly desilt and maintain drainage structures (culverts and side drains) to ensure free flow of water.	Construction Phase	Contractor	None
		Provide cutoff walls or wing walls on bridge abutments to prevent undermining.	Construction Phase	Contractor	Inlcuded in works
6.2.4.15	Water Quality Degradation such as chainnage 0+100, 29+020 – 38+480, 46+640 – 47+240 (refer to table 6-37)	Locate temporary facilities (construction campsites, general storage areas, fuel storage areas) at least 50 m away from wells, water sources and boreholes. Fuelling, washing, or maintenance of machinery will not occur near drains or watercourses.	Construction Phase	Contractor; Supervision Consultant	None
		Develop and implement a Waste Management Plan, considering all waste likely to be produced during construction, including identification, classification, and proper disposal.	Construction Phase	Contractor; Supervision Consultant	3,000
		Monitor water abstraction points (upstream, at the abstraction point, and downstream) to ensure water quality parameters are within acceptable ranges.	Construction Phase	Contractor; Supervision Consultant	10,000
		Ensure correct temporary storage of produced wastes, according to their type and local laws, preventing runoff/spills from reaching water bodies.	Construction Phase	Contractor; Supervision Consultant	3,000
		Provide proper sheltered storage facilities for hazardous substances, equipped with safety and spillage control measures.	Construction Phase	Contractor; Supervision Consultant	15,000

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REF.	Impacts & Risks	Impact and Risk Enhancement and Mitigation Measures	Schedule of Implementation	Responsible Institution	Implementation Cost (USD)
		Store used oils, lubricants, fuels, paints, glues, resins, and other hazardous substances in sealed containers for proper final disposal.	Construction Phase	Contractor; Supervision Consultant	None
		Promptly collect all chemical spills using appropriate absorbent products and store them for proper disposal.	Construction Phase	Contractor; Supervision Consultant	5,000
		Ensure adequate collection and storage/treatment facilities for domestic wastewater from construction yards, using septic tanks or properly sealed latrines.	Construction Phase	Contractor; Supervision Consultant	3,000
		Develop and implement a stormwater and water management plan (Guidelines in Annex 12).	Construction Phase	Contractor; Supervision Consultant	3,000
		Restrict clearance of vegetation, excavations, and soil compaction to approved sites only.	Construction Phase	Contractor; Supervision Consultant	3,000
		Obtain appropriate permits for any water abstraction requirements and comply with all regulatory standards.	Construction Phase	Contractor; Supervision Consultant	500
6.2.4.16	Disruption of Riparian Ecosystem such as 29+020 – 38+480, 46+640 – 47+240 and including all rivers and streams crossings (refer to table 6-37).	Schedule construction works in riparian areas during the dry season (June to November) to avoid the most critical periods for local fauna.	Construction Phase	Contractor; Supervision Consultant	None
		Apply erosion control techniques, such as silt fences and sedimentation basins, to prevent sediment from entering riparian zones during and after construction (see Guidelines in Annex 14).	Construction Phase	Contractor; Supervision Consultant	Included above
		Increase the span of riparian sections to maintain the ecological functions of the wetlands and avoid disrupting their services.	Construction Phase	Contractor; Supervision Consultant	2,000

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REF.	Impacts & Risks	Impact and Risk Enhancement and Mitigation Measures	Schedule of Implementation	Responsible Institution	Implementation Cost (USD)
		Ensure the maintenance of environmental flow (e-flow) at all riparian zone crossings during the construction phase to sustain the wetlands' natural functions.	Construction Phase	Contractor; Supervision Consultant	None
		Implement stormwater management systems that capture and treat road runoff before it enters riparian areas, reducing the risk of water contamination.	Construction Phase	Contractor; Supervision Consultant	Included above
		Adopt best management practices to prevent pollution from construction activities and road use, including proper waste disposal and minimising the use of harmful chemicals.	Construction Phase	Contractor; Supervision Consultant	None
6.2.4.17	Increased Risk of Accidents due to Change in Traffic Flow such as chainnage 0+100, 1+260 - 3+000, 9+840 - 11+720, 16+920 - 17+580, 18+140 – 22+700, 29+020 – 38+480, 43+400 – 43+920 46+640 – 47+240 (Refer to table 6-37)	Develop and implement a traffic management plan, as guided by Annex 5, to manage traffic disruptions and enhance safety.	Construction Phase	Contractor; Supervision Consultant	5,000
		Enforce compliance with safety and signalling standards on public roads, provision of signage and crossing pedestrian points, prioritising the safety of the local population and minimising disruptions to their daily activities.	Construction Phase	Contractor; Supervision Consultant	None
		Implement pedestrian safety management strategies, including the provision of safe corridors, side roads, and bridges, to protect pedestrians and livestock from traffic hazards.	Construction Phase	Contractor; Supervision Consultant	None
		Install barriers, such as guardrails and fencing, to prevent unauthorised pedestrian and livestock access to the roadway, except at designated crossing points.	Construction Phase	Contractor; Supervision Consultant	Included in works budget

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REF.	Impacts & Risks	Impact and Risk Enhancement and Mitigation Measures	Schedule of Implementation	Responsible Institution	Implementation Cost (USD)
		Secure and signal houses near the construction site that do not require resettlement to prevent accidental damage or injury.	Construction Phase	Contractor; Supervision Consultant	10,000
		Conduct regular road safety awareness and sensitisation programmes targeting pedestrians, motorcycle operators, and small vehicle drivers.	Construction Phase	Contractor; Supervision Consultant	10,000
		Install speed calming structures at strategic locations, including trading centres, villages, schools, hospitals, and public service areas, to reduce vehicle speeds and enhance safety.	Construction Phase	Contractor; Supervision Consultant	Included in works program
		Develop and implement a traffic circulation plan for construction sites to minimise the passage through densely populated areas and near sensitive receptors, such as schools and trading centres.	Construction Phase	Contractor; Supervision Consultant	Included in works program
		Prepare an emergency preparedness and response plan, as guided by Annex 18, in coordination with the local community and emergency responders, to provide timely first aid and hazardous materials response in the event of accidents.	Construction Phase	Contractor; Supervision Consultant	3,000
		Conduct a dedicated road safety programme for schools with tailored messages for students and staff.	Construction Phase	Roads Authority, Ministry of Education (District Education Offices)	15,000
6.2.4.18	Increased Risk of Sexually Transmitted Infections and	Develop an HIV and AIDS prevention and management plan, following the guidance provided in Annex 16, to address the risks associated with STIs and HIV and AIDS.	Construction Phase	Contractor; Supervision Consultant	15,000

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REF.	Impacts & Risks	Impact and Risk Enhancement and Mitigation Measures	Schedule of Implementation	Responsible Institution	Implementation Cost (USD)
	other Communicable Diseases	Prioritise the recruitment of local workers to reduce the influx of non-local workers and increase income for local families.	Construction Phase	Contractor; Supervision Consultant	None
		Conduct regular health awareness campaigns for workers and the local population to educate them on disease transmission, prevention and treatment, in line with Malawi's HIV and AIDS prevention programme.	Construction Phase	Contractor; Supervision Consultant	10,000
		Distribute condoms regularly to minimise the risk of spreading STIs, and HIV and AIDS.	Construction Phase	Contractor; Supervision Consultant	10,000
		Establish a campsite clinic and arrange with local health service provider to offer regular Voluntary Counselling and Testing (VCT) services.	Construction Phase	Contractor; Supervision Consultant	Budgted above
		Conduct frequent sensitisation/toolbox talks for workers on money management, encouraging them to invest in their families rather than spending on alcohol, gambling, or sex workers.	Construction Phase	Contractor; Supervision Consultant	3,000
		Eliminate pools of stagnant water created by construction activities to control mosquito proliferation and prevent insect-borne diseases such as malaria.	Construction Phase	Contractor; Supervision Consultant	5,000
6.2.4.19	Introduction and Spread of Invasive Alien Species (IAS)	Develop an invasive plant removal and management plan using the guidance provided in the Biodiversity Management Plan (BMP) Guidleines in Annex 15, to control and eliminate IAS.	Construction Phase	Contractor; Supervision Consultant	5,000

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REF.	Impacts & Risks	Impact and Risk Enhancement and Mitigation Measures	Schedule of Implementation	Responsible Institution	Implementation Cost (USD)
		Avoid transporting materials that may contain foreign seeds into the project area to prevent the introduction of new invasive species,	Construction Phase	Contractor; Supervision Consultant	None
		Remove all invasive species mechanically within the project area to prevent their spread.	Construction Phase	Contractor; Supervision Consultant	2,000
		Monitor construction areas and adjacent wetlands for invasive species and implement management plans to control or eradicate them before they become established.	Construction Phase	Contractor; Supervision Consultant	3,000
6.2.4.20	Loss of Trees such as 15+700 – 16+700, 9+840 - 11+720 (refer to table 6-37).	Carried out selective tree-cutting in necessary areas, avoiding unnecessary removal at locations such as campsites or borrow pit areas.	Construction Phase	Contractor; Supervision Consultant	None
		Develop and implement a biodiversity management and restoration plan guided by Annex 15 to mitigate the impact on local flora and fauna.	Construction Phase	Contractor; Supervision Consultant	3,000
		Replant trees at a rate of ten saplings for every tree cut under an afforestation plan to restore ecological balance.	Construction Phase	Contractor; Supervision Consultant	150,000
		Prohibit the purchase of firewood or charcoal from unlicensed suppliers to discourage illegal logging and charcoal production, and protect local forests.	Construction Phase	Contractor; Supervision Consultant	3,000
		Utilise renewable energy sources for cooking at campsites to reduce reliance on firewood.	Construction Phase	Contractor; Supervision Consultant	Included under works budget
		Provide packed meals to workers at all construction sites to minimise the demand for	Construction Phase	Contractor; Supervision Consultant	Included under works budget

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REF.	Impacts & Risks	Impact and Risk Enhancement and Mitigation Measures	Schedule of Implementation	Responsible Institution	Implementation Cost (USD)
		firewood and reduce pressure on local resources.			
6.2.4.21	Risk of Disturbance of Chance Finds	Implement and operationalize a Chance Find Procedure, in compliance with the Monuments and Relics Act and ESS8, covering discovery protocols, reporting, site protection, and expert consultation (See Procedure in Annex 22).	Construction Phase	Contractor	3,000
		Train all site workers and supervisors on how to recognize and respond to potential archaeological finds.	Construction Phase	Contractor	5,000
		Secure and isolate any chance find location immediately, stopping work until the Department of Antiquities provides clearance.	Construction Phase	Contractor	3,000
		Engage a qualified archaeologist or cultural heritage expert to assess any find and recommend appropriate action.	Construction Phase	Contractor	5,000
		Budget for contingency actions, including investigation, documentation, or respectful relocation of cultural materials.	Construction Phase	Contractor	None
6.2.4.22	Disruption of utilities and social services (e.g. water and electricity supply, social services like markets, clinics etc)	Conduct a detailed mapping and inventory of existing utilities and social services prior to construction (detailed in the RAP report)	Construction Phase	Contractor	Included in the RAP
		Engage with service providers (e.g. ESCOM, water boards, telecom companies) to coordinate and plan utility relocation or protection.	Construction Phase	Contractor	Included in the RAP
		Develop and implement a Utility Relocation and Management Plan under the RAP.	Construction Phase	Contractor	None

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REF.	Impacts & Risks	Impact and Risk Enhancement and Mitigation Measures	Schedule of Implementation	Responsible Institution	Implementation Cost (USD)
		Notify communities and service users in advance of any planned disruptions (at least 7 days' notice).	Construction Phase	Contractor	None
		Install and provide temporary service alternatives where possible (e.g., water tanks, backup generators, temporary market stalls).	Construction Phase	Contractor	None
		Carry out continuous access to critical services, especially clinics and schools, by planning appropriate detours and signage.	Construction Phase	Contractor	500
		Assign a Grievance Redress Mechanism (GRM) to handle complaints related to service disruptions promptly.	Construction Phase	Contractor	2,000
		Provide alternative sites for marketing activities prior to works close to the market in liaison with the district and city councils in all identified markets along the corridor.	Construction Phase	Contractor; District/City Councils	10,000
		Include utility protection clauses in contractor contracts, with penalties for negligence.	Construction Phase	RA	None
		Rehabilitate affected infrastructure promptly and to pre-project standards or better.	Construction Phase	Contractor	Included in the works contract
		Provide a fully approved clinic at the camp sites to handle cases related to construction works in order to reduce pressure on existing government health facilities.	Construction Phase	Contractor	To be costed under the bill of quantities (at least 300,000)
6.2.4.23	Impacts on Fauna (Disturbance, Habitat Loss, and	Restrict vegetation clearance to the approved road reserve and avoid unnecessary disturbance to riparian habitats.	Construction Phase	Contractor	None (compliance measure)

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REF.	Impacts & Risks	Impact and Risk Enhancement and Mitigation Measures	Schedule of Implementation	Responsible Institution	Implementation Cost (USD)
	Poaching Pressure)	Enforce a "no hunting/no bushmeat" policy through the Contractor's Code of Conduct, with penalties for violations.	Construction Phase	Contractor	None (contractual compliance)
		Conduct worker sensitisation campaigns on biodiversity conservation and wildlife laws.	Construction Phase	Contractor	3,000
		Implement tree replanting and greening programs with native species to restore roadside habitats.	Construction Phase	Contractor	50,000 (included under works budget – afforestation program)
		Schedule noisy activities (blasting, heavy machinery) during daylight hours only, to minimise wildlife disturbance.	Construction Phase	Contractor	None (management measure)
		Collaborate with the Department of Forestry and Department of National Parks and Wildlife (DNPW) to monitor and respond to any reported poaching incidents.	Construction Phase	Contractor; Forestry; DNPW	5,000 (support for joint monitoring activities)
6.2.5	**Positive Impacts During Operation Phase**				
6.2.5.1	Improved Mobility and Access to Social Services	Maintain road quality through routine and periodic maintenance activities.	Operation Phase	Contractor's Safeguards Officer; RA	Included in RA Ops budget
		Facilitate integration with local and regional public transportation systems such as the Nacala Corridor.	Operation Phase	RA; Ministry of Transport	3,000
		Construct and maintain access roads or footpaths linking communities to main road.	Operation Phase	Contractor's Safeguards Officer; RA; Local Councils	3,000

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REF.	Impacts & Risks	Impact and Risk Enhancement and Mitigation Measures	Schedule of Implementation	Responsible Institution	Implementation Cost (USD)
		Raise awareness among community members about safe and reliable transport services.	Operation Phase	RA; Local Councils; Ministry of Information	2,500
6.2.5.2	Stimulation of Local and Regional Economies	Develop roadside market infrastructure and promote small business incubation near trading centres.	Operation Phase	RA; Ministry of Trade; Local Councils	3,000
		Support local councils in developing market zoning and road setback enforcement.	Operation Phase	RA; Local Councils	2,500
		Facilitate access to finance and training for small traders and transport operators.	Operation Phase	RA; Ministry of Trade; Microfinance Institutions	2,500
		Encourage value-addition activities by linking farmers to processing facilities and organized markets.	Operation Phase	RA; Ministry of Agriculture	2,500
6.2.5.3	Enhanced Road Safety and Reduced Accidents	Install and maintain road signage, speed bumps, and guardrails in trading centres and near schools.	Operation Phase	Contractor's Safeguards Officer; RA; Supervision Consultant	2,500
		Conduct road safety awareness campaigns for drivers, cyclists, and pedestrians.	Operation Phase	RA; Ministry of Transport	2,000
		Collaborate with traffic enforcement agencies to ensure compliance with speed limits and road use regulations.	Operation Phase	RA; Traffic Police	2,000
		Monitor road safety performance through traffic incident reporting systems and stakeholder feedback.	Operation Phase	RA; Local Councils	2,500
6.2.6	**Negative Impacts During Operation Phase**				

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REF.	Impacts & Risks	Impact and Risk Enhancement and Mitigation Measures	Schedule of Implementation	Responsible Institution	Implementation Cost (USD)
6.2.6.1	Air Pollution Resulting in Climate Change-Related Impacts.	Plant trees of various species within the project areas and within the road corridor, at the extent of the Right of Way, at ten metres from each other on either side of the road.	Operation Phase	Roads Authority	3,000
		Encourage communities traversed by the road to replant trees in their areas in collaboration with local and national authorities.	Operation Phase	Roads Authority	2,000
		Enforce vehicle fitness tests are done at annual intervals for all vehicles using the road, and based on a certificate of fitness, only fit vehicles will be allowed to operate on the road and operationalize the weighbridge to be constructed under SATCP to control the load of vehicles.	Operation Phase	Roads Authority	None
		Follow occupational hygienic practices throughout the Project life cycle of the Road.	Operation Phase	Roads Authority	None
6.2.6.2	Increased risk of traffic-related accidents.	Provide proper road signs and warnings.	Operation Phase	Roads Authority; Road Traffic Directorate	2,000
		Provide service roads, junctions, and safe passages at appropriate locations to ensure safe and efficient access.	Operation Phase	Roads Authority; Road Traffic Directorate	2,000
		Provide suitable truck parking places.	Operation Phase	Roads Authority; Road Traffic Directorate	2,000
6.2.6.3	Noise Pollution and Excessive Vibrations	Enforcement of Traffic Act regulations to ensure that all vehicles using the road are in good condition all the time to avoid excessive noise generation.	Operation Phase	Roads Authority	3,000

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REF.	Impacts & Risks	Impact and Risk Enhancement and Mitigation Measures	Schedule of Implementation	Responsible Institution	Implementation Cost (USD)
		Install speed control measures such as bumps and rumble strips in the villages and towns where the road traverses.	Operation Phase	Roads Authority	3,000
		Install no hooting signs in sensitive areas such as near hospitals, schools, churches, mosques etc	Operation Phase	Roads Authority	3,000
6.2.6.4	Inadequate Stormwater Drainage and Flooding of Road Shoulders	Establish a routine road and drainage maintenance programme post-construction.	Operation Phase	Roads Authority	1,000
		Train district council staff and communities on identifying and reporting blocked drains or culverts.	Operation Phase	Roads Authority	2,000
		Include budget provisions for emergency de-silting and maintenance.	Operation Phase	Roads Authority	1,000
6.2.6.5	Proliferation of Informal Roadside Trading along the corridor	Work with local councils to designate and plan formal market spaces near bridge approaches.	Operation Phase	Roads Authority	1,000
		Install signage and roadside barriers to prevent unsafe informal vending near the carriageway.	Operation Phase	Roads Authority	Included in the design of the project
		Conduct community sensitisation on safety risks and legal limits of roadside trading.	Operation Phase	Roads Authority	500
		Enforce local by-laws against encroachment of the road reserve and drainage structures.	Operation Phase	Roads Authority	300
6.2.6.6	Risk of Illegal Settlements Along the Road Reserve	Enforce strict compliance with the 36m road reserve boundary in partnership with local authorities.	Operation Phase	Roads Authority	400
		Erect permanent beacons and demarcations to prevent land grabbing or informal construction.	Operation Phase	Roads Authority	500
		Conduct awareness campaigns on the legal status of the road reserve and its purpose.	Operation Phase	Roads Authority	500

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REF.	Impacts & Risks	Impact and Risk Enhancement and Mitigation Measures	Schedule of Implementation	Responsible Institution	Implementation Cost (USD)
		Develop a grievance mechanism for handling disputes over land use or forced relocations.	Operation Phase	Roads Authority	1,000
	TOTAL BUDGET				**884,200**
	Construction Phase (Pre-construction, Construction and Demobilization)				828,000
	Operation Phase Budget (Annual)				56,200

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7.4 Environmental and Social Monitoring Plan (ESMoP)

Monitoring involves a routine check on the progress of implementation and the resultant effects on the environment as the Project proceeds. These shall be checked against their effectiveness in reducing the negative impacts or enhancing the benefits identified in the ESIA report. Monitoring procedures will comprise formulations of enforceable contractual terms to ensure contractors implement the ESMP. The environmental and social monitoring plan (Table 7-2) has been designed to cover all the potential impacts, verifiable indicators, frequency of monitoring, responsible organisations for carrying out the monitoring and those for receiving the reports. The environmental and social monitoring plan provides for monitoring to checking implementation of the enhancement and mitigation measures proposed in the ESMP. The monitoring plan gives monitoring indicators, means of their verification, frequency of monitoring and the stakeholders responsible for monitoring. For Monitoring measures, the budget required to monitor the interventions during the pre-construction and contruction phases is estimated at U$D 181,300.00, and during operation and maintenance phase is U$D 57,700.00.

7.4.1 Project Reporting Commitments

The Contractor will be required to prepare regular reports (monthly, quarterly, and annual) on environmental, social, health and safety performance. On a bi-annual basis, services of an independent environmental and social compliance auditor to determine the level of the Project's environmental and social performance. The report will provide the information and data required to determine compliance with national legal requirements. Periodic reports on environmental and social sustainability will be submitted to MEPA and other regulatory authorities.

7.4.2 External Monitoring

Stakeholders and environmental authorities will have a significant role to play in monitoring and always ensuring compliance. Among the external monitoring parties will include;

(vii) Regulatory

i. MEPA for surveillance on the impacts management and compliance of projects.
ii. Ministry of Labour will be involved in the surveillance of labour management including occupational health and safety aspects of the project such as transportation of construction workers, road safety for the public etc. Labour authorities to keep watch on the compliance of labour laws for the construction works, especially regarding child labour and gender equity.
iii. Machinga and Zomba district councils to be involved in handling public concerns and especially where there are social conflicts.
iv. National Water Resources Authority for monitoring water abstraction and pollution.

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(viii) Independent Audits

Consistent with the World Bank OP/BP and national regulations, the Roads Authority will ensure that independent E&S audits are conducted annually throughout project implementation. Such audits are compulsory and should be factored into the budget and execution plan for the project.

The E&S audits will be conducted by third-party E&S experts under contract with the Roads Authority or an independent third party, and will:

- Assure adherence to the ESMP, RAP, and other safeguards instruments.
- Sample and measure key environmental variables such as biodiversity, water, air, soil and noise to give quantitative values of environmental quality.
- Scrutinize the performance of the Contractor

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Table 7-2: Environmental and Social Monitoring Plan

REF.	Impacts & Risks	Impact and Risk Enhancement and Mitigation Measures	Performance Indicator	Means of Verification	Monitoring Frequency	Monitoring Responsible	Annual Monitoring Cost (USD)
6.2.1	**Positive Impacts During Pre-construction Phase**						
6.2.1.1	Creation of short-term employment	Engage local experts (nationals), and communities along the corridor, especially youth and vulnerable persons, for all support roles during pre-construction.	Number of locals and vulnerable persons employed	Employment register, field verification	Quarterly	Contractor's Environmental/Safeguards Officer; RA; Ministry of Labour	500
		Engage local leadership such as GVHs and Village Developmemnt Committes to ensure transparent recruitment that avoids nepotism, discrimination, or political interference.	Recruitment process endorsed by local leaders	Recruitment records, signed minutes	Quarterly	Contractor's Environmental/Safeguards Officer; RA; Ministry of Labour	1,000
		Enforce fair labour practices including payment of fair wages, timely payment of wages, safe working conditions, clear work contracts and formal briefing before work begins.	Compliance with labour standards	Worker contracts, payrolls, interviews	Quarterly	Contractor's Environmental/Safeguards Officer; RA; Ministry of Labour	None
		Prohibit gate hiring, establish designated office/desk for recruitment.	Recruitment conducted only through designated office/desk (0 cases of gate hiring reported)	Recruitment records, GRM logs, site inspection reports	Quarterly	Contractor's Environmental/Safeguards Officer; RA; Ministry of Labour	None

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		Prioritize recruitment of women targeting a 30% of hires to be women and where possible, support women in supervisory or coordination roles for logistics and data collection.	Percentage of women employed and in leadership roles	Employment records, supervisor reports	Quarterly	Contractor's Environmental/Safeguards Officer; RA; Ministry of Gender	500
		Maintain a register of local people employed, including gender, village of origin, work type, and wage paid for monitoring social performance.	Updated employee register	Periodic field checks, employee records	Quarterly	Contractor's Environmental/Safeguards Officer; RA; Ministry of Labour	None
		Establish a Grievance Redress Mechanism (GRM) where employment concerns (e.g., harassment, underpayment) can be reported and addressed promptly.	Number of grievances logged and resolved	GRM logbook, resolution reports	Quarterly	Contractor's Environmental/Safeguards Officer; RA; Ministry of Labour	1,000
6.2.2	**Negative Impacts During Pre-construction Phase**						
6.2.2.1	Community anxiety and speculative encroachment	Launch comprehensive public awareness campaigns to inform the community about the project's objectives, scope, and potential impacts;	Number of public awareness campaigns conducted	Campaign reports, attendance registers, media content	Quarterly	Contractor's Safeguards Officer; RA; Ministry of Information; District Council	2,000
		Conduct targeted community sensitization programs addressing the potential loss of assets and related compensations. This involves engaging with local communities to provide detailed information, address concerns, and create an open forum for dialogue between project stakeholders and residents; and	Number of sensitization sessions conducted; concerns recorded	Meeting minutes, attendance sheets, feedback logs	Quarterly	Contractor's Safeguards Officer; RA; District Councils	1,000

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		Integrate asset loss considerations into the Resettlement Action Plan to ensure a structured approach in addressing community concerns. Develop clear guidelines and protocols for asset valuation, compensation, and the overall resettlement process.	RAP updated to include asset loss protocols	RAP document, verification checklists	Quarterly	Contractor's Safeguards Officer; RA; Ministry of Lands	1,000
6.2.3	**Positive Impacts During Construction and Demobilization Phase**						
6.2.3.1	Creation of Employment	Inform local communities about employment opportunities and prioritise the hiring of local workers to maximise local employment and community benefits.	% of workforce recruited locally	Employment records, recruitment logs	Quarterly	Contractor's Safeguards Officer; RA; Ministry of Labour	3,500
		Engage local leaders and organisations in the recruitment process to achieve effective outreach and equitable access to job opportunities for community members.	Number of leaders engaged; recruitment endorsed	Signed minutes, recruitment logs	Quarterly	Contractor's Safeguards Officer; RA; Local Authorities	Included above
		Treat all employees in compliance with Malawi Labour Regulations and WB ESS 2 to uphold fair labour practices and protect workers' rights.	Compliance with labour standards verified	Worker contracts, payrolls, labour audits	Quarterly	Contractor's Safeguards Officer; RA; Ministry of Labour	Included above

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		Develop and implement a Labour Management Plan, following the guidance in Annex 6, to: (a) Identify and implement a recruitment strategy that informs local communities about job opportunities and fosters a non-discriminatory and equal-opportunity recruitment process, promoting inclusivity and fairness in employment; and (b) include an accommodation strategy that guarantees any required housing is completed before workers arrive on-site, providing safe and adequate living conditions for the workforce.	LMP approved and implemented	LMP document, site inspections	Bi-annually	Contractor's Safeguards Officer; RA; Supervision Consultant	Included above
		Prepare a labour accommodation strategy for non-local workers to meet required standards and enhance worker well-being and compliance.	Strategy developed and implemented	Accommodation plan, inspection reports	Quarterly	Contractor's Safeguards Officer; RA; Ministry of Labour	Included above
		Pay all workers performing similar tasks equally, irrespective of gender or origin, to promote equity and prevent discrimination in the workplace	Wage parity across workforce	Payroll audits, HR data	Quarterly	Contractor's Safeguards Officer; RA; Ministry of Labour	Included above
		Mandate all workers to sign a code of conduct to uphold standards of behaviour and responsibility, ensuring a respectful and safe working environment.	% of workers signing Code of Conduct	Signed forms, induction logs	Monthly	Contractor's Safeguards Officer; RA; Supervision Consultant	Included above

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		Conduct sensitisation sessions for workers on the full range of risks (occupational health and safety, labour rights, public health, community safety, sexual harassment, and engagement risks) to heighten awareness and reduce the likelihood of incidents.	Number of sessions held	Training logs, attendance sheets	Quarterly	Contractor's Safeguards Officer; RA; Ministry of Labour	1,000
		Provide equal opportunities for men and women during recruitment and actively enhance benefits for women and vulnerable groups to promote gender equality and social inclusion. Aim for at least 30% female representation in the workforce.	% of women employed and in leadership roles	Gender-disaggregated hiring data	Quarterly	Contractor's Safeguards Officer; RA; Ministry of Gender	Included above
		Develop and implement a regular and detailed labour monitoring schedule to uphold ongoing compliance with labour standards and promptly address any issues.	Labour monitoring system in place	Monitoring logs, reports	Quarterly	Contractor's Safeguards Officer; RA; Supervision Consultant	Included above
		Provide monthly reports on the workforce profile, labour grievances, labour incidents, and workforce management activities and outcomes to maintain transparency, demonstrate accountability, and align with best practices in labour management	Monthly reports submitted	Workforce reports, grievance records	Monthly	Contractor's Safeguards Officer; RA; Supervision Consultant	Included above
6.2.3.2	Creation of New Opportunities for Local Businesses	Mandate the contractor to conduct a comprehensive supply chain review in accordance with the World Bank ESF to identify opportunities for local procurement and to ensure compliance with ethical and sustainable sourcing practices.	Supply chain review report completed	Procurement plan, audit reports	Once	Contractor's Safeguards Officer; RA; Supervision Consultant	5,000

		Develop a detailed procurement plan that outlines goods and services that can be sourced locally. The plan should be strictly adhered to and should include: (i) Environmentally friendly construction materials that comply with the laws of Malawi. (ii) Cement, paint, and other materials that are manufactured or processed in Malawi. (iii) Food items, groceries, and other related products that can be sourced from local markets to support local businesses.	Procurement plan approved	Vendor lists, procurement records	Quarterly	Contractor's Safeguards Officer; RA; MEPA	Included above
		Purchase all construction materials from Malawi Revenue Authority (MRA) registered suppliers and sourced only from approved, licensed, and tax-compliant vendors. Where it is not practical to get licensed suppliers (e.g., sand and gravel) the contractor must seek written permission from the District Council through the Environmental District Officer before extracting these resources.	% materials sourced from licensed suppliers	Procurement records, supplier certificates	Quarterly	Contractor's Safeguards Officer; RA; District Councils	Included above
		Adhere to prompt payment terms for building materials and services, ensuring payments are made within the agreed timelines and contract conditions, to support their cash flow.	% of payments made within contract timelines	Payment records, vendor statements	Quarterly	Contractor's Safeguards Officer; RA; Supervision Consultant	Included above

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6.2.3.3	Transfer of skills to local workers	Maximise the employment of local people, particularly focusing on the unskilled labour force, aiming for at least 30% female representation, to promote gender equality and community development.	% of local and female workforce	Recruitment records, payrolls	Quarterly	Contractor's Safeguards Officer; RA; Ministry of Labour	None
		Pair skilled and unskilled workers during various construction assignments to facilitate direct skills transfer and practical learning for unskilled labourers.	Number of skill pairings documented	Assignment logs, training reports	Quarterly	Contractor's Safeguards Officer; RA; Supervision Consultant	Included above
		Formalise on-the-job training for local unskilled labourers by including comprehensive induction sessions, toolbox talks, structured learning activities, and performance monitoring within the Labour Management Plan, ensuring consistent skills development.	Training sessions and monitoring conducted	Toolbox talks, induction logs	Quarterly	Contractor's Safeguards Officer; RA; Ministry of Labour	Included above
		Coordinate with local partners to raise workers' awareness of employment and training opportunities with contractors, enhancing community engagement and access to these opportunities.	Number of awareness sessions held	Partner records, training logs	Quarterly	Contractor's Safeguards Officer; RA; Local NGOs	Included above
6.2.4	**Negative Impacts During Construction and Demobilization Phase**						
6.2.4.1	Physical and Economic Displacement	Execute compensation in strict accordance with the Resettlement Action Plan (RAP) before commencing construction activities to ensure that Project-Affected Persons (PAPs) receive adequate,	% of PAPs compensated prior to works	RAP implementation reports, payment records	Monthly	Contractor's Safeguards Officer; RA; Ministry of Lands	2,000

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		fair, and prompt compensation and resettlement support.					
		Directly pay PAPs to guarantee transparency, fairness, and timely compensation delivery, thereby reducing the risk of disputes and delays.	% of PAPs receiving direct payments on time	Payment receipts, disbursement logs	Monthly	Contractor's Safeguards Officer; RA; Ministry of Lands	Included above
		Construct and hand over new structures as per the agreements with PAPs.	Number of replacement structures completed and handed over	Handover certificates, site inspection reports	Monthly	Contractor's Safeguards Officer; RA; Ministry of Lands	Included above
		Proceed with relocation only when agreed-upon conditions are met	% relocations completed under agreed conditions	Relocation agreements, verification checklists	Monthly	Contractor's Safeguards Officer; RA; Ministry of Lands	Included above
6.2.4.2	Disruption of Access to Properties and Social Services	Develop and implement a comprehensive traffic management plan following the guidelines provided in Annex 11 to ensure the safe and efficient traffic movement during construction.	Approved TMP in place and implemented	TMP document, traffic signage, site inspections	Quarterly	Contractor's Safeguards Officer; RA; Traffic Police	1,500
		Communicate project activity schedules to PAPs well in advance to enable them to adjust their livelihood plans and minimise disruptions including the access to graveyard.	% of PAPs informed before works	Communication logs, meeting minutes	Monthly	Contractor's Safeguards Officer; RA; Local Authorities	Included above

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		Clear demarcation of the road reserve to prevent accidental encroachment during works to avoid affecting graveyard access.	Percentage of graveyards demarcated	Monthly reports	Monthly	Contractor's Safeguards Officer; RA; Ministry of Education	Included above
		Traffic and access management plans to avoid blocking driveways, entrances, or access to the structures to avoid affecting graveyard access	Traffic management plan with measures included for works close to graveyars	Semi-annual reports	Semi-annually	Contractor's Safeguards Officer; RA; Ministry of Education	Included above
		Establish responsive mechanisms to address the needs of PAPs, especially regarding impacted infrastructure such as schools, ensuring continuity of access and services.	Mechanism established and functional	Feedback records, service access reports	Monthly	Contractor's Safeguards Officer; RA; Ministry of Education	Included above
		Identify and establish temporary alternative locations for market activities in all trading centres to minimise the disruption of local businesses during construction.	% of markets relocated successfully	Market relocation logs, vendor interviews	Monthly	Contractor's Safeguards Officer; RA; Local Councils	Included above
		Provide adequate alternative pathways to ensure continued accessibility and mobility during construction, as guided by Annex 18. Submit all traffic diversion plans to the relevant authority for approval before implementation to ensure compliance and safety.	Number of diversion routes provided	Approved TMP, signage, field inspections	Monthly	Contractor's Safeguards Officer; RA; Road Traffic Directorate	Included above
		Consult with communities to plan and agree on the location of stockpiling areas and access routes during construction to minimise disruption and ensure community buy-in.	% agreements documented	Meeting minutes, signed agreements	Monthly	Contractor's Safeguards Officer; RA; Local Councils	Included above

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		Restore all existing community access routes upon completion of construction and provide convenient alternative routes during the construction period to maintain access to essential services and properties.	% of routes restored and functional	Completion certificates, inspection reports	Monthly	Contractor's Safeguards Officer; RA; Supervision Consultant	Included above
6.2.4.3	Exposure to GBV	Develop and enforce a Labour Management Plan with a clear Code of Conduct prohibiting GBV and ensuring gender sensitivity in all project operations (see Annex 9).	LMP and Code of Conduct approved and enforced	Signed CoCs, LMP document	Quarterly	Contractor's Safeguards Officer; RA; Ministry of Labour	3,000
		Institute a zero-tolerance policy towards all forms of GBV, with clear and public communication of expected behaviours.	Zero-tolerance policy issued and displayed	Policy memos, awareness posters	Quarterly	Contractor's Safeguards Officer; RA; Ministry of Gender	Included above
		Provide mandatory GBV training for all workers and project stakeholders to build awareness and responsiveness.	Number of persons trained	Attendance records, training reports	Quarterly	Contractor's Safeguards Officer; RA; Ministry of Gender	Included above
		Establish community-based reporting and referral systems, linked with trained service providers and law enforcement.	Reporting/referral systems functional	Logs from CSOs, police, service providers	Quarterly	Contractor's Safeguards Officer; RA; Local Councils	Included above
		Expand and operationalize the Grievance Redress Mechanism (GRM) to include gender-sensitive protocols and designated GBV focal points (see Annex 8).	GRM operational with GBV focal points	GRM records, focal point rosters	Quarterly	Contractor's Safeguards Officer; RA; Supervision Consultant; Ministry of Gender	Included above

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		Engage local CSOs and women's groups in ongoing sensitization and survivor support services.	Number of CSOs engaged; survivors supported	MoUs, activity reports	Quarterly	Contractor's Safeguards Officer; RA; Ministry of Gender	Included above
		Promote gender parity in employment, prioritizing female hiring and leadership in community liaison roles.	% of women in liaison and leadership roles	Hiring records, staff lists	Quarterly	Contractor's Safeguards Officer; RA; Ministry of Labour	Included above
6.2.4.4	Sexual Exploitation, Abuse, and Harassment (SEA/SH)	Implement strict code of conduct addressing SEA/SH and ensure all workers receive induction training (sample contractor code of conduct included in Annex 6).	% of workers trained and signed code of conduct	Signed Codes of Conduct, induction records	Quarterly	Contractor's Safeguards Officer; RA; Ministry of Labour; Ministry of Gender	1,000
		Establish confidential and secure SEA/SH reporting channels with survivor-centred protocols.	Functionality of reporting channels; number of grievances received/resolved	GRM records, hotline logs, complaint registers	Quarterly	Contractor's Safeguards Officer; RA; Ministry of Gender	2,000
		Partner with local health centres and NGOs to provide access to counselling, medical care, and legal support.	Number of survivors supported; MoUs with service providers	Service provider MoUs, referral records, survivor support logs	Quarterly	Contractor's Safeguards Officer; RA; Ministry of Health; NGOs	3,000
		Enforce sanctions for SEA/SH perpetrators, ranging from dismissal to legal prosecution.	Number of cases sanctioned; records of disciplinary/legal action	HR records, dismissal reports, legal follow-up reports	Quarterly	Contractor's Safeguards Officer; RA; Ministry of Labour; Law Enforcement Agencies	None

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		Implement camp management standards (lighting, security, access control) that reduce risk of abuse.	Number of camps compliant with SEA/SH risk-reduction standards	Camp inspection reports, site photos, security audit logs	Quarterly	Contractor's Safeguards Officer; RA; Supervision Consultant	2,000
		Use anonymous third-party monitoring to oversee SEA/SH prevention efforts and independently investigate complaints.	Independent monitoring reports issued	Third-party monitoring reports, case investigations	Bi-annually	Independent Monitor; RA; Ministry of Gender	5,000
6.2.4.5	Poor Labour Conditions and Rights Violations	Develop and implement a Labour Management Plan (LMP) that outlines labour rights, responsibilities, and contract obligations for all categories of workers (LMP Guidelines in Annex 9).	Approved LMP in place and implemented	LMP document, inspection reports	Quarterly	Contractor's Safeguards Officer; RA; Ministry of Labour	Included in works
		Issue all workers written contracts that clearly specify wages, roles, hours, grievance mechanisms, and rights to social protection.	% workers with signed contracts	Worker files, payroll, audit reports	Quarterly	Contractor's Safeguards Officer; RA; Ministry of Labour	None
		Provide timely and transparent payment of wages, with documented payroll systems and routine compliance checks.	% of wages paid on time	Payroll records, worker interviews	Monthly	Contractor's Safeguards Officer; RA; Ministry of Labour	None
		Establish and operationalize a Workers' Grievance Redress Mechanism (WGRM) accessible to all site workers, including anonymous reporting options.	Functioning WGRM with records of resolved cases	GRM logbook, resolution reports	Quarterly	Contractor's Safeguards Officer; RA	1,000

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		Conduct regular labour audits to monitor compliance with labour standards and resolve emerging issues promptly.	Number of labour audits conducted	Audit reports, compliance checklists	Quarterly	Contractor's Safeguards Officer; RA; Ministry of Labour	2,000
		Provide awareness training for workers and supervisors on fair treatment, occupational rights, and protection from abuse or discrimination.	Number of trainings conducted	Training reports, attendance sheets	Quarterly	Contractor's Safeguards Officer; RA; Ministry of Gender	2,000
6.2.4.6	Occupational health and safety risks	Provide comprehensive training in safety, health, social, and environmental procedures to all construction workers, and extend relevant training to local villagers where appropriate. Supply personal protective equipment (PPE) to all workers free of charge, and ensure proper training, supervision, and enforcement of its use. Regularly monitor PPE usage through audits and inspections.	% workers trained; % PPE compliance	Training logs, PPE records, audit reports	Quarterly	Contractor's Safeguards Officer; RA	3,000
		Develop and implement a detailed Health and Safety Management Plan, that includes emergency preparedness and response based on guidance provided in Annex 20. This plan should also cover the safe use and maintenance of machinery and equipment, including vehicles fitted with seatbelts for all passengers.	HSMP approved and implemented	HSMP document, inspection logs	Quarterly	Contractor's Safeguards Officer; RA; Ministry of Labour	Included in works

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		Employ and train sufficient health and safety officers and first aiders to ensure swift responses to any incidents and monitor on-site health and safety practices and working conditions through regular observation, worker interviews, document reviews, and discussions with worker representatives.	Number of officers/first aiders on site	Staff rosters, training certificates	Quarterly	Contractor's Safeguards Officer; RA	2,500
		Install and maintain first aid kits and medical facilities at each project site, ensuring they are proportionate to the site's size and workforce. Obtain medical insurance for all workers to cover any health issues or injuries sustained on the job, and compensate injured workers per the Workers' Compensation Act of 2000.	% of sites with kits/clinics; insurance coverage	Medical records, insurance files	Quarterly	Contractor's Safeguards Officer; RA; Ministry of Labour	2,000
		Develop and enforce a comprehensive campsite and storage site plan, as guided by Annex 19, to ensure safety, operational efficiency, and secure living conditions, including clean canteens and cooking areas and adequate living space.	Approved plan implemented	Site layouts, inspection reports	Quarterly	Contractor's Safeguards Officer; RA	2,000
		Provide security at campsites and all satellite camps following a security risk assessment and following a security management plan. Ensure that security personnel adhere to IFC requirements and receive training in the use of force. All security staff will be unarmed.	Security plan implemented; trained guards deployed	Security logs, training certificates	Quarterly	Contractor's Safeguards Officer; RA	2,000

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		Establish and communicate flexible working hours, including rest breaks, rotational work practices, and scheduling heavy tasks during suitable weather and temperatures, to reduce the risk of heat-related illnesses. Clearly outline these practices in employment contracts and site management procedures.	Flexible schedules in contracts	Contracts, work rosters	Quarterly	Contractor's Safeguards Officer; RA	None
		Provide adequate quantities of clean drinking water, ablution facilities, and satisfactory welfare facilities, such as shaded areas for resting and eating, in line with international standards. Ensure these facilities are accessible to all workers, including those with disabilities, and are provided on-site for both women and men.	Facilities available and functional	Inspection reports, worker feedback	Quarterly	Contractor's Safeguards Officer; RA; Ministry of Labour	2,000
		Ensure safe passage at the construction site to facilitate the unobstructed movement of nearby residents and implement auxiliary safety measures for the public in the vicinity of the project site, including advance notice of work commencement, installing safety barriers, and using safety signs to mark work areas.	Barriers/signs installed; access routes maintained	Site inspections, photos	Quarterly	Contractor's Safeguards Officer; RA	3,000
		Prohibit fuelling and vehicle maintenance near wetlands and construction sites to prevent environmental contamination.	% compliance; zero spill incidents	Site records, inspection reports	Quarterly	Contractor's Safeguards Officer; RA; MEPA	None

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		Report regularly on workforce profiles, labour grievances, labour incidents, and workforce management activities, and adhering to government requirements and international best practices.	Reports submitted on schedule	Workforce reports, GRM database	Quarterly	Contractor's Safeguards Officer; RA	3,000
		Provide a campsite clinic to treat workers, at minimum, qualified medical personnel (a clinical officer, land technician and a nurse).	Clinics operational with certified staff	Clinic records, staff credentials	Quarterly	Contractor's Safeguards Officer; RA; Ministry of Health	Included in works (min. 300,000)
6.2.4.7	Risk of Child and Forced Labour	Enforce a zero-tolerance policy on child and forced labour, clearly articulated in the project's Labour Management Plan (LMP) and Code of Conduct.	Policy in place and disseminated	LMP, Code of Conduct, induction records	Quarterly	Contractor's Safeguards Officer; RA; Ministry of Labour	None
		Mandate all contractors and subcontractors to screen and verify the age and identity of all workers through national Identify Card before recruitment.	100% workers verified	Recruitment records, ID copies	Quarterly	Contractor's Safeguards Officer; RA; Ministry of Labour	None
		Conduct periodic audits and inspections to detect any cases of underage or coerced labour.	Number of audits conducted	Labour audit reports	Quarterly	Contractor's Safeguards Officer; RA	4,000
		Raise awareness among workers and community members about the prohibited nature of child and forced labour, their rights, and available grievance redress mechanisms.	Awareness sessions conducted	Training reports, attendance sheets	Quarterly	Contractor's Safeguards Officer; RA; Ministry of Labour	3,000
		Integrate clauses on child and forced labour prohibition in all contracts with service providers and suppliers.	Clauses included in 100% of contracts	Contract templates, signed contracts	Quarterly	Contractor's Safeguards Officer; RA Procurement Unit	None

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		Strengthen the Workers' Grievance Redress Mechanism (WGRM) to allow anonymous reporting of abuse or coercion, with guaranteed protection for whistleblowers.	GRM records show use of anonymous reporting	GRM logs, resolution records	Quarterly	Contractor's Safeguards Officer; RA	2,500
6.2.4.8	Risk of Discrimination and Unequal Treatment	Prioritise employment opportunities for women and individuals with disabilities, ensuring inclusivity and diversity in the workforce.	% of women and disabled hired	Gender/Disability -disaggregated data	Quarterly	Contractor's Safeguards Officer; RA; Ministry of Gender	None
		Offer flexible working hours to accommodate the childcare needs of breastfeeding women, thereby supporting their participation in the workforce.	Number of women benefitting	HR policies, shift rosters	Quarterly	Contractor's Safeguards Officer; RA	None
		Make deliberate efforts to employ women by conducting a comprehensive skills analysis of female candidates before recruitment begins, ensuring their capabilities are fully recognised and utilised.	Skills audits completed	HR files, audit reports	Quarterly	Contractor's Safeguards Officer; RA	None
		Encourage the recruitment of female workers for roles equivalent to those of male workers and guarantee equal pay for equal work, regardless of gender.	Wage parity verified	Payroll audits	Quarterly	Contractor's Safeguards Officer; RA	None
		Provide essential amenities at all campsites, including shops, medical clinics, and leisure facilities, to reduce the need for workers to leave the site, thereby minimising their interaction with the local community.	Amenities available	Camp inspection reports	Quarterly	Contractor's Safeguards Officer; RA	Included in works

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		Strategically locate campsites away from villages to limit the interaction between workers and the community, reducing the potential for harassment and other negative impacts.	Camps sited as per buffer requirements	Site plans, GPS	Quarterly	Contractor's Safeguards Officer; RA; Local Councils	None
		Implement and rigorously monitor a Grievance Redress Mechanism (GRM) with clear and accessible channels for reporting and investigating incidents of workplace harassment, ensuring that complaints are handled promptly and fairly.	Number of harassment cases reported/resolved	GRM logs, case files	Quarterly	Contractor's Safeguards Officer; RA; Ministry of Gender	2,000
6.2.4.9	Social Disruption and Risk of conflicts between contractor workers and community people	Establish labour camps before mobilizing workers to construction sites to ensure orderly accommodation and reduce conflicts.	Camps operational before site works	Camp setup records	Quarterly	Contractor's Safeguards Officer; RA	2,000
		Locate camps at least 500 metres away from settlements, water bodies, and sensitive receptors, in consultation with local communities, to minimize social disruption.	% compliance with buffer zone	Site inspections, GPS	Quarterly	Contractor's Safeguards Officer; RA; Local Councils	None
		Provide orientation and induction to all labourers, with emphasis on the Code of Conduct and sensitization to local cultural and social norms.	Inductions completed	Attendance records, induction logs	Quarterly	Contractor's Safeguards Officer; RA	None
		Maintain detailed records of all labourers, including personal information such as addresses, identity cards, and age verification, to ensure proper documentation and accountability, and ensure protection of such data in accordance with	Records complete and secure	HR records, data protection checklists	Quarterly	Contractor's Safeguards Officer; RA	None

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		national personal data protection law.					
		Implement measures to monitor and control workers' activities outside the work site to minimize the potential for conflict with local communities.	Reports of incidents resolved	Community feedback, site reports	Quarterly	Contractor's Safeguards Officer; RA	None
		Appoint a liaison officer to act as the point of contact between the contractor, local communities, and elders, facilitating regular communication and dispute resolution.	Liaison officer appointed	Meeting minutes, liaison logs	Quarterly	Contractor's Safeguards Officer; RA; Local Councils	Included in contractor staffing
		Install safety signage and security infrastructure at site offices and work yards to prevent unauthorized entry, especially by children.	% of sites with signage/security	Inspection reports, photos	Quarterly	Contractor's Safeguards Officer; RA	2,000
		Record all visitors and enforce strict access control measures to enhance site security and prevent unauthorized access to work areas.	Visitor logbooks maintained	Security logs, entry records	Quarterly	Contractor's Safeguards Officer; RA	None
		Prioritize the hiring and capacity-building of local workers to strengthen community relationships and reduce conflict risk.	% of unskilled workers local	Hiring logs, training records	Quarterly	Contractor's Safeguards Officer; RA	None
		Establish in-house stores and a tuck-shop within the labour camp to supply daily necessities and reduce	Stores operational	Store records, procurement logs	Quarterly	Contractor's Safeguards Officer; RA	Included in works

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		pressure on local markets and resources.					
		Comply fully with the siting, management, and development guidelines provided in Annex 9, Annex 19, and Annex 24 for construction and labour camps.	Compliance verified	Inspection reports, checklists	Quarterly	Contractor's Safeguards Officer; RA; Supervision Consultant	None
		Engage local unskilled and skilled labourers wherever feasible to promote integration and minimize community tensions.	Number of locals employed	HR records	Quarterly	Contractor's Safeguards Officer; RA	None
		Accommodate non-local workers in contractor-managed camps to reduce their impact on the local housing market.	% non-local workers housed in camps	Accommodation records	Quarterly	Contractor's Safeguards Officer; RA	None
		Discourage the provision of housing allowances by promoting the use of designated worker camps or personal lodging to avoid competition for local housing.	Allowances reduced/eliminated	Payroll, contracts	Quarterly	Contractor's Safeguards Officer; RA	None
6.2.4.10	Air Quality Deterioration	Acquire and deploy equipment to monitor air quality throughout the construction phase to track pollutant levels and ensure compliance with air quality standards.	Air quality data collected and reported	Monitoring logs, lab reports	Quarterly	Contractor's Safeguards Officer; RA; MEPA	2,000
		Regularly sprinkle water during the construction phase, particularly during dry and windy periods, to suppress dust and mitigate its dispersion into the surrounding environment.	Dust levels reduced	Field inspection logs, dust suppression records	Weekly/Quarterly	Contractor's Safeguards Officer; RA	2,000

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		Set and enforce moderate speed limits at construction sites and in passing areas such as trading centres, schools, and villages to minimise dust generation and reduce noise.	Speed limits posted and enforced	Signage, site inspections, enforcement records	Quarterly	Contractor's Safeguards Officer; RA; Traffic Police	3,000
		Develop and implement an Air Emissions Management Plan, as outlined in Annex 22, to manage and mitigate air quality impacts during construction.	Plan approved and implemented	Plan reports, inspections	Quarterly	Contractor's Safeguards Officer; RA	3,000
		Transport particulate or powdery construction materials with adequate load covering to prevent the dispersion of particulate matter, and avoid overloading transport vehicles to minimise emissions.	100% of loads covered	Truck inspection reports	Weekly/Quarterly	Contractor's Safeguards Officer; RA	Included above
		Use drop-height regulation equipment when unloading powdery materials to maintain the lowest possible drop-height, reducing dust emissions during these operations.	Drop height minimised	Inspection logs, equipment use records	Quarterly	Contractor's Safeguards Officer; RA	None
		Implement measures to reduce greenhouse gas (GHG) emissions and provide additional strategies for enhancing carbon sinks	GHG logs maintained	inventory	Annually	Contractor's Safeguards Officer; RA; MEPA	None
		Locate concrete production facilities and raw material storage areas as far away from human settlements as possible to minimise the impact of emissions on local communities.	Facilities sited > buffer distance	Site plans, GPS	Quarterly	Contractor's Safeguards Officer; RA	None

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		Install pollution control equipment at batching plants and hot-mix plants, ensuring that these plants are not operated if the pollution control equipment is non-functional.	Equipment installed and functional	Inspection reports, test results	Quarterly	Contractor's Safeguards Officer; RA	2,000
		Carry out necessary repairs, maintenance, and regular inspections of all machinery and vehicles used in construction, ensuring they are in good working order to mitigate gaseous emissions and noise, and reduce the risk of accidental spills.	Maintenance logs complete	Servicing records	Monthly/Quarterly	Contractor's Safeguards Officer; RA	None
6.2.4.11	Noise Pollution	Restrict construction activities to daytime hours (07:00 – 17:00) when working near populated areas, and apply the same restriction to moving heavy construction vehicles and machinery. If construction must extend beyond these hours, inform local authorities and the affected population in advance.	Compliance with hours	Site logs, community notices	Quarterly	Contractor's Safeguards Officer; RA; Local Councils	None
		Conduct regular maintenance of machinery, equipment, and vehicles to minimise noise levels, ensuring that all machinery adheres to a set maintenance schedule as specified by the contractor.	Noise within standards	Maintenance reports, inspection logs	Quarterly	Contractor's Safeguards Officer; RA	None
		Develop and implement a Noise and Vibration Control Management Plan, following the guidelines in Annex 21, to mitigate noise impacts throughout the construction process.	Plan implemented	Noise/vibration logs, inspections	Quarterly	Contractor's Safeguards Officer; RA	3,000

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		Deploy equipment to monitor noise levels, particularly at sensitive receptors such as schools, health centres, and churches, ensuring that noise levels remain within acceptable limits.	Noise records available	Monitoring reports	Quarterly	Contractor's Safeguards Officer; RA; MEPA	3,500
		Provide appropriate personal protective equipment (PPE), such as earplugs, earmuffs, or ear defenders, to workers exposed to high noise levels to protect their hearing.	PPE issued and used	PPE distribution records, site checks	Quarterly	Contractor's Safeguards Officer; RA	3,000
6.2.4.12	Soil and Land Degradation	Remove and safely store the fertile topsoil layer before beginning excavation and earthworks, and ensure that stockpiles are located outside drainage lines and protected to prevent erosion. Follow the guidance provided in Annex 11.	Topsoil preserved	Site inspections, storage records	Quarterly	Contractor's Safeguards Officer; RA	2,000
		Implement and adhere to mitigation and enhancement measures outlined in the ESMP and further specified in the C-ESMP, particularly regarding the management of batch plants, bulk material storage, quarries, borrow sites, and equipment maintenance areas.	ESMP compliance rate	Site inspections, contractor logs	Quarterly	Contractor's Safeguards Officer; RA; Supervision Consultant	3,000
		Avoid significant earthworks during periods of high precipitation to prevent soil erosion due to run-off. Take proper precautions to ensure slope and trench stability and prevent landslides.	Reduced erosion/landslides	Work schedule, site checks	Quarterly	Contractor's Safeguards Officer; RA	None

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		Install erosion and run-off control barriers along excavation and embankment areas, using silt fences or check dams to manage soil movement.	Barriers installed	Site inspection reports	Quarterly	Contractor's Safeguards Officer; RA	3,000
		Redistribute collected soil to the areas most affected by construction activities to aid in site rehabilitation and prevent long-term soil degradation.	Soil redistributed	Rehabilitation maps, photos	Quarterly	Contractor's Safeguards Officer; RA	None
		Restrict the movement of heavy machinery to designated areas to minimise soil compaction and avoid damage to privately owned land.	Machinery confined to approved zones	Site inspections, logs	Quarterly	Contractor's Safeguards Officer; RA	None
		Minimise vegetation clearance and follow an approved method statement to protect the local environment and reduce the risk of soil erosion.	Clearance only as permitted	Vegetation records, inspections	Quarterly	Contractor's Safeguards Officer; RA	None
		Continuously monitor embankments during construction for signs of erosion, and take immediate action to address any issues.	Erosion incidents addressed	Engineer logs, inspection reports	Quarterly	Contractor's Safeguards Officer; RA	Included above
		Confine heavy equipment operations within the road reserve wherever possible to avoid unnecessary soil compaction and damage to private land. If private lands must be disturbed, promptly inform the owner and agree on remedial actions in line with national laws.	Land use recorded and resolved	Landowner agreements, site checks	Quarterly	Contractor's Safeguards Officer; RA	None

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		Construct designated, signposted wash bays at each campsite, ensuring they are fully contained and regularly maintained, with treated water released to natural water bodies.	Wash bays functional	Facility inspection reports	Quarterly	Contractor's Safeguards Officer; RA	1,000
		Rehabilitate compacted sites by ripping, levelling, and re-vegetating disturbed areas, restoring them to a stable and sustainable condition.	Sites rehabilitated	Rehabilitation logs, GIS	Quarterly	Contractor's Safeguards Officer; RA	Included in works
		Reuse excavation products for backfilling used borrow pits, planting native vegetation on top to stabilise the soil. If excess material remains, store it in suitable alternative deposit sites.	Borrow pits rehabilitated	Site inspection, planting logs	Quarterly	Contractor's Safeguards Officer; RA	None
		Remove and safely store the fertile topsoil layer before beginning excavation and earthworks, and ensure that stockpiles are located outside drainage lines and protected to prevent erosion. Follow the guidance provided in Annex 11.	% of topsoil removed and stored as per guidelines; Stockpiles located outside drainage lines and protected	Site inspection reports, photographic evidence, topsoil storage logs	Quarterly	Contractor's Safeguards Officer; RA; Supervision Consultant	1,000
		Follow specific guidelines when collecting borrowed soil, ensuring that the soil is sourced from nearby locations to minimise transportation impacts, and that it is not sourced from riverbeds, flood-prone areas, protected sites, agricultural land, or sites near urban, touristic, or culturally sensitive areas.	Approved sources only	Permits, site inspection	Quarterly	Contractor's Safeguards Officer; RA; District Councils	None

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6.2.4.13	Increased Risk of Slope Failure Leading to Siltation	To prevent slope destabilisation and reduce the risk of landslides, clearance, cutting, and excavation activities beyond the proposed toe line should be prohibited.	Compliance with slope limits	Inspection logs, maps	Quarterly	Contractor's Safeguards Officer; RA	2,000
		Remove and properly stockpile topsoil and low-quality materials near the site, ensuring they are adequately covered to prevent erosion and degradation.	Stockpiles managed	Inspection reports, photos	Quarterly	Contractor's Safeguards Officer; RA	None
		Prevent the accumulation of stagnant water during quarry and borrow site operations, as standing water can contribute to slope instability and erosion.	No stagnant pools	Inspection records	Quarterly	Contractor's Safeguards Officer; RA	None
		To protect water quality and aquatic habitats from sedimentation and pollution, quarrying activities must be strictly prohibited within 500 metres of rivers and streams.	Compliance with buffer distance	Site maps, inspection reports	Quarterly	Contractor's Safeguards Officer; RA; MEPA	None
		Under no circumstances should spoil be dumped into watercourses, including rivers, streams, drainage areas, wetlands, or marshy areas, to prevent contamination and ecological disruption.	No spoil in waterways	Inspection reports	Quarterly	Contractor's Safeguards Officer; RA; Supervision Consultant	None
		To avoid further environmental and social harm, spoil should not be disposed of on fragile slopes, floodway's, wetlands, farmlands, forests, religious sites, culturally sensitive areas, or areas critical for local livelihoods.	Disposal outside restricted zones	GIS maps, field verification	Quarterly	Contractor's Safeguards Officer; RA	None

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		Locate spoil disposal sites at least 50 metres away from any surface watercourses and protect them from erosion by grassing and avoiding the creation of steep slopes (see Guidelines in Annex 23).	Spoil disposal sites compliant	Site inspections, photos	Quarterly	Contractor's Safeguards Officer; RA	Included above
6.2.4.14	Increased Risk of River and Embankment Erosion	Protect embankments with riprap, gabion mattresses, or revetments at river crossing points.	Riprap/gabions installed at crossings	Site inspection reports, photos	Quarterly	Contractor's Safeguards Officer; RA; Supervision Consultant	Included above
		Install energy dissipators (e.g., plunge pools or stilling basins) at culvert outlets to reduce scouring.	Dissipators constructed at culvert outlets	Engineering drawings, inspection reports	Quarterly	Contractor's Safeguards Officer; RA	Included above
		Design culverts and bridges using hydrological modelling to accommodate peak flood discharge.	Hydrological modelling applied in design	Approved design reports, engineer's certification	Once (Design Stage)	Design Engineer; RA	None
		Plant native grasses on embankment slopes to reduce erosion.	% vegetation cover established	Site inspections, planting logs	Quarterly	Contractor's Safeguards Officer; RA; Forestry Department	2,000
		Regularly desilt and maintain drainage structures (culverts and side drains) to ensure free flow of water.	Number of desilting operations conducted	Maintenance records, site inspections	Quarterly	Contractor's Safeguards Officer; RA	Included in works
		Provide cutoff walls or wing walls on bridge abutments to prevent undermining.	Wing walls installed	Bridge inspection reports	Quarterly	RA; Supervision Consultant	Included in works

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6.2.4.15	Water Quality Degradation	Locate temporary facilities (construction campsites, general storage areas, fuel storage areas) at least 50 m away from wells and boreholes. Fuelling, washing, or maintenance of machinery will not occur near drains or watercourses.	Distance maintained, no spills recorded	Site maps, inspection reports	Quarterly	Contractor's Safeguards Officer; RA	2,000
		Develop and implement a Waste Management Plan, considering all waste likely to be produced during construction, including identification, classification, and proper disposal.	WMP approved and implemented	Waste records, inspection checklists	Quarterly	Contractor's Safeguards Officer; RA; MEPA	3,000
		Monitor water abstraction points (upstream, at the abstraction point, and downstream) to ensure water quality parameters are within acceptable ranges.	Water quality within standards	Lab analysis reports	Quarterly	Contractor's Safeguards Officer; RA; Water Board	1,000
		Ensure correct temporary storage of produced wastes, according to their type and local laws, preventing runoff/spills from reaching water bodies.	Waste stored per guidelines	Storage inspection reports	Quarterly	Contractor's Safeguards Officer; RA	3,000
		Provide proper sheltered storage facilities for hazardous substances, equipped with safety and spillage control measures.	Sheltered storage facilities in use	Inspection checklists, photos	Quarterly	Contractor's Safeguards Officer; RA	500
		Store used oils, lubricants, fuels, paints, glues, resins, and other hazardous substances in sealed containers for proper final disposal.	% sealed storage containers verified	Waste manifests, storage inspection	Quarterly	Contractor's Safeguards Officer; RA	None
		Promptly collect all chemical spills using appropriate absorbent products and store them for proper disposal.	Spill response actions logged	Spill logs, incident reports	Quarterly	Contractor's Safeguards Officer; RA	500

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		Ensure adequate collection and storage/treatment facilities for domestic wastewater from construction yards, using septic tanks or properly sealed latrines.	Functioning wastewater facilities installed	Inspection reports, effluent test	Quarterly	Contractor's Safeguards Officer; RA	3,000
		Develop and implement a stormwater and water management plan (Guidelines in Annex 12).	Stormwater plan operational	Inspection logs, drainage maps	Quarterly	Contractor's Safeguards Officer; RA; Supervision Consultant	3,000
		Restrict clearance of vegetation, excavations, and soil compaction to approved sites only.	Work confined to approved boundaries	Drone imagery, site inspections	Quarterly	Contractor's Safeguards Officer; RA	3,000
		Obtain appropriate permits for any water abstraction requirements and comply with all regulatory standards.	Valid permits in place	Permit registry, compliance reports	Quarterly	RA; Water Board	500
6.2.4.16	Disruption of Riparian Ecosystem	Schedule construction works in riparian areas during the dry season (June to November) to avoid the most critical periods for local fauna.	Works aligned to schedule	Construction logs, rainfall data	Quarterly	Contractor's Safeguards Officer; RA	3,500
		Apply erosion control techniques, such as silt fences and sedimentation basins, to prevent sediment from entering riparian zones during and after construction (see Guidelines in Annex 14).	Erosion measures installed	Field inspection reports	Quarterly	Contractor's Safeguards Officer; RA	Included above
		Increase the span of riparian sections to maintain the ecological functions of the wetlands and avoid disrupting their services.	Span design compliance verified	Design drawings, site verification	Once (Design Stage)	Design Engineer; RA	2,000

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		Ensure the maintenance of environmental flow (e-flow) at all riparian zone crossings during the construction phase to sustain the wetlands' natural functions.	Flow data within range	Flow meters, hydrological reports	Quarterly	Contractor's Safeguards Officer; RA	None
		Implement stormwater management systems that capture and treat road runoff before it enters riparian areas, reducing the risk of water contamination.	Runoff treatment facilities installed	Inspection logs, lab tests	Quarterly	RA; Supervision Consultant	Included above
		Adopt best management practices to prevent pollution from construction activities and road use, including proper waste disposal and minimising the use of harmful chemicals.	Zero pollution incidents	Environmental audits, incident logs	Quarterly	Contractor's Safeguards Officer; RA	None
6.2.4.17	Increased Risk of Accidents due to Change in Traffic Flow	Develop and implement a traffic management plan, as guided by Annex 5, to manage traffic disruptions and enhance safety.	Approved TMP implemented	TMP documents, site checks	Quarterly	Contractor's Safeguards Officer; RA; Traffic Police	4,000
		Enforce compliance with safety and signalling standards on public roads, prioritising the safety of the local population and minimising disruptions to their daily activities.	Road safety signs in place	Road safety audits, field checks	Quarterly	Contractor's Safeguards Officer; RA; Traffic Police	None
		Implement pedestrian safety management strategies, including the provision of safe corridors, side roads, and bridges, to protect pedestrians and livestock from traffic hazards.	Pedestrian facilities constructed	Site inspection reports	Quarterly	RA; Local Councils	Included in works
		Install barriers, such as guardrails and fencing, to prevent unauthorised pedestrian and livestock access to	Barriers installed and functional	Site verification, photos	Quarterly	RA; Supervision Consultant	Included in works

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		the roadway, except at designated crossing points.					
		Secure and signal houses near the construction site that do not require resettlement to prevent accidental damage or injury.	Houses demarcated/signed	Community feedback, site inspection	Quarterly	Contractor's Safeguards Officer; RA	2,500
		Conduct regular road safety awareness and sensitisation programmes targeting pedestrians, motorcycle operators, and small vehicle drivers.	Number of sessions conducted	Attendance lists, campaign reports	Quarterly	RA; Local Councils	2,000
		Install speed calming structures at strategic locations, including trading centres, villages, schools, hospitals, and public service areas, to reduce vehicle speeds and enhance safety.	Speed calming measures installed	Site audits, traffic inspection reports	Quarterly	RA; Traffic Police	Included in works
		Develop and implement a traffic circulation plan for construction sites to minimise the passage through densely populated areas and near sensitive receptors, such as schools and trading centres.	Circulation plan operational	Routing maps, approval records	Quarterly	RA; Supervision Consultant	Included in works
		Prepare an emergency preparedness and response plan, as guided by Annex 18, in coordination with the local community and emergency responders, to provide timely first aid and hazardous materials response in the event of accidents.	Emergency plan developed and tested	Drill reports, EPRP documents	Quarterly	Contractor's Safeguards Officer; RA; Local Councils	3,000

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		Conduct a dedicated road safety programme for schools with tailored messages for students and staff.	Number of school campaigns conducted	School reports, training attendance	Quarterly	RA; Ministry of Education	2,000
6.2.4.18	Increased Risk of Sexually Transmitted Infections and other Communicable Diseases	Develop an HIV and AIDS prevention and management plan, following the guidance provided in Annex 16, to address the risks associated with STIs and HIV and AIDS.	HIV/AIDS plan developed and operational	Approved plan, implementation reports	Quarterly	Contractor's Safeguards Officer; RA; Ministry of Health	5,000
		Prioritise the recruitment of local workers to reduce the influx of non-local workers and increase income for local families.	% of workers from local communities	Employment records, recruitment logs	Quarterly	Contractor's Safeguards Officer; RA	None
		Conduct regular health awareness campaigns for workers and the local population to educate them on disease transmission, prevention and treatment, in line with Malawi's HIV and AIDS prevention programme.	Number of health awareness campaigns conducted	Attendance records, campaign reports	Quarterly	Contractor's Safeguards Officer; RA; Ministry of Health	2,000
		Distribute condoms regularly to minimise the risk of spreading STIs, and HIV and AIDS.	Number of condoms distributed	Distribution logs, supply records	Quarterly	Contractor's Safeguards Officer; RA; Ministry of Health	2,000
		Establish a campsite clinic and arrange with local health service provider to offer regular Voluntary Counselling and Testing (VCT) services.	Clinic operational, number of VCT sessions	Clinic reports, MoUs with providers	Quarterly	Contractor's Safeguards Officer; RA; Ministry of Health	Included above

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		Conduct frequent sensitisation/toolbox talks for workers on money management, encouraging them to invest in their families rather than spending on alcohol, gambling, or sex workers.	Number of toolbox talks conducted	Toolbox registers, attendance lists	Monthly	Contractor's Safeguards Officer; RA	3,000
		Eliminate pools of stagnant water created by construction activities to control mosquito proliferation and prevent insect-borne diseases such as malaria.	% of stagnant pools eliminated	Inspection reports, vector control records	Quarterly	Contractor's Safeguards Officer; RA	2,500
6.2.4.19	Introduction and Spread of Invasive Alien Species (IAS)	Develop an invasive plant removal and management plan using the guidance provided in the Biodiversity Management Plan (BMP) Guidleines in Annex 15, to control and eliminate IAS.	Plan developed and implemented	BMP plan, field verification reports	Quarterly	Contractor's Safeguards Officer; RA; Forestry Dept.	2,000
		Avoid transporting materials that may contain foreign seeds into the project area to prevent the introduction of new invasive species,	Compliance with material inspection protocols	Transport records, inspection checklists	Quarterly	Contractor's Safeguards Officer; RA	None
		Remove all invasive species mechanically within the project area to prevent their spread.	Area cleared of invasives	Site inspection reports, photos	Quarterly	Contractor's Safeguards Officer; RA	2,000
		Monitor construction areas and adjacent wetlands for invasive species and implement management plans to control or eradicate them before they become established.	Monitoring system operational	Monitoring logs, site reports	Quarterly	Contractor's Safeguards Officer; RA; Forestry Dept.	3,000
6.2.4.20	Loss of Trees	Carried out selective tree-cutting in necessary areas, avoiding unnecessary removal at locations such as campsites or borrow pit areas.	% of unnecessary trees avoided	Site inspection, vegetation inventory	Quarterly	Contractor's Safeguards Officer; RA; Forestry Dept.	None

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		Develop and implement a biodiversity management and restoration plan guided by Annex 15 to mitigate the impact on local flora and fauna.	Plan developed and actions implemented	Approved plan, restoration logs	Quarterly	Contractor's Safeguards Officer; RA; Forestry Dept.	3,000
		Replant trees at a rate of ten saplings for every tree cut under an afforestation plan to restore ecological balance.	Tree survival and replacement rate	Planting records, survival surveys	Quarterly	Contractor's Safeguards Officer; RA; Forestry Dept.	5,000
		Prohibit the purchase of firewood or charcoal from unlicensed suppliers to discourage illegal logging and charcoal production, and protect local forests.	% purchases from licensed suppliers	Procurement records, supplier checks	Quarterly	Contractor's Safeguards Officer; RA	3,000
		Utilise renewable energy sources for cooking at campsites to reduce reliance on firewood.	Renewable energy equipment in use	Camp inspection reports	Quarterly	Contractor's Safeguards Officer; RA	Included in works
		Provide packed meals to workers at all construction sites to minimise the demand for firewood and reduce pressure on local resources.	Number of packed meals provided	Meal distribution logs	Quarterly	Contractor's Safeguards Officer; RA	Included in works
6.2.4.21	Risk of Disturbance of Chance Finds	Implement and operationalize a Chance Find Procedure, in compliance with the Monuments and Relics Act and ESS8, covering discovery protocols, reporting, site protection, and expert consultation (See Procedure in Annex 22).	Chance Find Procedure activated on discoveries	Records of finds, notification logs	Quarterly	Contractor's Safeguards Officer; RA; Dept. of Antiquities	3,000
		Train all site workers and supervisors on how to recognize and respond to potential archaeological finds.	% of workers trained	Training records, attendance lists	Quarterly	Contractor's Safeguards Officer; RA	2,500

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		Secure and isolate any chance find location immediately, stopping work until the Department of Antiquities provides clearance.	% chance finds isolated and protected	Site inspection reports	As needed	Contractor's Safeguards Officer; RA; Dept. of Antiquities	3,000
		Engage a qualified archaeologist or cultural heritage expert to assess any find and recommend appropriate action.	Archaeologist engaged and reports produced	Expert reports, invoices	As needed	RA; Dept. of Antiquities	2,500
		Budget for contingency actions, including investigation, documentation, or respectful relocation of cultural materials.	Contingency budget available and used	Budget records, payment records	Annual	RA; Supervision Consultant	None
6.2.4.22	Disruption of utilities and social services (e.g. water and electricity supply, social services like markets, clinics etc)	Conduct a detailed mapping and inventory of existing utilities and social services prior to construction (detailed in the RAP report)	Mapping and inventory completed	RAP reports, site verification	Once (Pre-construction)	Contractor's Safeguards Officer; RA	Included in RAP
		Engage with service providers (e.g. ESCOM, water boards, telecom companies) to coordinate and plan utility relocation or protection.	Number of coordination meetings	Meeting minutes, agreements	Quarterly	Contractor's Safeguards Officer; RA	500
		Develop and implement a Utility Relocation and Management Plan under the RAP.	Utility plan developed and implemented	Approved plan, relocation records	Quarterly	Contractor's Safeguards Officer; RA	Included in RAP
		Notify communities and service users in advance of any planned disruptions (at least 7 days' notice).	% notifications delivered on time	Notification logs, community feedback	Quarterly	Contractor's Safeguards Officer; RA	None
		Install and provide temporary service alternatives where possible (e.g., water tanks, backup generators, temporary market stalls).	Number of temporary facilities installed	Site inspections, usage records	Quarterly	Contractor's Safeguards Officer; RA	2,000

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		Carry out continuous access to critical services, especially clinics and schools, by planning appropriate detours and signage.	% access routes maintained	Detour plans, site inspections	Quarterly	Contractor's Safeguards Officer; RA	None
		Assign a Grievance Redress Mechanism (GRM) to handle complaints related to service disruptions promptly.	Functioning GRM in place	GRM logs, resolution reports	Quarterly	Contractor's Safeguards Officer; RA	None
		Provide alternative sites for marketing activities prior to works close to the market in liaison with the district and city councils in all identified markets along the corridor.	% markets provided with alternatives	Market relocation records	Quarterly	Contractor's Safeguards Officer; RA; Local Councils	3,000
		Include utility protection clauses in contractor contracts, with penalties for negligence.	Clauses included in all contracts	Contract documents, compliance checks	Once	RA; Supervision Consultant	None
		Rehabilitate affected infrastructure promptly and to pre-project standards or better.	% infrastructure rehabilitated	Completion certificates, inspection reports	Quarterly	Contractor's Safeguards Officer; RA	Included in works
		Provide a fully approved clinic at the camp sites to handle cases related to construction works in order to reduce pressure on existing government health facilities.	Clinic established and operational	Medical facility inspection reports	Quarterly	Contractor's Safeguards Officer; RA; Ministry of Health	≥300,000 (works BoQ)
6.2.4.23	Impacts on Fauna (Disturbance, Habitat Loss, and Poaching Pressure)	Restrict vegetation clearance to the approved road reserve and avoid unnecessary disturbance to riparian habitats.	% of vegetation clearance limited to road reserve	Site inspection reports, clearance permits, satellite/drone imagery	Quarterly	Contractor's Safeguards Officer; RA; Department of Forestry	None

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		Enforce a “no hunting/no bushmeat” policy through the Contractor’s Code of Conduct, with penalties for violations.	Number of violations reported/sanctioned	Signed Codes of Conduct, violation records, incident logs	Quarterly	Contractor’s Safeguards Officer; RA; DNPW	None
		Conduct worker sensitisation campaigns on biodiversity conservation and wildlife laws.	Number of sensitisation sessions conducted	Training attendance sheets, awareness materials, photos	Quarterly	Contractor’s Safeguards Officer; RA; DNPW	1,000
		Implement tree replanting and greening programs with native species to restore roadside habitats.	Number of trees planted and survival rate	Tree inventory, planting maps, survival monitoring reports	Quarterly	Contractor’s Safeguards Officer; RA; Department of Forestry	3,000
		Schedule noisy activities (blasting, heavy machinery) during daylight hours only, to minimise wildlife disturbance.	% of noisy activities conducted only in daylight hours	Work schedules, contractor logs, noise monitoring records	Quarterly	Contractor’s Safeguards Officer; RA; Supervision Consultant	None
		Collaborate with the Department of Forestry and Department of National Parks and Wildlife (DNPW) to monitor and respond to any reported poaching incidents.	Number of joint monitoring patrols conducted; number of incidents addressed	Patrol reports, meeting minutes, incident logs	Quarterly	Contractor’s Safeguards Officer; RA; Department of Forestry; DNPW	2,000
6.2.5	**Positive Impacts During Operation Phase**						
6.2.5.1	Improved Mobility and Access to Social Services	Maintain road quality through routine and periodic maintenance activities.	Road condition index maintained or improved	Maintenance logs, inspection reports	Quarterly	Contractor’s Safeguards Officer; RA	Included in RA Ops budget
		Facilitate integration with local and regional public transportation systems such as the Nacala Corridor.	% alignment with regional transport plans	Regional planning docs, maps	Annually	RA; Ministry of Transport	3,000

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		Construct and maintain access roads or footpaths linking communities to main road.	% of access links constructed/maintained	Field inspections, completion certificates	Quarterly	Contractor's Safeguards Officer; RA; Local Councils	3,000
		Raise awareness among community members about safe and reliable transport services.	Number of sensitisation campaigns conducted	Campaign reports, attendance registers	Quarterly	RA; Local Councils; Ministry of Information	2,500
6.2.5.2	Stimulation of Local and Regional Economies	Develop roadside market infrastructure and promote small business incubation near trading centres.	Number of markets developed/upgraded	Site inspections, market operation records	Bi-annual	RA; Ministry of Trade; Local Councils	3,000
		Support local councils in developing market zoning and road setback enforcement.	Existence of zoning/setback by-laws enforced	Council reports, enforcement logs	Annually	RA; Local Councils	2,500
		Facilitate access to finance and training for small traders and transport operators.	Number of traders/operators accessing finance/training	Loan records, training registers	Bi-annual	RA; Ministry of Trade; Microfinance Institutions	2,500
		Encourage value-addition activities by linking farmers to processing facilities and organized markets.	Number of farmer linkages supported	Extension reports, supply chain data	Annually	RA; Ministry of Agriculture	2,500
6.2.5.3	Enhanced Road Safety and Reduced Accidents	Install and maintain road signage, speed bumps, and guardrails in trading centres and near schools.	% signage and safety infrastructure installed	Inspection reports, road safety audits	Quarterly	Contractor's Safeguards Officer; RA; Supervision Consultant	2,500
		Conduct road safety awareness campaigns for drivers, cyclists, and pedestrians.	Number of awareness campaigns conducted	Campaign reports, participant records	Quarterly	RA; Ministry of Transport	2,000

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		Collaborate with traffic enforcement agencies to ensure compliance with speed limits and road use regulations.	% of enforcement operations conducted	Police records, traffic reports	Quarterly	RA; Traffic Police	2,000
		Monitor road safety performance through traffic incident reporting systems and stakeholder feedback.	Number of accidents/incidents tracked	Crash statistics, stakeholder feedback reports	Quarterly	RA; Local Councils	2,500
6.2.6	**Negative Impacts During Operation Phase**						
6.2.6.1	Air Pollution Resulting in Climate Change-Related Impacts.	Plant trees of various species within the project areas and within the road corridor, at the extent of the Right of Way, at ten metres from each other on either side of the road.	Number of trees planted and survival rate	Tree inventory, survival surveys	Quarterly	Contractor's Safeguards Officer; RA; Forestry Department	2,500
		Encourage communities traversed by the road to replant trees in their areas in collaboration with local and national authorities.	Number of community tree-planting campaigns	District forestry records, campaign reports	Quarterly	RA; Local Councils; Forestry Department	2,000
		Enforce vehicle fitness tests are done at annual intervals for all vehicles using the road, and based on a certificate of fitness, only fit vehicles will be allowed to operate on the road and operationalize the weighbridge to be constructed under SATCP to control the load of vehicles.	% of vehicles certified fit; weighbridge operational logs	Vehicle inspection records, weighbridge reports	Annually	RA; Traffic Police; Ministry of Transport	2,500
		Follow occupational hygienic practices throughout the Project life cycle of the Road.	Number of OHS audits conducted	OHS audit reports, training logs	Quarterly	RA; Ministry of Labour	2,500
6.2.6.2	Increased risk of traffic-	Provide proper road signs and warnings.	% signage installed and maintained	Road sign database, inspection reports	Quarterly	RA; Supervision Consultant	2,500

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	related accidents.	Provide service roads, junctions, and safe passages at appropriate locations to ensure safe and efficient access.	Number of service roads/junctions constructed	As-built drawings, field inspections	Annually	RA; Design Engineer; Local Councils	3,000
		Provide suitable truck parking places.	Number of parking facilities constructed	Site inspections, usage surveys	Annually	RA; Local Councils	2,500
6.2.6.3	Noise Pollution and Excessive Vibrations	Enforcement of Traffic Act regulations to ensure that all vehicles using the road are in good condition all the time to avoid excessive noise generation.	% compliance with Traffic Act	Road patrol logs, enforcement records	Quarterly	RA; Traffic Police	2,500
		Install speed control measures such as bumps and rumble strips in the villages and towns where the road traverses.	Number of speed calming structures installed	Road safety audits, photos	Quarterly	RA; Local Councils	2,500
		Install no hooting signs in sensitive areas such as near hospitals, schools, churches, mosques etc	Number of no-hooting signs installed	Inspection reports, signage inventory	Quarterly	RA; Local Councils	2,000
6.2.6.4	Inadequate Stormwater Drainage and Flooding of Road Shoulders	Establish a routine road and drainage maintenance programme post-construction.	Existence of maintenance programme	Maintenance logs, inspection reports	Annually	RA	500
		Train district council staff and communities on identifying and reporting blocked drains or culverts.	Number of staff/community trained	Training reports, attendance records	Annually	RA; Local Councils	200
		Include budget provisions for emergency de-silting and maintenance.	Budget allocation confirmed	Maintenance budget records	Annually	RA; Local Councils	500
6.2.6.5	Proliferation of Informal Roadside	Work with local councils to designate and plan formal market spaces near bridge approaches.	Number of formal markets established	Meeting minutes, council plans	Annually	RA; Local Councils	500

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	Trading along the corridor	Install signage and roadside barriers to prevent unsafe informal vending near the carriageway.	Number of barriers installed	Inspection reports, signage photos	Annually	RA; Local Councils	500
		Conduct community sensitisation on safety risks and legal limits of roadside trading.	Number of sensitisation campaigns held	Campaign records, participant lists	Annually	RA; Local Councils	500
		Enforce local by-laws against encroachment of the road reserve and drainage structures.	Number of enforcement actions taken	Council reports, by-law enforcement records	Annually	RA; Local Councils	500
6.2.6.6	Risk of Illegal Settlements Along the Road Reserve	Enforce strict compliance with the 36m road reserve boundary in partnership with local authorities.	% compliance with 36m boundary	Enforcement reports, site inspections	Annually	RA; Local Councils	500
		Erect permanent beacons and demarcations to prevent land grabbing or informal construction.	Number of beacons/demarcations installed	Field inspection reports, site photos	Annually	RA; Local Councils	500
		Conduct awareness campaigns on the legal status of the road reserve and its purpose.	Number of awareness campaigns conducted	Campaign reports, community feedback	Annually	RA; Local Councils	500
		Develop a grievance mechanism for handling disputes over land use or forced relocations.	GRM established and functional	GRM records, grievance logs	Annually	RA; Local Councils	500
	TOTAL BUDGET						**262,700**
	Construction Phase (Pre-construction, Construction and Demobilization)						205,000
	Operation Phase Budget (Annual)						57,700

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7.5 Implementation of the ESMP

The ESMP shall be implemented to address all activities that have been identified to have potentially significant impacts on the environment during normal operations and upset conditions. The implementation of the Project environment and social component will be overseen by different institutional arrangements. The players include the following:

7.5.1 Roads Authority through the SATCP PIU

The Roads Authority is the proponent responsible for overseeing the Southern Africa Trade and Connectivity Project (SATCP) implementation. The Project Implementation Unit (PIU), already in place, handles the daily management and coordination of the project activities. The Project Coordinator, who leads the PIU, plays a central role in ensuring the project's smooth operation. They work closely with other key personnel within the PIU, including the Environmental Specialist and the Social Specialist. These specialists are crucial for managing and mitigating environmental and social risks throughout the project cycle. The PIU's Environmental Specialist, OHS Specialist and Social Specialists will directly engage with Environmental, OHS Specialist and Social Experts from both the Supervision Consultant and the Contractor. The specific roles of the key PIU staff are as follows:

- Project Coordinator
- Overall responsibility for managing the PIU.
- Coordinates all activities related to project implementation on a daily basis.
- Liaison between the Roads Authority, the World Bank, government bodies, and key stakeholders.
- Ensures that project timelines, budgets, and objectives are met.
- Oversees the implementation of environmental and social safeguards.

- Environmental Safeguards Specialist
- Coordinate the Development and implementation of Environmental and Social safeguards instruments.
- Conducts regular environmental monitoring to ensure compliance with national laws and World Bank Environmental and Social Standards (ESS).
- Identifies environmental risks and proposes mitigation strategies during the project's lifecycle.
- Works closely with the Environmental Experts from the Supervision Consultant and Contractor to ensure proper environmental management.
- Reports on environmental compliance to the Project Coordinator and World Bank as required.

- Social Safeguards Specialist
- Develops and implements the Social Management Plan, including compliance with OP/BP 4.12 (Involuntary Resettlement) and the consultation and disclosure requirements under OP/BP 4.01 (Environmental Assessment).
- Manages the project's social impacts, including community relations, stakeholder engagement, and grievance redress.
- Works to minimise the negative social impacts of the project, including issues such as displacement, livelihood restoration, and gender-based violence (GBV).

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- Monitors social risks and ensures timely resolution of grievances through the Grievance Redress Mechanism (GRM).

- Occupation Health and Safety Safeguards Specialist
- Coordicate the development and implementation of Occupation Health and Safety Plan and community health and safety plan for the SATCP;
- Work closely with consulting engineer and stakeholder in implementation of OccupationHealth and Safety and community and safety measures.

7.5.2 Supervision Consultant

Monitoring activities will be the responsibility of the supervision with the Resident Engineer being the leader. Among other staff, the Resident Engineer will have a qualified Environmental Safeguards Expert, Occupation health and safety expert and Social safeguards Expert. Among the immediate and follow-up tasks of the Environmentalist and Social Experts at the Resident Engineers office will include;

- Development of a monitoring tool or checklist based on the ESMP and guided by the project physical layout;
- Develop a monitoring program for the works targeting specific project working sites, material sites, sensitive environment and social areas, etc.;
- Prepare monthly site meetings to involve the Contractor, Client and stakeholders;
- Monthly reports in addition to continuous communications to the Contractor, Client, the authorities and stakeholders as the situation require;
- The Resident Engineer will convene monthly meetings for progress reporting by the Contractor and the supervision team.
- Develop a change management procedure (by contractor and/or Supervising Engineer) that includes E and S Safeguards specialists in review and approval process.

7.5.3 The Contractor

The Contractor is expected to integrate environmental and social focus during project management. To ensure effective implementation of the Project's impacts mitigation measures, therefore, the Contractor must employ Environmental safeguards officer, Health and Safety Officer and the Social Safeguards Officer with the following responsibilities;

- Evaluate and review the ESMP developed from the main ESIA process and internalize the provisions for implementation based on the realities of the project.
- Develop Contractor's ESMP, Traffic Management Plan, GBV/SEA/SH/VAC Prevention Plans, Occupational Safety and Health Plan, Community Health and Saefty Plan, Grievance Redress Mechanism, Waste Management Plan and other management plans identified in the ESIA.
- Customise the project ESMP and generate a C-ESMP as a tool to guide the implementation and monitoring of indicators.
- File a copy with the Resident Engineer.
- Procure necessary equipment for environment measurements or engage some appropriate expert personnel for the activity in specific environment quality aspects including air quality, noise, water, and soil quality,

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- Monthly reporting throughout the Project period.

7.6 Stakeholder engagement, Grievance Redress Mechanim, Displosure and Consultations

A separate Stakeholder Engagement Plan (SEP) has been prepared for the Project. This ESIA will be disclosed after approval, of which it will be disclosed on Roads Authority's website; www.ra.org.mw, SATCP's website; www.satcp.mw , the local newspaper and the community meetings which will be arranged by the PIU. Key feedback on this ESIA is provided in Annex 2 and 7 of which it shows the stakeholders engaged and key issues raised.

The project also developed the Grievance Redress Mechanism Manaul (accessed on; https://satcp.mw/projects/safeguards/), which guides the implementation of the GRM issues for the project. For Liwonde-Matawale Road, the project set up the GRM committee at three levels which are; National, District and community level as specified in the GRM manual for the project.

The project has a dedicated platform for reporting grievances. The following are the platforms provided by the project.

A. At National Level, a dedicated email addressed was developed (grievance@satcp.mw) and a cell phone lines (+265 989565007, +265897776944) which are all active. Additionally, the National GRM committee meets quarterly to share the progress made towards implementation of the GRMs
B. At District level, the project is using the existing GRM structures for the District, of has representation of the Public Works, Planning, Environment, Labour, Social Welfare, Gender, Community Development, among others. The Secretary to the committee is the Environmental Officer.
C. At the community Level, the project has the Community Grievance Redress committee which are responsible of handling all community related grievances.

All the committees report to the higher committee, except the National Level committee.

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CHAPTER 8: CONCLUSION AND RECOMMENDATIONS

8.1 Conclusion

The proposed upgrade of the Liwonde–Matawale (M003) Road is expected to yield significant positive socio-economic benefits, particularly through enhanced transportation connectivity, reduced travel times and costs, improved access to markets and social services, and the stimulation of local economic development. The enhanced road infrastructure is anticipated to benefit both rural and urban communities along the corridor, support agricultural value chains, and foster regional integration.

However, the project also presents several negative environmental and social risks that must be carefully managed to ensure sustainable implementation. Generally, the proposed project is planned to follow existing alignments thus the potential impacts are therefore reduced.

The key environmental impacts include:

i. Loss of Vegetation and Biodiversity especially within the Liwonde Forest Reserve and other natural habitats. This could disrupt vital ecosystem services and habitat integrity, although it is noteworthy that no critically endangered species were recorded.
ii. Soil Erosion and Siltation, particularly in hilly sections and near river crossings. This may result in increased sediment loading in nearby streams such as the Lifani, Domasi, and Chikupira Rivers.
iii. Air Pollution from dust emissions and vehicular exhaust during both the construction and operational phases, potentially affecting the health of workers and communities in densely populated areas like Songani and Domasi.
iv. Noise Pollution is expected from heavy equipment operation and increased traffic volumes, particularly impacting settlements close to the road, such as Machinga Boma and Chinamwali.
v. Water Pollution Risks associated with water pollution, including the contamination of surface water sources due to improper disposal of construction waste, fuel spills, and increased sedimentation.
vi. Increased Flooding Risks particularly in low-lying areas with inadequate drainage design, posing threats to the longevity of infrastructure and community safety.

Social impacts that warrant attention include physical and economic displacement along the road, poor labour conditions and rights violations, exposure of workers to occupational health and safety hazards, increased incidences of Gender-Based Violence (GBV), and Sexual Exploitation and Abuse and Sexual Harrassment (SEA/SH). These risks necessitate ongoing attention throughout the project's lifecycle.

In response to these risks, the project has developed a comprehensive Environmental and Social Management Plan (ESMP), which includes mitigation and monitoring measures tailored to each identified risk, aligning with Malawi's regulatory framework and international best practices. These measures encompass biodiversity conservation strategies, erosion and

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sediment control, occupational health and safety procedures, GBV and SEAH prevention campaigns, waste management systems, and compensation protocols related to the RAP.

The ESMP places significant emphasis on continuous stakeholder engagement, grievance redress mechanisms, and capacity-building initiatives to enhance community ownership and ensure compliance. With diligent execution of the ESMP, regular oversight, and commitment from all stakeholders, the Liwonde–Matawale Road Project is well-positioned to deliver transformative outcomes while minimizing its environmental and social footprint. Ultimately, the project represents a critical step toward inclusive and sustainable infrastructure development in Malawi.

8.2 Recommendations

The following recommendations address key environmental and social management actions identified in this Project. These measures are intended to guide RA, implementing partners, and relevant regulatory institutions in ensuring compliance, effective risk mitigation, and long-term sustainability.

Roads Authority (RA)

i. Allocate adequate financial and human resources for the implementation of the ESMP, including the Environmental and Social Monitoring Plan.
ii. Require the construction contractor to prepare and submit for approval the following plans prior to mobilization: Environmental and Social Implementation Plan (ESIP), Waste Management Plan, Occupational Health and Safety Plan (OHSP), Grievance Redress Mechanism (GRM), and Gender-Based Violence (GBV)/Sexual Exploitation and Abuse (SEA) Action Plan.
iii. Establish a community-level Grievance Redress Mechanism to address complaints from Project-Affected Persons (PAPs), and ensure that the contractor and supervising engineer establish separate GRM committees for worker-related grievances.
iv. Implement measures to guarantee all compensation and livelihood restoration activities in the RAP are completed prior to construction works in affected areas.
v. Conduct periodic audits and evaluations of ESMP compliance and integrate lessons learned into adaptive management processes.
vi. Design the climbing lanes with smooth or gentle gradients to improve vehicle safety and reduce construction-related environmental impacts.
vii. Appoint or assign a qualified hydrologist among key project staff to address road drainage design and water management, particularly in areas with high water tables and river crossings.

Construction Contractor

- Appoint qualified environmental safeguards officer, health and safety officerand social safeguards officer on-site to coordinate daily implementation of the C-ESMP and supervise adherence to mitigation measures.
- Provide Personal Protective Equipment (PPE) to all workers and train them in safe working procedures, in accordance with the Occupational Safety, Health, and Welfare Act.
- In collaboration with the Roads Authority and the Department of Forestry, the contractor must engage an independent entity to carry out reforestation intevrnetions to

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off-set impacts on vegetation clearance along the Liwonde Forest Reserve. The entity must have clear expertise in biodiversity conservation initiativess mainly in identification and replacmenent of the specific species cleared within the alignment (foe specific specied identified in the study, as these perfom specific functions for the communities).

- Implement dust suppression measures (e.g., watering unpaved roads, enclosing materials) and ensure machinery is regularly serviced to reduce emissions.
- Install adequate sanitation and waste disposal facilities at construction camps and work sites, ensuring proper management of solid, liquid, and hazardous waste.
- Train workers and subcontractors on the Code of Conduct, including provisions on GBV, SEA, child labour, and respectful community interactions.
- Prepare and implement a Traffic Management Plan (TMP) in collaboration with local authorities, including speed controls, pedestrian safety features, and designated access routes.
- Conduct regular toolbox talks, environmental awareness sessions, and community outreach programs to sensitize workers and communities.

Malawi Environmental Protection Authority (MEPA)

- Conduct regular field inspections and compliance audits to ensure implementation of the ESMP and adherence to environmental standards.
- Monitor water quality in key rivers such as the Lifani, Domasi, and Chikupira during construction phases.
- Require the submission of quarterly environmental and social monitoring reports by the contractor and supervising consultant.

Ministry of Labour (OHS Inspectorate)

- Enforce compliance with occupational health and safety standards through routine inspections and audits.
- Monitor contractor labour practices to prevent child labour and ensure fair treatment of workers.

Road Traffic Directorate

- Enforce road safety regulations along the construction corridor and ensure that temporary and permanent signage is installed appropriately.
- Collaborate with the contractor to monitor implementation of the TMP and ensure safe traffic flow during construction.

District Councils (Zomba and Machinga)

- Support stakeholder engagement activities and ensure that community concerns are reflected in project implementation.
- Oversee management of community-level grievance redress processes and assist in conflict resolution when needed.

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Annex 1: Terms of Reference

Our Reference No: MEPA / / / /
Your Reference No: .....
Communications should be addressed to:
The Director General

Malawi Environment Protection Authority
P/ Bag 317
Lilongwe 3
Tel: +265 1771111

Protecting the environment, Protecting life

30th January, 2023.

The Chief Executive Officer
Roads Authority
Functional Building
Off Paul Kagame Road
Private Bag B346
Lilongwe 3.

Dear Sir,

REQUIREMENT FOR ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE CONSTRUCTION OF LIWONDE-MATAWALE (M003) ROAD

Reference is made to the project brief on the above captioned subject which was submitted to the Authority for review and guidance.

Considering the nature and scope of the proposed project and as a requirement of Environmental Management Act of 2017, I wish to advise that you are required to prepare an Environmental and Social Impact Assessment (ESIA) before implementation of activities on the proposed site. Find the attached Terms of Reference for preparing the ESIA.

Should you require any further information or clarification on the foregoing, please do not hesitate to contact us.

Yours Faithfully,
MALAWI ENVIRONMENT PROTECTION AUTHORTY

B.B Yassin
FOR: ACTING DIRECTOR GENERAL

Attd: Terms of Reference for ESIA

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TERMS OF REFERENCE FOR ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE CONSTRUCTION OF LIWONDE-MATAWALE (M003) ROAD

1. Provide a full description of the nature/components of the proposed project with respect to the name of the proponent, postal and physical address, aim and objectives of the project, the estimated cost of the project, the size of land for the project site, the number of people to work on the area (provide a breakdown of males and females, locals and non-locals), nature of roads works, source of raw materials (borrow pits and quarries to be developed) and waste types to be generated, and waste disposal.
2. Describe main activities to be undertaken in the construction (or rehabilitation and upgrading) of the road. Identify the main construction and operation activities of the project including access roads, source of raw materials (quarries and borrow pits), storm water drainage, road works, road safety features, drainage systems (soil and water measures) and sanitary facilities. In the description also include the type of machinery to be used, nature and quantity of wastes that will be generated, facilities for appropriate waste disposal and management of waste and estimated costs for the activities.
3. Provide a site specific map of the area (Scale 1:50,000) showing the proposed project site and (1:10,000) showing existing establishment in the proposed area and surrounding areas. A site plan of the project should also be provided.
4. Provide a concise description of the existing biophysical characteristics and the socio-economic environment status of the proposed area by identifying and analyzing:
    - Physical conditions: soil, geology, site topography, temperature, rainfall patterns and drainage system (water courses);
    - Biological Resources: scope of vegetative resources of the project area including riparian vegetation, extent of terrestrial and aquatic fauna;
    - Socio-economic conditions: demographic trend within and around the project area, main land uses, business activities, basic infrastructure and health situation; and
    - Any changes anticipated during implementation of the project area. Provide a description of HIV/AIDS prevalence rates in the proposed project sites.

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5. State the reason for selecting the proposed site of the project as opposed to other sites. Consider alternatives to the project, such as alternative sites and the reason for selecting the preferred option including the 'no project' alternative. The ESIA should also consider 'within – project' alternatives e.g. designs, technology etc.
6. Predict environmental and social impacts associated with the activities at and around the site, focusing on both the positive and negative impacts. The impacts should include:
   - Project location (e.g. loss of forest reserves, loss of agricultural land, loss of grazing pastures, impact on water resources, impact on flora and fauna, impact on cultural site, and resettlement of people);
   - Project design (e.g. drainage problem, fire safety designs, and other structures);
   - Construction works (e.g. soil erosion, dust pollution, noise, disposal of construction spoils); and
   - Project operation (e.g. pollution by stored oil, fire risks to surrounding community, impacts on soil such as surface erosion and runoff, conflict of use) through its projected life.
7. Prescribe the measures to eliminate, reduce or mitigate the negative effects identified and the measures to enhance the positive effects.
8. Propose an Environmental and Social Management Plan by which all of the measures prescribed in 7 above, will be carried out. Indicate the budget for the recommended mitigation measures, specifications of who will be responsible for these measures and the schedule when these measures will take place during construction and operation of the project.
9. Propose an Environmental and Social Management and Monitoring Plan by which all mitigation measures recommended in Environmental Management Plan will be monitored. The plan should include the activities, frequency of monitoring, the key monitoring indicators, resources required and the authorities responsible for monitoring the exercises.
10. Review the legal framework pertaining to the proposed project and indicate their impacts on the project. Reference should at least be made to the Environment Management Act, Forestry Act, Water Resources Act, National Water Policy, National Environment Policy, Malawi National Land Policy, Public Health Act, Occupational Safety, Health and Welfare

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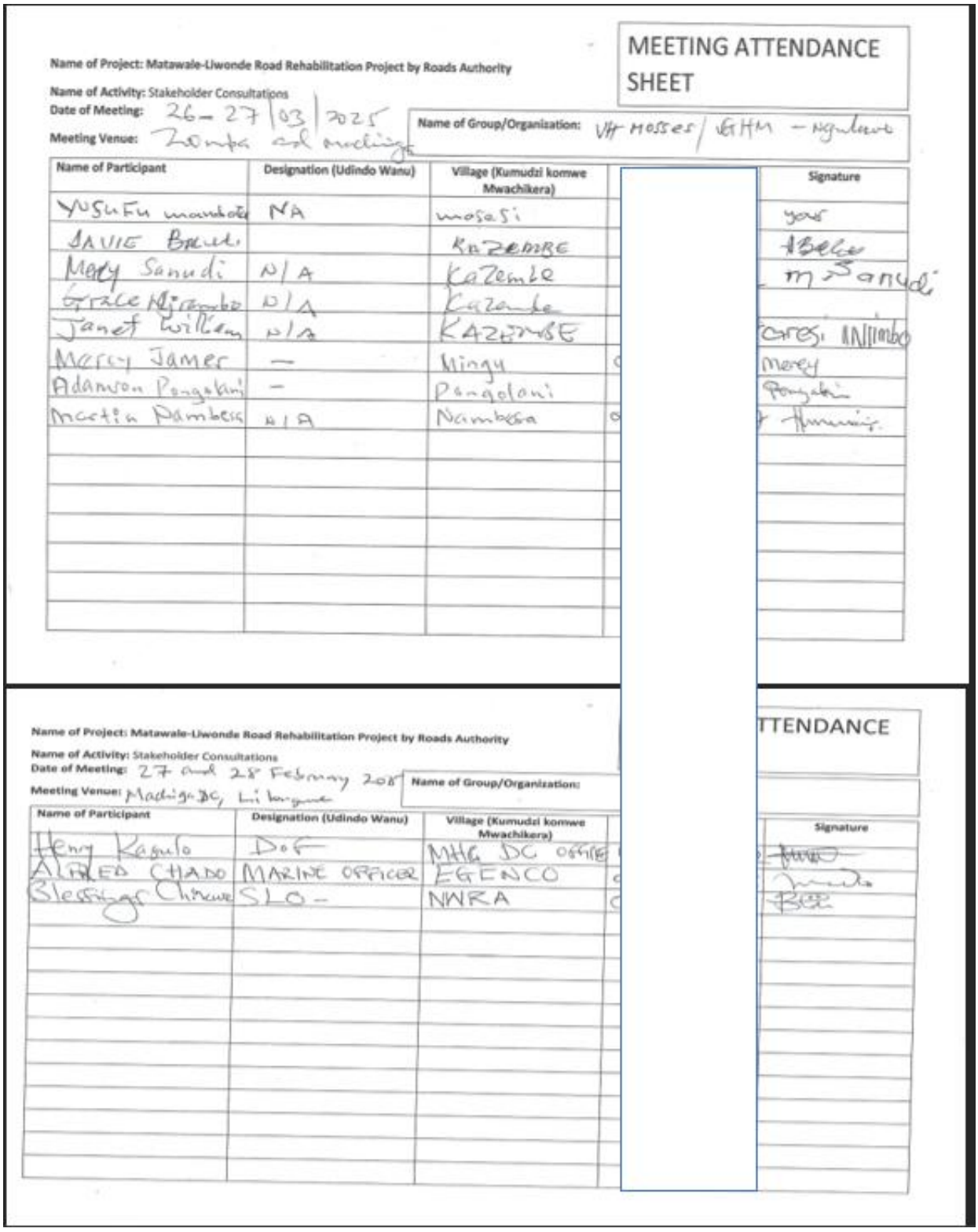
Act, Malawi Development and Growth Strategy, other relevant policies and piece of legislation. Furthermore, provide an account of all regulatory licences and approvals obtained for the proposed project to ensure that they are in line with sound environmental management practices and are in compliance with relevant existing legislation.

11. Undertake stakeholder consultation to ensure key interested and affected stakeholders are involved in the Environmental and Social Impact Assessment process. Incorporate their views in the report and indicate a record of consultations in the appendices parts of the report.
12. Ensure that District Commissioners and EDO for Machinga and Zomba District Council are consulted on the project.
13. The preparation, presentation and structure of the EIA report should follow the format in the Guidelines of Environmental Impact Assessment for Malawi (1997) as stipulated on pages 33-37. The minimum content of required information in an EIA Report is outlined in pages 53-59.
14. The ESIA team should include the following experts:
    - Environmental Impact Assessment Expert;
    - Social Expert; and
    - Civil Engineer;
15. Submit 2 hard copied to the Malawi Environment Protection Authority for preliminary review before submission of 15 hard copies for Advisory Committee on Environmental and Social Assessment Review and a soft copy of the ESIA report to the Director General of the Malawi Environment Protection Authority.
16. Provide the names of the ESIA Team and their respective fields and attach them as annex of the ESIA report.
17. Printing of ESIA report should be printed using Times New Roman, font size 12.

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Annex 2: List of People Consulted

Annex 2.1. Participant Signing Sheets



MEETING ATTENDANCE SHEET

Name of Project: Matawale-Liwonde Road Rehabilitation Project by Roads Authority

Name of Activity: Stakeholder Consultations

Date of Meeting: 26 – 27/03/2025

Meeting Venue: Zomba rd meeting

Name of Group/Organization: VH MOSES / GHM – Ngulowo

Name of Participant	Designation (Udindo Wanu)	Village (Kumudzi komwe Mwachikera)	Signature
YUSUFU mandoka	NA	mosesi	yous
JAVIE Bakali		KAZEMBE	JBeke
Mary Sanudi	N/A	Kazembe	M Sanudi
Grace Mjamba	N/A	Kazembe	
Janet William	N/A	KAZEMBE	Janet William
Mercy James	—	Ningu	Mercy
Adamson Pangakani	—	Pangalani	Pangakani
Martin Pambera	N/A	Nambera	Martin

Name of Project: Matawale-Liwonde Road Rehabilitation Project by Roads Authority

Name of Activity: Stakeholder Consultations

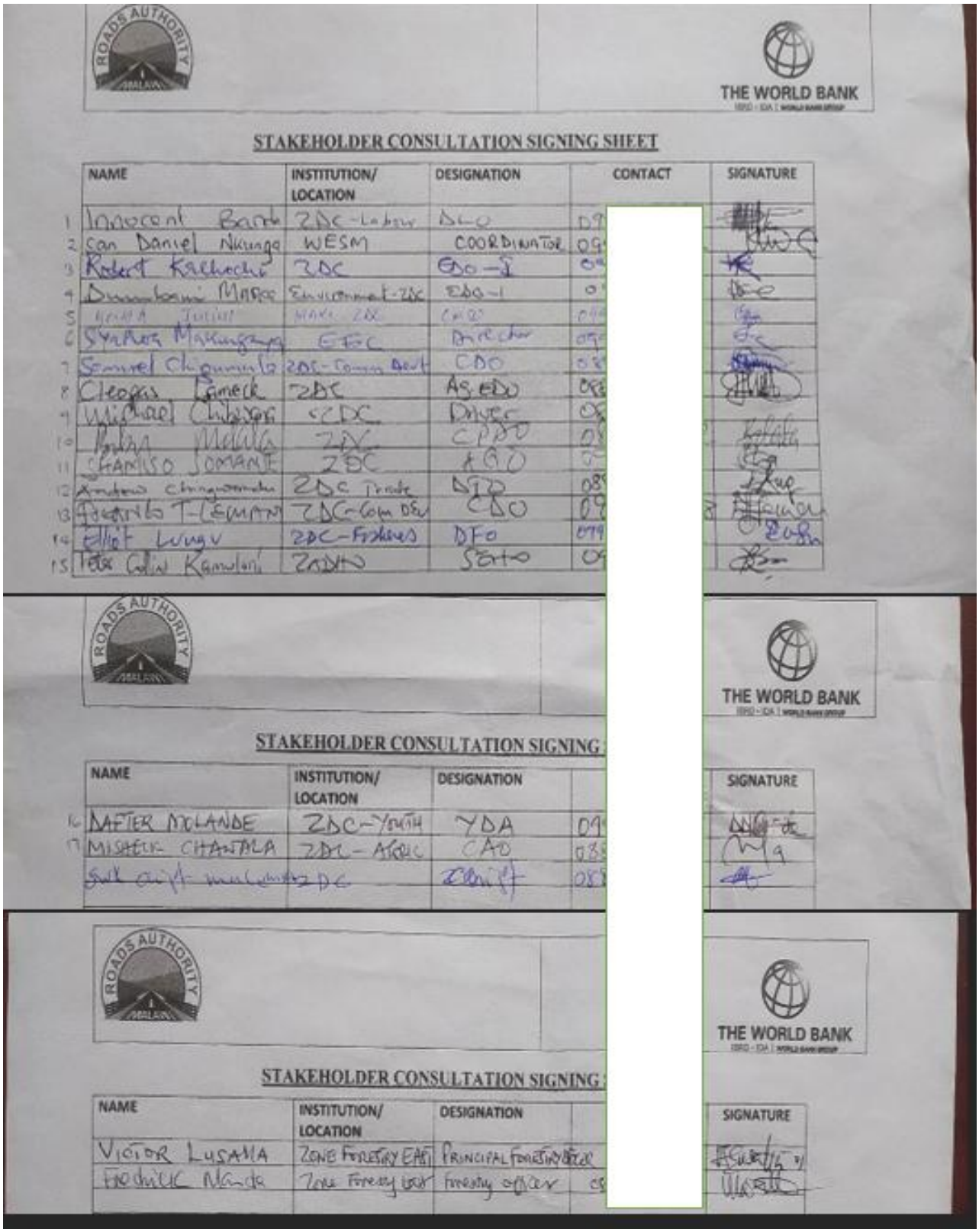
Date of Meeting: 27 and 28 February 2025

Meeting Venue: Machinjiri, Liwonde

Name of Group/Organization:

Name of Participant	Designation (Udindo Wanu)	Village (Kumudzi komwe Mwachikera)	Signature
Henry Kaguda	DoF	MHG DC OFFICE	
ALFRED CHADO	MARINE OFFICER	EGENCO	
Blessings Chirwa	SLO –	NWRA	

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STAKEHOLDER CONSULTATION SIGNING SHEET

	NAME	INSTITUTION/ LOCATION	DESIGNATION	CONTACT	SIGNATURE
1	Innocent Banda	ZDC - Lobby	DLO	09	
2	Can Daniel Nkunga	WESM	COORDINATOR	09	
3	Robert Kachuchi	ZDC	EDO - I	09	
4	Dzambani Mapoo	Environment - ZDC	EDO - I	0	
5	[illegible]	[illegible]	[illegible]	09	
6	Stephen Makungwa	EFDC	Director	09	
7	Samuel Chigumula	ZDC - Comm Dev't	CDO	08	
8	Cleopas Lameck	ZDC	AG EDO	08	
9	Michael Chibwana	CZDC	Driver	09	
10	Rodian Mkwinda	ZDC	CPDO	08	
11	CHAMISO SOMANJE	ZDC	AGO	09	
12	Andrew Chingwemba	ZDC Trade	DTD	08	
13	Fackson T-LEMANI	ZDC - Com Dev	CDO	09	
14	Elliot Lungu	ZDC - Fisheries	DFO	079	
15	Tete Calvin Kamulani	ZNDN	Secto	09	

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	NAME	INSTITUTION/ LOCATION	DESIGNATION		SIGNATURE
16	MAFTER MOLANDE	ZDC - YOUTH	YDA	09	
17	MISHECK CHAMBALA	ZDC - AGRIC	CAO	08	
	Gift Mwalwanda	ZDC	Gift	08	

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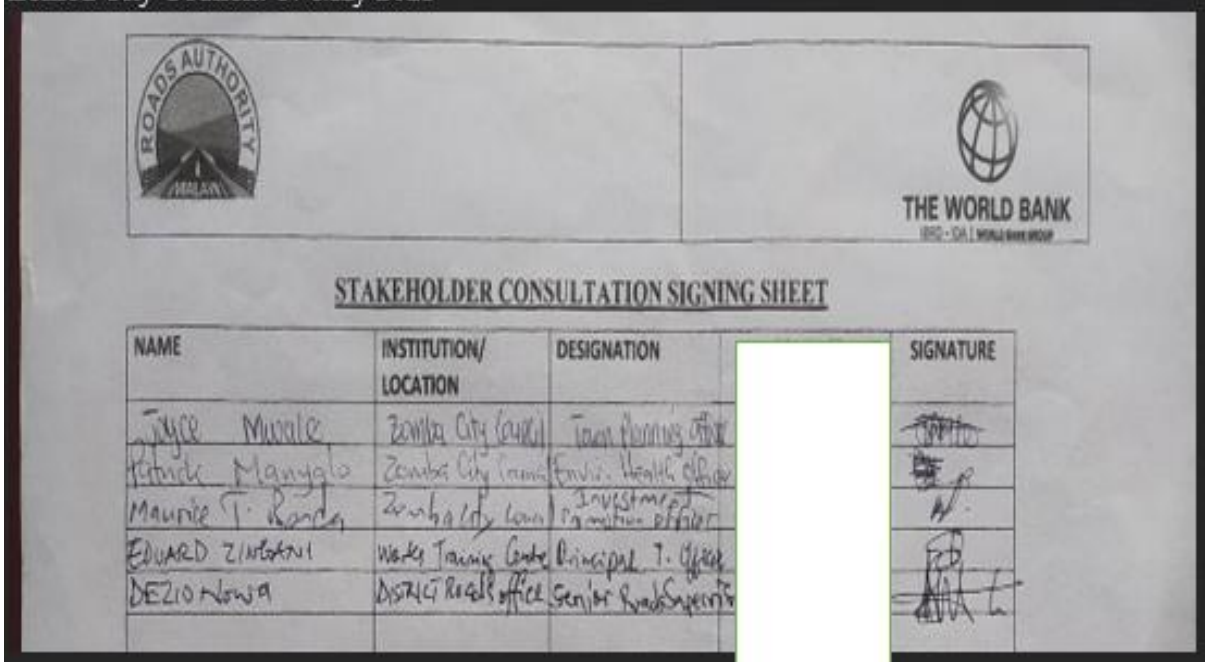
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STAKEHOLDER CONSULTATION SIGNING

NAME	INSTITUTION/ LOCATION	DESIGNATION		SIGNATURE
VICTOR LUSAMA	ZONE FORESTRY EAST	PRINCIPAL FORESTRY OFFICER		
FRANCIS Nanda	Zone Forestry West	Forestry officer	08	

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Zomba City Council: 17 May 2023



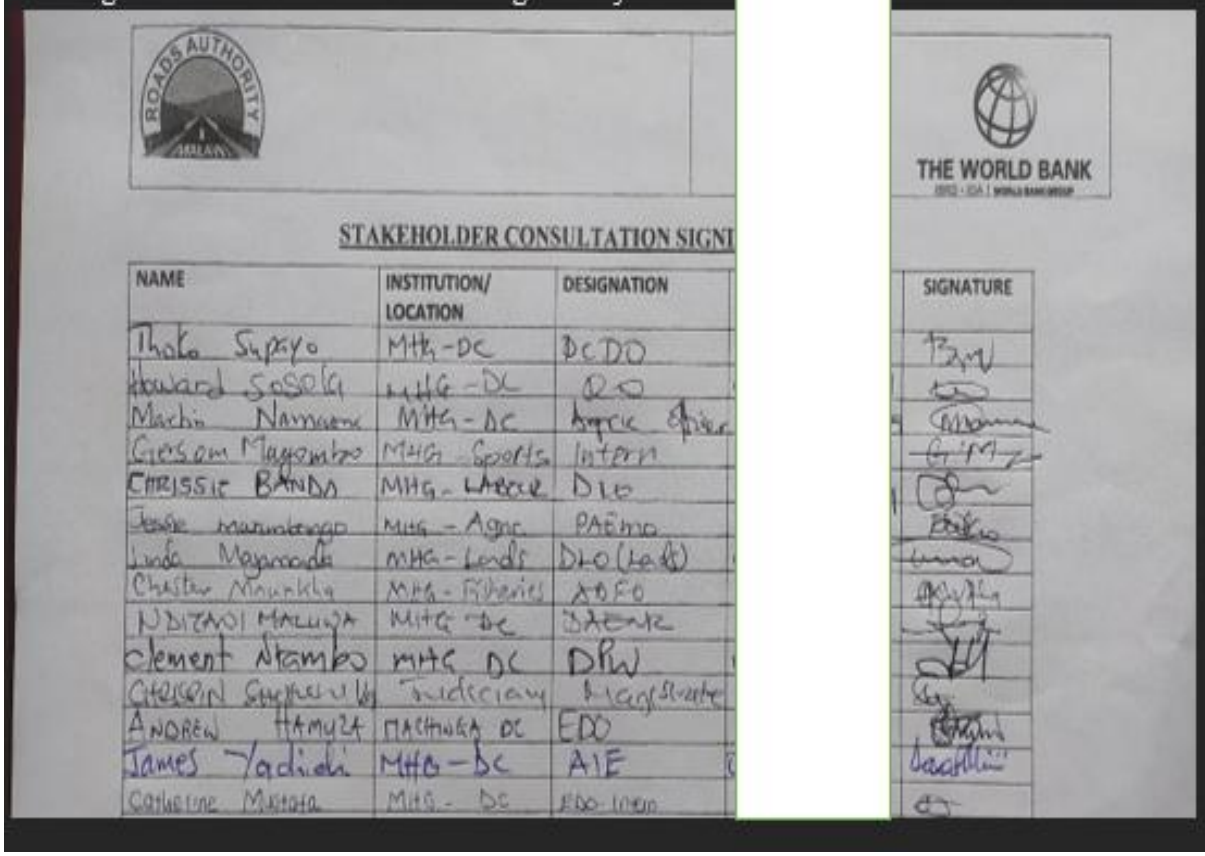
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STAKEHOLDER CONSULTATION SIGNING SHEET

NAME	INSTITUTION/ LOCATION	DESIGNATION	SIGNATURE
Joyce Musale	Zomba City Council	Town Planning Officer	
Patrick Manyala	Zomba City Council	Envir. Health officer	
Maurice T. Ranga	Zomba City Council	Investment promotion officer	
EDUARD ZIMBANI	Works Training Centre	Principal T. Officer	
DEZIO NOWA	DISTRICT Roads office	Senior Road Superintendent	

Machinga District Council DESC Meeting 18 May 2023



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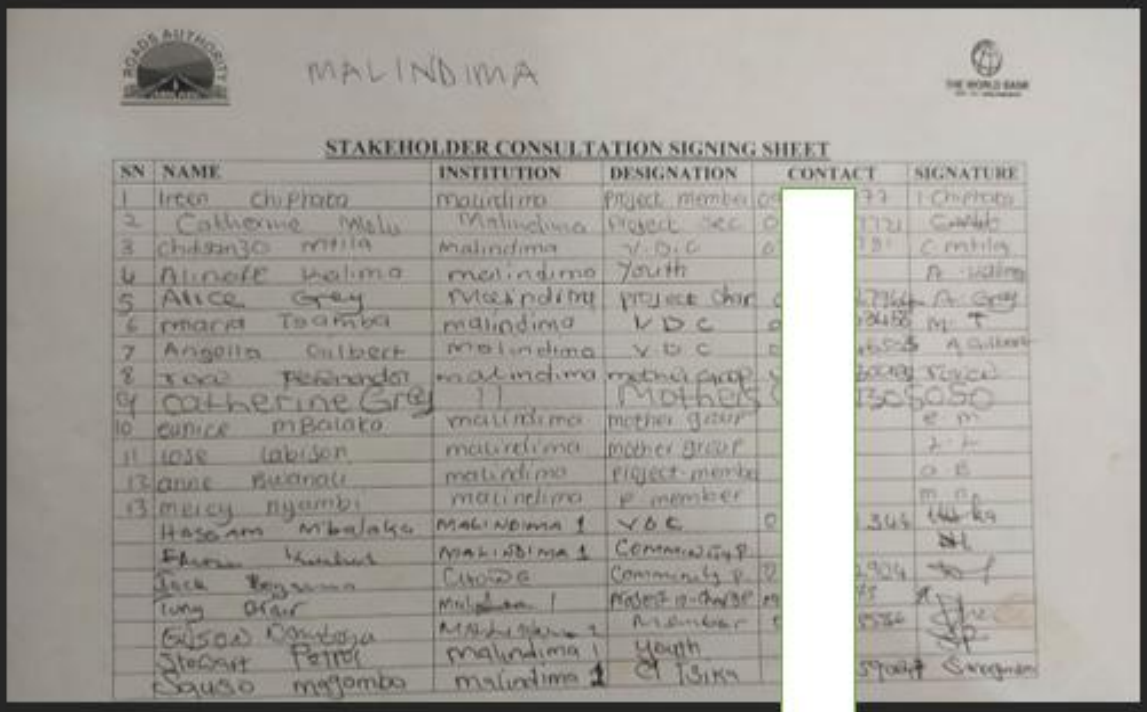
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STAKEHOLDER CONSULTATION SIGNI

NAME	INSTITUTION/ LOCATION	DESIGNATION	SIGNATURE
Thoko Supayo	MHG-DC	DCDO	
Howard Sosola	MHG-DC	RO	
Machin Namaona	MHG-DC	Agric Officer	
Gerson Magombo	MHG Sports	Intern	
CHRISSIE BANDA	MHG-Lands	DLO	
Jessie Mwambenga	MHG-Agric	PAEMO	
Linda Magwanda	MHG-Lands	DLO (Ag)	
Chester Mkunkha	MHG-Fisheries	ADFO	
NDIZANI MACLIYA	MHG-DC	DAEMO	
Clement Ntambo	MHG DC	DPW	
CHRISPIN Stephen	Judiciary	Magistrate	
ANDREW HAMULA	MACHINGA DC	EDO	
James Yadiel	MHG-DC	AIE	
Catherine Mwaona	MHG-DC	EDO (Ag)	

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Community FGDs: Malindima Village (12 June 2023)

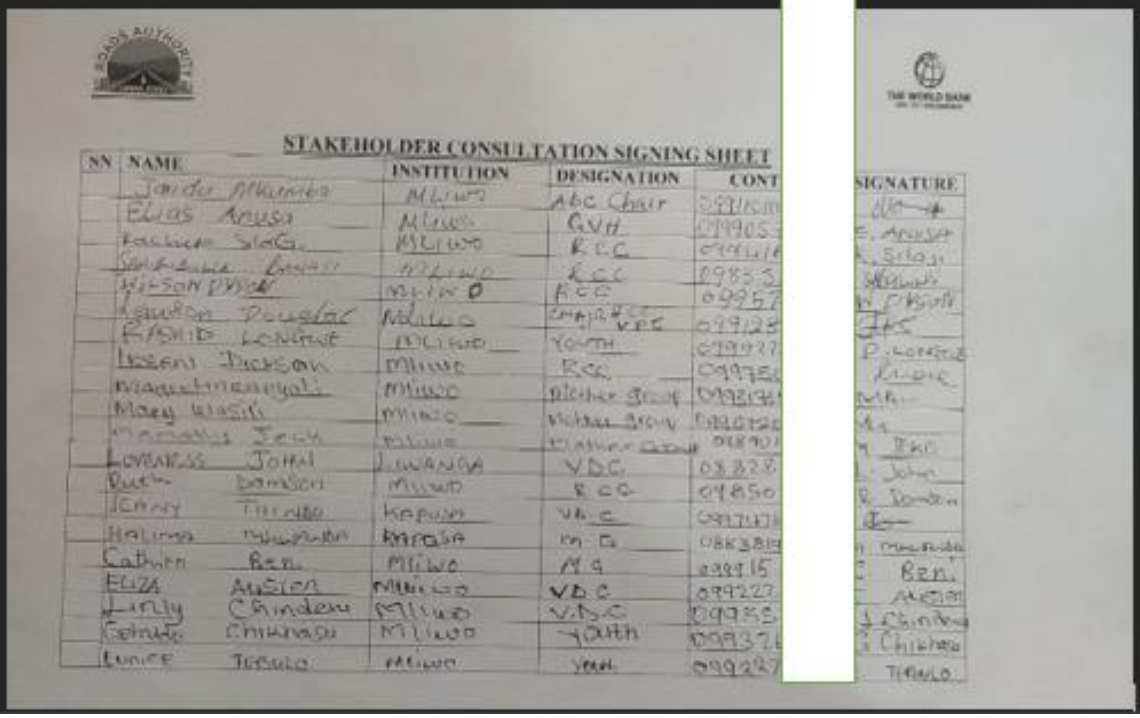


MALINDIMA

STAKEHOLDER CONSULTATION SIGNING SHEET

SN	NAME	INSTITUTION	DESIGNATION	CONTACT	SIGNATURE
1	Irene Chipala	malindima	Project membe		
2	Catherine Mulu	Malindima	Project Sec		
3	Chisanzo Mtila	Malindima	V.D.C		
4	Alinoff Kalima	malindima	Youth		
5	Alice Grey	Malindima	project chair		
6	Maria Tsamba	malindima	V D C		
7	Angella Gilbert	Malindima	V D C		
8	Jane Fernando	malindima	mother group		
9	Catherine Grey	"	Mothers		
10	Eunice Mbalako	malindima	mother group		
11	Rose Lakison	malindima	mother group		
12	Anne Bwanali	malindima	Project member		
13	Mercy Nyambi	malindima	P member		
	Hassan Mbalako	MALINDIMA 1	V D C		
	Edson Kumbuli	MALINDIMA 1	Community P		
	Jack Banda	Chipoda	Community P		
	Tony Phiri	Malindima 1	Project Member		
	Edson Daniela	MALINDIMA 1	Member		
	Stewart Petro	malindima 1	Youth		
	Sauso mgombo	malindima 1	CI Isika		

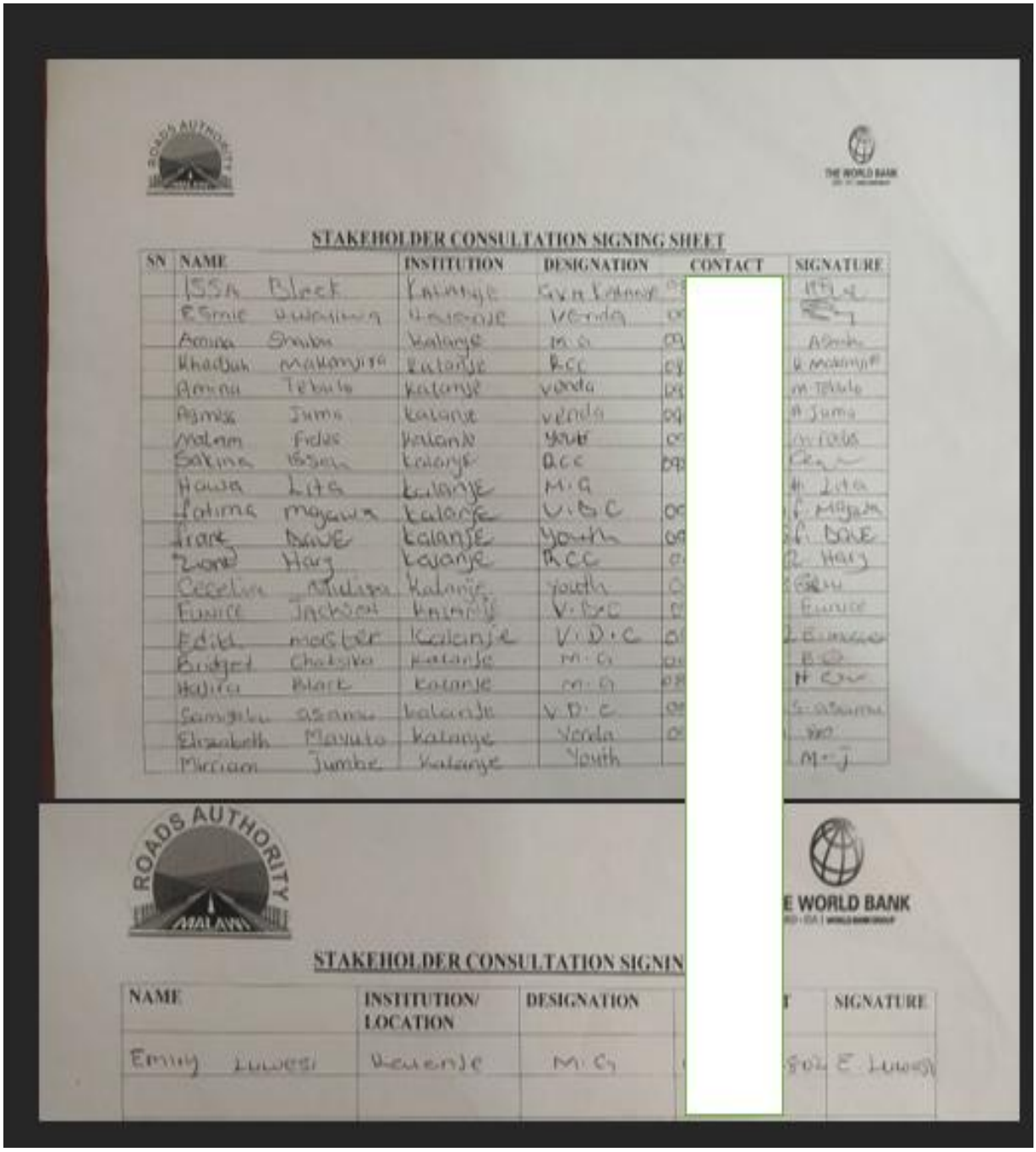
Community FGDs: Mliwo Village (13 June 2023)



STAKEHOLDER CONSULTATION SIGNING SHEET

SN	NAME	INSTITUTION	DESIGNATION	CONT	SIGNATURE
	Jordan Mkumba	Mliwo	ADC Chair		
	Elias Anusa	Mliwo	GVH		
	Rashid Sinda	Mliwo	RCC		
	Wilson Phiri	Mliwo	RCC		
	Kenson Douglas	Mliwo	Chairperson VEC		
	Rashid Lonjwe	Mliwo	Youth		
	Issen Jackson	Mliwo	RCC		
	Magaltmanyali	Mliwo	Mother Group		
	Mary Kasili	Mliwo	Mother Group		
	Mercy Jere	Mliwo	Mother Group		
	Lovemore Johal	Lwanda	VDC		
	Ruth Samson	Mliwo	RCC		
	Jenny Tembo	Kapuza	VDC		
	Halima Mwamba	Kapuza	M G		
	Cathrin Ben	Mliwo	M G		
	Eliza Anson	Mliwo	VDC		
	Lilly Chindemi	Mliwo	V.D.C		
	Estrida Chikwasi	Mliwo	Youth		
	Eunice Tembo	Mliwo	Youth		

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SN	NAME	INSTITUTION	DESIGNATION	CONTACT	SIGNATURE
	Issa Bleck	Kalonje	Gvn Kalonje		
	Esmie Kwenina	Kalonje	Vendor		
	Amina Simba	Kalonje	M.C		
	Khadijah Makanjira	Kalonje	BCC		
	Amina Tebula	Kalonje	Vendor		
	Asma Juma	Kalonje	Vendor		
	Malam Fidel	Kalonje	Youth		
	Salima Esau	Kalonje	BCC		
	Hawa Lita	Kalonje	M.C		
	Fatima Mgawa	Kalonje	V.D.C		
	Isaac Banda	Kalonje	Youth		
	Zione Harry	Kalonje	BCC		
	Cecelia Mudasa	Kalonje	Youth		
	Fumie Jackson	Kalonje	V.D.C		
	Edith master	Kalonje	V.D.C		
	Budget Chaziya	Kalonje	M.C		
	Hawa Black	Kalonje	M.C		
	Samson Asama	Kalonje	V.D.C		
	Elizabeth Mavuto	Kalonje	Vendor		
	Mirriam Jumbe	Kalonje	Youth		

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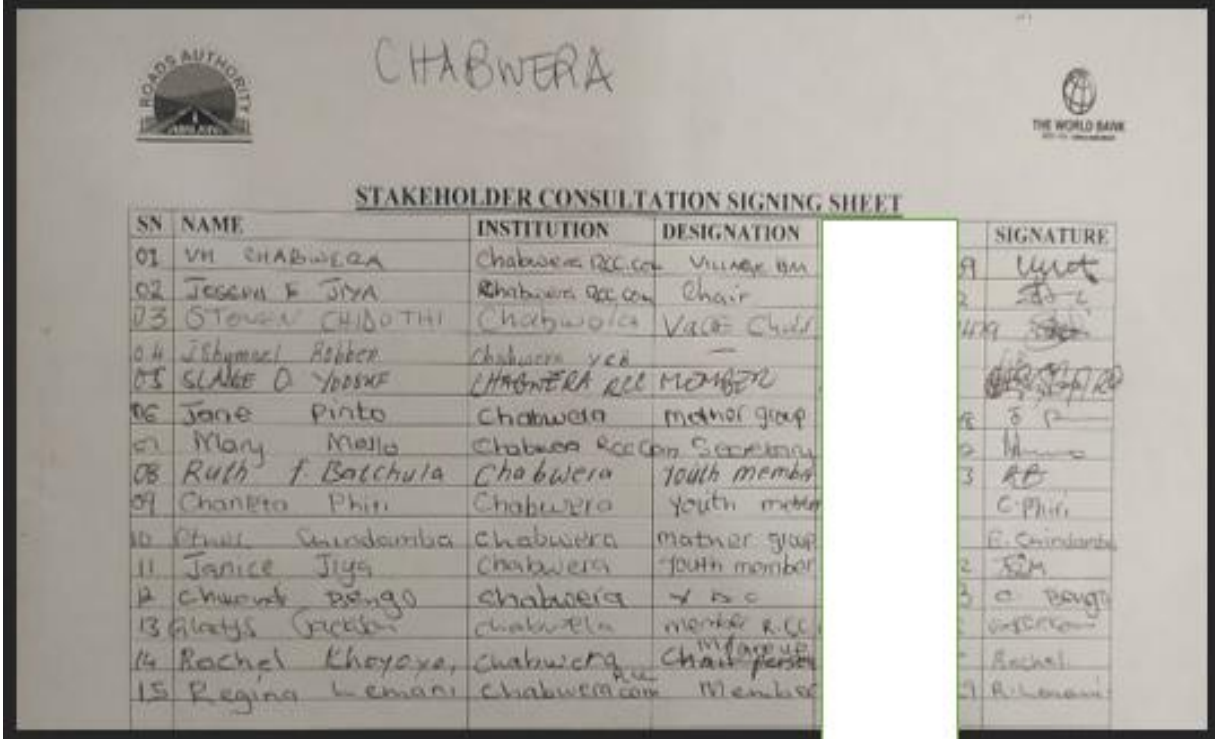
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STAKEHOLDER CONSULTATION SIGNIN

NAME	INSTITUTION/ LOCATION	DESIGNATION		SIGNATURE
Emily Luwesi	Kalonje	M.C		E. Luwesi

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Community FGDs: Chabwera Village (15 June 2023)

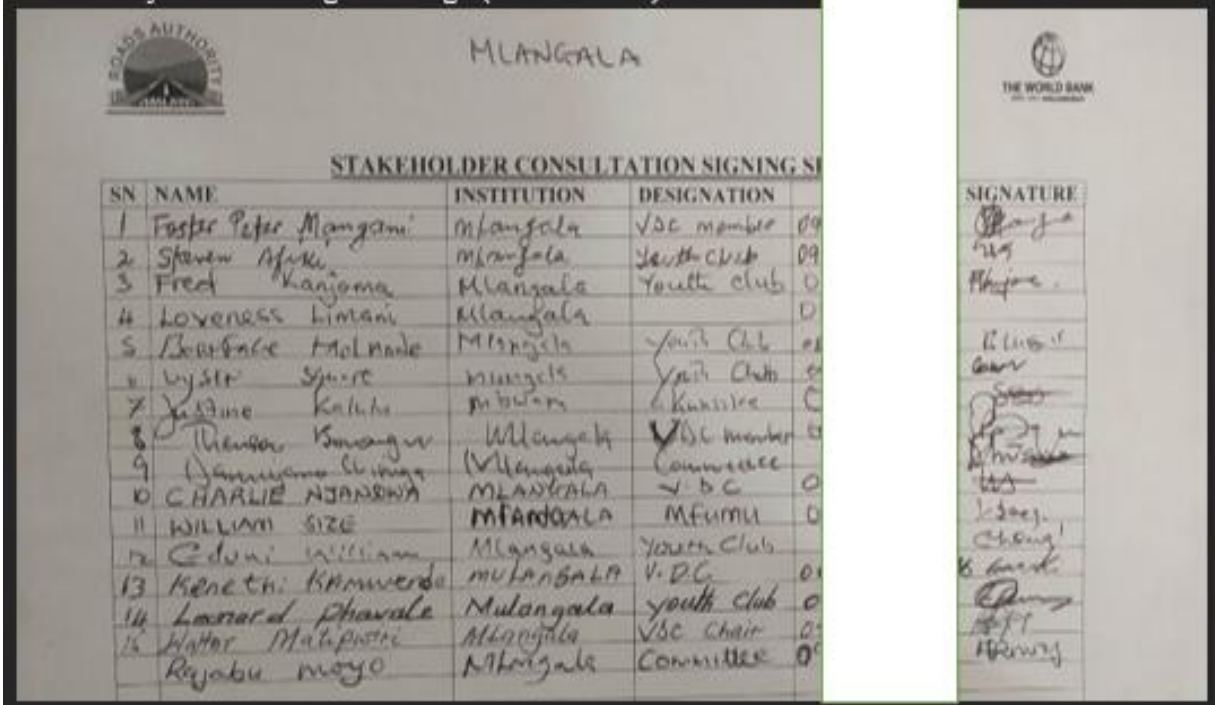


CHABWERA

STAKEHOLDER CONSULTATION SIGNING SHEET

SN	NAME	INSTITUTION	DESIGNATION	SIGNATURE
01	VH CHABWERA	Chabwera RCC	Village BM	
02	JOSEPH K JIYA	Chabwera RCC	Chair	
03	STEVEN CHIBOTHI	Chabwera	Vice Chair	
04	Ishmael Robert	Chabwera YCC	—	
05	SLAGE O YOOSUF	CHABWERA RCC	MEMBER	
06	Jane Pinto	Chabwera	mother group	
07	Mary Mello	Chabwera RCC	Secretary	
08	Ruth f. Balchula	Chabwera	Youth member	
09	Chaneta Phiri	Chabwera	Youth member	C. Phiri
10	Chuli Saindamba	Chabwera	mother group	E. Saindamba
11	Janice Jiya	Chabwera	Youth member	
12	Chwezi Bango	Chabwera	V D C	C Bango
13	Gladys Jackson	Chabwera	member RCC	
14	Rachel Kheyoxa	Chabwera	Chairperson	Rachel
15	Regina Lemani	Chabwera	Member	R. Lemani

Community FGDs: Mlangala Village (16 June 2023)

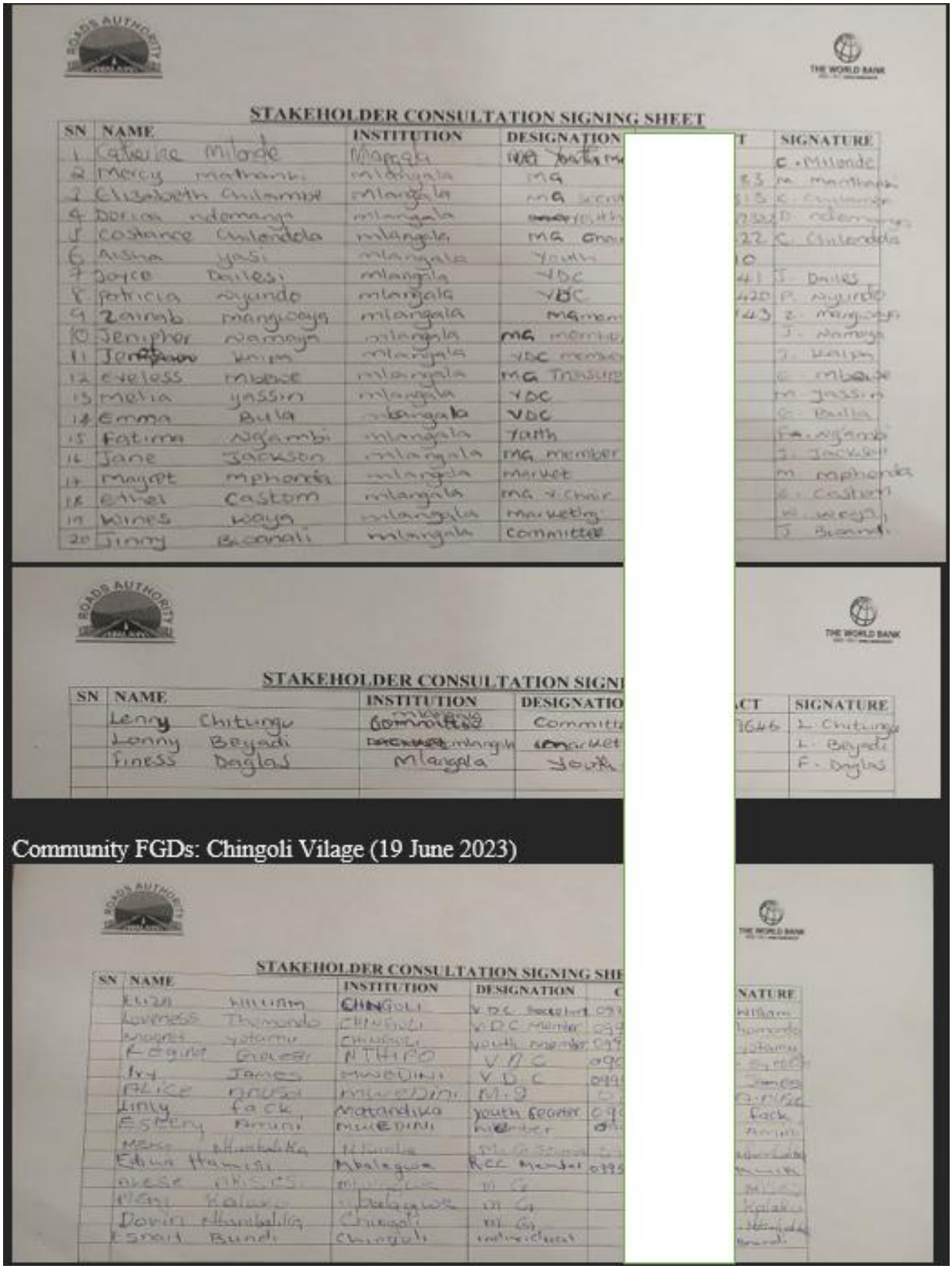


MLANGALA

STAKEHOLDER CONSULTATION SIGNING SH

SN	NAME	INSTITUTION	DESIGNATION	SIGNATURE
1	Foster Peter Mangani	Mlangala	VDC member	
2	Steven Afuki	Mlangala	Youth Club	
3	Fred Kanjoma	Mlangala	Youth club	
4	Loveness Limani	Mlangala		
5	Beatrice Malunde	Mlangala	Youth Club	
6	Lyster Spare	Mlangala	Youth Club	
7	Justine Kalulu	Mlangala	Chairlady	
8	Thember Kamanga	Mlangala	VDC member	
9	Jamiano Chinga	Mlangala	Committee	
10	CHARLIE NJANDWA	MLANGALA	V D C	
11	WILLIAM SIZE	MLANGALA	MEMBER	
12	Eduni William	Mlangala	Youth Club	
13	Keneth Kamwendo	MLANGALA	V.D.C	
14	Leonard Phavale	Mulangala	youth club	
15	Hatter Mahpiri	Mlangala	VDC Chair	
	Rejabu Moyo	Mlangala	Committee	

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SN	NAME	INSTITUTION	DESIGNATION	SIGNATURE
1	Gabriel Milonde	Mlangali	MG	C. Milonde
2	Mercy mathanga	mlangala	MG	M. Mathanga
3	Elizabeth Chilembe	mlangala	MG	E. Chilembe
4	Doris ndemanga	mlangala	MG	D. ndemanga
5	Costance Chilendela	mlangala	MG	C. Chilendela
6	Aisha yasi	mlangala	Youth	
7	Joyce Dailesi	mlangala	VDC	J. Dailesi
8	Patricia nyundo	mlangala	VDC	P. nyundo
9	Zainab mangoya	mlangala	MG	Z. mangoya
10	Jenipher Namaya	mlangala	MG	J. Namaya
11	Jen[illegible] Kalim	mlangala	VDC	J. Kalim
12	eveless Mbewe	mlangala	MG	E. Mbewe
13	Melia yassin	mlangala	VDC	M. yassin
14	Emma Bula	mlangala	VDC	E. Bula
15	Fatima Ngambi	mlangala	Youth	F. ngambi
16	Jane Jackson	mlangala	MG member	J. Jackson
17	Magret mphanda	mlangala	Market	M. mphanda
18	Ethel Costom	mlangala	MG V Chair	E. Costom
19	Wines Kaya	mlangala	Marketing	W. Kaya
20	Jimmy Beanali	mlangala	Committee	J. Beanali

STAKEHOLDER CONSULTATION SIGN[illegible]

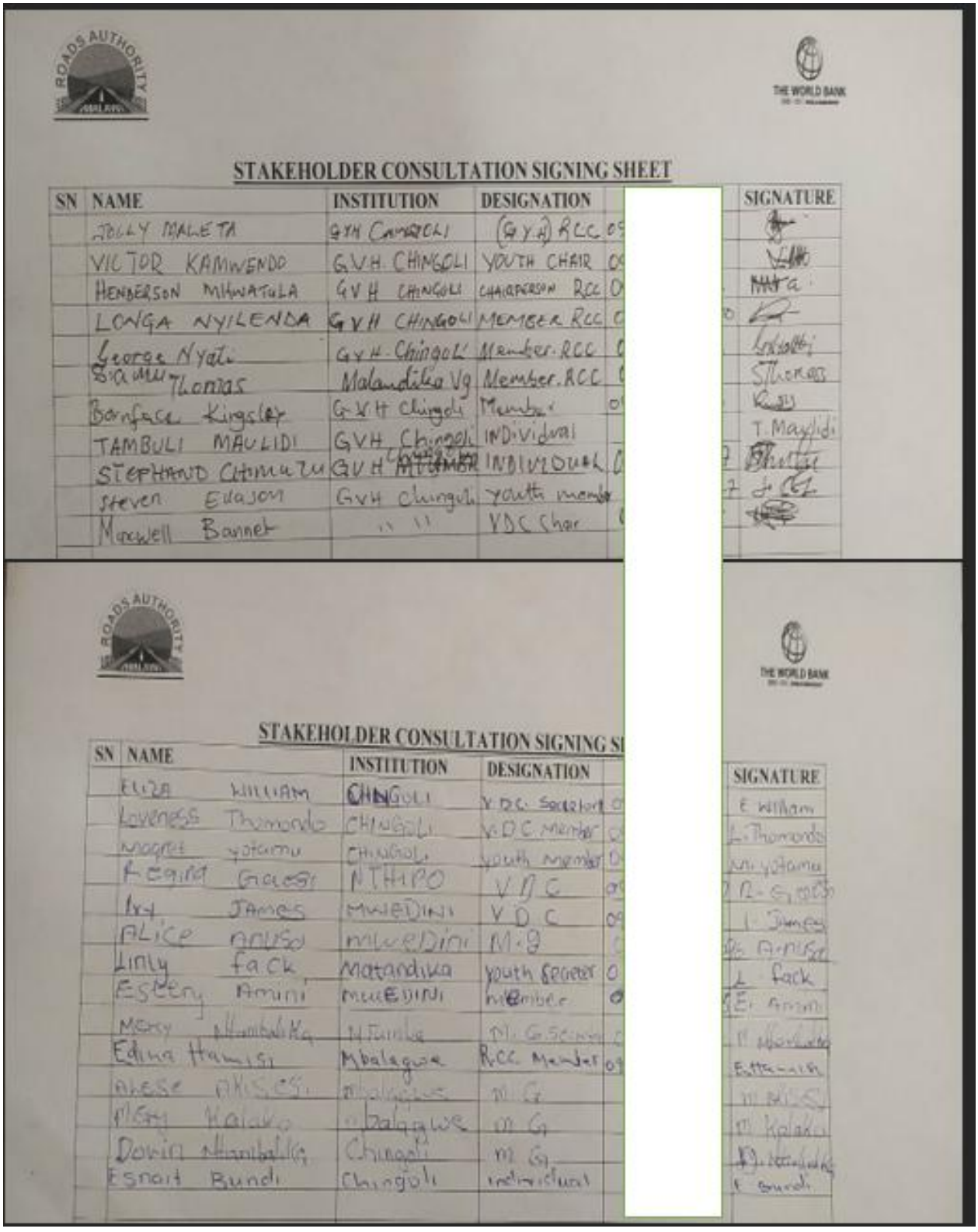
SN	NAME	INSTITUTION	DESIGNATION	ACT	SIGNATURE
	Lenny Chitungu	Committee	Committee	1646	L. Chitungu
	Lenny Beyadi	Mlangala	Market		L. Beyadi
	Finess Daglas	Mlangala	Youth		F. Daglas

Community FGDs: Chingoli Vilage (19 June 2023)

STAKEHOLDER CONSULTATION SIGNING SHE[illegible]

SN	NAME	INSTITUTION	DESIGNATION	C	NATURE
	Eliza William	CHINGOLI	VDC	099	William
	Lovness Thimado	CHINGOLI	VDC Member	099	Thimado
	Magret yotamu	CHINGOLI	Youth member	099	yotamu
	Regina Grace	NTHIRO	VDC	099	
	Ivy James	MWEDINI	VDC	099	James
	ALICE DAUSI	MWEDINI	M.G	09	
	Linly Jack	Matandika	Youth leader	099	Jack
	ESTERY Amuni	MWEDINI	Member	09	Amuni
	Mercy Mwabulika	Mlangala	VDC Secretary	09	Mwabulika
	Edina Hamisi	Mbalagwa	Acc Member	0995	
	Alice [illegible]	[illegible]	M G		
	Mary Kalaka	Mbalagwa	M G		Kalaka
	Davis Mwabulika	Chingoli	M G		Mwabulika
	Esnart Bundi	Chingoli	Individual		Bundi

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STAKEHOLDER CONSULTATION SIGNING SHEET

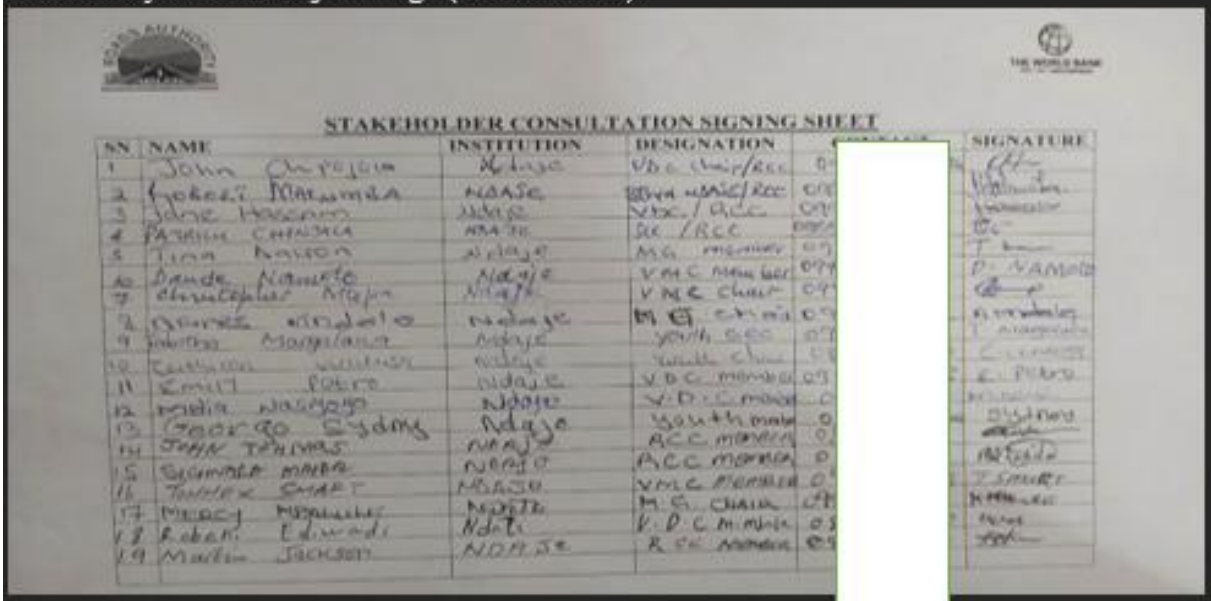
SN	NAME	INSTITUTION	DESIGNATION	SIGNATURE
	JOLLY MALETA	GVH CHINGOLI	(GVH) RCC	
	VICTOR KAMWENDO	G.V.H. CHINGOLI	YOUTH CHAIR	
	HENDERSON MHAWATULA	GVH CHINGOLI	CHAIRPERSON RCC	
	LONGA NYILENDA	GVH CHINGOLI	MEMBER RCC	
	George Nyati	GVH Chingoli	Member. RCC	
	Siamu Thomas	Malandika Vg	Member. RCC	
	Boniface Kingsley	GVH Chingoli	Member	
	TAMBULI MAULIDI	GVH Chingoli	INDIVIDUAL	
	STEPHANO CHOMUZU	GVH [illegible]	INDIVIDUAL	
	steven Edason	GVH Chingoli	youth member	
	Maxwell Bannet	" "	VDC Chair	

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	ELIZA WILLIAM	CHINGOLI	V.D.C. Secretary	E William
	Loveness Thomondo	CHINGOLI	V.D.C. Member	L. Thomondo
	Magret yotamu	CHINGOLI	youth Member	M. yotamu
	Regina Gaosi	NTHIPO	V.D.C	
	Ivy JAMES	MWEDINI	V.D.C	I. James
	ALICE ARUSO	MWEDINI	M.G	
	Linly fack	Matandika	youth Secretary	L fack
	Esteny Amini	MWEDINI	Member	E. Amini
	Mercy Nambalika	Ntimba	M. G. Secretary	
	Edina Hamisi	Mbalagwa	RCC Member	
	ALICE AKISES	Mbalagwa	M. G	
	Mercy Kalaka	Mbalagwa	M. G	M. Kalaka
	Dowin Nambalika	Chingoli	M. G	
	Esnart Bundi	Chingoli	individual	E. Bundi

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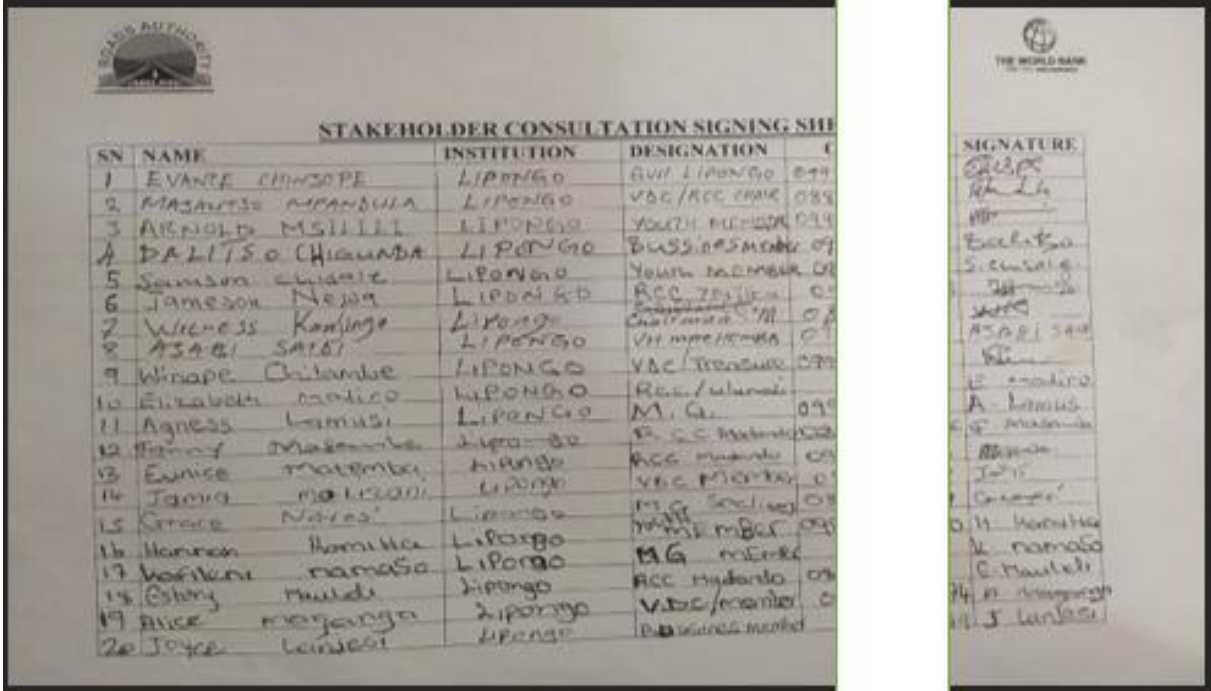
Community FGDs: Ndaje Village (20 June 2023)



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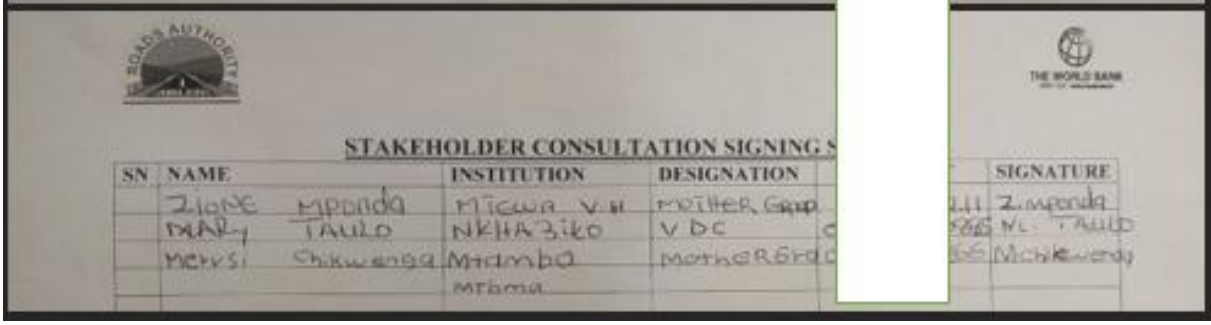
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1	John Chipeleu	Ndaje	VDC Chair/RCC		
2	Yokesi Mkumba	NDAJE	VDC/RCC		
3	Jane Hassan	NDAJE	VDC/RCC		
4	PASKAL CHINJALA	NDAJE	SC/RCC		
5	Tina Kaison	Ndaje	MG member		
6	Dande Namate	Ndaje	VMC Member		
7	Christopher Mapa	Ndaje	VMC Chair		
8	[illegible]	Ndaje	MG		
9	[illegible]	Ndaje	Youth Sec		
10	[illegible]	Ndaje	Youth Chair		
11	Emily Peter	Ndaje	VDC member		
12	Nelia Nasenga	Ndaje	VDC member		
13	George Sydney	Ndaje	Youth member		
14	JOHN THOMAS	NDAJE	ACC member		
15	Susanna Mapa	Ndaje	ACC member		
16	Thomas Smart	Ndaje	VMC Member		
17	Mercy Mpalume	Ndaje	M.G. Chair		
18	Robert Edwards	Ndaje	V.D.C Member		
19	Martin Jackson	NDAJE	RCC Member		

Community FGDs: Lipongo Village (21 June 2023)



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1	EVANCE CHINSOPE	LIPONGO	Guvi Lipongo		
2	MASAMBO MPANDULA	LIPONGO	VDC/RCC CHAIR		
3	ARNOLD MSILILI	LIPONGO	YOUTH MEMBER		
4	DALITSO CHIGUMBA	LIPONGO	BUSS.ASSmember		
5	Samson Chisale	LIPONGO	Youth MEMBER		
6	Jameson Nejja	LIPONGO	RCC TREASURER		
7	Witness Kamanga	LIPONGO	Chairman's WIFE		
8	ASABI SAIDI	LIPONGO	VH MPEICHEMA		
9	Winape Chilambe	LIPONGO	VDC Treasurer		
10	Elizabeth Mpico	LIPONGO	RCC/ulumbi		
11	Agness Lemusi	LIPONGO	M.G.		
12	Nancy Masamba	Lipongo	RCC member		
13	Eunice Matemba	NDAJE	VDC Member		
14	Jamia Malisoni	LIPONGO	MG Secretary		
15	Grace Nanesi	Lipongo	MG member		
16	Hannah Ibrahim	Lipongo	MG member		
17	Josiken Namasa	Lipongo	ACC member		
18	Ashley Mauldi	Lipongo	VDC/member		
19	Alice Mayanga	Lipongo	Pupils member		
20	Joyce Lemusi	Lipongo			

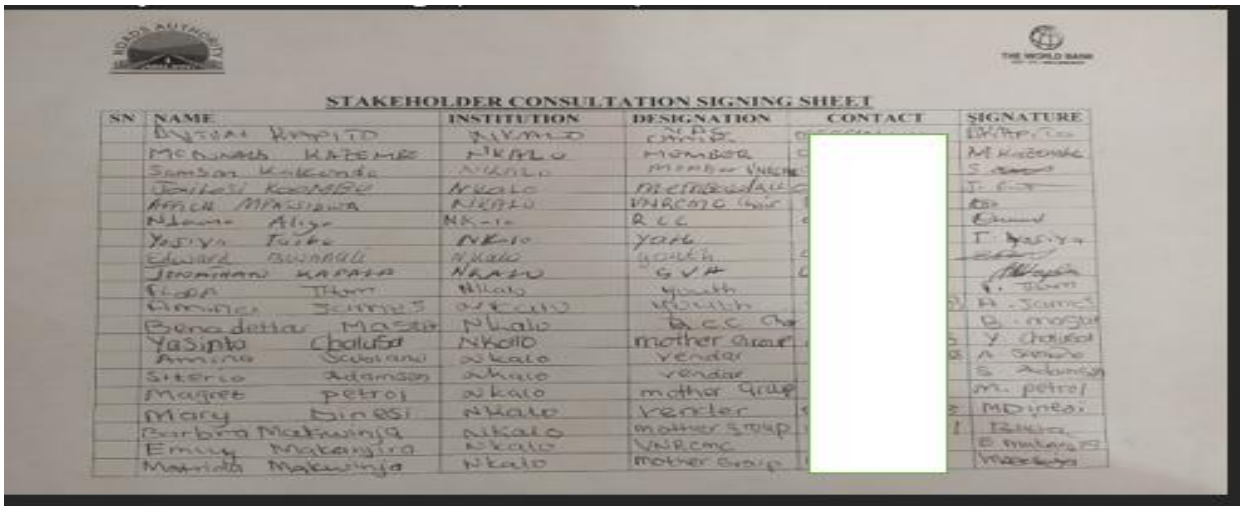


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SN	NAME	INSTITUTION	DESIGNATION		SIGNATURE
	Zione Mpanda	Mtewa V.H	Mother Group		Z.Mpanda
	Mary Tauko	NKHAZIKO	VDC		M. Tauko
	Nenesi Chikwenga	Mtamba	Mother Group		Mchikwenga
		Mtama			

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Community FGDs: Nkalo Village (22 June 2023)

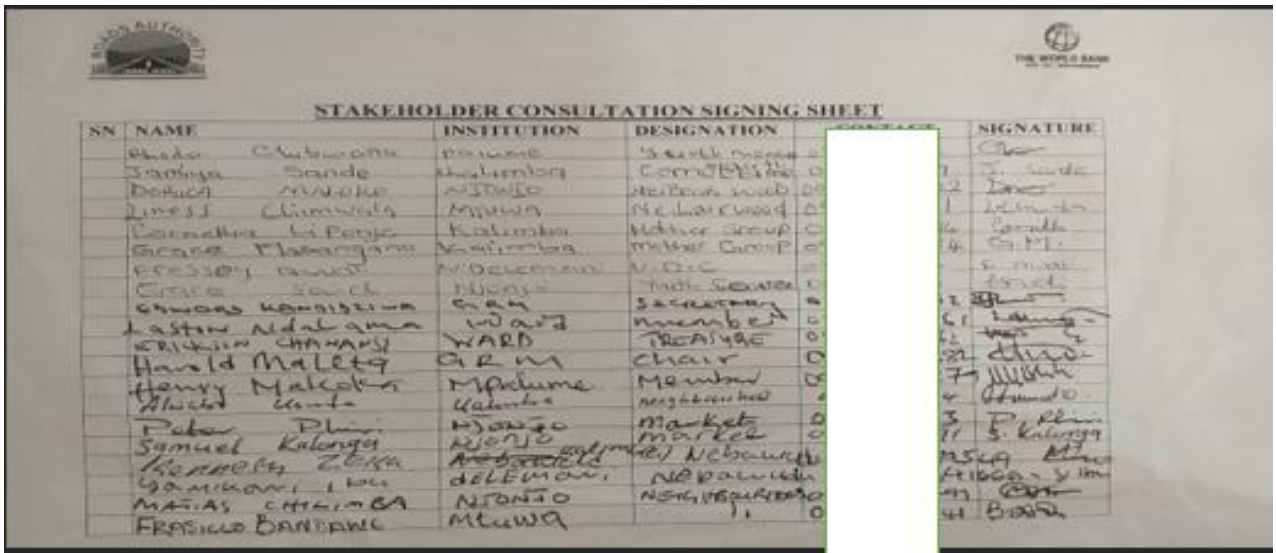


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SN	NAME	INSTITUTION	DESIGNATION	CONTACT	SIGNATURE
	[illegible]	[illegible]	[illegible]		
	[illegible]	[illegible]	[illegible]		
	[illegible]	[illegible]	[illegible]		
	[illegible]	[illegible]	[illegible]		
	[illegible]	[illegible]	[illegible]		
	[illegible]	[illegible]	[illegible]		
	[illegible]	[illegible]	[illegible]		
	[illegible]	[illegible]	[illegible]		
	[illegible]	[illegible]	[illegible]		
	[illegible]	[illegible]	[illegible]		
	Bernadetta Masta	Nkalo	[illegible]		
	Yasinta Chalufa	Nkalo	mother group		
	[illegible]	[illegible]	[illegible]		
	[illegible]	[illegible]	[illegible]		
	[illegible]	[illegible]	[illegible]		
	[illegible]	[illegible]	[illegible]		
	[illegible]	[illegible]	[illegible]		
	[illegible]	[illegible]	[illegible]		

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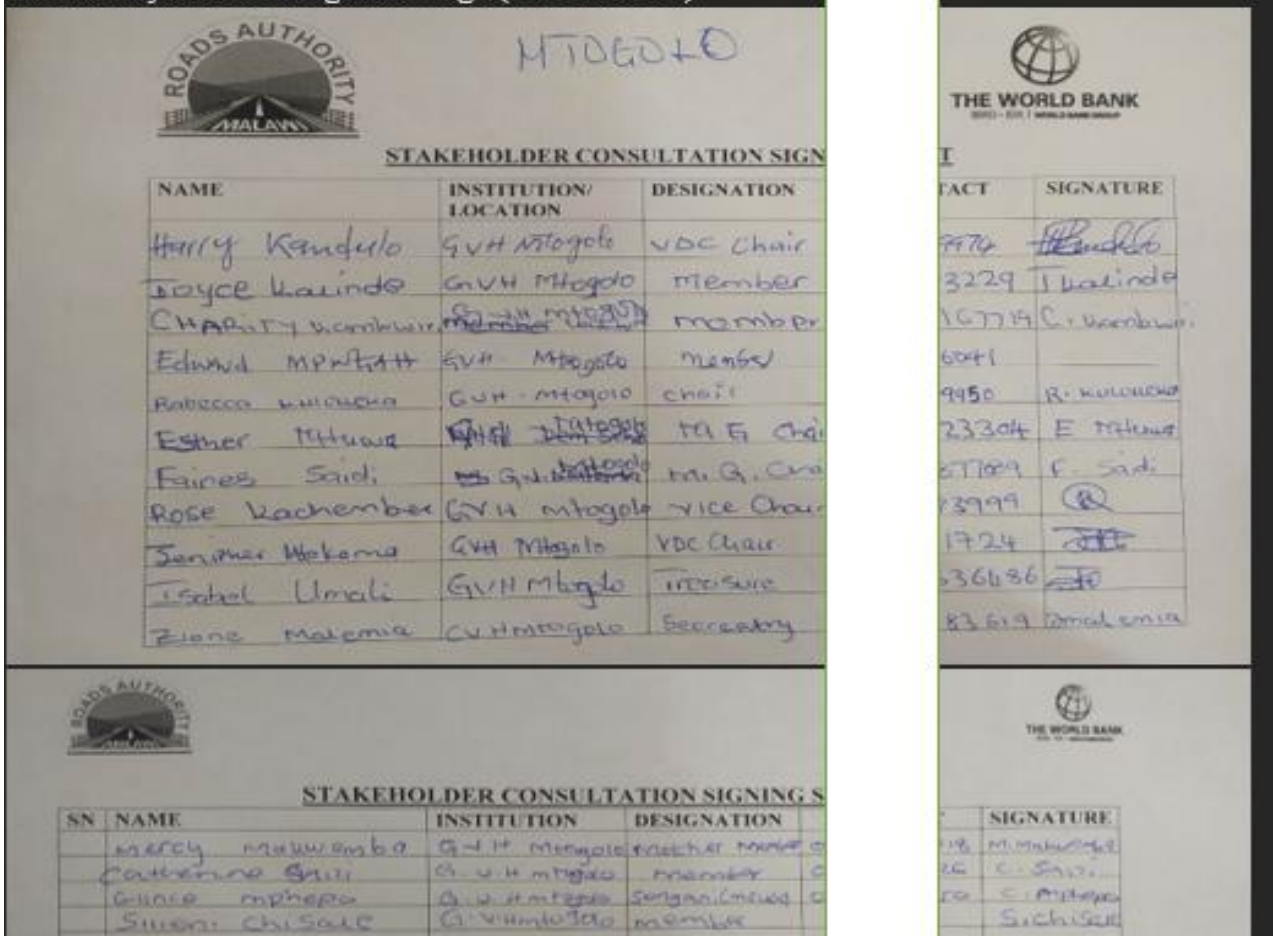
Community FGDs: Kalimba/Njonjo Villages (23 June 2023)



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SN	NAME	INSTITUTION	DESIGNATION	SIGNATURE
	Phiri Chibwana	Kalimba	Secretary	
	Sadiya Sande	Kalimba	Committee	
	Dorica Mwale	Njonjo	Member	
	Limesi Chimwala	Mtuwa	Member	
	Cornelius Kapanje	Kalimba	Mother Group	
	Grace Thawanjani	Kalimba	Mother Group	
	Fresbey Banda	Njonjo	Member	
	Chisale Sauchi	Njonjo	Member	
	Chimwaza Kamsisima	Chief	Secretary	
	Laston Ndalama	Ward	Member	
	Erikson Chamansi	Ward	Treasurer	
	Harold Maleta	GVH	Chair	
	Henry Malekano	Mphuma	Member	
	Alick Kuntaka	Kalimba	Neighborhood	
	Peter Phiri	Njonjo	Market	
	Samuel Kalonga	Njonjo	Market	
	Kenneth Zeka	Ambassador	Neighborhood	
	Gamaliel Phiri	Delemani	Neighborhood	
	Matias Chikamba	Njonjo	Neighborhood	
	Frasiko Bantawe	Mtuwa		

Community FGDs: Mtogolo Village (26 June 2023)



MTOGOLO

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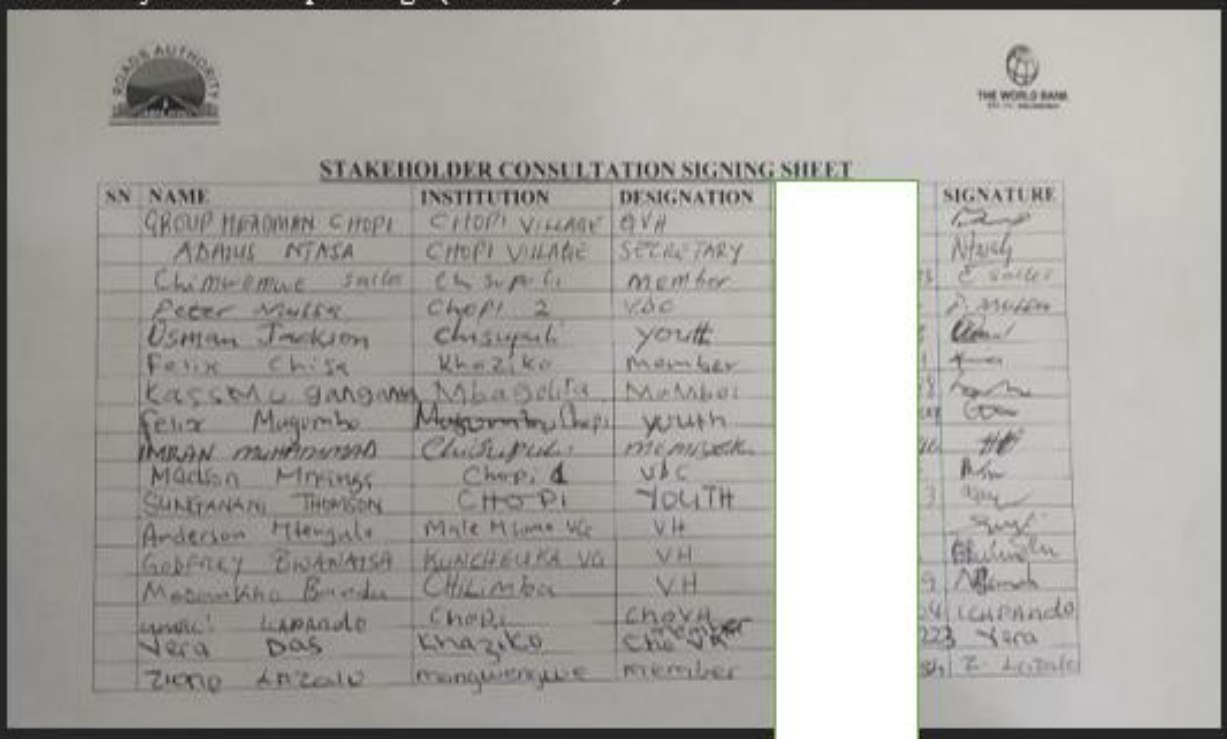
NAME	INSTITUTION/ LOCATION	DESIGNATION	SIGNATURE
Harry Kanderlo	GVH Mtogolo	VDC Chair	
Joyce Kalinde	GVH Mtogolo	Member	
Charity Nkombwe	GVH Mtogolo	member	
Edward Mphatha	GVH Mtogolo	Member	
Rebecca Kuchuma	GVH Mtogolo	Chair	
Esther Mtuwa	GVH Mtogolo	VDC Chair	
Faines Saidi	GVH Mtogolo	Vice Chair	
Rose Kachembere	GVH Mtogolo	Vice Chair	
Jennifer Mekema	GVH Mtogolo	VDC Chair	
Isabel Umali	GVH Mtogolo	Treasure	
Fiona Mekemia	GVH Mtogolo	Secretary	

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SN	NAME	INSTITUTION	DESIGNATION	SIGNATURE
	Mercy Makwemba	GVH Mtogolo	Mother Member	
	Catherine Saidi	GVH Mtogolo	Member	
	Grace Mphepo	GVH Mtogolo	Secretary	
	Susan Chisale	GVH Mtogolo	Member	

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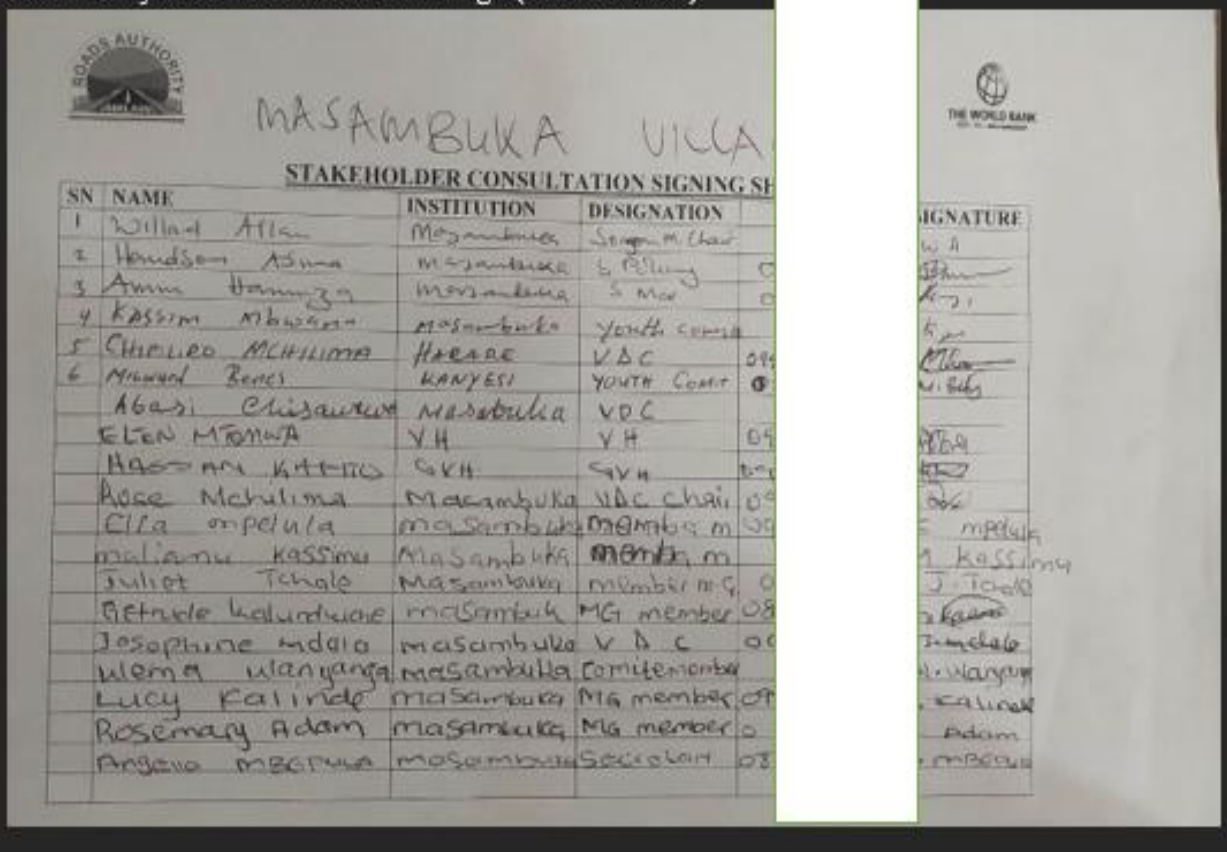
Community FGDs: Chopi Village (27 June 2023)



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SN	NAME	INSTITUTION	DESIGNATION	SIGNATURE
	GROUP HEADMAN CHOPI	CHOPI VILLAGE	GVH	
	ADAMUS MTASA	CHOPI VILLAGE	SECRETARY	
	Chimwemwe Saiti	Ch Supi G.	member	
	Peter Mulesa	Chopi 2	VDC	
	Osman Jackson	chisyuli	youth	
	Felix Chisa	Khaziko	Member	
	Kassim Gangama	Mbangelita	Member	
	Felix Mugumbo	Mugumbo Chopi	youth	
	IMRAN MUHAMMAD	Chisyuli	member	
	Madison Mwinga	Chopi 1	VDC	
	SUNETANANI THOMSON	CHOPI	YOUTH	
	Anderson Mlengale	Male Mlima VG	VH	
	Godfrey Bwanaisa	Kunchekuka VG	VH	
	Masumba Brooks	Chilimba	VH	
	LAPANDO	Chopi	chopi member	
	Vera Das	Khaziko	Chopi VH	
	Zione Arzalo	mangwengwe	member	

Community FGDs: Masambuka Village (28 June 2023)



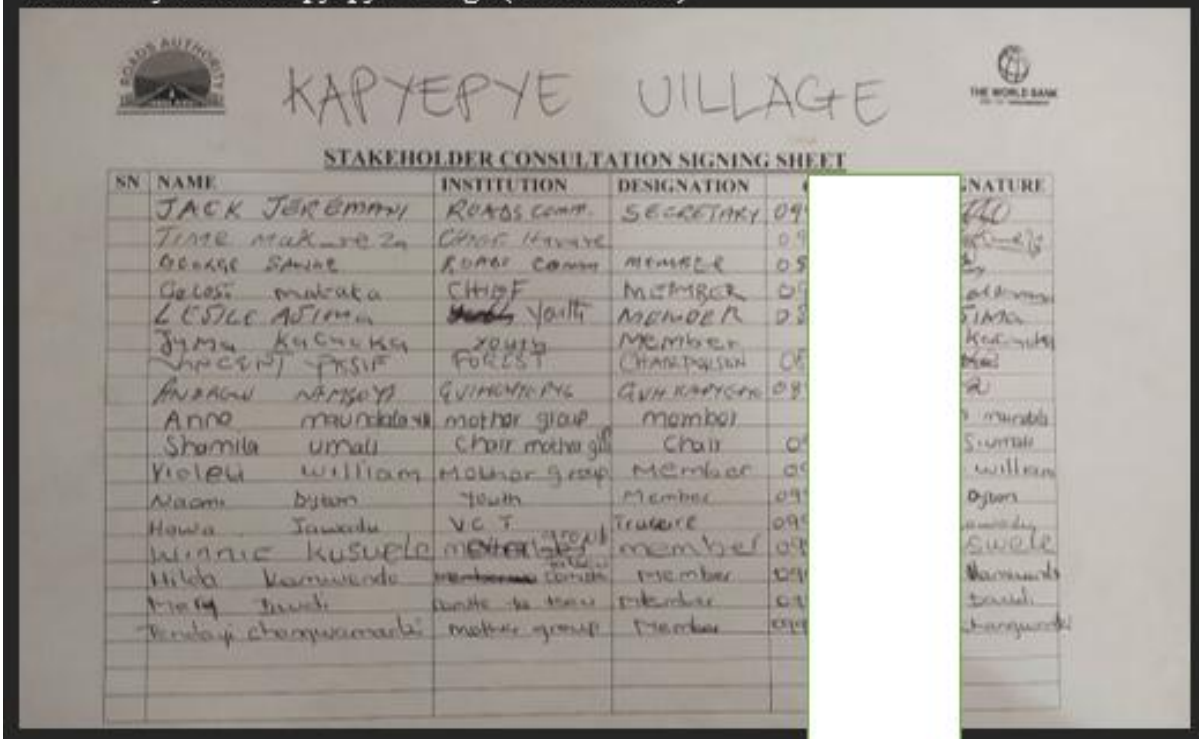
MASAMBUKA VILLA

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SN	NAME	INSTITUTION	DESIGNATION	SIGNATURE
1	Willard Atlas	Masambuka	Secretary/Chair	
2	Hendson Asma	Masambuka	Secretary	
3	Anna Hamza	Masambuka	Secretary	
4	KASSIM Mbangani	masambuka	youth comm	
5	CHARLES MCHILIMA	HARARE	VDC	
6	Mohamed Benesi	KANYESI	YOUTH COMM	
	Agasi Chisaweni	Masabuka	VDC	
	ELEN MTONGA	VH	VH	
	HASSANI KATETO	GVH	GVH	
	Rose Mchulima	Masambuka	VDC chair	
	Ella Mpelula	masambuka	Member	
	mariamu kassimu	Masambuka	member	
	Juliet Tchale	Masambuka	member	
	Getrude Kalundwe	masambuka	MG member	
	Josephine mdala	masambuka	VDC	
	Wema wanyanga	masambuka	Committee member	
	Lucy Kalinde	masambuka	MG member	
	Rosemary Adam	masambuka	MG member	
	Angela MBEWA	masambuka	Secretary	

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Community FGDs: Kapyepye Village (29 June 2023)

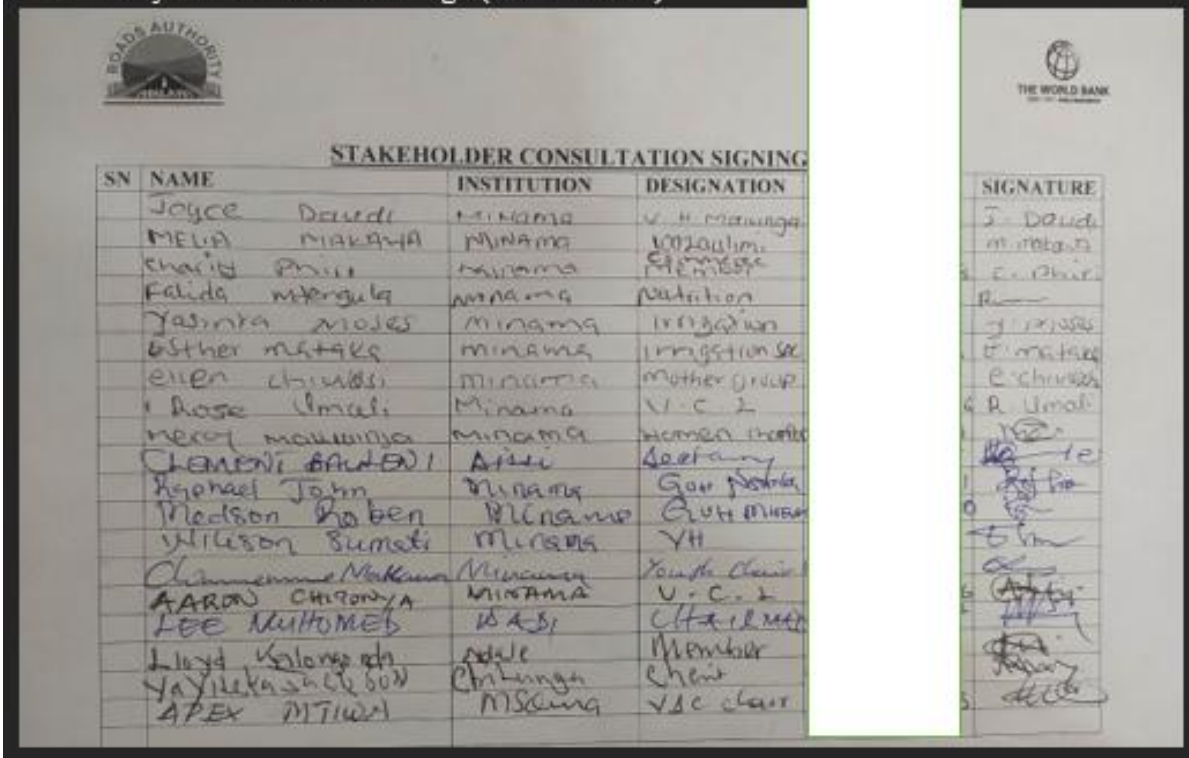


KAPYEPYE VILLAGE

STAKEHOLDER CONSULTATION SIGNING SHEET

SN	NAME	INSTITUTION	DESIGNATION		SIGNATURE
	JACK JEREMIAH	ROADS COMM.	SECRETARY	09	
	TIME MAKWE 2n	CHIEF HEADMAN		09	
	GEORGE SAMBE	ROAD COMM	MEMBER	09	
	Gelosi makata	CHIEF	MEMBER	09	
	LESLIE ASIMA	Youth	MEMBER	09	
	Jyma Kachecha	YOUTH	MEMBER		
	VINCENT PASIF	FOREST	CHAIRPERSON	09	
	ANDREW NAMSEYA	GVH MEMBER	GVH KAPYEPYE	09	
	Anne mundalesa	mother group	member		
	Shamila umali	Chair mother gp	Chair	09	
	Violet William	Mother Group	Member	09	
	Naomi Dyson	Youth	Member	09	
	Hawa Jawadu	V.C.T	Treasure	09	
	WINNIE KUSUELE	mother group	member	09	
	Hilda Kamwendo	[illegible]	member	09	
	Mary Jumbi	[illegible]	member	09	
	Rodah chanyuamaki	mother group	Member	09	

Community FGDs: Minama Village (30 June 2023)



STAKEHOLDER CONSULTATION SIGNING

SN	NAME	INSTITUTION	DESIGNATION	SIGNATURE
	Joyce Daudi	MINAMA	V. H Minama	J. Daudi
	MELIA MAKAMA	MINAMA	Mzaulimi	
	Charity Phiri	Minama	Member	
	Falida Mkangula	Minama	Nutrition	
	Yasinta Moses	Minama	Irrigation	
	Esther Mataka	minama	Irrigation Sec	
	ellen chimbisi	Minama	Mother group	
	Rose Umali	Minama	V.C.2	R. Umali
	mercy mawanga	Minama	Women chair	
	CLEMENT BANDA	Minama	Secretary	
	Raphael John	Minama	Gen Secretary	
	Madison Baben	Minama	Youth Member	
	WILSON Sumati	Minama	VH	
	Chamemma Makawa	Minama	Youth Chair	
	AARON CHIPONYA	MINAMA	V.C.2	
	LEE MUTHOMES	Minama	Chairman	
	Lloyd Kalonga	Minama	Member	
	YAYILEKA CHISUN	Minama	Chair	
	APEX MTIWA	Minama	VDC chair	

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Annex 2.2: Stakeholder Consultations Approach and Results

1. Overview

The stakeholder and public consultation for the Liwonde to Matawale (M003)) Road rehabilitation Project in Machinga and Zomba districts, Malawi, aimed to ensure a high-quality, comprehensive, and effective environmental assessment. The focus was on considering the views and concerns of all interested and affected parties. The approach involved conducting meetings with key stakeholders and public community representatives, as well as organising various activities such as public consultations and engagement sessions within the project area. This inclusive approach allowed for the incorporation of all relevant perspectives, including environmental and community concerns, throughout the Project. The consultations fostered collaboration and transparency by providing access to Project details and enabling participants to express their opinions and contribute to the decision-making process. Overall, the goal was to uphold the highest environmental assessment standards and create a well-informed and participatory approach to the road rehabilitation Project. The consultations encompassed the following:

- Meetings with key stakeholders to create a platform for them to share their opinions,expertise, and raise any concerns they have regarding the project.
- Stakeholders were involved in defining the issues to be addressed in the Environmental and Social Impact Assessment (ESIA), identifying potential adverse impacts that could arise from the Project, and determining appropriate and effective mitigation approaches and measures to address these impacts throughout the Project. Through their active engagement
- Soliciting comments on the final ESIA reports

2. Stakeholder Analysis

The stakeholder analysis process involved identifying stakeholders, conducting initial consultations, and analysing their interests and experiences. It aimed to facilitate the participation of stakeholders based on their capacity and relevance to each issue. To gather public opinions from both Machinga and Zomba districts, the consultants arranged consultation meetings and engaged with Traditional Authorities. Additionally, the consulting team conducted interviews and meetings with officials from government ministries, departments, and agencies, as well as local leaders in both districts.

Table 8-1: Stakeholder mapping.

Stakeholder	Justification
Project proponent: Roads Authority	Roads Authority, being the project proponent, is obligated to supply all essential information pertaining to the proposed project to facilitate the Environmental and Social Impact Assessment (ESIA) process.
Machinga and Zomba district councils: District Environmental Sub-Committee and key personnel such as: Environment District	Key personnel responsible for monitoring and enforcing the Environmental and Social Impact Assessment (ESIA) that will be

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Officer, District Environmental Health Officer, Director of Education, Youth and Sports, District Planning Officer, District Forestry Officer.	formulated for the proposed project through the ESIA process.
Neighbours and institutions within the Project area.	These parties could potentially be impacted by the project development due to their proximity to the Project site.

3. Stakeholder involvement

During this stage, stakeholders actively participated in consultations to assess the impacts and contribute to mitigation measures. It was crucial to engage stakeholders to ensure that the proposed measures were acceptable and feasible for successful implementation. The consultations focused on understanding the significance of impacts and formulating effective mitigation strategies. By gaining stakeholder buy-in, the measures were more likely to be accepted and practical, leading to successful implementation. During these consultations, the typical agenda included the following:

- Introducing the Project.
- During consultations, stakeholders were engaged to gather their environmental and socioeconomic concerns and perspectives regarding the proposed project. The discussions covered various aspects, such as land use on the Project site, conflicts surrounding land ownership, potential adverse environmental impacts, and both negative and positive project impacts. Strategies for managing identified negative impacts and approaches to enhance positive impacts were also explored. This inclusive process ensured that stakeholders' inputs were considered, leading to more informed decision-making and the development of a well-balanced and sustainable Project, and
- Factors to be considered or followed for ensuring sustainable Project operations.

4. Consultations held with Machinga and Zomba district councils' officials

Consultations and discussions involved officials from the Machinga and Zomba district councils, covering various aspects. Including:

- Providing an overview of the objectives behind conducting environmental and socio-economic studies for the Project.
- Exploring the local-level and wider benefits that the upcoming Project can bring.
- Identifying the primary challenges associated with the proposed infrastructure projects.
- Discussing measures to be implemented for mitigating negative impacts and maximising benefits.
- Examining the significant potential socio-economic issues within the Project area.
- Anticipating the environmental and social impacts, both positive and negative, that may arise from the implementation and operation of the planned projects.
- Seeking stakeholders' opinions and suggestions concerning the proposed Project activities.

Throughout these consultations, in-depth discussions took place, resulting in the gathering and summarisation of valuable information. The main findings of the DESC consultations are summarised.



Figure 8-1:During DESC meeting at Machinga District Council.



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Figure 8-2:Consultation meeting with the Zomba DESC.

5. Consultations with the local community members

During the public consultation process, the community showed a generally positive attitude towards the proposed Project, recognising its potential for economic betterment and increased livelihood opportunities. They actively participated in group discussions, providing valuable feedback to the consultant. However, they also expressed their concerns and offered suggestions for the upcoming projects. The Consultant compiled a comprehensive summary of the community's questions, views, and suggestions to ensure that all stakeholders' perspectives were taken into consideration during the decision-making process.

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Figure 8-3:Focus group discussion at Lipongo GVH with community members



Figure 8-4:Focus group discussion at Kapyepye GVH with the affected community members.

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Figure 8-5:During Focus group discussion with the Project affected people at Malindima GVH.



Figure 8-6:Masambuka GVH focus group discussion with the community members.

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Table 8-2. Issues raised by Machinga DESC, Zomba DESC, and Zomba City Environmental Sub-Committee

SN	Stakeholder	Council Name	Issue/Concern	How Issue/Concern has been Addressed in the ESIA Report
1	Machinga District Environmental Sub-Committee (DESC)	Machinga District Council	Concern over potential encroachment into Liwonde Forest Reserve during construction of the climbing lane.	ESIA adopted a minimalist design for the climbing lane; vegetation clearance restricted to approved road reserve; mitigation hierarchy applied with replanting of trees and habitat restoration measures included.
2	Machinga DESC	Machinga District Council	Risk of soil erosion and siltation of nearby rivers due to earthworks.	Soil erosion control measures incorporated in ESMP (silt traps, gabion protection, slope stabilization, and progressive rehabilitation of disturbed areas).
3	Zomba District Environmental Sub-Committee (DESC)	Zomba District Council	Community concerns on land acquisition, compensation, and disruption to businesses along trading centres.	A Resettlement Action Plan (RAP) has been prepared, consistent with OP/BP 4.12, with provisions for fair compensation, livelihood restoration, and stakeholder engagement.
4	Zomba DESC	Zomba District Council	Potential health and safety risks from increased traffic during construction.	ESIA provides for a Traffic Management Plan (Annex 11), installation of speed calming structures, road signage, and community sensitization campaigns.
5	Zomba DESC	Zomba District Council	Waste management concerns at contractor campsites.	ESIA includes a Waste Management Plan (Annex 12), requiring proper storage, segregation, and disposal of waste at licensed facilities, plus provision of sanitation facilities at camps.

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SN	Stakeholder	Council Name	Issue/Concern	How Issue/Concern has been Addressed in the ESIA Report
6	Zomba City Environmental Sub-Committee	Zomba City Council	Community concerns on land acquisition, compensation, and disruption to businesses along Chinamwali and Matawale trading centres.	ESIA outlines provision of temporary access routes, advance community notification (minimum 7 days), and installation of signage to maintain access.
7	Zomba City Environmental Sub-Committee	Zomba City Council	Noise and dust emissions in built-up areas of Zomba City during construction.	ESIA proposes regular sprinkling of water, strict working hours (07:00–17:00), and noise/vibration control plan to limit disturbance in sensitive locations.
8	Zomba City Environmental Sub-Committee	Zomba City Council	Road safety risks for pedestrians and non-motorized traffic within Zomba City.	ESIA commits to pedestrian safety measures (sidewalks, safe crossings, signage, speed bumps) and community sensitization on road use.

Table 8-3:Main concerns during the community consultations

No.	Issues/Concerns Raised	How Issue/Concerns Have Been Addressed in the ESIA Report (with Section Reference)
1	Employment and economic opportunities: Community members expect job opportunities, fair wages above the minimum wage, inclusion of women, skills development (vocational, building), poverty reduction, and fair/non-corrupt recruitment processes.	ESIA commits to local employment, fair labour practices, equal opportunity for women, and compliance with Malawi Labour Regulations. A Labour Management Plan and Code of Conduct are required. Skills transfer and training opportunities included. See ESIA Ch. 6.2.1 (Positive Impacts), Table 6-2 to 6-4; ESMP, Table 7-1; Annex 9 (Labour Management Guidelines).
2	Improved road quality, transport, and business opportunities: Anticipated better transport, enhanced income, tourism growth,	ESIA emphasises road quality standards, traffic management, and safety features; proposes designated temporary sites for businesses to reduce disruption; highlights economic benefits of

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No.	Issues/Concerns Raised	How Issue/Concerns Have Been Addressed in the ESIA Report (with Section Reference)
	business continuity, and designated spaces for traders.	improved access. See Ch. 6.2.1 & 6.2.3 (Positive Impacts), Table 6-2 to 6-3; ESMP Table 7-1.
3	Community development spin-offs: Road may attract other services (boreholes, NGOs).	ESIA recognises induced/secondary benefits such as improved access to services and development projects. See Ch. 6.2.3 (Positive Impacts during operation).
4	Dust, noise, and vibration impacts: Dust may cause health problems; noise/vibrations may damage property.	Mitigation includes water bowser for dust suppression, speed control, noise/vibration monitoring, and compensation where necessary. GRM provided for claims. See Ch. 6.2.2 (Air, Noise & Vibration), Tables 6-9 to 6-10, 6-25; ESMP Table 7-1; Annex 21–22.
5	Vegetation and biodiversity loss: Concerns on tree loss and environmental degradation.	ESIA requires compensatory tree planting, biodiversity conservation, and reforestation in Liwonde Forest Reserve. See Ch. 6.2.2 (Loss of Trees), Table 618; Annex 15 (Biodiversity Management Protocol).
6	HIV and AIDS, STIs, and early pregnancies: Risk of increased HIV and AIDS, STIs, early pregnancies, and student–worker relationships.	HIV/AIDS management plan, sensitisation campaigns, condom distribution, Code of Conduct prohibiting sexual exploitation/abuse, child protection. See Ch. 6.2.2 (GBV & SEAH, STDs), Tables 6-7, 6-16; Annex 16 (HIV/AIDS Guidelines).
7	Road safety and accidents: Concerns about accidents involving workers, pedestrians, and road users.	Traffic Management Plan, pedestrian crossings, safety awareness, fencing and barricades, speed calming structures. See Ch. 6.2.2 (Traffic accidents), Table 6-15; Annex 11 (Traffic & Access Management Guidelines).
8	Cultural heritage: Risk of disturbance to cultural values.	ESIA includes procedures to respect cultural heritage, chance find procedures, and community engagement in decision-making. See Ch. 5.4.14 (Religion & Culture), 5.4.16 (Archaeological Resources), and ESMP Table 7-1.
9	Education impacts: Risk of school dropouts and child exposure to unsafe sites.	Mitigation includes restricting child access to construction sites (barricades, awareness), community sensitisation, and worker Code of Conduct. See Ch. 6.2.2 (GBV/SEAH & Community Safety); ESMP Table 7-1.

6. Main findings

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The consultations revealed broad community support for the Liwonde–Matawale Road Rehabilitation Project, with expectations of social and economic benefits alongside concerns over environmental, health, and safety risks. Key findings include:

1. Strong demand for local jobs, fair wages, inclusion of women, skills development, and transparent recruitment.
2. Anticipation of better road quality, improved mobility, enhanced trading opportunities, and continuity of business activities during construction.
3. Expectation that the road will attract additional services (e.g., boreholes, NGOs, social infrastructure).
4. Concerns over dust, noise, vibrations, and vegetation loss, with calls for dust suppression, monitoring, and tree planting.
5. Fears of HIV and AIDS, STIs, early pregnancies, and student–worker relationships, highlighting the need for awareness campaigns and strict worker Codes of Conduct.
6. Calls for pedestrian crossings, speed calming, fencing, and public sensitisation to reduce accidents.
7. Requests for cultural sensitivity, respect for traditions, and procedures for managing chance finds.
8. Risks of school dropouts and child exposure to unsafe sites, with recommendations for site barricading and awareness.

Overall, stakeholders emphasised the balance between maximising socio-economic benefits and addressing environmental, health, safety, and cultural concerns through strong mitigation and management measures.

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Annex 2.3 Key Informant Inteviews

<table>
<tr><td>1. Name of Stakeholder</td><td colspan="2">Department of Forestry, Machinga District Forestry Office</td></tr>
<tr><td>Objective(s) of the consultations</td><td colspan="2">To inform relevant stakeholders about the project and to ask them for their support, including any perceived risks and impacts of the proposed project on the biodiversity</td></tr>
<tr><td colspan="2">Outcomes:</td><td>List of Participants</td></tr>
<tr><td colspan="2">He emphasized that the proposed project has the potential to reduce road accidents that frequently occur in the affected areas. While he personally supports the project, he stressed the importance of consulting senior officials at the Forestry Department’s Head Office in Lilongwe. He also recommended implementing the following measures to ensure proper execution and to minimize environmental impacts:
Conduct a thorough assessment and inventory of trees at each project site. Any trees affected by the project should be replaced, either within the forest reserve or in another suitable location, to compensate for forest loss.
All trees designated for removal must be formally handed over to the Machinga Office of the Forestry Department for appropriate processing and distribution to hospitals, prisons, and schools.
Vegetation clearing during construction should strictly adhere to the approved design plans.
The contractor must avoid clearing vegetation beyond the designated project footprint.
If any endangered plant species are encountered during construction, they should be salvaged and replanted in suitable areas near the project site once the construction work is completed.
Lastly, he reiterated the importance of consulting with the Director of Forestry in Lilongwe, especially given the project's impact on two forest reserves: Machinga (Liwonde) Forest Reserve and Chindudzi Hills, with the latter being a significant part of the former.</td><td>Department of Forestry
Henry Kagulo – District Forestry Officer
George Kalilani – Director of Planning and Development
Bigpot Consulting
Jamestone Kamwendo – Biodiversity Expert
▪  </td></tr>
</table>

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2. Name of Stakeholder	Electricity Generation Company of Malawi (EGENCO)
Objective(s) of the consultations	To inform relevant stakeholders about the project and to ask them for their support, including any perceived risks and impacts of the proposed project on biodiversity
Outcomes:	List of Participants
• Mr. Alfred Chado who is the Marine Officer for Egenco stated that this project is a good development taking into account that the road is currently in bad shape. • However, he stated that in order to be professional done and reduce the negative impacts that could come with it such as soil erosion and loss trees along the road reserves, there is need to ensure that: ✓ The contractor should install soil erosion trays and silt traps, especially in areas where the road crosses rivers and streams; ✓ The contractor must use soil conserving methods such as use of blankets and gabions in all sloppy areas to control soil erosion. ✓ These measures will help to control soil getting into the Shire River which has potential to damage the hydropower plants at Nkula, Tetdzani and Kapichira respectively during the rainy season.	EGENCO • Alfred Chado – Marine Officer Bigpot Consulting • Jamestone Kamwendo – Biodiversity Expert
3. Name of Stakeholder	National Water Resources Authority (NWRA)
Objective(s) of the consultations	To inform relevant stakeholders about the project and to ask them for their support, including any perceived risks and impacts of the proposed project on biodiversity
• Mr. Blessings Chikuse also supported the development. • However, he cautioned the expert that there was need: NWRA advised on measures to prevent water pollution, manage storm water runoff, and ensuring sustainable water usage during construction and operation phases. Recommendations included implementing water conservation practices, proper waste disposal methods, and monitoring water quality. 1. Before any construction/rehabilitation works at the site, the contractor must apply for a water permit from NWRA to enable them to abstract	NWRA • Blessings Chikuse –Senior Licensing Officer Bigpot Consulting • Jamestone Kamwendo – Biodiversity Expert

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water for the construction works, failing which is a violation of the Water Resources Act (2013).

2. Stressed the need to prevent water pollution and manage storm water runoff.
    - There is also need to construct proper storm water drains that connect to natural drainage systems
    - Implement measures to protect local water resources from contamination and overuse.
    - Proper sewage treatment and water management systems to protect local water bodies.

3. Advised on sustainable water usage practices during construction and operation phases.
    - The project should think of trying to use rainwater harvesting and wastewater recycling, to minimize the project's impact on local water resources.
    - Use water-efficient technologies and practices to minimize water consumption during construction and operation.

4. Recommended implementing water conservation measures and monitoring water quality.
    - Develop a robust water management plan to ensure the sustainable use of water resources.
    - The project should include water-efficient fixtures and rainwater harvesting systems to reduce water consumption and promote conservation.

5. The proposed project site does not pose a significant impact to the catchment and water ecosystems in the proposed development area.

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6. The contractor is required to obtain water abstraction waste water permits which are pegged at MK90, 000/permit for Domestic and industrial use. Client should contract the permits ▪ 7. The NWRA should be contacted for registers 8. The contractor should ensure that the employers are provided with a reliable and safe water source at the camp Legal documents to refer to: - Water Resources Act 2013 - National Water Policy - Water Works 1992 - Integrated Water Resources Management Plan - Water Regulation Act 2015 Non-compliance of Water Resources Act can lead to fines, imprisonment for up to five years, and orders to cease activities affecting water resources. Violation of National Water Policy can result in fines, legal actions, and mandatory compliance measures. Positive Impacts: - Sustainable Water Use: Opportunities to implement water-saving technologies in the new facility.	

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Annex 3: Parameters for Water Quality Monitoring and Baseline

Annex 3.1 Surface Water Quality Parameters and Standards

MS 691:2005 gives quality parameters standards for discharge of treated effluent in surface water body. The parameters which need to be monitored at identified monitoring locations, labour camps and assoiated baselines are given in table below.

Parameter	MS691:2005	Baseline March 2025	Remarks
pH	6.0–9.5	6.23–7.05	Within acceptable range
Temp (°C)	-	22.2–23.1	Normal for tropical surface waters
Dissolved Oxygen (mg/l)	-	Not provided	Data not available
Electrical Conductivity (µs/cm at 25°C)	3500	18–52	Very low; indicates very soft water
TDS (mg/l)	2000	11–32	Very low and well within standard
Carbonate (mg/l)	Not Mentioned	0	Not detected
Bicarbonate (mg/l)	Not Mentioned	0	Not detected
Chloride (mg/l)	750	0.2–0.4	Extremely low; no salinity issues
Sulphate (mg/l)	800	0.5–0.9	Far below limit; no concern
Nitrate (mg/l)	1	0.0–0.2	Within acceptable limit; no contamination
Fluoride (mg/l)	6	Not provided	Data not available
Sodium (mg/l)	500	Not provided	Data not available
Potassium (mg/l)	-	Not provided	Data not available
Calcium (mg/l)	250	Not provided	Data not available
Magnesium (mg/l)	200	Not provided	Data not available
Iron (mg/l)	3	0.067–0.418	Within acceptable range
Manganese (mg/l)	1.5	Not provided	Data not available
Hardness (as $CaCO_3$)	800	Not provided	Data not available
Alkalinity (as $CaCO_3$)	-	0	Not detected
Silica	-	Not provided	Data not available
Turbidity (NTU)	25	0.52–1.0	Very low turbidity
Suspended Solids (mg/l)	-	0.52–1.0	Minimal presence; no issues
Faecal coliform (/100ml)	50	31–>300	Highly contaminated across all sites
E. coli (/100ml)	Not Mentioned	31–>300	Presence indicates faecal contamination risk
Faecal streptococci	0	<1.0–>300	Detected beyond standard at most sites

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Annexx 3.2 Parameters For Ground Water Quality

Malawi government regulates drinking water quality through series of drinking water standards such as (MS 733:2005) for borehole and well. The parameters which need to be monitored at identified monitoring locations, labour camps, etc. are given in table below.

Parameter	MS733:2005	WHO Water Quality Guideline value	Baseline average	Remarks
Physical Parameters				
pH	6.0-9.5	6.5 to 8.5		
Electrical Conductivity	3500			
TDS	2000	1000		
Major Ions				
Carbonate, (mg/ℓ)	Not Mentioned			
Bicarbonate (mg/ℓ)	Not Mentioned			
Chloride (mg/ℓ)	750	250		
Sulphate (mg/ℓ)	800	250		
Nitrate (mg/ℓ)	1	10		
Fluoride (mg/ℓ)	6	1.5		
Sodium (mg/ℓ)	500	200		
Potassium (mg/ℓ)	-	1.2		
Calcium (mg/ℓ)	250	100		
Magnesium (mg/ℓ)	200			
Iron (mg/ℓ)	3	0.3		
Manganese(Mn++), mg/l	1.5	0.1		
Hardness (as $CaCO_3$)	800	150		
Alkalinity (as CaCO3), mg/l	-			
Turbidity, NTU	25			
Microbiological				
Faecal coli., Count/100ml	50	Absent		
E Coli, Count/100ml	Not Mentioned	Absent		
Faecal strept.,., Count/100ml	0			

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Annex 4. Composition and Credentials of ESIA Team

Name	Qualification	Role
Tananga Mathews Nyirenda	• PhD Environmental Engineering • MSc Environmental Science • BSc Environmental Science	Environmental Impact Assessment Expert (Team Leader)
Willie Sagona	• Master in Gender and Rural Development • BSc in Sociology	Social Expert
Eng. Moses Kalenga	• Master of Integrated Water Management • BSc Civil Engineering	Civil Engineer
Elizabeth Mwafongo	• PhD in Plant Molecular Taxonomy • MSc in Plant Systematics and Conservation Biology • BSc Honors in Botany and Ecology • BSc in Botany and Psychology	Biodiversity Expert 1
Jamestone Kamwendo	• MSc in Conservation Biology (University of Malawi, Chancellor College) • BSc (Hons) in Environmental Management (University of South Africa) • BSc in Biological Sciences (University of Malawi, Chancellor College) • Certified ESIA Expert (MEPA, Malawi)	Biodiversity Expert 2
Samuel Mkandawire	• Bachelor of Social Science. • Master of Arts in Economics (Pending)	Assistant Social Expert
Doreen Kamanga	• BSc Environmental Science.	Assistant Biodiversity Expert
Peter Khambadza	• BSc Environmental Science.	Assistant Environment Expert
Welton Phalira	• MSc Environmental Science • BSc (Biology & Demography) • Certified ESIA Expert (MEPA, Malawi)	Independent Reviewer

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Annex 5: Flora and Fauna Recorded

Annex 5.1. Flora Species of Liwonde Forest Reserve (Climbing Lane 1: Chainage 9+500)

SN	Scientific Name	Local Name	No. of Individual Species	Habit	National Plant Red-List Category/Protected by Forestry Regulations under Act (1997)	IUCN Red-List category
1	*Albizia adianthifolia*	Flat-crown albizia	2	Tree	Least Concern	Least Concern
2	*Albizia versicolor*	Poison-pod albizia	4	Tree	Least Concern	Least Concern
3	*Annona senegalensis*	African casturd-apple	5	Shrub	Least Concern	Least Concern
4	*Antidesma venosum*	Tassel-berry	3	Shrub	Least Concern	Least Concern
5	*Bauhinia petersiana*	Kalahari white bauhinia	5	Shrub	Least Concern	Least Concern
6	*Brachystegia boehmii*	Mombo	8	Tree	Least Concern	Least Concern
7	*Brachystegia floribunda*	Mombo	3	Tree	Least Concern	Least Concern
8	*Brachystegia longifolia*	Mombo	10	Tree	Least Concern	Least Concern
9	*Brachystegia managa*	Mombo	5	Tree	Least Concern/Protected	Least Concern
10	*Brachystegia spiciformis*	Mombo	5	Tree	Least Concern	Least Concern
11	*Brachystegia tamarindoides*	Mombo	2	Tree	Least Concern	Least Concern
12	*Brachystegia utilis*	Monbo	6	Tree	Least Concern	Least Concern
13	*Brackenridge zamuehnies*	Woodlice	1	Shrub	Least Concern	Least Concern
14	*Bridelia cathartica*	Blue-sweetberry	1	Shrub	Least Concern	Least Concern
15	*Bridelia micrantha*	Mitzeeri	1	Tree	Least Concern/Protected	Least Concern

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SN	Scientific Name	Local Name	No. of Individual Species	Habit	National Plant Red-List Category/Protected by Forestry Regulations under Act (1997)	IUCN Red-List category
16	*Burkea africana*	Wild syringa	2	Tree	Least Concern/Protected	Least Concern
17	*Casimiria edulis*	Mexican apple	2	Tree	Least Concern	Least Concern
18	*Casimiroa edulis*	White sapote	1	Tree	Least Concern	Least Concern
19	*Cassipourea malosana*	Onionwood	1	Tree	Least Concern	Least Concern
20	*Catunaregam obovata*	Thorny-bone apple	1	Shrub	Least Concern	Least Concern
21	*Citrus lemon*	Lemon	1	Tree	Least Concern	Least Concern
22	*Combretum molle*	Velvet bushwillow	3	Tree	Least Concern	Least Concern
23	*Combretum zeyheri*	Zeyher's bushwillow	7	Tree	Least Concern	Least Concern
24	*Crossopteryx febrifuga*	Crown-berry	1	Shrub	Least Concern	Least Concern
25	*Cussonia arborea*	Octopus cabbage tree	1	Tree	Least Concern	Least Concern
26	*Dalbergia melanoxylon*	African blackwood	2	Tree	Vulnerable/Protected	Near-threatened
27	*Dalbergia nitidula*	Glossy flat-bean	4	Tree	Least Concern	Least Concern
28	*Dalbergiella nyassae*	Mane-pod	1	Tree	Least Concern	Least Concern
29	*Delonix regia*	Flamboyant	3	Tree	Least Concern	Least Concern
30	*Dichrostachys cinerea*	Bell mimosa	4	Shrub	Least Concern	Least Concern
31	*Diplorhynchus condylocarpon*	Wild rubber	7	Shrub	Least Concern	Least Concern
32	*Eucalyptus saligna*	Sydney bluegum	3	Tree	Least Concern	Least Concern

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SN	Scientific Name	Local Name	No. of Individual Species	Habit	National Plant Red-List Category/Protected by Forestry Regulations under Act (1997)	IUCN Red-List category
33	*Faurea rochetiana*	Broad-leaved beechwood	1	Tree	Least Concern	Least Concern
34	*Ficus bubu*	Bubu fig	1	Tree	Least Concern	Least Concern
35	*Flacourtia indica*	Indian plum	3	Shrub	Least Concern	Least Concern
36	*Gymnanthenum amygdalinum*	African bitterleaf	1	Shrub	Least Concern	Least Concern
37	*Holarrhena pubescens*	Bitter oleander	2	Shrub	Least Concern	Least Concern
38	*Hymenocardia acida*	African corkwood	1	Tree	Least Concern	Least Concern
39	*Hyparrhenia hirta*	Thatching grass	22	Grass	Least Concern	Least Concern
40	*Indigofera hirsuta*	Hairy indigo	15	Herb	Least Concern	Least Concern
41	*Jacaranda mimosifolia*	Jacaranda	1	Tree	Least Concern	Least Concern
42	*Julbernardia globiflora*	Tsamba	12	Tree	Least Concern	Least Concern
43	*Khaya anthotheca*	African mahogany	2	Tree	Protected	Vulnerable
44	*Lannea discolor*	Tree grape	6	Tree	Least Concern	Least Concern
45	*Lantana camara*	Lantana	12	Shrub	Invasive	Not Listed
46	*Mangifera indica*	Mango	8	Tree	Least Concern	Least Concern
47	*Manihot esculenta*	Cassava	3	Shrub	Least Concern	Least Concern
48	*Manihot glaziovii*	Tree cassava	2	Shrub	Least Concern	Least Concern
49	*Melia azedarach*	Syringa berry	1	Tree	Least Concern	Least Concern
50	*Monotes africanus*	Yellow wood	2	Tree	Least Concern	Least Concern
51	*Moringa oliefera*	Moringa	3	Tree	Least Concern	Least Concern
52	*Morus alba*	White mulberry	1	Tree	Least Concern	Least Concern

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SN	Scientific Name	Local Name	No. of Individual Species	Habit	National Plant Red-List Category/Protected by Forestry Regulations under Act (1997)	IUCN Red-List category
53	*Multidentia crassa*	Thick-leaved multidentia	2	Shrub	Least Concern	Least Concern
54	*Ochna leptoclada*	Mickey-mouse plant	1	Shrub	Least Concern	Least Concern
55	*Ochna schweinfurthiana*	Black-red ochna	3	Tree	Least Concern	Least Concern
56	*Ormocarpum kirkii*	Caterpillar bush	1	Shrub	Least Concern	Least Concern
57	*Ozoroa insignis*	African resign tree	6	Tree	Least Concern	Least Concern
58	*Parinari curatellifolia*	Hissing tree	6	Tree	Least Concern/Protected	Least Concern
59	*Pavetta schumanniana*	Poison-bride's bush	1	Shrub	Least Concern	Least Concern
60	*Peltophorum africanum*	Weeping-wattle	1	Tree	Least Concern	Least Concern
61	*Pennisetum purpureum*	Elephant grass	9	Grass	Least Concern	Least Concern
62	*Pericopsis angolensis*	Afrormosia	2	Tree	Least Concern/Protected	Least Concern
63	*Piliostigma thonningii*	Camel's foot tree	5	Tree	Least Concern	Least Concern
64	*Protea angolensis*	Northern sugarbush	3	Shrub	Least Concern	Least Concern
65	*Pseudolachnostylis maprouneifolia*	Kudu berry	4	Tree	Least Concern/Protected	Least Concern
66	*Psidium quajava*	Guava	3	Tree	Least Concern	Least Concern
67	*Psydrax whytei*	Cylon boxwood	1	Tree	Least Concern	Least Concern
68	*Pterocarpus angolensis*	Wild teak	3	Tree	Vulnerable/Protected	Least Concern

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SN	Scientific Name	Local Name	No. of Individual Species	Habit	National Plant Red-List Category/Protected by Forestry Regulations under Act (1997)	IUCN Red-List category
69	*Pterocarpus rotundifolius*	Round-leaved bloodwood	4	Tree	Least Concern/Protected	Least Concern
70	*Securidaca longependiculata*	Violet tree	2	Shrub	Least Concern	Least Concern
71	*Senna siamea*	Siamese cassia	5	Tree	Least Concern	Least Concern
72	*Senna singueana*	Winter-flowering senna	5	Shrub	Least Concern	Least Concern
73	*Steganotaenia araliacea*	Carrot root	2	Shrub	Least Concern	Least Concern
74	*Steriospermum kunthianum*	Pink jacaranda	2	Tree	Least Concern	Least Concern
75	*Strychnos innocua*	Monkey orange	2	Shrub	Least Concern	Least Concern
76	*Strychnos spinosa*	Spiny monkey orange	2	Shrub	Least Concern	Least Concern
77	*Tereminalia sericeae*	Silver-terminalia	8	Tree	Least Concern	Least Concern
78	*Terminalia stenostachya*	Rosette cluster-leaf	2	Tree	Least Concern	Least Concern
79	*Turraea nilotica*	Lowveld honeysuckle	2	Shrub	Least Concern	Least Concern
80	*Uapaca kirkiana*	Sugar plum	6	Tree	Least Concern	Least Concern
81	*Uapaca nitida*	Narrow-leaved mahobohobo	5	Tree	Least Concern	Least Concern
82	*Vangueria infausta*	African medlar	1	Shrub	Least Concern	Least Concern
83	*Vernonia cinerea*	Little ironweed	6	Herb	Least Concern	Least Concern
84	*Vernonia natalensis*	Silver vernonia	1	Herb	Least Concern	Least Concern
85	*Vitex doniana*	Black plum	2	Tree	Least Concern	Least Concern

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SN	Scientific Name	Local Name	No. of Individual Species	Habit	National Plant Red-List Category/Protected by Forestry Regulations under Act (1997)	IUCN Red-List category
86	*Vitex mombassae*	Smelly-berry fingerleaf	1	Tree	Least Concern	Least Concern
87	*Ximenia americana*	Yellow plum	1	Shrub	Least Concern	Least Concern
88	*Ximenia caffra*	Sour plum	1	Shrub	Least Concern	Least Concern
89	*Zanha africana*	Velvet-fruited zanha	3	Tree	Least Concern/Protected	Least Concern
90	*Ziziphus mauritianus*	Indian plum	7	Shrub	Least Concern	Least Concern

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Annex 5.2. Flora Species of Liwonde Forest Reserve (Climbing Lane 2: Chainage 11+400)

SN	Scientific Name	Local Name	No. of Individual Species	Habit	National Plant Red-List Category/Protected by Forestry Regulations under Act (1997)	IUCN Red-List category
1	*Acacia polyacantha*	White thorn	4	Tree	Least Concern	Least Concern
2	*Acacia seyal*	White-galled acicia	2	Tree	Least Concern	Least Concern
3	*Acacta dealbata*	Silver wattle	2	Tree	Least Concern	Least Concern
4	*Adenia gummifera*	Monkey rope	1	Climber	Least Concern	Least Concern
5	*Albizia harveyi*	Sickle-leaved albizia	2	Tree	Least Concern	Least Concern
6	*Albizia verscolor*	Poison-pod albizia	2	Tree	Least Concern	Least Concern
7	*Albizia versicolor*	Poison-pod albizia	4	Tree	Least Concern	Least Concern
8	*Annona senegalensis*	Wild custard-apple, Mpoza	1	Shrub	Least Concern	Least Concern
9	*Bauhinia petersiana*	White bauhinia	6	Shrub	Least Concern	Least Concern
10	*Bidens pilosa*	Black-jack	7	Herb	Least Concern	Least Concern
11	*Brachystegia boehimii*	Prince of wales feathers	10	Tree	Least Concern	Least Concern
12	*Brachystegia floribunda*	Mombo	6	Tree	Least Concern	Least Concern
13	*Brachystegia longifolia*	Mombo	9	Tree	Least Concern	Least Concern
14	*Brachystegia manga*	Mombo	13	Tree	Least Concern/Protected	Least Concern
15	*Brachystegia spiciformis*	Mombo	7	Tree	Least Concern	Least Concern
16	*Brachystegia stipulata*	Mombo	5	Tree	Least Concern	Least Concern

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SN	Scientific Name	Local Name	No. of Individual Species	Habit	National Plant Red-List Category/Protected by Forestry Regulations under Act (1997)	IUCN Red-List category
17	*Brachystegia tamarindoides*	Mombo	4	Tree	Least Concern	Least Concern
18	*Bridelia carthatica*	Blue sweetberry	5	Shrub	Least Concern	Least Concern
19	*Burkea africana*	Wild syringa	3	Tree	Least Concern/Protected	Least Concern
20	*Cassipourea malosana*	Onionwood	2	Tree	Least Concern	Least Concern
21	*Catunaregum obvata*	Thorny borne-apple	3	Shrub	Least Concern	Least Concern
22	*Combretum adenogonium*	Four-leaved bushwillow	3	Tree	Least Concern	Least Concern
23	*Combretum apiculatum*	Red bushwillow	3	Tree	Least Concern	Least Concern
24	*Combretum collinum*	Silver bushwillow	6	Tree	Least Concern	Least Concern
25	*Combretum molle*	Velvet bushwillow	7	Tree	Least Concern	Least Concern
26	*Combretum zeyheri*	Zeyheri's combretum	5	Tree	Least Concern	Least Concern
27	*Commiphora mossambicensis*	Pepper-leaved corkwood	3	Shrub	Least Concern	Least Concern
28	*Crossopteryx febrifuga*	Ordeal tree	1	Tree	Least Concern	Least Concern
29	*Cussonia arborea*	Octopus cabbage tree	1	Tree	Least Concern	Least Concern
30	*Dalbergia boehinii*	Rosewood	3	Tree	Least Concern	Least Concern
31	*Dalbergia melanoxylon*	African blackwood	3	Tree	Vulnerable/Protected	Near-threatened

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SN	Scientific Name	Local Name	No. of Individual Species	Habit	National Plant Red-List Category/Protected by Forestry Regulations under Act (1997)	IUCN Red-List category
32	*Dalbergia nitidula*	Purple wood dalbergia	7	Tree	Least Concern	Least Concern
33	*Dalbergiella nyassae*	Mane-pod	1	Tree	Least Concern	Least Concern
34	*Dichrostachys cinerea*	Bell mimosa	6	Shrub	Least Concern	Least Concern
35	*Diospyros kirkii*	Large-leaved jackal berry	4	Tree	Least Concern	Least Concern
36	*Diospyros virginiana*	Common Persimmon	1	Tree	Least Concern	Least Concern
37	*Diplorhynchus condylocarpon*	Wild ruber	12	Shrub	Least Concern	Least Concern
38	*Dombeya rotundifolia*	Wild pear	3	Tree	Least Concern	Least Concern
39	*Ehretia amoena*	Sandpaper stamperwood	1	Tree	Least Concern	Least Concern
40	*Eragrostis aspera*	Rough love grass	5	Grass	Least Concern	Least Concern
41	*Fadogia ancylantha*	Tea bush	3	Shrub	Least Concern	Least Concern
42	*Ficus sycomosa*	Sycamore fig	1	Tree	Least Concern	Least Concern
43	*Flacourtia indica*	Governor's plum	5	Shrub	Least Concern	Least Concern
44	*Grewia mollis*	Grewia gum	3	Shrub	Least Concern	Least Concern
45	*Heteropogon contortus*	Spear grass	5	Grass	Least Concern	Least Concern
46	*Hyparrhenia filipendula*	Fine thatching grass	17	Grass	Least Concern	Least Concern
47	*Hyparrhenia hirta*	Thatching grass	17	Grass	Least Concern	Least Concern
48	*Hyparrhenia nyassae*	Nyasaland thatching grass	12	Grass	Least Concern	Least Concern

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SN	Scientific Name	Local Name	No. of Individual Species	Habit	National Plant Red-List Category/Protected by Forestry Regulations under Act (1997)	IUCN Red-List category
49	*Hyparrhenia rufa*	Giant thatching grass	25	Grass	Least Concern	Least Concern
50	*Hyperthelia dissoluta*	Yellow thatching-grass	8	Grass	Least Concern	Least Concern
51	*Julbernardia globiflora*	Mtondo	21	Tree	Least Concern	Least Concern
52	*Lannea discolor*	Tree grape	8	Tree	Least Concern	Least Concern
53	*Lannea edulis*	Wild grape	7	Shrub	Least Concern	Least Concern
54	*Leonotis nepetifolia*	Christmas candlestick	2	Herb	Least Concern	Least Concern
55	*Monotes africanus*	Yellow wood	1	Tree	Least Concern	Least Concern
56	*Ochna leptoclada*	Mickey mouse plant	2	Shrub	Least Concern	Least Concern
57	*Ochna schweinfurthiana*	Brick-red ochna	4	Tree	Least Concern	Least Concern
58	*Ormocarpum kirkii*	Caterpillar pod	2	Shrub	Least Concern	Least Concern
59	*Ozoroa insignis*	Resin tree	5	Tree	Least Concern	Least Concern
60	*Parinari curatellifolia*	Hissing tree	11	Tree	Least Concern/Protected	Least Concern
61	*Peltoporum africana*	African black wattle	2	Tree	Least Concern	Least Concern
62	*Pericopsis angolensis*	Afrormosia	3	Tree	Least Concern/Protected	Least Concern
63	*Philenoptera violacea*	Rain tree	1	Tree	Least Concern	Least Concern
64	*Phyllanthus ovalifolius*	Small-fruited potato bush	3	Shrub	Least Concern	Least Concern

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SN	Scientific Name	Local Name	No. of Individual Species	Habit	National Plant Red-List Category/Protected by Forestry Regulations under Act (1997)	IUCN Red-List category
65	*Piliostigma thonningii*	Camel's foot	3	Tree	Least Concern	Least Concern
66	*Piliostigma thonningii*	Camel's foot tree	3	Tree	Least Concern	Least Concern
67	*Plukenetia africana*	African walnut	1	Shrub	Least Concern	Least Concern
68	*Pseuolachnostylis maprouneifolia*	Kudu berry	11	Tree	Least Concern	Least Concern
69	*Psorospermum febrifugum*	Christmas berry	1	Shrub	Least Concern	Least Concern
70	*Pterocarpus angolensis*	Wild teak	7	Tree	Vulnerable/Protected	Least Concern
71	*Pterocarpus rotundifolius*	Round-leaved bloodwood	6	Tree	Least Concern/Protected	Least Concern
72	*Rotheca myricoides*	Butterfly Clerodendrum	1	Shrub	Least Concern	Least Concern
73	*Rourea orientalis*	Short-pod	1	Climber	Least Concern	Least Concern
74	*Sclerocarya birrea*	Marula tree	2	Tree	Least Concern	Least Concern
75	*Senna singueana*	Winter cassia		Shrub	Least Concern	Least Concern
76	*Steganotia aralicea*	Carrot tree	2	Shrub	Least Concern	Least Concern
77	*Sterculia quinqueloba*	Large-leaved sterculia	2	Tree	Least Concern	Least Concern
78	*Sterculia quinqueloba*	Large-leaved star-chestnut	2	Tree	Least Concern/Protected	Least Concern
79	*Stereospermum kunthianum*	Pink jacaranda	4	Tree	Vulnerable/Protected	Least Concern
80	*Stereospermum kunthianum*	Pink jacaranda	5	Tree	Least Concern	Least Concern
81	*Strychnos innocua*	Monkey orange	8	Shrub	Least Concern	Least Concern

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SN	Scientific Name	Local Name	No. of Individual Species	Habit	National Plant Red-List Category/Protected by Forestry Regulations under Act (1997)	IUCN Red-List category
82	*Strychnos madagacriensis*	Black monkey orange	6	Shrub	Least Concern	Least Concern
83	*Strychnoys spinosa*	Monkey orange	10	Shrub	Least Concern	Least Concern
84	*Tamarindus indica*	Tamarind	1	Tree	Least Concern	Least Concern
85	*Terminalia macroptera*	Rebreb terminalia	1	Tree	Least Concern	Least Concern
86	*Terminalia stenostachya*	Rosette-leaved terminalia	5	Tree	Least Concern	Least Concern
87	*Terminaria sericeae*	Silver-terminalia	12	Tree	Least Concern	Least Concern
88	*Thespesia garckeana*	African chewing gum	2	Tree	Least Concern	Least Concern
89	*Tridax procumbens*	Tridax daisy	3	Herb	Least Concern	Least Concern
90	*Turraea nilotica*	Bushveld honeysuckle-tree	2	Shrub	Least Concern	Least Concern
91	*Uapaca kirkiana*	Sugar plum	8	Tree	Least Concern	Least Concern
92	*Uapaca nitida*	Narrow-leaved mahobohobo	3	Tree	Least Concern	Least Concern
93	*Vitex mombasa*	Smelly-berry fingerleaf	4	Tree	Least Concern	Least Concern
94	*Vitex payos*	Chocolate berry	1	Tree	Least Concern	Least Concern
95	*Xeroderris stuhlmanni*	Wing-bean	12	Climber	Least Concern	Least Concern
96	*Ximenia americana*	Yellow plum	1	Shrub	Least Concern	Least Concern
97	*Zanha africana*	Velvet-fruited zanha	6	Tree	Least Concern/Protected	Least Concern
98	*Ziziphus mauritiana*	Jujube	1	Tree	Least Concern	Least Concern

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Annex 5.3 Birds Species of Liwonde Forest Reserve

SN	*Scientic name*	Local name	Family name	National Mammal Red-List category	IUCN Red-List category
1	*Alcedo cristata*	Malachite Kingfisher	Alcedinidae	Least Concern	Least Concern
2	*Apus apus*	Eurasian Swift	Apodiidae	Least Concern	Least Concern
3	*Ardea Cinerea*	Grey Heron	Ardeidae	Least Concern	Least Concern
4	*Batis molitor*	Chinspot Batis	Platysteiridae	Least Concern	Least Concern
5	*Cercomela failiaris*	Familiar Chat	Turdidae	Least Concern	Least Concern
6	*Chrysococcyx klaas*	Claas's Cuckoo	Cuculidae	Least Concern	Least Concern
7	*Cisticola Chiniana*	Rattling Cisticola	Cisticolidae	Least Concern	Least Concern
8	*Cisticola erthrops*	Red-faced Cisticola	Cisticolidae	Least Concern	Least Concern
9	*Cisticola fulvicapilla*	Neddick Cisticola	Cisticolidae	Least Concern	Least Concern
10	*Cisticola juncidis*	Fan-tailed Cisticola	Cisticolidae	Least Concern	Least Concern
11	*Corvus albus*	Pied Crow	Corvidae	Least Concern	Least Concern
12	*Cossypha heuglini*	Heuglin Robin	Malaconotinidae	Least Concern	Least Concern
13	*Coturnix delegorguei*	Harlequin Quail	Phasianidae	Least Concern	Least Concern
14	*Dedropicos fuscescens*	Cardinal Woodpecker	Picidae	Least Concern	Least Concern
15	*Dicrurus adsimilis*	Folk-tailed Drongo	Dicruridae	Least Concern	Least Concern
16	*Erythropygia leucophrys*	White-browed Scrub Robin	Turdidae	Least Concern	Least Concern
17	*Estrilda astrild*	Common Waxbill	Estrildidae	Least Concern	Least Concern
18	*Euplectes capensis*	Yellow-Rumped Bishop	Ploceidae	Least Concern	Least Concern
19	*Euplectes orix*	Red Bishop	Ploceidae	Least Concern	Least Concern

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SN	*Scientic name*	Local name	Family name	National Mammal Red-List category	IUCN Red-List category
20	*Halcyon albiventris*	Brown-hooded Kingfisher	Alcedinidae	Least Concern	Least Concern
21	*Hedydipna collaris*	Collored Sunbird	Nectarinidae	Least Concern	Least Concern
22	*Indicator minor*	Lesser Honeyguide	Indicatoridae	Least Concern	Least Concern
23	*Laniarius aethiopicus*	Tropical Boubou	Malaconotinidae	Least Concern	Least Concern
24	*Nectarina venusta*	Yellow-bellied Sunbird	Nectarinidae	Least Concern	Least Concern
25	*Nectarinia manoensis*	Miombo Double - collored Sunbird	Nectarinidae	Least Concern	Least Concern
26	*Oriolus larvatus*	Eastern Black-headed Oriole	Oriolidae	Least Concern	Least Concern
27	*Passer domesticus*	House Sparrow	Passeridae	Least Concern	Least Concern
28	*Ploceus cucullatus*	Village Weaver	Ploceidae	Least Concern	Least Concern
29	*Pogoniulus bilineatus*	Golden-rumped Tinkerbird	Lybiidae	Least Concern	Least Concern
30	*Prinia subflava*	Tawny-flanked Prinia	Cisticolidae	Least Concern	Least Concern
31	*Scopus umbretta*	Harmecop	Scopidae	Least Concern	Least Concern
32	*Serinus mosambicus*	Yellow-fronted Canary	Fringillidae	Least Concern	Least Concern
33	*Spermestes cucullata*	Bronze Manikin	Estrildidae	Least Concern	Least Concern
34	*Streptopelia capicola*	Cape Turtle Dove	Columbidae	Least Concern	Least Concern
35	*Streptopelia semitorquata*	Red-eyed Dove	Columbidae	Least Concern	Least Concern
36	*Streptopelia senegalensis*	Loughing Dove	Columbidae	Least Concern	Least Concern
37	*Tchagra australis*	Brown-headed Tchagra	Malaconotinidae	Least Concern	Least Concern
38	*Tchagra senegalensis*	Black-crowned Tchagra	Malaconotinidae	Least Concern	Least Concern
39	*Vidua chalybeata*	Village Indigo bird	Viduidae	Least Concern	Least Concern

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SN	*Scientic name*	Local name	Family name	National Mammal Red-List category	IUCN Red-List category
40	*Vidua macroura*	Pin-tailed Widow	Viduidae	Least Concern	Least Concern
41	*Vidua paradisaea*	Eastern Paradise-whydah	Viduidae	Least Concern	Least Concern

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Annex 5.4 Insect species

SN	Order	Family	Species	Common Name
1	Odonata	Libellulidae-	*Palpopleura lucia*	
2	Orthoptera	Acrididae	*Acanthancris ruficornis*	Garden Locust
3	Lepidoptera	Acraeidae	*Acraea natalica*	Natal Acraea
4	Lepidoptera	Nymphalidae	*Acraea oncaea*	Window Acraea
5	Odonata	Aesnidae	*Anax imperator*	
6	Odonata	Aesnidae	*Anax tristis*	
7	Hymenoptera	Apidae	*Apis mellifera*	Apis
8	Hymenoptera	Pompilidae	*Batonozellus furiginosus*	
9	Lepidoptera	Pieridae	*Catopsilia florella*	African Migrant
10	Orthoptera	Acrididae	*Chorthippus brunneus*	Common Field Grasshopper
11	Diptera	Calliphoridae	*Chrysomya sp*	
12	Lepidoptera	Nymphalidae	*Danaus chrysippus*	African Mornach
13	Lepidoptera	Nymphalidae	*Hamanumida daedatus*	Guinea Fowl Butterfly
14	Scorpiones	Buthidae	*Hottentotta trilineatus*	Scopion
15	Hymenoptera	Chrysididae	*Hymenoptera*	Cuckoo Wasps
16	Hymenoptera	Halictidae	*Hymenoptera*	Sweat Bees
17	Lepidoptera	Nymphalidae	*Junonia hiertacebrene*	
18	Lepidoptera	Nymphalidae	*Neptis laeta*	Common Sailer
19	Odonata	Bellulidae	*Orthetrum chrysostigma*	Dragonly
20	Lepidoptera	Papilionidae	*Papilio demodocus*	Citrus Swallowtail Papilio
21	Lepidoptera	Papilionidae	*Papilio nireus lyaeus*	Blue-banded Swallowtai
22	Odonata	Coenagrionidae	*Pseudagrion kersteni*	
23	Hymenoptera	Eumenidae	*Synagris mirabilis*	
24	Hymenoptera	Apidae	*Thyreus pictus*	
25	Odonata	Bellulidae	*Trithemis anulata*	Red Ordanata
26	Hymenoptera	Vespidae	*Vespula germanica*	Social Wasp
27	Hymenoptera	Apidae	*Xylocopa eucostans*	Carpenter Bee
28	Hymenoptera	Apidae	*Xylocopa latipes*	Carpenter Bee
29	Hymenoptera	Apidae	*Xylocopa scioensis*	Carpenter Bee
30	Odonata	Aeschnidae		
31	Hymenoptera	Apidae		Carpenter Bee
32	Odonata	Libellulidae		Skimmer Dragonfly
33	Lepidoptera	Noctuidae		Moth
34	Orthoptera	Pamphagidae		

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Annex 6 Contractor Code of Conduct

I, _____, acknowledge that preventing any misconduct as stipulated in this code of conduct, including gender based violence (GBV), child abuse/exploitation (CAE) are important. Any activity, which constitute acts of gross misconduct are therefore grounds for sanctions, penalties or even termination of employment. All forms of misconduct are unacceptable be it on the work site, the work site surroundings, or at worker's camps. Prosecution of those who commit any such misconduct will be pursued as appropriate.

I agree that while working on this project, I will:

1. Consent to security background check;
2. Treat women, children (persons under the age of 18) and persons with disability with respect regardless of race, colour, language, religion, political or other opinion, national, ethnic or social origin, property, birth or other status;
3. Not use language or behaviour towards men, women or children that is inappropriate, harassing, abusive, sexually provocative, demeaning or culturally inappropriate;
4. Not participate in sexual activity with children—including grooming or through digital media. Mistaken belief regarding the age of a child and consent from the child is not a defence;
5. Not exchange money, employment, goods, or services for sex, with community members including sexual favours or other forms of humiliating, degrading or exploitative behaviour;
6. Not have sexual interactions with members of the communities surrounding the work place, worker's camps and fellow workers that are not agreed to with full consent by all parties involved in the sexual act (see definition of consent above). This includes relationships involving the withholding, promise of actual provision of benefit (monetary or non-monetary) to community members in exchange for sex - such sexual activity is considered "non-consensual" within the scope of this Code;
7. Attend trainings related to HIV and AIDS, GBV, CAE, occupational health and any other relevant courses on safety as requested by my employer;
8. Report to the relevant committee any situation where I may have concerns or suspicions regarding acts of misconduct by a fellow worker, whether in my company or not, or any breaches of this code of conduct provided it is done in good faith;
9. With regard to children (under the age of 18):
    - Not invite unaccompanied children into my home, unless they are at immediate risk of injury or in physical danger.
    - Not sleep close to unsupervised children unless absolutely necessary, in which case I must obtain my supervisor's permission, and ensure that another adult is present if possible.
    - Refrain from physical punishment or discipline of children.
    - Refrain from hiring children for domestic or other labour, which is inappropriate given their age, or developmental stage, which interferes with their time available for education and recreational activities, or which places them at significant risk of injury.
    - Comply with all relevant local legislation, including labour laws in relation to child labour.

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10. Refrain from any form of theft for assets and facilities including from surrounding communities.
11. Remain in designated working area during working hours;
12. Refrain from possession of alcohol and illegal drugs and other controlled substances in the workplace and being under influence of these substances on the job and during workings hours;
13. Wear mandatory PPE at all times during work;
14. Follow prescribed environmental occupation health and safety standards;
15. Channel grievances through the established GRM.

I understand that the onus is on me to use common sense and avoid actions or behaviours that could be construed as misconduct or breach this code of conduct.

I acknowledge that I have read and understand this Code of Conduct, and the implications have been explained with regard to sanctions on-going employment should I not comply.

Signed by: _____
Signature: _____
Date: _____

FOR THE EMPLOYER
Signed by: _____
Signature: _____
Date: _____

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Annex 7. Stakeholder Engagement Plan Guide

Introduction

The Proponent shall be required to prepare a Stakeholder Engagement Plan (SEP) for the Liwonde–Matawale Road Project. The SEP is a critical document that outlines how stakeholders will be identified, consulted, engaged, and involved throughout the project lifecycle. The purpose of the SEP is to promote effective, inclusive, and transparent communication with stakeholders, manage expectations, and ensure that stakeholder inputs inform decision-making and project outcomes.

This document provides guidelines for the preparation of the SEP in accordance with applicable national requirements and international best practices, including the World Bank standards. These guidelines must be used by the Proponent and its implementing partners to ensure the SEP meets required quality standards and supports project sustainability and stakeholder trust.

1. Executive Summary

The SEP must include a clear and concise Executive Summary in both English and Chichewa, summarizing:

- The purpose and objectives of the SEP.
- Key project risks and opportunities requiring engagement.
- Who the stakeholders are and how they will be engaged.
- How feedback will be integrated and conflicts resolved.

2. Priority Environmental and Social (E&S) Issues for Engagement

The SEP shall outline the critical E&S risks and issues that warrant stakeholder consultation throughout the project lifecycle, including:

- Land acquisition and resettlement.
- Disruption of community access routes.
- Employment opportunities and working conditions.
- Impacts on vulnerable groups (youth, women, persons with disabilities).
- Biodiversity and habitat disturbance.
- Road safety and accident risks.
- Gender-Based Violence (GBV), Sexual Exploitation and Abuse (SEA).
- Public health risks (HIV/AIDS, COVID-19).
- Noise, vibration, and dust near communities.

3. Stakeholder Mapping and Analysis

The SEP must include a detailed stakeholder mapping, distinguishing between:

- Primary stakeholders: directly affected people and communities.
- Secondary stakeholders: NGOs, local government, civil society.
- Vulnerable groups: elderly, people with disabilities, etc.

Each stakeholder must be characterized by location, interests, influence, and preferred communication channels, noting language preferences (English/Chichewa).

4. Engagement Plan

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Engagement shall be outlined per project phase:
Preparation Phase:

- Issues: Information disclosure, feedback on design.
- Methods: Public meetings, radio, posters in Chichewa.
- Outputs: Input logs, summaries.

Implementation Phase:

- Issues: Labour influx, grievance handling, GBV.
- Methods: Trainings, mobile hotlines, suggestion boxes.
- KPIs: % grievances resolved within 14 days.

Completion Phase:

- Issues: Project closure, sustainability.
- Methods: FGDs, surveys.
- Outputs: Satisfaction report.

All materials must be bilingual (English and Chichewa).

5. Implementation Arrangements
Roles and responsibilities:

- PIU: Oversight and budget.
- Safeguards Officer: Daily stakeholder contact.
- Contractor: Field-level engagement and GRM.
- Independent facilitator (optional): Sensitive dialogue.

6. Consultations During SEP Preparation
Include documentation of consultations held during SEP preparation:

- Venues, dates, and attendance lists.
- Photos, meeting notes, community feedback.
- Summary of how feedback was incorporated.

7. Grievance Redress Mechanism (GRM)
The GRM must be accessible, confidential, and bilingual.

- Able to handle labor, GBV, and environmental concerns.
- Define process steps, timelines, appeals, and responsible staff.

8. Costing and Budget
Include cost estimates for:

- Staff, logistics, materials (radio, posters).
- Meeting costs and reporting mechanisms.

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Annex 8: Grievance Redress Mechanism

1. Introduction

A Grievance Redress Mechanism (GRM) refers to a system that is set up to addresses concerns, queries, and complaints about a project. It ensures continuous stakeholder engagement and feedback, resolving issues at the project and local levels before escalation. The GRM serves as the first line of response to stakeholder concerns, complementing other grievance management channels. It must be accessible, collaborative, responsive, and effective in resolving concerns through dialogue and problem-solving, helping to maintain strong relations between the project and the local community.

It is anticipated that implementation of the Project especially construction activities will generate a number of grievances from communities, construction workers and the public at large. The grievances may range from resettlement, labour, environmental health and safety as well as GBV/SEA and TIP issues.

The contractor to develop a GRM management plan which will have measures of management of the grievances. The GRM will have two ways of recording grievances. This will be electronic and manual means of recoding the grievances. However, the electronic form will be promoted mostly to allow automatic capturing of grievances which can be easily tracked by managers and upper management when grievances are left unanswered, and it also facilitates compilation of data to offer a live portrait of grievance management.

2. Categories and Types of Grievances

All types of grievances related to the project will be received at the SATCP. In addition, grievances can be received through the project-dedicated phone line, which will be active throughout the project. By this phone line, PAPs who cannot come to the project office or are away from the affected areas, can express their concerns and grievances regarding the project. The phone number shall be widely advertised in the project area through the community information meetings. In addition, each site will have grievance boxes where affected PAPs can deposit grievances.

Category of Grievance	Type of Grievance	Description
Resettlement	Compensation Disputes	Issues related to delays or inadequacies in compensation for resettlement.
	Relocation Issues	Complaints about the conditions or process of relocation, including access to services.
	Loss of Livelihood	Grievances about the impact of resettlement on income and livelihoods.
Health and Safety	Safety Violations	Inconsistent/unfair resolutions of employee safety violations on similar offences

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Category of Grievance	Type of Grievance	Description
	Accidents and Injuries	Grievances arising from workplace accidents or injuries e.g. dismissals due to involvement in accident
	Health and safety Hazards	Issues related to exposure to hazardous materials, exposure to unsafe conditions, unsafe acts, inadequate or no PPEs issued,
	Community safety complaints	Exposure to noise, dust, blockage of community access roads to critical services, construction vehicles movements and over speeding.
Labour/Contractor	Payment Disputes	Delays in payment, underpayment, or non-payment for work completed.
	Working Conditions	Complaints about unsafe or unhealthy working environments.
	Wage Disputes	Issues related to wage rates, overtime pay, or non-payment of wages.
	Discrimination and Harassment	Claims of discrimination or workplace harassment.
	Contract Interpretation	Conflicts over the interpretation of contract terms and conditions.
Gender and Social Inclusion (GSI)	Gender Discrimination	Complaints about gender inequality or bias in the workplace.
	Social Exclusion	Grievances related to the exclusion of certain groups from project benefits or participation.
	Cultural Insensitivity	Issues arising from lack of respect for local customs or traditions.
Environmental	Pollution and Waste Management	Complaints about improper disposal of waste, noise pollution, or environmental degradation.
	Community Impact	Grievances from the local community regarding environmental impacts.
	Natural Resource Damage	Issues related to the destruction or depletion of local natural resources.
General	Project Delays	Disputes over the causes and responsibility for delays.
	Communication Gaps	Issues arising from poor communication between project stakeholders.
	Stakeholder Engagement	Grievances related to inadequate consultation or involvement of stakeholders in decision-making.

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3. Objectives of GRM

The specific objectives of this GRM are as follow:

- To creates accessible, responsive and demonstrably fair channels to resolve beneficiaries', communities' and workers' grievances and complaints in a mutually acceptable process;
- To implement effective dialogue and open lines of communication with the public;
- To establish a system of investigation, response and quick grievance resolution;
- To create an extra channel for receiving information about community, beneficiaries and worker grievances and complaints with the project;
- To serve as a release valve for community and worker grievances and complaints stemming from a project and provides early warning of potential problems that are developing;
- To prevent unrealistic expectations or negative perceptions from the local population towards the project activities;
- To prevent grievances and complaints from accumulating and escalating to conflicts such as protests, sabotage or strikes that can be very costly to the project in terms of its reputation and in terms of work time, land access or additional demands;
- To allow the project team to understanding the project risks associated with a grievance. Protests, campaigns and strikes can arise from 'unfounded' grievances or misunderstandings as well. The grievance mechanism provides one channel that a project can use to rectify these sorts of misunderstandings or explain why a grievance is unfounded or is not within the project's jurisdiction;
- To ensure that the rights of affected parties are respected;
- To increase stakeholder involvement in the project;
- To manage negative publicity and activist campaigns. Projects that operate responsibly and have effective grievance management channels can actively manage strike threats and hence reduce opportunities for activists to influence aggrieved workers.
- To improve the Project social performance through the analysis of grievances and complaints

4. Principles of the GRM

The Project is designed on principles related to universal principles of human rights, gender equality and the respect for rule of law. The key principles governing this GRM are;

- Human dignity: The GRMs should recognize and respect the inherent dignity and the equal and inalienable human rights of all individuals;
- Equity and justice: The GRM should recognize that equality between individuals require acknowledging their differences and taking positive action, including empowerment, in order to promote equity and justice for all including women, men, youth, the vulnerable and marginalized groups;
- Gender equality: GRM should ensure equal rights of women and men to the enjoyment of all human rights, while acknowledging differences between women and men and taking specific measures to accelerate de facto equality when necessary.
- Accessibility: The principle guarantees that the GRM will be easily accessible to all stakeholders, including local communities who will like to submit a complaint. To that, the Project GRM has been designed such that it is accessible by the Project Affected Persons. It includes the ability to submit a grievance verbally.

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- Fairness: The principle of fairness ensures that all grievances are treated fairly and impartially. It emphasizes that mechanisms will be in place to assess the validity of the complaint and conduct an objective investigation. The principle further highlights that the resolution process will be free from any bias or favouritism. It ensures that an appeal procedure for complainants who reject SATCP's or agents acting on their behalf's intended action to redress a grievance is in place.
- Transparent: The principle provides that GRM operates in a transparent manner, ensuring that the process and procedures are clearly communicated to all stakeholders. This includes providing information on how grievances are handled, the timelines for resolution, and the feedback mechanisms in place; proportionate to risks and adverse impacts. Transparency further means, clarifying at the outset who is expected to use the Grievance Mechanism, and assuring stakeholders that there will be neither costs nor retribution associated with lodging a grievance. Stakeholders will be informed that grievance can be submitted anonymously and that they can request that their identity be kept confidential. The entire process – from how a grievance is received and reviewed, through to how decisions are made and, in the case of a grievance, the possibilities that exist for appeal – will be made as transparent as possible through good communications.
- Accountability: This principle provides that GRM will hold project implementers accountable for addressing the grievances raised by stakeholder. This principle will compel SATCP GRM to have a clear mechanism for tracking and monitoring the progress of grievance resolution.
- Capability: This principle requires SATCP to develop the necessary capacities in terms of technical knowledge and skills, human resources, and financial resources. These capacities are essential for effectively managing the Grievance Redress Mechanism (GRM) and achieving its intended purpose.
- Responsiveness: The GRM will promptly respond to grievances received from stakeholders. It will acknowledge receipt of the complaint and provide regular updates on the progress of the grievance resolution process.
- Rule of Law: This principle guarantees that the results of the Grievance Redress Mechanism (GRM) align with the provisions of the Malawi Constitution, laws, and internationally recognized human rights. Free of cost for the stakeholders;
- Social Inclusivity: This principle ascribes to the notion that no one will be left behind. This principle will compel SATCP to have multiple grievance uptake channels, ensuring that all individuals can raise their concerns.
- Confidentiality: The GRM respects the confidentiality of the complainants and treats their personal information with care. This also entails that GRM must offer anonymity option as appropriate.
- Participation and Engagement: The GRM encourages active participation and engagement of stakeholders throughout the grievance resolution. This principle will compel SATCP GRM to provide opportunities for dialogue and consultation during resolution of grievances; and
- Predictability: This principle guarantees that the Grievance Redress Mechanism (GRM) provides a well-defined procedure with specified timeframes for each stage. It also ensures clarity regarding the outcomes that the GRM can and cannot deliver. This principle will require SATCP GRM to have clear and straight forward procedures for grievance management as well as timeframe for each procedure.
- Systematic: Maintaining written records of all grievances received (comments/concerns) will be recorded and tracked under a wider stakeholder

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engagement database) as this is critical for effective grievance management. A grievance can also be received by phone, SMS, WhatsApp, email, or dropped in a grievance box, written on a form and submitted to the system by an agent. At any step of the grievance processing, it will be possible to attach media (pictures, videos, audio files, etc.) to it. A grievance can be submitted 100% anonymously. When done this way, the complainant will be provided with a unique code and web address (URL) where he/she can track the progress of the processing of the grievance.

- Right to appeal: The complainants will be given explanations of and have the right to appeal against the decision made on their grievance

5 Implementation of the GRM

The GRM will be implemented at three levels namely: Site Level Grievance Redress Committees, District level grievance redress committee and at Traditional Authority / community level. At site level there will be Workers' Grievance Redress Committee for the employees. At the districts level, the committee is referred to as the District Grievance Redress Committee (DGRC) and at community level, there will be the community level GRM committee set up at the group village head level. The committee members in all GRCs will be working on voluntary basis[11]. At district level, the project will adopt already existing GRM committees which serve for various other projects apart from the compact project. The GRM committee will also include representative of SATCP, Supervising Engineer, community sensitization consultant, RAP Consultant. The table below presents the composition of the various GRM Committees at Community, site level and district level.

GRM committees Compositions

Contractor (Workers GRM)	Community Level	District Level
A total of 6 to 10 workers with a representation of not less than 40% of either sex. • Workers Representatives • Contractor Representative • Consultants Representative • Service providers (Including GBV SP) • DC Representative	The composition of GRC with a representation of at least 40% of either sex • PAP representatives • Youth Representative • Women Representative • Local NGO/CBO representative • Community member • Member from community policing • Community Development assistant • Community case worker	• District Environmental Officer • Director of Public Works, • District Gender Officer • Social Welfare Coordinator/Officer, • District Lands Officer, • District Labour Officers, • HIV and AIDS Officer • NGO Representative and • Police Officer (from Victim Support Unit)

[11] To ensure independence and impartiality, Chiefs or politicians should not be members of CGRCs. However, it is important that the committee should update the local leaders of the grievances they are handling to ensure support

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Contractor (Workers GRM)	Community Level	District Level
		• Police Officer (From Community policing department) • Magistrate • District Education Officer • LEA associates safeguards personnel.

The roles and responsililties

District level GRM committee: the committee will be responsible for the following.

- Resolving and addressing grievances which have been referred from CGRC and WGRC;
- Referring to Project level GRC unresolved grievances at community and District level;
- Building capacity of Community GRC and Workers GRC on GRM;
- Investigating the grievance, facilitate and mediate resolution of grievance;
- Reporting to the project level GRC all complainants handled at community and district level; and
- Documenting status of the complaint and its resolution

(b) Facilitates establishment of CGRCs

- Facilitates GRM trainings and awareness meetings at community level.
- Records all grievances as submitted to them by the complainant;
- Reviews all grievances referred by the CGMC, WGRC and Supervising Engineer;
- Determines cases and provides feedback to the CGRC, WGRC, Supervising Engineer, and the aggrieved persons
- Ensures that there is transparency and accountability in the implementation of project Activities interventions.
- Periodically reviews (monthly) all grievances in the district.
- Referring GBV/SEA/SH and other serious cases to relevant authorities for action;
- Prepares grievance handling progress reports and presents them to the District Executive Committee (DEC) during quarterly meetings and to the PGRMC
- Supervises, monitors and evaluates CGRM and WGRCs
- Conducts quarterly field reviews to supervise the CGRCs and WGRC.
- Submits quarterly reports to the DEC

(b) Contractor/Workers Level Grievance Redress Committee: The committee will be responsible for the following:

- Recording all grievances as submitted to them by complainants;
- Vetting all received grievances and consider their appropriateness for resolution under this GRM. If the grievance is not within jurisdiction of the committee, it will be referred to the appropriate authority;
- Summoning all concerned parties for hearing;

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- Considering and investigate the issue, facilitate and mediate resolution of grievance;
- Documenting status of the complaint and its resolution;
- Referring the grievance to the District Level GRM for resolution with appropriate documentation and justification for reference if the case is unresolved;
- Considering and investigating the issue, facilitate and mediate resolution of grievance;
- Providing feedback to the complaining party and ensure reporting; and
- Sensitizing workers on GRM.
- District Level Grievance Redress

(c) Community Level Grievance Redress Committee: The committee will be responsible for the following;

- Conduct community sensitization meetings on the project and associated grievances in liaison with other community structures
- Receive and record all grievances as submitted to them by the PAPs;
- Review and screen all received grievances;
- Investigate and facilitate grievance resolution process in liaison with relevant respondents
- Refer complex grievances to the Supervising Engineer and DGRM for action
- Hear and determine all cases
- Document the status of the complaint and its resolution;
- Refer GBV/SEA/SH/TIP and other serious cases to Supervising Engineer, Police and other relevant institutions for action.
- Refer all criminal related grievances to police
- Provide feedback on grievance to PAPs
- Submit monthly reports to DRGC.

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Annex 9: Labour Management Guidelines for Contractor Compliance and Planning

The construction of Project roads requires the employment of numerous skilled and unskilled workers. There are risks of unequal or unfair treatment in hiring and during implementation, of forced and child labour, health and safety at work, among others risks. To effectively implement the ESMP, the Contractor is to develop a Labour Management Plan (LMP) that will help define and manage all labour- related matters during the implementation of this Project. All labour matters must be handled in accordance with the Malawi's Employment Act, 2000[12] and good intenational industry practices.

In line with the requirements of OP/BP 4.01 (Environmental Assessment) to assess and manage social risks, and consistent with Malawi labour laws, it is expected that the project will engage the following categories of workers:

- *Employees:* These would include Contractor employees of various specialties and disciplines or in administrative positions.
- *Contracted Workers:* These would include Consultants, Contractors, and Security personnel working at the project sites.
- *Community workers*: These would be community members engaged to provide community labour for the construction works.
- *Migrant workers*: These are skilled labourers who may not be available in the local area where construction is being undertaken. This category includes both national and international staff.
- *Primary supply workers:* Only primary suppliers that meet the relevant requirements of this LMP will be engaged.

Objectives

The purpose of the Labour Management Plan is:

- To promote safety, health, and welfare at work;
- To promote the fair treatment, non-discrimination, and equal opportunity of project workers;
- To protect project workers, including vulnerable workers such as women, persons with disabilities, children (of working age), migrant workers, contracted workers, and primary supply workers, as appropriate;
- To protect their personal details
- To prevent the use of all forms of forced labour and child labour;
- To support the principles of freedom of association and collective bargaining of project workers in a manner consistent with national law;
- To provide project workers with accessible means to raise workplace concerns.

Measures Needed

The Contractor will address these risks by undertaking site specific risk assessments and incorporating mitigation measures for the identified risks into the program specific

[12] The reference sections indicated in this context are for Malawi's Employment Act, 2000

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environmental, social, health, and safety management plans. The Contractor shall establish and implement the following measures:

Recruitment Procedures

- Ensure hiring practices comply with anti-discrimination provisions (Section 5), prohibiting bias based on race, sex, religion, disability, or social origin.
- Prohibit forced labor (Section 4) and comply with minimum age requirements to prevent child labor (Section 21).
- Maintain a register of employed young persons (Section 23).

Employment Contracts

- Specify contract types (Section 25) to include permanent, fixed-term, and task-based employment.
- Provide written particulars of employment (Section 27), detailing job roles, wages, benefits, and working hours.
- Include terms for probationary periods (Section 26).

Worker Welfare and Health Facilities

- Comply with statutory limits on working hours and rest days (Sections 36–40).
- Ensure provision for annual, sick, and maternity leave (Sections 44–47) per legal requirements.
- Guarantee non-discriminatory pay structures (Section 6).
- Provide adequate health, sanitary, and welfare facilities to ensure worker safety, hygiene, and overall well-being. Below are the key requirements outlined in the Act, along with supplementary provisions from related labour laws:

1. Sanitary and Hygiene Facilities
    - Employers must provide clean and well-maintained toilet facilities.
    - Access to potable drinking water must be ensured.
    - Proper waste disposal systems should be in place to maintain cleanliness.
    - Handwashing stations with soap and water or sanitizers should be available.

2. Medical and First Aid Facilities
    - Employers must maintain well-stocked first aid kits at workplaces.
    - Arrangements should be made for emergency medical assistance in case of injuries.
    - Employees exposed to hazardous materials must undergo health surveillance.
    - Large workplaces should have on-site medical facilities or access to clinics.

3. Rest and Welfare Facilities
    - Workers must have access to designated rest areas and canteens where applicable.
    - Provision of shelters or shaded areas for protection from extreme weather conditions.
    - For employees requiring protective clothing, provide changing rooms and secure storage facilities.

4. Occupational Health and Safety (OHS) Measures
    - Workplaces must be maintained free from hazardous conditions.

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- Personal Protective Equipment (PPE) must be provided when necessary.
- Minors (ages 14–18) must not be engaged in hazardous work.
- Employees must be given weekly rest days, annual leave, and sick leave.

5. Maternity and Family Welfare
    - 8 weeks of paid maternity leave every three years for female employees.
    - Right to return to the same job with the same benefits after maternity leave.
    - Employers are prohibited from dismissing workers due to pregnancy or childbirth.

6. Housing and Transport (Where Applicable)
    - Employers providing on-site housing must ensure it meets habitability standards.
    - Transport arrangements must be made for workers in remote locations.

Labour Relations and Grievance Mechanism

- Establish a formal dispute resolution mechanism (Sections 64–65).
- Protect employees from unfair and summary dismissal (Sections 57–59), requiring valid reasons for termination.
- Uphold the right to freedom of association and collective bargaining.

Occupational Health and Safety (OHS) Measures

- Implement workplace safety measures in line with national regulations.
- Maintain records of workplace accidents (Section 9).
- Enforce non-hazardous working conditions for young employees (Section 22).

Compliance and Monitoring

- Adhere to wage payment regulations (Sections 50–55) to ensure timely remuneration.
- Include severance allowance provisions (Section 35) for terminated employees.
- Issue termination certificates (Section 31) to employees upon dismissal.

Grievance Redress Mechanism

The Contractor for the project shall put in place a Workers Grievance Redress Mechanism (WGRM) to ensure that workers have the ability and opportunity to lodge complaints or concerns without cost and with the assurance of expedited and satisfactory settlement of disputes that may arise during the implementation of the program. The Contractor is to develop the WGRM for review and approval of the Supervision Consultant and SATCP. All workers under the program will be informed of the WGRM and the procedures that will be involved. The workers, SATCP, community members and Supervision Consultants will have to be informed and involved in the development of the Contractors's WGRM

Worker Code of Conduct

The Contractor will sign a Contract with SATCP for upgrading of the road and the associated link roads. These Works will be carried out throughout the road corridors. The Contractor will be required to implement measures to address environmental and social risks related to the

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Works, including the risks of Trafficking in Persons, sexual exploitation, sexual abuse and sexual harassment.

This Code of Conduct is part of the set of measures that the Contractor will undertake to manage the environmental and social risks related to the Works. It applies to its staff, labourers and other employees at the various Work Sites or other places where the Works will be carried out. It also applies to the personnel of each subcontractor and any other personnel assisting the Contractor in the execution of the Works. All such persons are referred to as "Contractor's Personnel" and are subject to this Code of Conduct.

This Code of Conduct identifies the behaviour that will be required from all Contractor's Personnel. The Contractor's workplace will be an environment where unsafe, offensive, abusive or violent behaviour will not be tolerated and where all persons should feel comfortable raising issues or concerns without fear of retaliation.

Monitoring & Guidance:
The LMP applies to all Project workers, whether full-time, part-time, temporary, seasonal, or migrant. The LMP is applicable to the Project in the following manner:

1. People employed or engaged directly by SATCP to work specifically in relation to the Project;
2. People employed or engaged by consultants and contractors to perform work related to the core function of the project, regardless of location;
3. People employed or engaged by the primary suppliers under this project.

This LMP identifies a number of risks, such as:

- Occupational Safety and Health risks during construction and operation;
- Risk of communicable diseases, including Malaria and Cholera, to the workforce, students, and staff
- Noncompliance with labour laws and regulations by the contractors;
- An influx of migrant workers;
- Gender Based Violence GBV (Sexual Harassment, Sexual Exploitation and Abuse, Rape and Discrimination)
- Violence against Children; (Child labour, Defilement, Child Marriage)
- Risk of contracting HIV and AIDS and STIs;
- Risk of exposure to hazardous materials and wastes
- Risk of excess exposure to noise and vibrations
- Increased competition over resources due to the influx of labour
- Discrimination and exclusion of vulnerable groups;
- Labour conflicts and work conditions

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Annex 10: Waste Management Guidelines

To ensure effective waste minimization and environmentally sound disposal practices during project implementation, the Contractor shall prepare a comprehensive Waste Management Plan (WMP), aligned with the guidelines outlined in this annex and subject to review and approval by the Supervision Consultant. The plan should meet the following objectives:

- Waste Minimization: To minimize the waste load discharged to the environment. The following suggested measures can be adopted:
    - Carry out a waste minimization assessment which examines opportunities for waste avoidance reduction, reuse, and recycling.
    - Reduce wastes by selecting, in order of preference, avoidance, reduction, reuse and recycling.
    - Incorporate waste minimization targets and measures into the environmental management plan.

- Ensure that all contaminated material uncovered on a construction site are excavated and disposed of in an environmentally responsible manner. The following suggested measures can be adopted:
    - Assay material uncovered on-site prior to disposal. If the wastes include putrescible wastes, then also analyse leachate and landfill gases.
    - Excavate material in a manner which avoids off-site environmental problems.
    - Seal remaining contaminated material or wastes, where only part of the tip has been excavated, to ensure that there is no off-site effect now or in the future.
    - Transport odorous wastes in covered vehicles.
    - Dispose of contaminated material in a landfill/area licensed to take the type of contaminated material or wastes uncovered.

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Annex 11: Traffic and Access Management Guidelines

These guidelines provide a comprehensive framework to assist the Contractor in developing a site-specific Traffic and Access Management Plan for the Liwonde–Matawale Road Rehabilitation Project. The plan must adhere to the principles outlined below and be submitted to the Supervising Consultant and the State Agency for Transport and Construction Projects (SATCP) for review and approval prior to the commencement of construction.

The Contractor is responsible for ensuring that all vehicle, equipment, and personnel movements are managed safely, efficiently, and in an environmentally responsible manner, while minimizing disturbances to surrounding communities and existing infrastructure.

1. Purpose and Objectives

Construction activities will significantly increase vehicular and machinery traffic, both within work sites and along existing regional and community road networks. Without proper management, this traffic may:

- Interfere with regular traffic and pedestrian flows
- Pose safety risks to both workers and the public
- Damage existing road infrastructure
- Generate dust, noise, and congestion

The objectives of these guidelines are to:

- Promote safe interactions between construction traffic, community members, and local road users
- Minimize environmental and social risks associated with traffic
- Guide the establishment and maintenance of temporary access routes
- Address site-specific traffic impacts through design, scheduling, and appropriate signage

2. Access Roads and Haul Routes

- The Contractor shall prepare layout plans for all proposed access and haul roads. These plans must be submitted to the Supervising Consultant and accompanied by written consent from relevant landowners or traditional leaders (e.g., village headmen), where applicable.
- Whenever feasible, existing roads should be utilized. Temporary access roads will only be permitted if approved by the Site Manager and affected landowners.
- All temporary roads must be decommissioned and rehabilitated using stockpiled topsoil after construction is complete. Additionally, these areas should be revegetated with indigenous species when applicable. Topsoil must be removed and preserved prior to road construction to facilitate effective rehabilitation later.
- Environmental factors such as vegetation, water bodies, current land use, and proximity to households must be considered during the planning of haul routes.
- Contractors shall be responsible for the construction, maintenance, and rehabilitation of access and haul roads used during the project.

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- Contractors must implement dust suppression measures, including regular watering, speed control (e.g., speed limits of 30 km/h), and use of dust palliatives where necessary, especially near settlements, schools, or health facilities.
- Dust control activities should be monitored and reported as part of the environmental compliance reporting.
- Drainage infrastructure should be installed early in the construction process to prevent erosion on access roads.

3. Traffic Management and Safety Measures

The Contractor's Traffic Management Plan must include the following components:

- Traffic Control and Signage
- Clearly defined access routes to and within the work site, communicated to all drivers.
- Traffic warning signage must be installed along haul routes and near construction zones to alert both the public and construction traffic.
- During bridge works, temporary bypasses must be constructed before work commences to avoid full road closures.
- Speed limits and control points must be established and enforced throughout all project areas.

Transport of Materials

- All vehicles transporting fine or granular materials must have their loads covered with tarpaulins to prevent dust generation and material spillage.
- The Contractor must promptly address any spillage or dust pollution along transport routes at their own expense.
- Delivery schedules should align with off-peak hours to minimize congestion and public disturbance.

All drivers must:

- Hold a valid license appropriate for the vehicle or machinery they operate
- Be certified in defensive driving and road safety
- Undergo training in eco-driving to reduce fuel consumption and emissions
- Participate in induction training covering pedestrian safety, fatigue management, and substance abuse prevention
- Driver shifts must be managed to prevent excessive working hours and ensure adequate rest.
- Record and maintain up-to-date dust suppression logs.

Interaction with Communities and Sensitive Areas

Assess high-risk interaction areas (e.g., schools, markets, and health centers) and implement local improvements, such as:

- Pedestrian crossings
- Temporary bypasses
- Speed bumps or traffic calming devices
- Warning lights and signage

4. Monitoring, Enforcement, and Reporting

The Contractor’s Traffic Management Plan must include:

- An accident register and procedures for incident reporting

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- Random protocols for alcohol and drug testing for drivers
- A penalty structure for non-compliance with traffic safety protocols
- Monitoring of road conditions and repairs for roads damaged by construction traffic
- Monthly reports detailing traffic management performance, issues encountered, and resolution measures

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Annex 12: Stormwater Management Guidelines

The conceptual understanding of the specific project sites will have to be developed, and it will have to involve the identification of potential clean areas and their isolation from potentially dirty areas. The main principles in the Stormwater Management Plan (SWMP) will include the following:

- No construction activities should be conducted during rains.
- Confine or divert any unpolluted water to a 'clean' water system, and polluted water to a 'dirty' water system.
- 'Clean' and 'dirty' water systems must be designed and constructed to prevent cross-contamination between the 'clean' and 'dirty' water systems.

▪ No mechanical plant, equipment or vehicles will be washed onsite.

- Pollutants such as cement, concrete, lime, chemicals and fuels will not be discharged into any water source.
- Water from ablution facilities and the contractor camp will be discharged into a sewer or into a conservancy tank for removal from the site if a sewer line is not available.
- Appropriate maintenance and management of storm water related infrastructure.

The proposed water systems or infrastructure will be designed to prevent any potential contamination of natural water resources in the area. A SWMP will be prepared before any construction commences and implemented during the construction phase. This plan will indicate how all surface runoff generated because of the Project and associated activities (during both the construction and operational phases) will be managed prior to entering any natural drainage system or wetland and how surface water runoff will be retained outside of any demarcated buffer zones and subsequently released to simulate natural hydrological conditions. The detailed SWMP will, as a minimum, include:

- Stormwater runoff from the site office footprint will be channelled to the site stormwater drainage system, which will meet relevant outfall standards, and flow reduction specifications.
- Soil erosion measures (limiting the extent of work areas, management of stormwater runoff and sediment containment structures).
- Adequate concreted stormwater drainage depressions and channels with energy dissipaters that channel these flows into the river in a controlled manner.
- Provision of suitable waste receptacles across all working areas within a designated area with consideration to stormwater management and labelled indicating various waste types.
- Design layout of engineering measures

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Annex 13: Detailed ESIA Methodology

The assessment of potential environmental effects resulting from project-related activities was carried out in accordance with EMA (2017), World Bank OP/BP, and the professional experience of the study team. Some of the information in this report was obtained from the Detailed Feasibility study, and some selected national documents, policies, and pieces of legislation. For national documents, policies, and pieces of legislation, the desk study looked at relevant project documents, the Guidelines for an ESIA, and the regulatory framework discussed in Chapter 4.

A multidisciplinary team comprising an Environmental and Social Impact Assessment Expert, Social and Gender Inclusion Expert, Biodiversity Expert, and Water Quality Expert conducted field assessments at the project site between May and July 2023. The names, roles, and qualifications of the ESIA team are provided in Annex 4, and the Table below presents the specific dates, activities, and details of those visits.

In addition to the 2023 fieldwork, updated field surveys were undertaken by an Independent Reviewer from 25 February to 1 March 2025. The purpose of these updated surveys was to validate the initial findings, align the data with specific project locations, and identify site-specific impacts based on revised project information and design updates. The results and outcomes of the updated field verification exercise are included in Annex 5.

Table 8-4: Schedule of community consultations and baseline data collection

SN	Activity	Team Composition	May				June				July			
			1	2	3	4	1	2	3	4	1	2	3	4
1	Site Familiarisation - Reconnaissance Survey	ESIA Expert												
		Social Expert												
		Biodiversity Expert												
		Water Quality Expert												
		Field Officers												
2	Consultation Meeting at District Councils	ESIA Expert												
		Social Expert												
3	Conduct community consultations	ESIA Expert												
		Social Expert												
		Field Officers												
4	Conducted Household Surveys	Social Expert												
		Field Officers												
5	Baseline data collection	ESIA Expert												
		Biodiversity Expert												

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SN	Activity	Team Composition	May				June				July			
			1	2	3	4	1	2	3	4	1	2	3	4
		Water Quality Expert												

Data Collection
The study team undertook site investigations to the proposed project site in the months of April and May 2023 to acquaint themselves with the setup of the project site, identify, analyse, and assess the potential negative and positive impacts that would be brought about by the project.

Land Use Assessment
Land use classification schemes addressed both land use and land cover. Traditional land use classification uses local or regional information of the land, such as spectral indices, pixel signatures, or the texture of remote sensing images. In this study, data was acquired based on the information provided by the village headman and information obtained from the Surveys Department; the data was cross-checked using GPS and remote sensing data in the field. Based on the data acquired in the field, the land uses were classified as follows: vegetation, impervious surface, agriculture land/ bare land and water (wetlands, streams, and reservoirs). The area was mapped to determine the rock type and lithological boundaries. The geological mapping helped to delineate lithological boundaries and geological structures like faults.

Flora (vegetation) survey
During the planning phase, a desktop review of the available literature on the proposed project site was conducted to get an in-depth understanding of the project and its impact areas. The following documents were reviewed: the IUCN red data list, past plant inventory reports from the National Herbarium for the targeted area, the Botanical Research and Herbarium Management System (BRAHMS) database, Invasive Alien Species (IAS), Global Biodiversity Information Facility (GBIF) and online citizen science data such as *i*-naturalist.

Reconnaissance survey
A rapid reconnaissance survey was initially conducted by the field team in May 2023. This exercise provided a quick overview of the project area, helped document the dominant vegetation types, and informed the allocation and distribution of sample plots for more detailed ecological assessments.

To complement and strengthen the initial findings, an updated reconnaissance survey was carried out by an Independent Reviewer between 25 February and 1 March 2025. This updated assessment served to validate the 2023 observations, align findings with specific chainage locations, and capture any changes in vegetation or site conditions based on the updated project design and footprint.

Sampling methods for herbs, climbers & grasses

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Rapid Botanical Surveys (RBS) were initially conducted in June 2023 to document trees, herbs, climbers, and grasses at 43 sampling points within the 60-meter road reserve of the Liwonde–Matawale (M003) Road. The survey employed 20m × 20m plots, systematically distributed along both sides of the road corridor at predetermined 2 km intervals (Figure 1-3). Within each 400 m² quadrant, all plant species—both native and alien—were identified and recorded, including trees, herbs, grasses, vines, and ferns, following the methodology by Hawthorne & Marshall (2016). Onsite identification and documentation were conducted for all herbaceous and grass species in each plot.

To ensure accuracy and alignment with the updated project design, follow-up vegetation assessments were carried out by an Independent Reviewer from 25 February to 1 March 2025. These updated surveys aimed to validate the 2023 findings, refine species records to specific chainage locations, and capture changes in vegetation composition and disturbance levels along the revised project footprint.

During both surveys:

- GPS coordinates were recorded for each sample point.
- Vegetation types and land-use modifications were documented.
- Specimens not identified in the field were collected, pressed, and later verified using field guides, online tools such as iNaturalist, the Global Biodiversity Information Forum (GBIF), and reference collections at the National Herbarium and Botanical Gardens (NHBG) in Zomba.
- Areas overexploited for charcoal and firewood were geo-referenced, and inputs were obtained from community key informants and Department of Forestry officials.

Sampling methods for trees and shrubs along the proposed road

Three (3) concentric subplots of radii, 2m, 6m, and 20m were established at each sample point. Each of these subplots categorically represented a tree size stratum about tree abundance in the stratum – thus the more trees of a certain stratum, the less the subplot size. All trees were tagged and measured, and species identified by experienced botanists and technicians in the field. Tree diameters were measured on all trees at the breast height (DBH) using a diameter tape or Calliper, while the total height of individual trees was measured by using a Haglöf Vertex5.

The tree data variables with corresponding scientific names were recorded on a well-designed data collection form. Samples that were not identified onsite were collected and taken to the herbarium for proper identification and further verification. The tree measurements were meant to help to understand the structure of tree vegetation based on tree size classes (i.e. Height & Diameter at Breast Height (DBH)) and also to determine above-ground biomass (AGB) and assist further in the quantity of biomass carbon, a key component in Green House Gas (GHG) emissions tabulation that may be lost along the perimeter of the road. For ease of on-site identification and distinction amongst tree sizes, trees were categorized into three subgroups namely regenerants, saplings, and juvenile or adult trees. All trees with DBH (i.e., 1.3m above ground) of less/equal to 5cm were classified as regenerants and saplings while those above 5cm

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cut-off point were classified as juveniles/adult trees. DBH and height were recorded in the 20m subplot only.

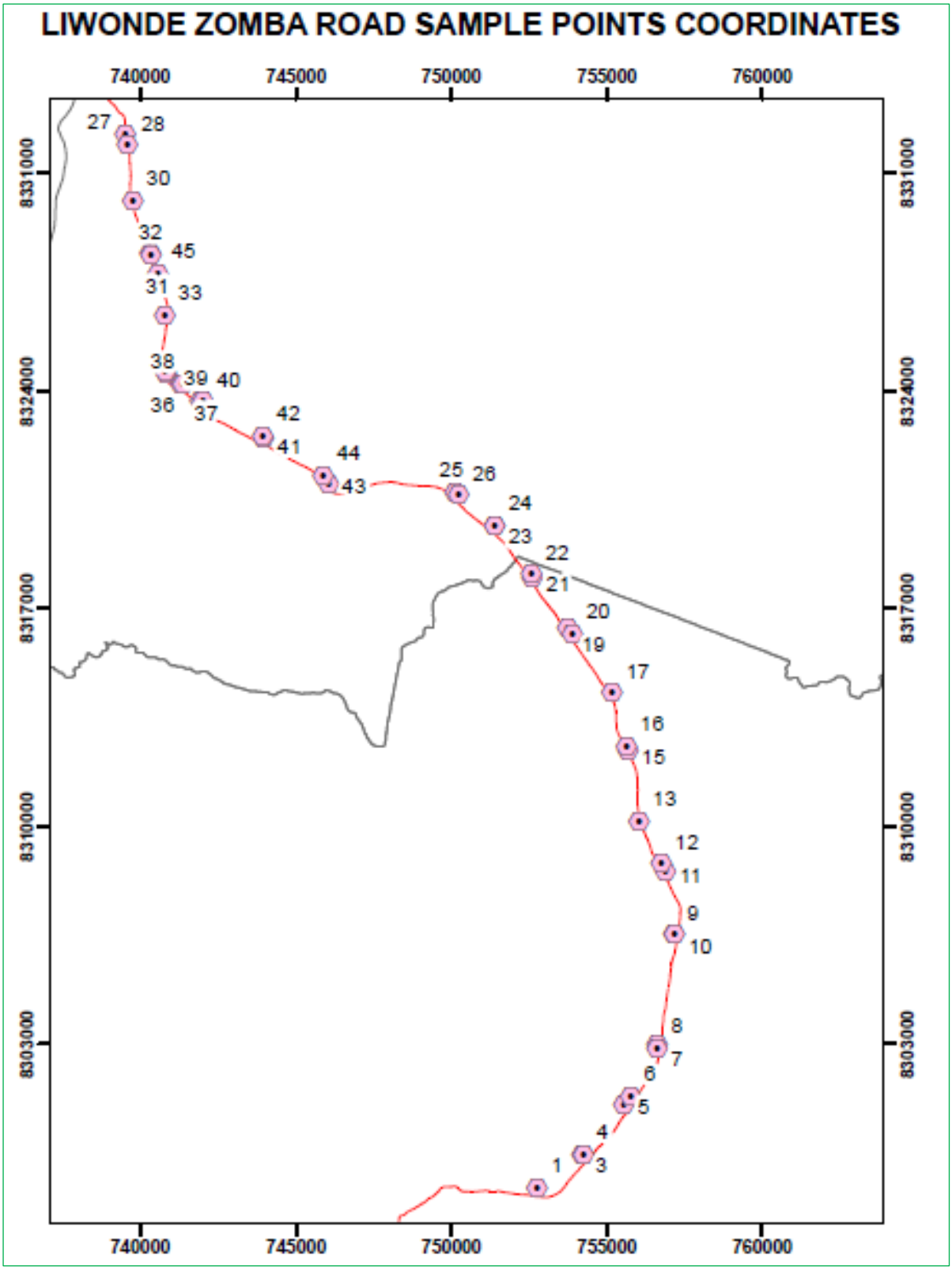


Figure 8-7: Sample points for the vegetation survey along the road

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Fauna Survey

Birds Survey

In June 2023, initial bird surveys were conducted at 42 sampling points along the Liwonde–Matawale (M003) Road. These surveys utilized the standardized search method developed by Watson (2003) and aimed to identify both terrestrial and waterbird species, including migratory birds.

The methodology involved direct physical observations, conducted while walking slowly through various vegetation communities. Observers identified and recorded all bird species seen or heard during twenty-minute sessions at each sampling point, documented in field notebooks. To facilitate accurate species identification, observers employed Swarovski 10x42 EL binoculars. The surveys were performed during the first five hours of daylight, encompassing peak bird activity, and were supplemented by incidental sightings noted throughout the day.

To enhance detection of less visible species, playback calls were utilized, while nocturnal point counts were carried out to locate owls, nightjars, and other nighttime birds. Additional evidence, such as feathers, was collected for identification purposes, and any unidentifiable birds were photographed for reference against regional bird guides. The survey results were further corroborated through face-to-face interviews with local communities and a literature review of relevant publications.

To validate and supplement the findings from 2023 in light of revised project chainages, a follow-up avifaunal assessment was conducted by an Independent Reviewer from 25 February to 1 March 2025. This supplementary fieldwork focused on several key objectives:

- Confirming the presence of bird species in critical habitats identified during the 2023 survey.
- Capturing seasonal variations in migratory bird populations.
- Aligning bird presence data with the updated project design footprint, particularly in sensitive ecological zones such as the Liwonde Forest Reserve and the riparian corridors along the Domasi and Chikupira Rivers.
- The assessment conducted in 2025 reaffirmed the presence of several species of conservation interest, refined the understanding of habitat associations, and identified minor shifts in species abundance, likely attributed to seasonal dynamics or increased habitat disturbance in localized areas.

The results from both the 2023 and 2025 bird surveys provide a comprehensive baseline for assessing potential impacts on avian populations and for developing appropriate mitigation and monitoring measures. A detailed list of the recorded bird species is included in Annex 5.

Mammal survey

An initial mammal survey was conducted in June 2023 at 35 sampling points along the Liwonde–Matawale (M003) Road. This survey aimed to document both large and small mammals utilizing methods such as criss-cross transect walks, direct observation, and active searches through various habitat types. The survey included systematic inspections of trees,

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thickets, grasslands, and caves, particularly focusing on the potential presence of bats, often conducted concurrently with bird surveys.

In addition to direct sightings, the field team recorded indirect indicators of mammal presence, which included footprints, droppings, fur traces, chew marks, burrows, trails, and sounds. Surveys were carried out during morning and afternoon hours, periods when mammal activity is anticipated to be highest. Any mammals that could not be confidently identified in the field were photographed and later classified using regional mammal field guides.

The findings from the survey were further informed by face-to-face interviews with local residents and traditional authorities who are knowledgeable about the area's fauna, supplemented by a literature review of relevant mammalian studies.

To strengthen and validate the initial baseline findings, a follow-up mammal survey was conducted by an Independent Reviewer from 25 February to 1 March 2025. This updated assessment focused on several key objectives:

- Verifying the presence of mammals in sensitive ecological zones, including Liwonde Forest Reserve, Mandevu Farm, and riparian zones along the Domasi and Chikupira Rivers.
- Assessing habitat use and disturbance within the updated project footprint.
- Recording evidence of seasonal movements, particularly in relation to changes in vegetation cover and human activity.

The follow-up survey confirmed the ongoing presence of species such as vervet monkeys, baboons, rodents, mongooses, and small antelope, revealing minor fluctuations in the signs of presence across different zones. It also generated refined geo-referenced data about mammal habitats in relation to chainage-based impact zones.

The combined data from the 2023 and 2025 mammal surveys provide a robust foundation for evaluating project-related risks to terrestrial fauna and for designing appropriate avoidance and mitigation measures. A comprehensive inventory of observed mammal species is detailed in Annex 5.

Reptile and amphibian surveys

Initial surveys targeting reptiles and amphibians were conducted in June 2023, with 34 sampling points established along the Liwonde–Matawale (M003) Road. These surveys employed both opportunistic and active search methods, including direct observations made during concurrent bird and mammal assessments.

The surveys searched for species in various habitats such as leaf litter, grass cover, rock crevices, decaying logs, burrows, caves, and water bodies, as well as marshy or riverine environments. The surveys were conducted during the morning and afternoon hours, periods when many herpetofauna species are typically active and observable. All observed individuals were identified to the species level, while those that could not be immediately identified in the

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field were photographed for later identification using herpetofauna field guides and identification keys.

To complement and validate the initial findings, a follow-up survey of reptiles and amphibians was conducted by an Independent Reviewer from 25 February to 1 March 2025. This updated assessment aimed to:

- Confirm species presence and update spatial records using chainage-specific coordinates.
- Document seasonal variations, particularly in amphibian activity within moist zones and temporary pools.
- Assess habitat utilization in areas impacted by the road realignment and adjacent construction zones.

The follow-up survey reaffirmed the presence of common species such as skinks, geckos, toads, and frogs, particularly in riparian and moist habitats along the Domasi and Chikupira Rivers. While no rare or threatened herpetofauna were observed, this updated assessment identified microhabitats that may be sensitive to potential construction impacts.

Additionally, anecdotal information regarding fish species present in local streams and rivers was gathered through interviews with community members, who provided insights supplemented by a review of published records of aquatic biodiversity relevant to the area.

The combined findings from both the 2023 and 2025 assessments have been documented in Annex 5, which includes a comprehensive presentation of observed species, habitats, and conservation considerations pertinent to the project

Macro-invertebrate survey

The macro-invertebrate survey was initially conducted in June 2023, incorporating sampling at 44 points along the Liwonde–Matawale (M003) Road. The primary objective was to document the diversity and distribution of macro-invertebrate species within various vegetation communities, wetlands, and disturbed habitats throughout the project area.

To achieve this, opportunistic sampling methods were utilized, including direct physical observations, active hand searches, and the placement of baited insect traps containing banana and peanut butter. These traps were strategically mounted in different vegetation types along the corridor, targeting a range of insect groups, including ants, beetles, butterflies, and pollinators.

To enhance the robustness of the data and ensure alignment with the updated project footprint, a follow-up macro-invertebrate survey was conducted by an Independent Reviewer from 25 February to 1 March 2025. This updated fieldwork aimed to:

- Validate the presence of species recorded in the 2023 survey.
- Capture seasonal shifts in macro-invertebrate activity, particularly during the wetter late-summer period.

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- Refine the spatial distribution of species along chainage-specific sections, with a focus on Zone 2 (Liwonde Forest Reserve) and riparian patches.

All observed or captured macro-invertebrates were identified to the species level where feasible. Specimens that could not be identified in the field were photographed for later identification using regional macro-invertebrate field guides and taxonomic keys at the field lodging facility. Fieldwork was conducted daily in the morning and afternoon when insect activity was most pronounced.

The combined data from both survey periods serve to assess habitat health, pollinator presence, and provide potential indicators of ecosystem change. The results from both the 2023 baseline survey and the 2025 validation survey are compiled and presented in Annex 5 and section 5.3 of the report, which includes species lists, photographs, and habitat associations.

Stakeholder Consultations

To inform the Environmental and Social Impact Assessment (ESIA) and establish a biodiversity baseline, an inclusive and phased stakeholder engagement process was implemented. This process ensured the active participation of institutional stakeholders and local communities, enabling the study team to gather a comprehensive range of insights regarding the environmental, social, and cultural conditions pertinent to the Liwonde–Matawale (M003) Road Rehabilitation Project.

Initial Consultations – 2023 Phase

A purposive sampling approach was utilized to engage members of the District Environment Sub-Committees (DESCs) in the Machinga and Zomba Districts. These committees comprise officials from various sectors, including:

- Environmental Affairs
- Forestry
- Water Development
- Community Development
- Social Welfare
- Land Services
- Environmental Health

Consultative meetings were convened with the Machinga DESC on June 3, 2023, and the Zomba DESC on June 4, 2023. Subsequently, key informant interviews were conducted from June 14 to June 25, 2023, to gather detailed, sector-specific knowledge.

At the community level, Focus Group Discussions (FGDs) were held in villages along the road corridor from June 11 to July 6, 2023. Each village hosted three FGDs—one for men, one for women, and one for youth—engaging a total of 524 participants (145 men, 176 women, and 203 youth). These discussions were facilitated by a Social Development Specialist and field assistants, yielding valuable insights into community dynamics, vulnerabilities, access to resources, usage patterns, and expectations regarding project impacts and benefits.

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Follow-Up Consultations – 2025 Phase

To update and validate stakeholder input in light of revised project details and refined impact zones, additional consultations were conducted from February 26 to February 28, 2025. These engagements took place at the Machinga District Council and various field locations along the project route, targeting key informants and technical personnel from relevant governmental and non-governmental entities. Participants included:

- Officials from the Department of Forestry and local agencies such as EGENCO and the National Water Resources Authority (NWRA).
- Local stakeholders from villages such as Kazembe, Mikuyu, Nambazo, and others.
- Representatives from women's groups, youth organizations, and community-based resource user groups.

These consultations reaffirmed previously expressed concerns regarding:

- Charcoal production and forest degradation
- Labour opportunities and the risk of population influx
- Protection of water sources
- Disruption to livelihoods and required mitigation strategies
- Community safety during road construction

Attendance registers for these meetings are included in Annex 2.

Table 8-5: Details of FGDs conducted along the road.

Group Village Head	Number of FGDs	Males FGD (Number of Participants)	Female FGD (Number of Participants)	Youth Group	
				Males	Female
Machinga District					
Chibwana	3	9	16	9	7
Malindima	3	6	8	4	8
Mliwo	3	7	13	5	6
Kalanje	3	8	11	6	5
Chabwera	3	9	12	7	6
Mlangala	3	9	15	7	8
Chingoli	3	14	11	6	5
Ndaje	3	7	12	8	9
Lipongo	3	9	11	5	6
Nkalo	3	7	13	6	8
Zomba District					
Minama	3	10	9	4	8
Mtogolo	3	6	13	5	6
Mwambaka	3	9	10	6	5
Kapyepye	3	8	9	4	8
Chopi	3	14	5	5	6
Chinamwali	3	13	8	8	7
Total	145	176	70	95	108

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Stakeholder Identification

In accordance with the World Bank's Operational Policy on Environmental Assessment (OP/BP 4.01), stakeholders are defined as individuals, groups, or communities outside the core operations of a project who may be affected by, or have an interest in, its implementation. This category encompasses individuals, businesses, community organizations, district councils, NGOs, and various other institutions.

Affected Communities

The affected communities consist of individuals, groups, and entities located within the Project Area that may experience direct impacts, whether positive or negative, from the project. Identification of these communities was based on a proximity criterion of one kilometer from the Liwonde-Matawale Road, extending 0.5 kilometers on either side as well as along link roads. The identified affected communities include:

- Women's groups (e.g., Mother Groups)
- Youth groups
- Vulnerable groups, such as female-headed households, low-income families, individuals with disabilities, and those with chronic illnesses
- Community-Based Organizations (CBOs)
- Livelihood-focused groups, encompassing small and medium-sized enterprises, agricultural cooperatives, and transport operators
- Local traditional leaders

Non-Community Stakeholders

Non-community stakeholders, who possess decision-making authority or an interest in the project, include:

- Structures within the District Council such as the DESC and its affiliated offices
- District Hospitals and various NGOs
- National-level institutions including the Malawi Environment Protection Authority (MEPA), Ministry of Water Development, National Water Resources Authority, Roads Authority, Department of Forestry, and Ministry of Lands.

Gender and Social Inclusion

The stakeholder consultation process was intentionally designed to foster gender and social inclusion, ensuring that the voices of disadvantaged and vulnerable groups were acknowledged and represented. Particular emphasis was placed on obtaining women's perspectives to achieve a comprehensive understanding of the potential risks and benefits associated with the project. The consultations underscored the necessity of identifying gender-specific and social impacts, along with developing effective mitigation strategies.

To facilitate meaningful participation, meetings and consultations were organized at easily accessible venues within walking distance of communities. These sessions were scheduled during convenient hours (9:00 AM – 11:30 AM and 2:00 PM – 4:30 PM). All discussions were

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conducted in Chichewa, the local language, thus guaranteeing inclusivity and comprehension amongst participants.

The data collected throughout this process was systematically disaggregated by gender to enable effective analysis and informed decision-making. Special FGDs were held separately for men, women, and youth to capture a diverse range of perspectives and concerns.

Household Socioeconomic Survey

A questionnaire was used to collect data on demographic and socio-economic characteristics surrounding communities and their perceptions of the project's impact. The study population was randomly selected from households within a 100-meter radius of the road, the direct impact zone. Household heads were selected as the major respondents in this survey since they have sufficient and required information. Other responsible adult household members were selected when the household heads were absent. The survey was conducted to capture the socioeconomic aspects of the affected people and the community. The explored areas included the respondents' demographics, household characteristics, property ownership status, livelihood aspects, compensation, and resettlement issues. A total of 278 respondents were interviewed during the survey. Of the 278 households, 167 were from Machinga, representing 60.1%, and Zomba had 111 households, representing 39.9%.

Roadside Business Survey

A survey of businesses along the road was conducted, and data on the demographic and business characteristics was collected using a questionnaire. The study's business population was randomly selected from within a 100-meter radius of the road, and respondents included business owners, employees, and close relatives of the business owners. The main objective of this study was to gather baseline business data and get their perceptions on how their businesses will be affected by the proposed road project. The study interviewed 177 businesspeople along the road, and the survey results are presented in Chapter 5.

Data analysis and reporting

Data collected for the study was analyzed using Microsoft Excel to produce descriptive statistics that reflect the baseline conditions. A descriptive analysis was conducted to calculate means, minimum and maximum values, frequencies, and percentages. The deductions drawn from the analysis were based on a triangulation of findings obtained from both quantitative and qualitative data sources. This approach served as the foundation for preparing the reports for both the baseline assessment and the environmental and social assessment study.

Annex 14: Erosion Management Guidelines

These guidelines are intended to support the development of a detailed, site-specific Erosion Management Plan by the Contractor. The Contractor will be required to prepare and implement the plan as part of their broader Environmental and Social Management responsibilities, based on the principles, objectives, and actions outlined herein. This guidance outlines best practices

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for erosion prevention, control, and rehabilitation, and must be adapted to specific site conditions and construction activities.

The objective of the guidelines are to provide:

- A general framework for soil erosion and sediment control, which enables the contractor to identify areas where erosion can occur and be accelerated by construction related activities; and
- An outline of general methods to monitor, manage and rehabilitate erosion, ensuring that all erosion resulting from all phases of the development is addressed.

This plan to be developed should align with the following:

A13.1 Erosion and Sediment Control Principles

The goals of erosion control during and after construction at the site will be to:

- protect the land surface from erosion;
- intercept and safely direct run-off water from undisturbed upslope areas through the site without allowing it to cause erosion within the site or become contaminated with sediment; and
- progressively revegetate or stabilise all areas disturbed by the Project.

These goals can be achieved by applying the management practices outlined in the following sections.

A13.2 Onsite Erosion Management

Exposed and unprotected soils are the main cause of erosion in most situations. Therefore, this Erosion Management Plan and the Revegetation and Rehabilitation Plan are closely linked to one another and must not operate independently but must rather be seen as complementary activities within the broader environmental management of the site and must therefore be managed together. This Erosion Management Plan addresses the management and mitigation of potential impacts relating to soil erosion, including the following:

- Material stockpiled for long periods (two weeks) must be retained in a bermed area.
- Stockpiles not used in three months after stripping must be seeded to prevent dust and erosion.
- No stockpiling of soil or any other materials used during the construction phase will be done on or near steep slopes, near a watercourse or water body.
- Sensitive areas need to be identified prior to construction so that the necessary precautions must be implemented.
- Vegetation clearance must be phased to ensure that the minimum area of soil is exposed to potential erosion at any one time.
- Areas to be cleared must be clearly demarcated and this footprint strictly maintained.
- Areas which are not to be constructed on within two months must not be cleared to reduce erosion risks.
- Silt fences and erosion control measures must be implemented in areas where these risks are more prevalent.
- Wind screening and stormwater control must be undertaken to prevent soil loss from the site.

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- Other erosion control measures that must be implemented are as follows:
  - Brush packing with cleared vegetation.
  - Mulch or chip packing.
  - Planting of vegetation.
  - Hydroseeding/hand sowing.
- All erosion control mechanisms need to be regularly maintained.
- Seeding of topsoil and subsoil stockpiles to prevent wind and water erosion of soil surfaces. Re-vegetation of disturbed surfaces must occur immediately after construction activities are completed. This must be done through seeding with indigenous grasses.
- No impediment to the natural water flow other than approved erosion control works is permitted.
- To prevent stormwater damage, the increase in stormwater run-off resulting from construction activities must be estimated and the drainage system assessed accordingly.

A13.3 Monitoring

The site will be monitored continuously during construction and operation in order to determine any indications of erosion. If any erosion features are recorded as a result of the activities on site, the Environmental Officer (during construction) or Site Manager (during operation) will:

- Assess the significance of the situation;
- Take photographs of the soil degradation;
- Determine the cause of the soil erosion;
- Inform the contractor/operator that rehabilitation will take place and that the contractor/operator will implement a rehabilitation method statement and management plan;
- Monitor that the contractor/operator is taking action to stop the erosion and assist them where needed; and
- Report and monitor the progress of the rehabilitation weekly and record all the findings in a site register.

All actions with regards to the incidents will be reported on a monthly compliance report which will be submitted to the relevant authority (during construction) and kept on file for consideration during the annual audits (during construction and operation).

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Annex 15: Biodiversity Management Protocol

This Biodiversity Management Protocol forms an integral part of the ESMP. It prescribes mandatory procedures for biodiversity protection, plant rescue, habitat rehabilitation, and invasive alien species (IAS) management. The Contractor shall implement these protocols on-site, and compliance will be supervised by the Supervising Consultant and monitored by the Roads Authority (RA).

15.1 Plant Rescue and Protection Protocol

- Vegetation clearing shall commence only after a qualified ecologist/botanist conducts a walkdown survey and necessary permits are obtained.
- Clearing must be limited strictly to the active construction footprint; phased clearing is preferred to wholesale removal.
- Delivery of materials to site shall be timed to avoid premature clearing of land.
- No vegetation shall be used for firewood or harvesting of fruits, medicinal plants, or other natural resources without prior approval.
- Camps, offices, and laydown areas shall be clearly demarcated to prevent encroachment.
- Topsoil shall be stripped, preserved, and stockpiled (free of contamination) for use in restoration.
- All disturbed areas shall be rehabilitated with locally indigenous species.
- Buffer zones shall be demarcated in sensitive areas to prevent encroachment.
- Use of pesticides and herbicides shall be discouraged, as these affect pollinators and native vegetation.

15.2 Search and Rescue Protocol

- Rescue operations shall target species of conservation concern within the development footprint prior to construction.
- Timing of rescue and replanting shall coincide with the growing season.
- Each rescued plant shall be photographed before removal, tagged with a unique ID, and georeferenced using GPS.
- Rescued individuals shall be planted into containers for temporary nursery housing or translocated directly into suitable habitat near their original location.
- Monitoring of relocated plants shall be conducted by the Supervising Consultant/Environmental Officer.
- Unauthorized collection or harvesting of plants is strictly prohibited.
- Staff shall be trained on legal and conservation aspects of biodiversity protection.

15.3 Re-vegetation and Habitat Rehabilitation Protocol

- Stabilise disturbed areas immediately after works using erosion-control measures.
- Re-vegetate using native species only; exotic or invasive plants are prohibited.
- Monitor establishment until an acceptable plant cover is achieved (>20% within 12 months).
- Areas with erosion or poor cover shall be re-contoured and reseeded.
- Maintenance shall continue until restoration success criteria are met.

15.4 Invasive Alien Species (IAS) Management Protocol

- Conduct baseline mapping of IAS before site clearance.
- Prevent introduction of IAS by ensuring imported fill, equipment, and landscaping materials are free of invasive seeds.

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- Apply IAS control measures (manual/mechanical removal; targeted herbicide application by trained personnel only).
- Ensure rehabilitation soil and planting stock are IAS-free.
- Monitor for IAS emergence during and post-construction; eradicate immediately when detected.
- Train workers and supervisors to identify and report IAS.
- Document IAS monitoring and control in monthly environmental reports.

15.5 Monitoring and Adaptive Management Protocol

- Monitor re-vegetated areas every four months for the first 12 months after construction.
- Success benchmark: minimum 20% vegetation cover within 12 months (excluding weeds and IAS).
- Where benchmarks are not met, reseeding or additional planting shall be undertaken.
- Areas showing erosion shall be re-stabilised and reseeded immediately.
- Monitoring shall include composition and density of re-planted vegetation, soil stability, and presence of IAS.
- Adaptive management measures (re-seeding, erosion repair, IAS clearance) shall continue until ecological stability is restored.

During operation, the Roads Authority shall continue biodiversity monitoring in collaboration with the Department of Forestry.

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Annex 16: HIV and AIDS Management Guidelines

These HIV and AIDS Management Guidelines outline a high-level framework for addressing the risks of HIV and AIDS transmission and impact during project implementation. The Contractor shall prepare a detailed, site-specific HIV and AIDS Management Plan (HAMP), aligned with the principles and measures described in this annex. The plan will be subject to review and approval by the Supervising Consultant and the SATCP before construction activities commence.

A comprehensive response to HIV and AIDS is critical for the well-being of project workers and surrounding communities. Infrastructure projects of this nature often involve worker influx, population mobility, and increased interaction between workers and host communities, all of which can elevate the risk of HIV and AIDS transmission.

A16.1 Objectives of this Plan

The overall objectives of the HIV and AIDS Management Plan will be to:

- Create awareness around HIV and AIDS amongst construction personnel;
- Mitigate and manage the spread of HIV and AIDS on construction sites; and
- Provide support for staff who have HIV and AIDS.

A16.2 Guiding Principles

1. *Non- discrimination:* The respect of human rights and dignity of persons infected or affected by HIV and AIDS requires equality between individuals living with HIV and AIDS and those without. No employee will be discriminated against based on his or her real or perceived HIV positive status. This includes access to training and promotion.
2. *Job Security:* Employees with HIV infection or AIDS will not be dismissed on the grounds of their status. Persons with AIDS-related illnesses should be able to work for as long as medically fit in available, appropriate work (reasonable accommodation).
3. *Confidentiality:* All persons with HIV and AIDS have the legal right to privacy. No employee or applicant for a job will be required to disclose HIV-related personal information. Nor should co-workers be obliged to reveal such information about fellow workers. Company management and medical staff as well as union leaders and officials are bound by strict confidentiality about a person's status.
4. *Voluntary Counselling and Testing:* No HIV and AIDS testing will be required for job applicants or for persons already in employment. Individuals are encouraged to know their HIV status through testing. Testing must be voluntary, confidential and with the informed and written consent of the person concerned. Professional pre- and post-testing counselling services must be available.
5. *Treatment and Care:* Workers infected with HIV and suffering from AIDS and their dependents are entitled to the same health services as those with other diseases. Treatment with antiretroviral drugs must be available when Voluntary Counselling and Testing is advocated. Dependents of workers who have died from AIDS or AIDS-related diseases must have access to the same care as those who have died from other diseases or industrial accidents.
6. *Gender Equality:* The gender dimensions of the epidemic are recognised by the social partners. Gender discrimination at the workplace is ruled out. Sexual harassment and the exploitation of dependency of women is an offence.

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7. *OHS:* The work environment must be healthy and safe. Tools which bear the danger of injuries such as cuts should not be shared between workers. In case of accidents which involve blood and body fluid emissions, first aid must be exercised with the use of protective barriers, such as gloves and masks, which prevent direct contact with blood or other body fluids.
8. *Prevention and Behaviour Change:* Employees with HIV and AIDS will not be unfairly discriminated against in the allocation of employee benefits. With regard to sick leave, HIV and AIDS related illness will be treated no different from other chronic or life threatening conditions. Health and social security schemes run by the company will give the same benefits to those with HIV and AIDS as to any other worker. The same applies to separation allowance, retirement schemes and pension benefits.
9. *Prevention and Behaviour Change:* Outside sexual abuse and violence, and access to emergency medical services, HIV infection is preventable. The parties will promote prevention efforts at the workplace, within families and in the wider community. Because it is within the power of everyone to avoid HIV infection, it is expected that employees take responsibility of their own health. They are urged to avoid risky behaviour such as unprotected sexual intercourse and the injection of drugs through shared needles.

A16.3 Implementation

The plan will be implemented onsite through the following:

1. This HIV and AIDS Management Plan will be made known and explained to all employees through the distribution of the text as a brochure in the appropriate languages and through meetings.
2. The implementation of this plan includes information and education activities aimed at communicating correct information about HIV and AIDS and eradicating myths to eliminate stigma and discrimination.
3. The developer will organise and if necessary and appropriate with the participation of health professionals, regular awareness, and prevention programmes about HIV and AIDS during working time for staff.
4. As condoms and femidoms are an effective barrier to STIs and HIV transmission, condoms and femidoms will be made available at no cost on the construction site.
5. Meetings, information, and training activities should be included in an action programme with an implementation plan for a defined period of time. This should include material to be acquired or produced. The company should make provisions in its budgetary process to include the cost of activities and materials.
6. Disputes or grievances arising from the application of the principles of this policy and its implementation are dealt with by the HIV and AIDS Committee and/or in established dispute resolution or grievance procedures.

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Annex 17: Hazardous Materials Handling and Storage Guidelines

Hazardous substances are chemicals or materials that can cause acute or chronic harm to health, be it humans or the environment. The key potential sources of impact related to the management of hazardous chemical substances and fuel during construction relate to the risk of accidental release of hydrocarbons to the environment, accidental exposure to workers, and fire and explosion risks. Potential impacts associated with these risks, if poorly managed, include:

- Impact to soil and/or groundwater, which may result in degradation of the resource and requirement for remedial action.
- Impacts on pastoralist livelihoods due to contamination of pasture or water resources and consequent impacts to their, health, livelihood, and animals.
- Impacts on human health & safety due to either direct exposure or through fire/explosion.
- Gas emissions associated with the combustion of fuel are mainly compounds of nitrogen, carbon including very small traces of Sulphur and particulate matter.
- Fugitive emissions from dangerous goods and fuel storage.

The purpose of this Hazardous Materials Management Plan (HMMP) is to provide a framework for the management of hazardous substances onsite during construction works as follows:

- Ensure the handling and storage of hazardous substances are in accordance with relevant standards.
- To ensure that the storage and handling of chemicals and hydrocarbons on-site does not cause pollution to the environment or harm to persons.
- To ensure that the storage and maintenance of machinery onsite does not cause pollution of the environment or harm to persons.

A plan for managing the transportation, delivery, storage, and handling of hazardous substances onsite is detailed below. A Method Statement detailing the specific storage and handling practices during construction will be prepared by the Contractor prior to the commencement of construction.

1. Register of Hazardous Substances

Contractors will establish inventories or registers of hazardous substances on site. The inventory will be updated when new hazardous substances are introduced to the workplace, or the use of existing hazardous substances is discontinued. Both the chemicals' register, and the Material Safety Data Sheets (MSDSs) will be readily available at a central location or near where the chemicals are being stored or used.

2. Material Safety Data Sheets

It is standard practice that an MSDS is provided by the manufacturer or supplier of all hazardous substances. An MSDS is required for all chemicals and substances on site. These MSDSs will be made available to all parties affected by the use or storage of the chemical. MSDSs are the key to communicating hazards and safe handling practices for chemicals. In addition, MSDS information will be made available to all employees.

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3. Deliveries

Transport of all hazardous substances will be in accordance with the relevant legislation and regulations. Contractors are responsible for identifying and securing any necessary permits for any proposed bulk fuel storage arrangements. The supplier will fill contractors fuel tanks; fuelling is the responsibility of the licensed contractor who will be supervised by the storage/work area supervisor. No 'black-market' or 'grey-import' fuels will be used. All fuels purchased will be legitimate and subject to required duties and taxes.

Prior to fuel transfer the operator will verify that: all fuel transfer hoses have been connected properly and couplings are tight; transfer hoses are not obviously damaged; fuel transfer personnel are familiar with procedures; for fuelling stations, personnel are located at both the fuel truck and fuel transfer tank(s) and have the ability to shut off fuel flow manually; a means of communication has been established between the two people transferring fuel; and a high liquid level shutoff device can be substituted for the person at the delivery tank, in which case operation of the shutoff will be verified each time it is used.

The fuel contractor will clean up and report any accidents or spills immediately to the Supervising Engineer and SATCP.

4. Environmental and Occupational Health and Safety

The following requirements are additional to any applicable requirements established in other management plans such as the Occupational Health & Safety (OHS) Management Plan:

- Storage facilities will have the applicable MSDS available.
- Smoking will be strictly prohibited from any areas where fuel loading operations take place.
- Appropriate signage will be used to identify potential spill risks.
- Any accidental damage to containment structures will be inspected immediately and appropriate repairs undertaken. The extent of damage, the remedial repairs effected together with the date of repairs and any follow up inspection will be reported in writing. Any release of fuels or other substance will be cleaned up.
- All used fuel/oil products will be collected in tanks marked "Waste Oil".
- All hydrocarbon associated wastes will be managed in line with a Waste Management Plan.

5. Materials Storage

- All temporary hydrocarbon storage will be situated above ground. There will be no buried storage tanks permitted.
- All chemicals, fuels and other hazardous materials will be stored in designated and bunded areas, where the bunded area is impermeable and is impervious to the stored substance. The bunded area will contain 110% volume of the largest container stored.
- Bunds and service area platforms to be cleaned and maintained regularly.
- Spill kits will be made available on-site for the clean-up of spills and leaks of contaminants. The relevant construction crew members will be trained in their use.
- Keep a record of all hazardous substances stored on site. Clearly label all the containers storing hazardous waste.

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- The storage of flammable and combustible liquids such as oils will be in designated areas which are appropriately bunded and stored in compliance with MSDS files and applicable regulations and safety instructions.
- Chemical and hydrocarbon storage facilities will be covered to prevent rainfall ingress into secondary containment units and well-ventilated.
- Any storage and disposal permits/approvals which are required will be obtained, and the conditions attached to such permits and approvals will be compiled with.
- An effective monitoring system will be put in place to detect any leakage or spillage of all hazardous substances during their transportation, handling, installation and storage.

6. Training

The contents of the HMMP will be communicated to the staff through the induction training. On-the-job training can also be undertaken using Environmental Toolbox Talks. All training will be undertaken as outlined in the Training Procedure.

Examples of Toolbox Talks include:

- Storage of hazardous substances.
- Working with hazardous substances.
- Management of hazardous waste.
- Spill Prevention.

7. Disposal of hazardous materials

The contractor will be responsible for disposal of hazardous materials. However, the disposal of all hazardous materials will require authorization by obtain nessesary permits from relevanrt authorities, particularly MEPA and the concerned district councils or Zomba City Council as the case may be. In addition, the transportation and disposal of any hazardous material will must be done by licensed contractors.

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Annex 18: Emergency Preparedness and Response Plan Guidelines

Appropriate resources must be provided to respond to accidental and emergency situations for operations and activities during construction phase. The contractor will produce the EPRP for addressing training, resources, responsibilities, communication, and all other aspects required to effectively respond to emergencies associated with their respective hazards.

This Emergency Preparedness and Response Plan (EPRP) is intended as a practical working document for the Project. The purpose of this document is to provide the basic guidelines on how to respond to potential emergency situations that may arise from the Project. These potential emergency situations include medical emergencies and fires. All activities associated with the Project will require a site-specific EPRP to mitigate impacts, which meet or exceed all applicable regulations.

The objectives of the EPRP are as follows:

- Protect the communities and the environment through the development of emergency response strategies and capabilities.
- Set out the framework for hazard identification to define procedures for response to the situations including the development of contingency measures.
- Structure a process for rapid and efficient response to and manage emergency situations during the Construction works.
- Assign responsibilities for responding to emergency situations.

A9.2 Undertake the Risk Assessment

Regular risk assessments should be conducted to identify potential hazards related to the construction works. Update the risk assessment periodically and whenever there are significant changes to the project.

A9.1 Spill Prevention and Management Plan

Liquid waste spills that are not appropriately managed have the potential to harm the environment. By taking certain actions, the likelihood of spills can be reduced, and their effect minimized. To avoid spills and to help the clean-up process of any spills, the construction contractors, supervising engineer, and the management and staff of SATCP should be aware of spill procedures. By formalizing these procedures in writing, staff members can refer to them when required thus avoiding undertaking incorrect spill procedures.

A detailed spill management plan will be prepared for the construction phase. These plans will contain the following:

- Identification of potential sources of spill and the characterization of spill material and associated hazards.
- Risk assessment (likely magnitude and consequences)
- Steps to be undertaken taken when a spill occurs (stop, contain, report, clean up and
- record).

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- A map showing the locations of spill kits or other cleaning equipment. This should also be included in the C-ESMP.

A9.2 Other Emergencies

Response plans for other emergencies, including but not limited to the following, will also be developed:

- Extreme weather events such as extreme heat, heavy downpour and consequent flooding.
- Vehicle accident.
- Electrical and fire hazards.
- Power outages and equipment Failure.
- Community unrest and worker protests

A9.3 Roles and Responsibilities

With respect to this ERP, the construction contractor has the responsibility to:

- Provide emergency response services and to structure and coordinate emergency response procedures for the Project;
- Ensure that specific emergency responsibilities allocated to them are organised and undertaken; and
- Ensure that employees and contractor third parties are trained and aware of all required emergency procedures.

Roles, responsibility and authority will be defined, documented and communicated in order to facilitate effective emergency response through implementation of the EPRP. Management will provide resources essential to the implementation and control of the EPRP including: human resources, technology, and financial resources.

The construction contractor will appoint specific emergency response representative(s) who, irrespective of other responsibilities, will have defined roles, responsibility, and authority for emergency response of the facility. The sections below provide more specific responsibilities related to each position.

A9.3.1 Emergency Response Representatives

- Actively participate in the facilities planning, implementation and reviewing of the sites ERP.
- Ensure all staff members are aware of the procedures outlined in the ERP.
- Setting up practical training schedules (drills) annually to ensure that all staff are prepared in case of an emergency.
- Report any incidents that occur to senior management staff and/or the relevant authorities.
- Appoint an Emergency Response team which includes an appropriate first aid representative and a fire warden.
- Ensure that the appointed Emergency Response team members undergo the correct training.
- Appoint an appropriate Emergency coordinator.

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A9.3.2 First Aid Representatives

- Ensure that the first aid box is properly stocked to meet all foreseeable incidents which may occur.
- Ensure that the boxes are properly safe guarded and that First Aiders name appears on the box.
- Should any activity involve hazardous chemical substances, or any other specific first aid emergencies, this must be brought to the attention of the emergency coordinator.
- Ensure the first aid certificate is current.
- Ensure that there is always a first aider available at each shift.

A9.3.3 Fire Wardens

- Ensure that the firefighting equipment is regularly serviced.
- Attend the relevant firefighting training.
- Report any unserviceable or damaged fire- fighting equipment to the Emergency Response Representatives.

A9.3.4 Emergency Co-Ordinator

- Ensure that an update of the EPRP is kept on file and is easily accessible in case of an emergency.
- Ensure that all staff have been issued with the correct PPE.
- Ensure that a list of emergency telephone numbers, including those of the Emergency Response team, are visible to all staff at several locations around the facility.
- In the case of an emergency, the emergency coordinator is responsible for undertaking roll call at the designated Assembly points.

A9.4 Emergency Communications and Coordination Plan

In an emergency where there is an immediate threat to communities, personnel or the environment, the Project Manager will be notified immediately. The Project Manager will dispatch the Emergency Response Coordinator who will determine the appropriate plan of action depending on the severity of the emergency, the people affected, and the need to evacuate.

If there is a developing emergency or an unusual situation, where an emergency is not imminent, but could occur if no action is taken, the Senior Operations Manager (or if the Senior Operations Manager is absent) the Environmental Manager) is to be informed immediately. Once the emergency or unusual situation has been managed, the correct incident/near miss must be reported to the World Bank.

If an emergency situation poses a direct threat to communities in the area, the Environmental Officer and/or Social Officer will advise persons in the vicinity of the emergency to evacuate due to the potential risk. The appropriate government authorities will immediately be notified of such an emergency evacuation. The Emergency Response Coordinator will be tasked with responding to the potential risk. Should the emergency situation be such that it can be managed by ESA, equipment and personnel will be deployed to the maximum extent necessary, so as to prevent/minimise potential risks.

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A9.5 Response to Incidents

An incident is any occurrence that has caused, or has the potential to cause, a negative impact on people, the environment or property (or a combination thereof). It also includes any significant departure from standard operating procedures. The reporting and investigation of all potential and actual incidents that could have a detrimental impact on human health, the natural environment or property is required so that remedial and preventive steps must be taken to reduce the potential or actual impacts because of all such incidents.

Any incident must immediately be reported to the relevant authorities and all the necessary documentation must be completed and submitted to the relevant authorities within the prescribed timeframes.

A9.6 Verification

An environmental emergency response system will be developed for the execution of emergency drills that will include the following, inter alia:

- Fire Drills.
- Emergency Evacuation Drills.
- Medical and Environmental Drills.

Reporting and monitoring requirements for the plan will include:

- Monthly inspections and audits;
- Quarterly reporting of accidents/ incidents;
- Reporting at the time of the incident and monthly spill reporting;
- Bi-annual emergency response drills; and
- Annual reporting on training.

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Annex 19: Campsite and Storage sites for Construction Material and Equipment

Upgrading the roads in the project area will result in opening of borrow pits, construction of camps and diversions. These will result in land degradation which will need to be rehabilitated once construction activities of the project are finalized.

This Annex provides guidance to the Contractor campsite and storage site activities for the project. It includes specific guidance to prevent the eventual associated environmental, social economic and community health and safety impacts by reinstating the campsite and material and equipment storage sites to an acceptable standard as close to its baseline environmental state as possible.

The aim of the rehabilitation is to:

- Return the disturbed area to an acceptable state;
- Ensure that all areas are stable, and there is not risk of erosion;
- Prevent alien plant invasion on the site until the site is in a stable state; and
- Ensure that all areas are free draining and non-polluting

1. Camp site Location and Fencing

The site's boundaries will be demarcated before any work commencing on the site. The campsite shall not be located near schools, forest reserve, or any other protected or contested area (e.g. disputed land). The Contractor will be responsible for deciding on an appropriate system of protective solid barrier fencing for the site to control access, prevent encroachment, restrict visibility and bar noise and dust emissions from camp activities. The site boundary demarcation fence will be removed when the site is decommissioned and fully or almost fully restored to its original state. The Contractor will ensure that all their plant, labor, and materials remain within the boundaries of the site, and will ensure that materials used for construction on the site do not blow across or move outside the site.

When selecting camp locations, the Contractor shall also assess water supply options. Borehole drilling will be avoided in environmentally sensitive areas (wetlands, protected forests, or sacred sites) and must not interfere with community water points or traditional water sources. Community consultations will be undertaken before borehole drilling.

2. Storage of Construction Materials and Equipment

Construction materials will be stored in a manner to ensure that:

- Where it is unavoidable to obstruct any of the service paths, the contractor will provide temporary or alternate by-passes without inconveniencing the flow of traffic or pedestrians;
- There is no obstruction of drainage channels and natural water courses;
- There is no contamination of surface water, groundwater, or the ground;

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- There is no access by public or unauthorized persons to materials and equipment storage areas;
- There is no access by staff, without appropriate protective clothing, to materials and equipment storage areas;
- Access by staff and public or unauthorized persons to hazardous, corrosive, or poisonous substances, including sludge, chemicals, solvents, oils, asbestos cement dust, or their receptacles, such as boxes, drums, sacks, and bags, is prohibited.

3. General Requirement for Campsite Rehabilitation

- The Contractor shall remove all temporary structures, equipment, materials, water, and facilities used for construction activities. Any oil and fuel-contaminated soil shall be removed and buried in waste disposal areas, soak pits and septic tanks shall be covered and effectively sealed off, and the sites shall be grassed. All the sites shall be restored to a similar condition to that prior to the commencement of the works or to a condition agreed to with council officials. Rehabilitation will be restricted to areas excavated and used for the purposes of this project.
- The objective of rehabilitation will be to restore the camp sites and material and equipment storage sites to a condition which is as similar as possible to the natural environment or to the pre- determined end use.
- Boreholes constructed for temporary camps shall be decommissioned at the end of the project unless otherwise formally handed over to local authorities or communities. Decommissioning shall include sealing of the borehole, removal of pumps and infrastructure, and restoration of the site to a safe and stable condition. If transfer is agreed, boreholes must be tested for water quality, yield, and safety prior to handover.

4. Surplus Material and Topsoil

- Topsoil and other materials from clearing and grubbing from the construction site and adjacent access road clearing activities shall also be used to supplement topsoil for the borrow areas where topsoil is deemed to be inadequate
- The topsoil must be keyed into the re-profiled surfaces to ensure that they are not eroded or washed away.
- The top-soiled surface shall also be left fairly rough (i.e., not smoothed down) to enhance seedling establishment, reduce water run-off and increase infiltration.

5. Landscaping

- The rehabilitated land will be visually in keeping with the immediate environment, and any negative visual impact will be rectified

6. Measures Needed

The following additional measures shall be applied in conjunction with the land owner

- No construction equipment, vehicles or unauthorized personnel shall be allowed unto areas that have been rehabilitated.
- Only persons or equipment required for the preparation of areas, spreading of top material shall be allowed to operate on these areas.
- Permanent, stock-proof fencing shall be erected / reinstated /installed
- For boreholes, the Contractor shall implement measures to prevent contamination of groundwater (e.g., by providing proper drainage aprons, soak-away pits for wastewater,

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and spill prevention for fuels and lubricants). Routine water quality monitoring shall be undertaken (e.g., E. coli, nitrates, and heavy metals) and results shared with the Supervising Consultant.

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Annex 20: Health and Safety Management Guidelines

The Contractor shall protect the health and safety of workers by providing the necessary and approved protective clothing and by instituting procedures and practices that protect the workers from dangerous operations. The contractor shall be guided by and shall adhere to the relevant national Labor Regulations for the protection of workers. Management of different key health and safety hazards relevant to the construction activities are presented below.

- Prepare a Traffic Management Plan to ensure safety of workers, road users and community members;
- Install enclosures and cover on material storage piles, and increase moisture content;
- Implement dust suppression techniques, such as applying water or non-toxic chemicals along access roads to reduce dust from moving vehicles;
- Avoid burning solid waste;
- Remove materials from the bottom of piles to minimize dust re-suspension;
- Cover transport vehicles.
- Hazardous materials storage and handling facilities should be constructed away from traffic zones and should include protective mechanisms (e.g., reinforced posts, concrete barriers, etc.) to protect storage areas from vehicle accidents.
- Covered and ventilated temporary storage areas should be designed to facilitate collection of potentially hazardous leaks and spills, including the use of sloped surfaces to direct spill flows, and the use of catch basins with valve systems to allow spills and releases to enter a dead-end sump from which spilled materials can be pumped/recovered.
- Where hydraulic equipment is used over or adjacent to water or other sensitive receptors, biodegradable hydraulic oils should be used.
- Include secondary containment for above ground liquid storage tanks and tanker truck loading and unloading areas.
- Fueling areas should be equipped with containment basins in areas with a high risk of accidental releases of oil or hazardous materials (e.g., fueling or fuel transfer locations). Fuel dispensing equipment should be equipped with "breakaway" hose connections that provide emergency shutdown of flow should the fueling connection be broken by movement. Fueling equipment should be inspected prior to fueling activities to ensure all components are in satisfactory condition.
- Prepare a spill prevention, control, and countermeasure plan;
- Provide portable spill containment and cleanup equipment on site and provide training on how to use equipment.
- Train workers in lifting and material handling techniques, including the placement of
- weight limits above which mechanical assists or two-person lifts are necessary;
- Plan work site layout to reduce the need for manual transfer of heavy loads;
- Select tools and design work stations that reduce force requirements and holding times, and which promote improved posture, including, where applicable, user adjustable work stations;
- Implement administrative controls into work processes, such as job rotations, rest, or stretch breaks;
- Implement good housekeeping practices, such as sorting and placing loose construction materials or demolition debris in established areas away from foot paths;
- Clean up excessive waste debris and liquid spills regularly;

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- Locate electrical cords and ropes in common areas and marked corridors;
- Use slip retardant footwear.
- Conduct sawing, cutting, grinding, sanding, chipping or chiseling with proper guards and anchoring as applicable;
- Maintain clear traffic ways to avoid driving of heavy equipment over loose materials;
- Wear appropriate PPE, such as safety glasses with side shields, face shields, hard hats, and safety shoes.
- Plan and segregate the location of vehicle traffic, machine operation, and walking areas, and control vehicle traffic through the use of one-way traffic routes, establishment of speed limits, and on-site trained flag-people wearing high-visibility vests or outer clothing coverings to direct traffic;
- Ensure the visibility of personnel through the use of high visibility vests when working in or walking through heavy equipment operating areas, and training workers to verify eye contact with equipment operators before approaching the operating vehicle;
- Ensure moving equipment is outfitted with audible back-up alarms;
- Use inspected and well-maintained lifting devices that are appropriate for the load, such as cranes, and securing loads when lifting them to higher job-site elevations;
- Minimize the risk of free fall of materials by installing telescoping arm loaders and conveyors; inspect all slings before use;
- Equip lifting appliances with means of emergency escape from the driver's cabin and a safe means for the removal of an injured or ill driver.
- Control site-specific factors which may contribute to excavation slope instability including, for example, the use of excavation dewatering, side-wall support, and slope gradient adjustments that eliminate or minimize the risk of collapse, entrapment, or drowning;
- Provide safe means of access and egress from excavations, such as graded slopes, graded access routes, or stairs and ladders;
- Avoid the operation of combustion equipment for prolonged periods inside excavation areas where other workers are required to enter unless the area is actively ventilated.

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Annex 21: Noise and Vibration Baseline and Management Guidelines

Baseline

Station	Dominant Frequency Range (Hz)	Peak Frequency (Hz)	Amplitude (Peak Vibration)	Remarks
STA0 (Liwonde)	1–9.1	9.2	0.08	Low amplitude; minimal vibration
STA1 (Machinga)	1–6.2	3.1	5.9	Moderate vibration amplitude
STA2 (Namwera Turn-Off)	2–12	5.7	2.9	Moderate vibration; localized influence
STA3 (Somba)	2–10	7.4	7	High vibration amplitude; possible concern
STA4 (Domasi)	1–5	8.5	0.49	Very low amplitude
STA5 (Songani)	1–4	4.6	0.4	Low vibration level
STA6 (Naisi)	1–3.5	5.5	0.48	Low vibration level
STA7 (Chinamwali)	1–3.7	4.9	0.28	Very low amplitude; minimal impact

Management Guidelines

These Noise Management Guidelines provide a framework for identifying and minimizing noise impacts associated with project construction activities. The Contractor shall develop a detailed, site-specific Noise Management Plan (NMP) based on these guidelines, for review and approval by the Supervision Consultant.

Construction activities such as drilling, excavation, backfilling, and the movement of vehicles and machinery are expected to generate significant noise. It is therefore essential to maintain ambient noise levels within acceptable limits to protect both construction workers and surrounding communities.

- Ensure all vehicles, equipment, and machinery are in good working order, specifically that that mufflers are present and functional.
- Ensure all workers are equipped with proper hearing protection when working near or within noise generating equipment and machinery for a prolonged period and that they have been trained to know when and how to use the protective equipment.

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- Favor realization of noisy activities during normal day operation hours which presently are from 7:00 am to 5:00 pm.
- Consider locating any noise generating stationary equipment (electrical generators, compressors) away from
- moderately sensitive receptors. If this can't be realized install temporary acoustic enclosures around this equipment.
- Favor manual clearing of vegetation cover when feasible and possible.
- Favor the use of equipment, machinery and vehicle with lower noise generating levels.
- If noise related grievances are received develop and implement a noise monitoring
- program to verify construction related noise levels and identify the main sources for
- potential actions.
- General site inspection to detect important noise sources and to ensure workers are
- wearing their PPEs.
- If grievances are received, develop and implement an ambient noise monitoring program to measure noise levels at site limits and potentially at the level of key sensitive receptors located close to the work site.

For the visual inspection, the responsibility must be given to the work site HSE officers whom should include this aspect in their daily work site visit. They should be equipped with a dB meter unit to help them define the elevated noise areas within the work site.

For the noise level monitoring program, the following should be considered for its preparation and implementation:

- Identification of the noise sources and of the potential receptors;
- Determination of the parameters to be analyzed and standards to be considered for
- comparison;
- Establishing the position of the sampling points;
- Determination of the sampling frequency in agreement with the SC;
- Definition of the sampling methodology, to be approved by the SC.;
- Agreement on a report format with the SC.

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Annex 22: Air Quality Standard and baseline

The Environmental monitoring of the parameters involved and the threshold limits specified are discussed below:

1 Ambient Air Quality Monitoring
The air quality parameters namely Sulphur Dioxide (SO2), Oxides of Nitrogen (NOX), Carbon Monoxide (CO), Particulate Matter (PM10), and Particulate Matter (PM2.5), will be regularly monitored at identified locations. The standards and baselines are provided in the Table below.

Parameter	MS737:2005 Limit	Baseline March 2025	Remarks
Sulphur Dioxide (SO_2)	150 µg/m³ (24-hr avg)	5.5–8.2 µg/m³	Very low levels; well within the limit
Nitrogen Dioxide (NO_2)	110 µg/m³ (24-hr avg)	1.8–2.0 µg/m³	Minimal pollution; within safe threshold
Carbon Monoxide (CO)	10 mg/m³ (8-hr avg)	0.0–0.6 mg/m³	Extremely low levels; no risk
$PM_{2.5}$	25 µg/m³ (24-hr avg)	11.3–43.2 µg/m³	Exceeds limit at Liwonde (43.2 µg/m³) and Somba (32.9 µg/m³)
PM_{10}	150 µg/m³ (24-hr avg)	24.0–149.1 µg/m³	Near limit at Liwonde; within elsewhere
Total Suspended Particulates (TSP)	230 µg/m³ (24-hr avg)	32.1–210.9 µg/m³	All within the standard range

2 Ambient Noise Quality Standards and Baseline
The noise levels will be monitored at identified locations in accordance with the Ambient Noise Quality standards given in Table below.

Location	MS173:2005 Limit (dBA)	Baseline Noise Level (March 2025, dBA)	Remarks
Liwonde	55 (Daytime)	47.2	Within limit
Machinga	55 (Daytime)	37.9	Well within limit
Namwera	55 (Daytime)	48.4	Within limit
Somba	55 (Daytime)	48.3	Within limit
Domasi	55 (Daytime)	48	Within limit
Songani	55 (Daytime)	44.5	Within limit
Naisi	55 (Daytime)	44.5	Within limit

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Chinamwali	55 (Daytime)	47.8	Within limit

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Annex 23: Spoil Disposal Management Guidelines

Spoil is defined as any earthen material that is surplus to requirements or unsuitable for re-use in fill and embankments (such as unsuitable rock and soil material) or material that is contaminated. This Plan has been prepared to facilitate the beneficial reuse of all material, ensuring that none is disposed off-site, except if unsuitable for reuse, and if so, disposed of appropriately.

1. Spoil Types

Fill is defined as earthen material excavated from one location along the corridor (for example, for a detention basin or cut excavations) and relocated elsewhere as compacted fill. Cut and fill material will generally not be stockpiled but will be removed from the excavation site and transported directly to the construction face for immediate reuse as compacted fill. Unsuitable excavated material will primarily be transported to identified locations within the construction site for temporary storage for reuse or possible disposal.

2. Spoil Strategy

The following provides an overview of the strategy for achieving the key spoil management objectives:

- Minimise the amount of spoil generated – this requirement will be achieved by ensuring that the design minimises the volume of spoil generated from excavation.
- Maximise the beneficial reuse of spoil on site based on its classification (both contamination category and geotechnical characteristics). Some of the spoil generated is expected to be able to be reused on site and will be suitable as general fill across the site.
- Maximise the beneficial reuse of spoil off site based on its classification (both contamination category and geotechnical characteristics)
- Dispose of spoil off site based on its contamination classification - spoil unable to be reused on site or off site would be disposed of at a facility that has the appropriate development approval to receive and store the relevant waste classification of the spoil.
- Manage the excavation, storage, transport reuse and disposal of spoil to minimise impacts and meet other environmental requirements – this includes implementing mitigation measures to manage potential impacts on traffic and soil and water, dust generation and contamination of spoil.

3. Spoil Generating Activities

The activities associated with the generation and management of spoil and fill materials are:

- Clearing of vegetation;
- Selection of material;
- Clearing of topsoil;
- Excavation of earthen material;
- Blasting of earthen material (as required);
- Transport of earthen material;
- Storage/stockpiling of spoil, topsoil and mulch; and
- Reuse of spoil, topsoil and mulch.

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4. Storage of Spoil

Material which can be re-used on-site but which cannot be directly re-placed will be stored in designated stockpile areas on-site. Where space is restricted material may require temporary storage off-site prior to re-use on-site. All spoil material requiring disposal will be classified prior to disposal to ensure it is disposed at the appropriate facility. Temporary storage areas will be identified prior to commencement of construction to ensure that disturbance to residents is minimised and to protect receiving waters from potential runoff.

5. Stockpile Management

Stockpiles will:

- Generally be located within the construction site or at sites specifically identified for stockpiling;
- Be located on flat areas where possible. Stockpiles are not to be placed on indigenous vegetation;
- Be located more than 2 m from existing indigenous vegetation, concentrated water flow, roads, and other restricted areas including residential areas, places of public access and site buildings;
- Generally be located away from steep slopes;
- Be located at least 100 m from any water bodies unless adequate erosion and sedimentation controls are installed;
- Have sediment fences down-slope and earth banks upslope to divert water and/or use sandbags to divert run-off from disturbed areas; and
- Be accessible for the purpose of dust suppression (e.g. Application of water sprays, covers, binding agents etc).

6. Spoil Management

- All material excavated from the construction will be re-used or recycled where suitable and if cost-effective to do so. Re-use of material generated from construction will be maximised in preference to any import of fill.
- Unsuitable fill material will be used for non-structural purposes (including landscaping) on the Project.
- Ensure that any spoil transported from the site is taken to a place that can lawfully accept it.
- Ensure that weed infested topsoil, as identified by a qualified ecologist, is not used in the rehabilitation works unless it is treated and sterilised in an appropriate manner.
- Cover all trucks transporting spoil to offsite locations and check tailgates are secured before leaving the site.

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Annex 24: Guideline for Siting, and Management of Construction Camps

1. Overview

Construction camp involve numerous of activities, which are highly polluting in nature causing considerable environmental impact and its proper siting, management and redevelopment is crucial to avoid, minimize and mitigate those impacts. The ESMP clearly distinguishes between various impacts that may occur at various stages of the camp like (i) siting, (ii) setting up, (iii) operation and (iv) closure / redevelopment and provide respective mitigation measures to some extent. In addition to that, this guideline has been prepared to provide the Contractor with comprehensive and systematic information on various steps to be undertaken during these four stages, so that s/he can execute his/her role in an environmentally sound manner. Various mitigation measures have been synthesized into this guideline so that it serves as a single and standalone document for the Contractor.

2. Criteria for Siting the Camp

To the extent, possible barren land or wastelands will be preferred during site selection and fertile land and agricultural land will be avoided. All such sites must be above the HFL with adequate drainage facility. In areas prone to floods, cyclones, cloudbursts or heavy rainfall, the site selection will be made considering the safety of the camp and the workers. In addition, the Contractor will take care of the following criteria for locating the site:

- A minimum of 250 m away from any major settlement or village in downwind direction.
- A minimum of 200 m of any major surface water course or body
- Not within 500 m from ecologically sensitive areas like wild life sanctuary, mangroves etc.
- Sufficiently wide access roads (at least 5.5 m Wide) for heavy vehicle movements
- Away from schools

3. Designing of Camp / Preparation of Layout Plan

The Contractor will design a layout plan of the camp with adequate space for (i) site office along with store room, rest area and sanitary facilities, (ii) plants, machineries, (iii) workshops, (iv) vehicle washing area, (v) fuel handling area, (vi) room for raw material unloading and stocking, (vii) space for storage and handling of solid wastes (viii) security cabin etc. The laying out of these will be undertaken in such a manner that it facilitates smooth functioning of both man and machine. Fuel pumps, storage facility for inflammable and hazardous chemicals/ materials will be provided inside the camp, but at a safe distance from office. Electric safety practices will be integrated/ incorporated during the lay-out plan preparation. Prevailing wind direction will be kept in mind while planning out the lay-out of internal facilities. Cutting of trees will be minimum and the existing ones need to be integrated into the lay-out plan with proper planning. The roads within the camp will be well planned with adequate space for movement of vehicles and their parking.

4. Setting Up of Construction Camp

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- *Site preparation:* The stripping, stacking and preservation of top soil will be mandatory in case of farm lands and fertile areas and absolutely no material stacking or equipment or vehicle parking or any other activity will be allowed prior to the satisfactory completion of this activity as per guidelines in the C-ESMP. Thereafter, the site will be graded and rendered free from depressions such that the water does not get stagnant anywhere. A compound wall of 2.4 m height will be constructed all around the camp to prevent the trespassing of humans and animals. Green belt will be provided along the boundary and as detailed in the ESMP, it will be integrated with storm water drain and sedimentation trenches as given in annex 12 of this ESMP. No. of trees planted will not be less than ten times the number of trees cut. The approved layout plan will be strictly adhered to while setting up the camp.
- *Setting up of plants and machineries:* Adequate arrangements will be made for avoiding fugitive emissions from plants and camp premises. This will include (i) control of air pollution through provision of in-built dust extraction systems like bag filter, damper and cyclone filter for bitumen hot mix plant, (ii) a chimney of appropriate height from ground level attached with dust extraction system and scrubber for the hot mix plant, (iii) a chimney of appropriate height for the DG set (iv) water sprinkling facilities for the concrete batching plant, wet mix macadam plant as well as in the camp premises and (v) garden net to prevent fugitive emissions from storage place of cement and aggregates. It has to be also ensured that effluent from the sludge tank of the scrubber is recycled and reused and the sludge is used for land filling with top soil spread on it. To ensure that noise levels are within the limit, all plants and machineries will have their own silencers or any other noise control devices. All pollution control devices will be provided with back-up power. Following conditions will be complied regarding the sound level conditions:
    - The DG set will be provided with acoustic enclosure/acoustic treatment with an insertion loss of minimum 25 dB(A).
    - The DG set will be provided with proper exhaust muffler with insertion loss of minimum 25dB(A).
    - A proper, routine and preventive maintenance procedure for the DG set will be set and followed in consultation with the DG set manufacturer.
    - Concrete flooring with slope drains and oil interceptors will be proposed for hot mix plant area and workshop, vehicle washing and fuel handling area as per ESMP, so that oil and lubricants that may spill on the floor does not contaminate any soil or water body. In case of any oil spills, it will be cleaned properly. There will also be provisions for storage of used oil until it is disposed as per comprehensive waste management plan prepared by Contractor and approved by Supervising Engineer.

Sanitation Facilities: Adequate number of toilets will be provided separately for males and females (depending on their strength), screened from those of men and provided with markings in vernacular language. All such facilities must have adequate water supply with proper drainage and effluent treatment system like septic tank with soak pit. Soak pit will have a sealed bottom, honey comb wall and 75 cm. thick, 2 mm sand envelope around that. The sewage system for the camp must be properly sited, designed, built and operated so that no health hazard occurs and no pollution to the air, ground or adjacent watercourses takes place. Sanitation facilities and designs must be approved by Supervising engineer.

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Portable toilets may be brought to use and the night soil from such units has to be disposed through designated septic tanks so as to prevent pollution of the surrounding areas. In the construction camp, no night soil or sewerage will be disposed of at any place other than the septic tanks constructed at the site.

Waste Disposal: While preparing the layout plan, the Contractor will allocate adequate space for storage and handling of various wastes generated until they are disposed of in pre-identified disposal sites. The Contractor will provide separate garbage bins for biodegradable, non-biodegradable and domestic hazardous wastes in the camps and ensure that these are regularly emptied and disposed off in a hygienic manner. No incineration or burning of wastes will be carried out by the Contractor. The disposal of any biodegradable matter will be carried out in pits covered with a layer of earth within the camp site. Discarded plastic bags, paper and paper products, bottles, packaging material, gunny bags, hessian, metal containers, strips and scraps of metal, PVC pipe scrubber and poly urethane foam, auto mobile spares, tubes, tires, belts, filters, waste oil, drums and other such materials will be either reused or sold /given out for recycling. POL (petroleum, oil and lubricants) waste will be disposed of by transfer only to recycler/ re-refiners possessing valid authorization from MEPA.

First aid / safety facilities: At every camp site, a readily available first-aid unit including an adequate supply of sterilized dressing materials and appliances will be provided. Workplaces which are remote and far away from regular hospitals will have indoor health units with one bed for every 230 workers. Details of nearest clinics as well as major hospitals like their location, distance from camp, phone nos. facilities offered by the hospital will be displayed in the camp office at clearly visible location in a legible manner. Suitable transport will be provided to facilitate taking injured and ill persons to the nearest hospital. Adequate personal protective equipment's and firefighting equipment's as detailed out in ESMP will be made available in the camp and provided to the staff / workers. Operation manuals and training will be provided to machine operators. Warning signs will be placed at accident prone areas as well as at the entrance of the site.

Training to workers: Workers will be trained in smooth operation of plants and machines, their regular maintenance and various safety measures to be followed as well as about the need for adherence to these measures.

Information dissemination: There will be a sign board of size 6' x 4' mentioning the project details and Contractor 's details to disseminate the information to the public. There will be a second sign board displaying the latest air and noise monitoring data against the standards specified. Warning signboards will be set up at the entrance gate for the public as well as at other required places for the workers to alert them about the nature of operation being undertaken at those respective places.

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5. Operation of Construction Camp

In the operational phase of the construction camp, it is imperative to implement a systematic and rigorous approach to the maintenance and oversight of vehicles and machinery. Regular maintenance of all equipment is essential, accompanied by the timely renewal of their pollution certificates to ensure compliance with environmental standards. Furthermore, the effectiveness of all pollution control devices must be continuously monitored and maintained according to a defined schedule.

In the event of a disturbance or failure in the pollution control equipment, the affected units shall be immediately shut down. These units will remain inoperable until the necessary corrective measures have been applied to restore their functionality and achieve compliance with established efficiency standards. It is also mandated that all operational activities be limited to the hours of 6:00 AM to 10:00 PM.

To address waste management, particularly the oil and grease generated from the garages within the camp, it is essential to implement oil interceptors that facilitate proper drainage. These interceptors must be regularly maintained to ensure their effectiveness. Additionally, proactive measures will be undertaken to suppress dust: water will be sprinkled at appropriate intervals, and all raw materials and products will be transported using secure coverings to minimize dust dispersion.

Maintaining a hygienic environment within the camp is critical. This will be achieved through several key practices:

- Provision of safe drinking water.
- Regular upkeep of sanitary facilities, which includes daily cleaning and disinfection of toilets using suitable disinfectants.
- Continuous cleaning of drainage systems, including the removal of silt and solid waste where applicable.
- Implementation of comprehensive waste management strategies.

Moreover, it is crucial to ensure that firefighting equipment, such as fire extinguishers, is functional and readily accessible. Concurrently, the use of personal protective equipment (PPE) by construction workers must be monitored, with timely replacements provided as necessary. A schedule of weekly inspections will be established to maintain desired safety and hygiene levels across all facilities in the camp.

Environmental monitoring will be conducted by the Contractor in accordance with the C-ESMP. Should the MEPA stipulate emission standards for hot mix plants, the Contractor is responsible for collecting and analyzing emissions from all chimneys on a monthly basis. Additionally, a register will be maintained at the site office, which will include:

- A standardized one-page format for each migrant laborer, detailing personal information such as name, age, sex, educational qualification, address, blood group, and any significant health issues. This will be accompanied by a copy of an identification document and an original photograph.

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- A copy of the identification card for local laborers.

Furthermore, a comprehensive report detailing the profiles of migrant laborers will be submitted to the local police station to promote transparency and compliance with local regulations.

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Annex 25: Chance Find Procedure for the Liwonde–Matawale Road Rehabilitation Project

1. Introduction

This Chance Find Procedure outlines the protocol to be followed in the event that previously unidentified cultural heritage is discovered during the implementation of the Liwonde–Matawale (M003) Road Project. Cultural heritage may include archaeological materials, graves, religious artifacts, sacred sites, or historical objects not identified during the initial environmental and social assessment. This procedure ensures compliance with the requirements of the Monuments and Relics Act (Cap 29:01) of Malawi and World Bank's OP/BP 4.11 (Physical Cultural Resources).

2. Purpose

The purpose of this procedure is to safeguard Malawi's tangible cultural heritage by ensuring that any unexpected discoveries are handled with care and in accordance with legal and safeguard requirements. The procedure seeks to prevent unauthorized interference, preserve historical and cultural assets, and maintain respect for community traditions and sensitivities.

3. Scope

This procedure applies to all personnel involved in the project, including contractors, subcontractors, consultants, field workers, and any party engaged in construction, material sourcing, excavation, or related site activities. It is applicable to all locations along the project corridor, including campsites, borrow pits, material stockpiles, access roads, and working zones.

4. Definition of a Chance Find

A chance find is defined as any artifact, feature, structure, or site of cultural, historical, or religious significance that is discovered unexpectedly during the execution of project activities. Examples may include human remains, pottery fragments, stone tools, religious objects, altars, burial grounds, historical ruins, or sacred trees. These are typically items or sites not previously recorded or anticipated in the ESIA or RAP documentation.

5. Procedure to Follow in the Event of a Chance Find

If a chance find is encountered, the following steps must be followed:

1. All work in the immediate vicinity must stop immediately. The affected area must be secured with a buffer zone of no less than 20 to 50 meters to prevent disturbance or looting.
2. The Contractor must promptly inform the Supervision Consultant, the Project Implementation Unit (PIU) of the Roads Authority, and the Department of Antiquities (DoA) within 24 hours.
3. The DoA will dispatch a qualified cultural heritage or archaeological specialist to assess the nature, significance, and appropriate treatment of the discovery.
4. Based on the expert assessment and consultations with relevant stakeholders, the cultural material may be preserved in situ, documented and relocated, or managed in

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accordance with traditional practices—such as holding customary ceremonies prior to relocating graves or sacred objects.

5. No work should resume in the vicinity until the DoA has provided written clearance authorizing continuation. All findings must be properly recorded, photographed, and geotagged for documentation and reporting purposes.

6. Roles and Responsibilities

The Contractor is responsible for ensuring that all site personnel are trained in this procedure and for immediately halting work and protecting the area in the event of a discovery. The Supervision Consultant must verify contractor compliance and support the coordination of response efforts. The PIU is responsible for notifying the Department of Antiquities, facilitating expert engagement, and ensuring adherence to this procedure. The Department of Antiquities will lead assessments, determine the heritage value of the find, and authorize appropriate measures or clearance to resume work.

7. Training and Awareness

To ensure that all relevant personnel are aware of and can implement this procedure, pre-construction induction training will be provided to all workers and supervisors. This will include awareness of local cultural sensitivities and the importance of cultural heritage protection. Refresher training will be conducted every six months or upon the onboarding of new workers. On-site communication materials such as posters and briefing cards will be used to reinforce awareness.

8. Legal and Policy Basis

This procedure is grounded in the Monuments and Relics Act (Cap 29:01) of Malawi, which mandates the protection and reporting of archaeological discoveries and prohibits unauthorized disturbance of cultural resources. It is also aligned with the World Bank's OP/BP 4.11 (Physical Cultural Resources), which requires Borrowers to avoid, minimize, or mitigate impacts on cultural heritage and to engage relevant communities and authorities in the process of managing heritage resources.

9. Reporting and Documentation

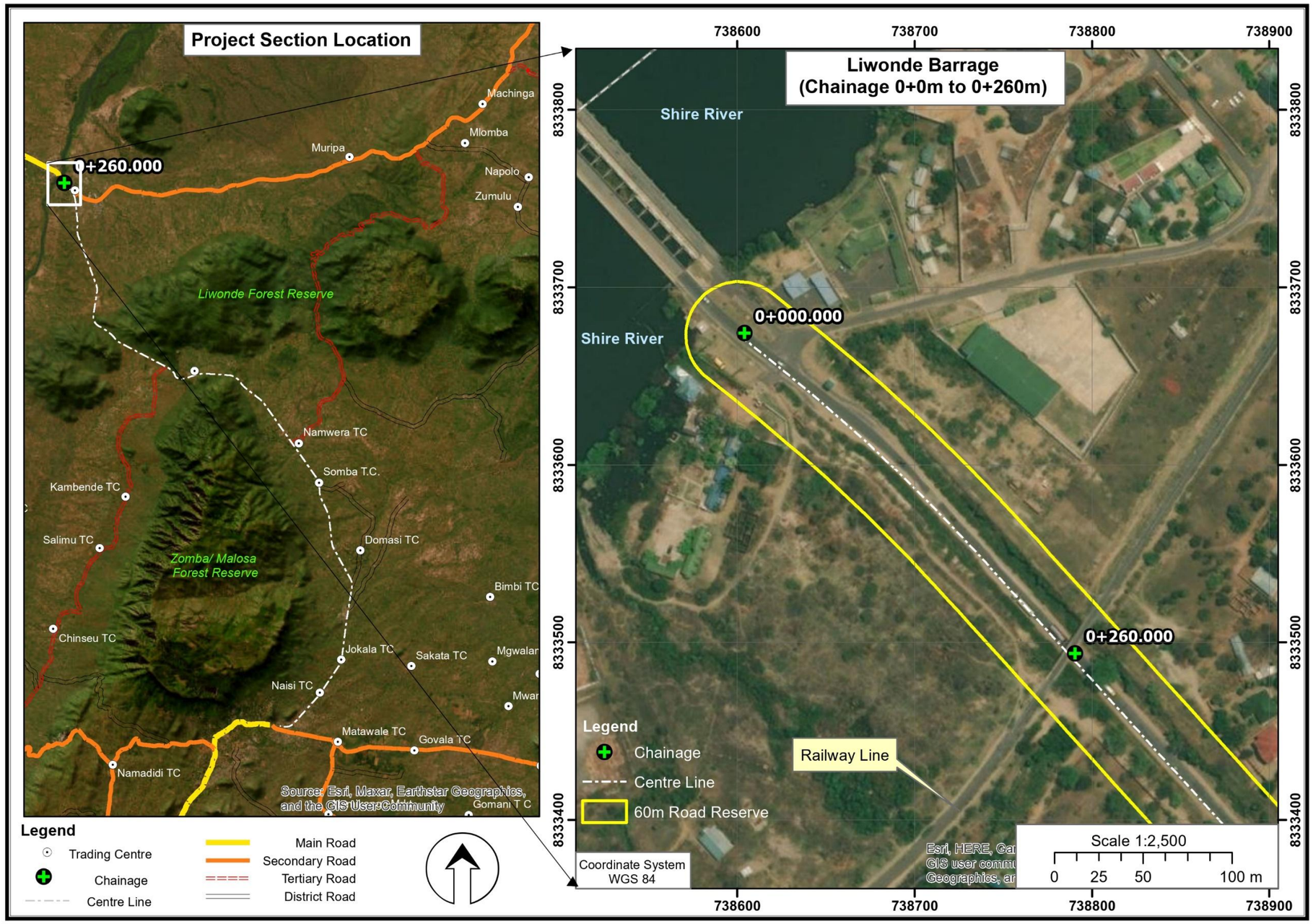
All chance finds must be documented in a standardized reporting format that includes the date and time of discovery, location coordinates (GPS), a physical description of the find, photographic records, and the actions taken. These reports must be submitted to the PIU, the Department of Antiquities, and included in the Contractor's monthly E&S compliance reporting. Records of follow-up actions, assessments, and final clearance must also be retained.

10. Budget and Resources

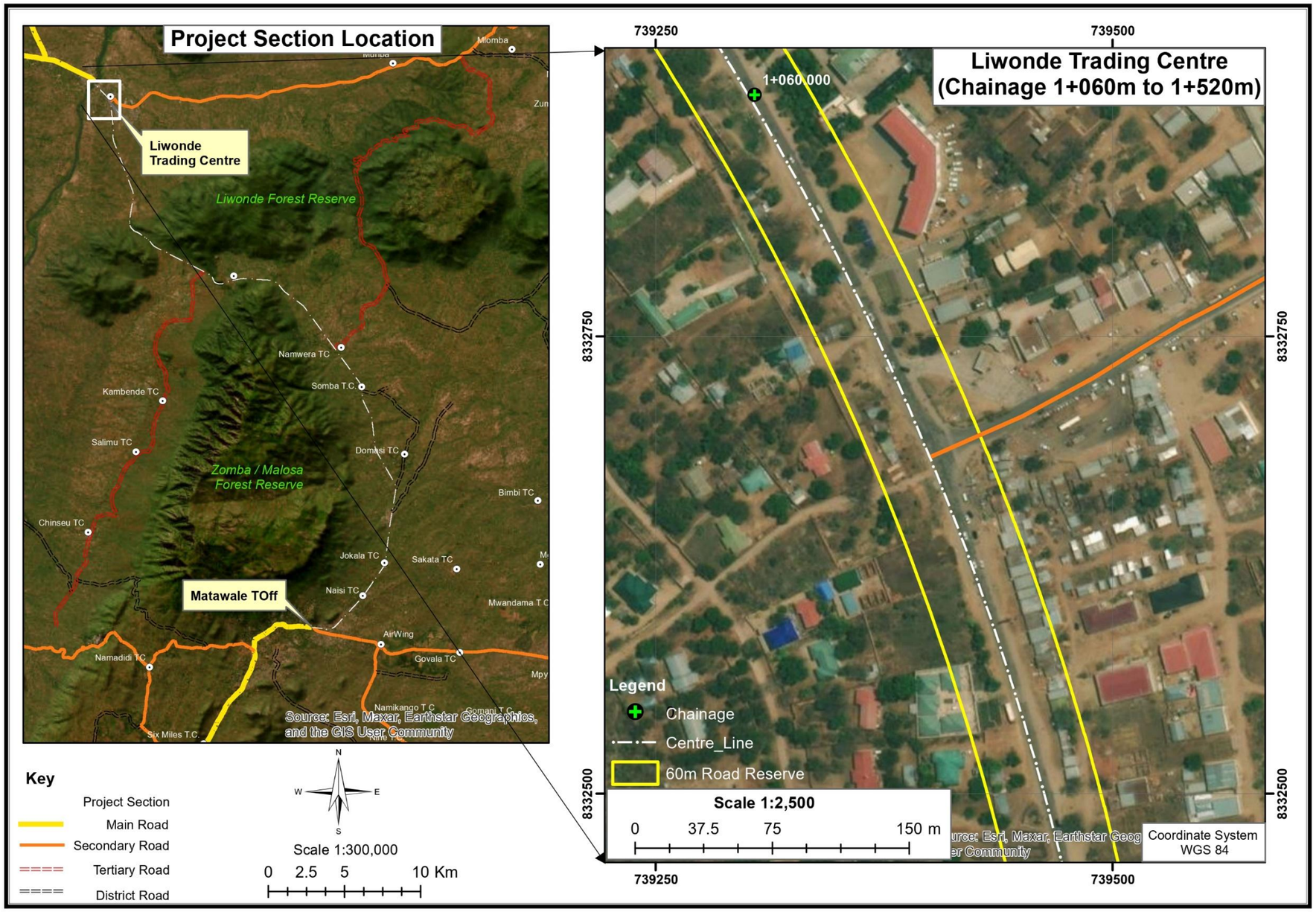
A dedicated budget line will be included in the project's Environmental and Social Management Plan (ESMP) to support implementation of the chance find procedure. This will cover costs associated with expert assessments, protective measures (e.g., fencing), documentation, stakeholder engagement, and cultural or ceremonial activities where required for the proper treatment of sacred or religious sites.

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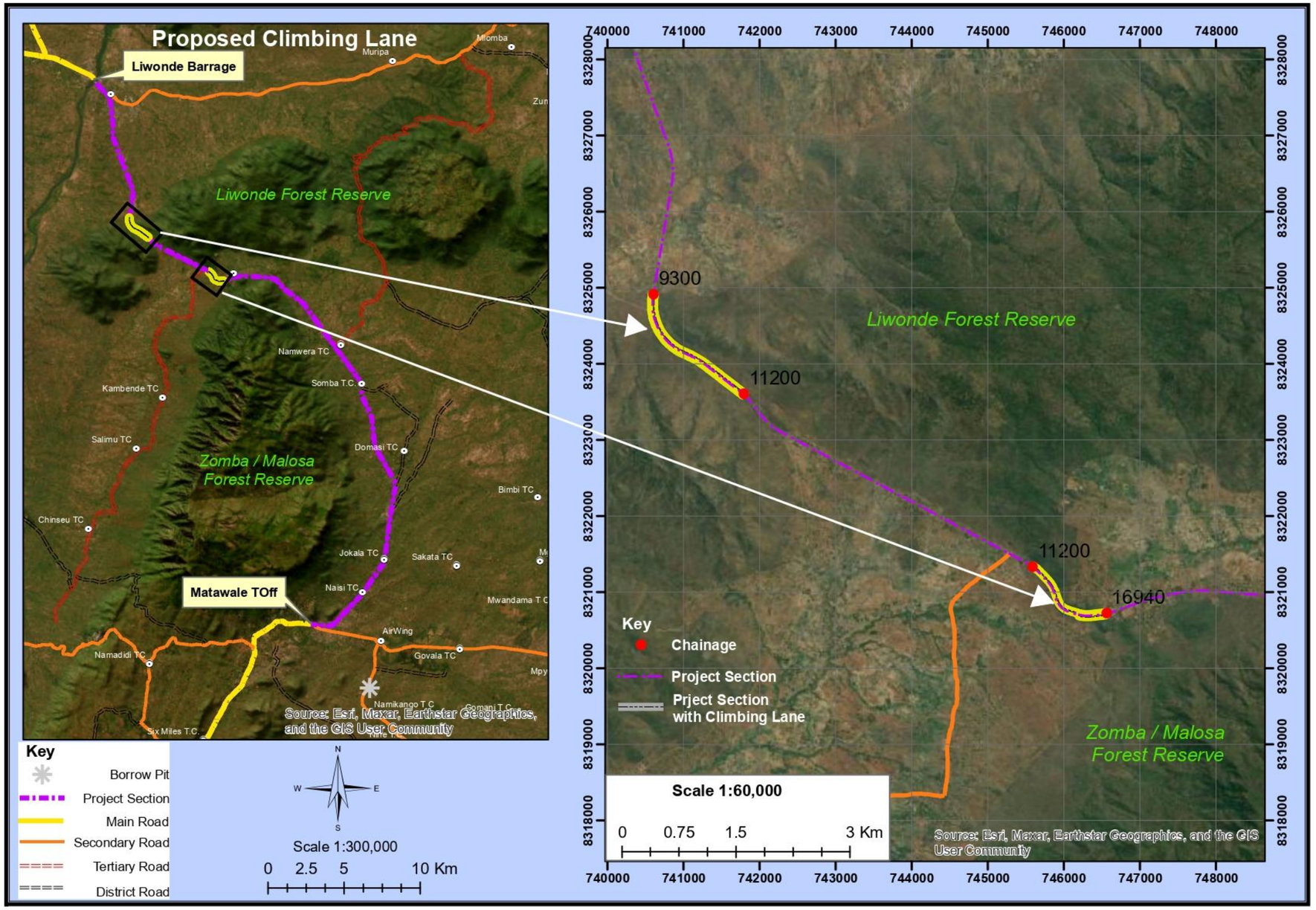
Annex 26: Detailed maps of the Area



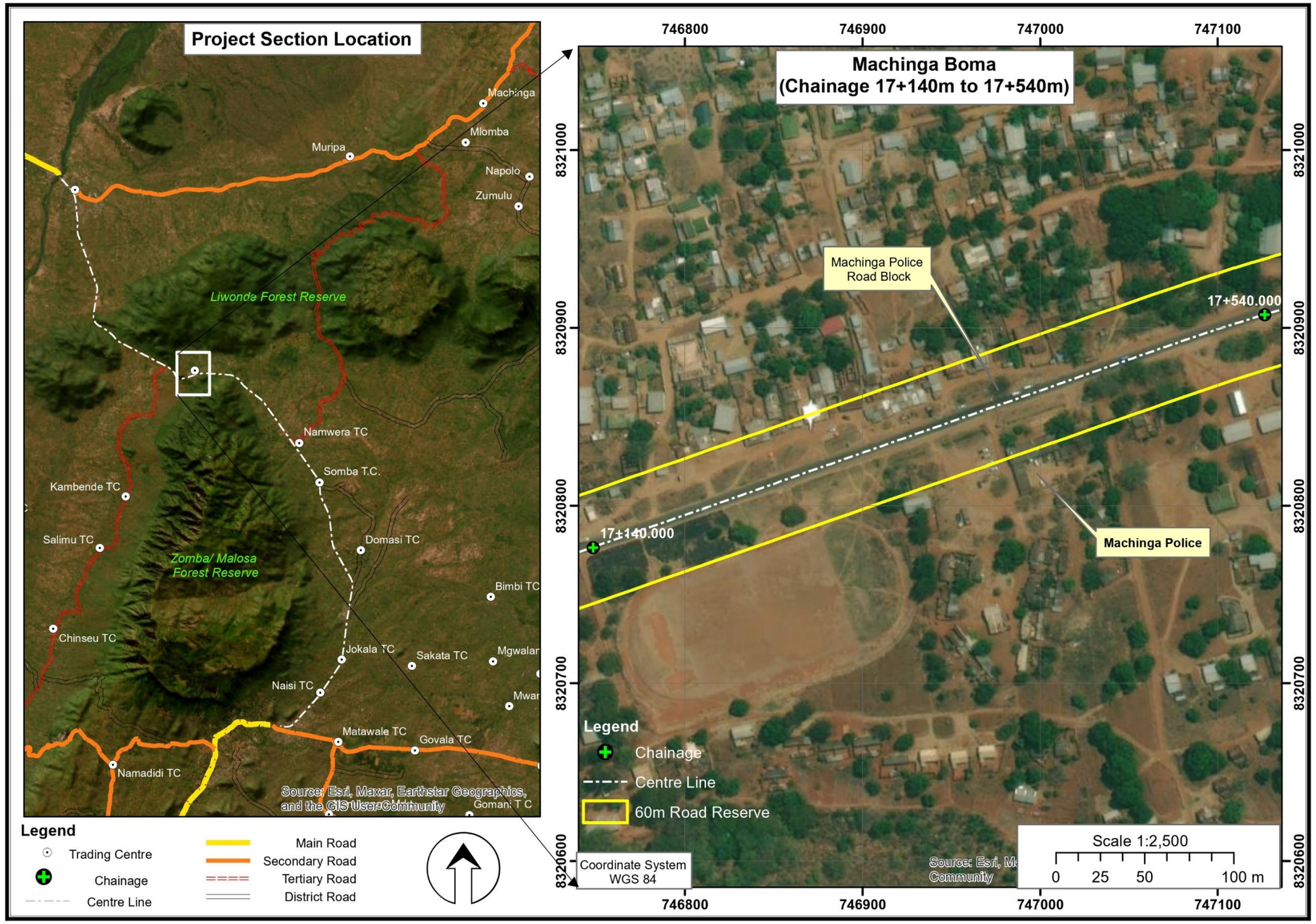
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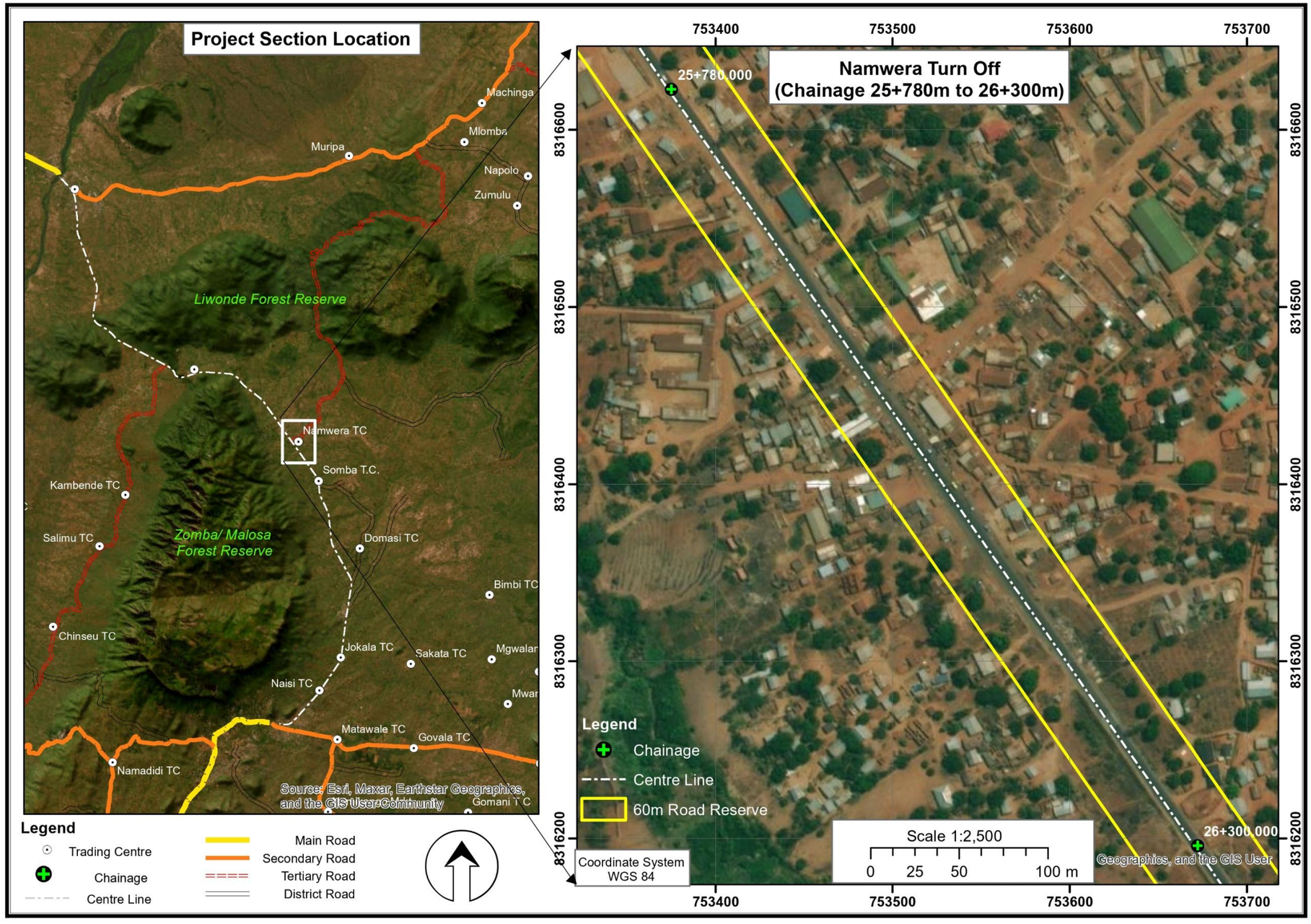
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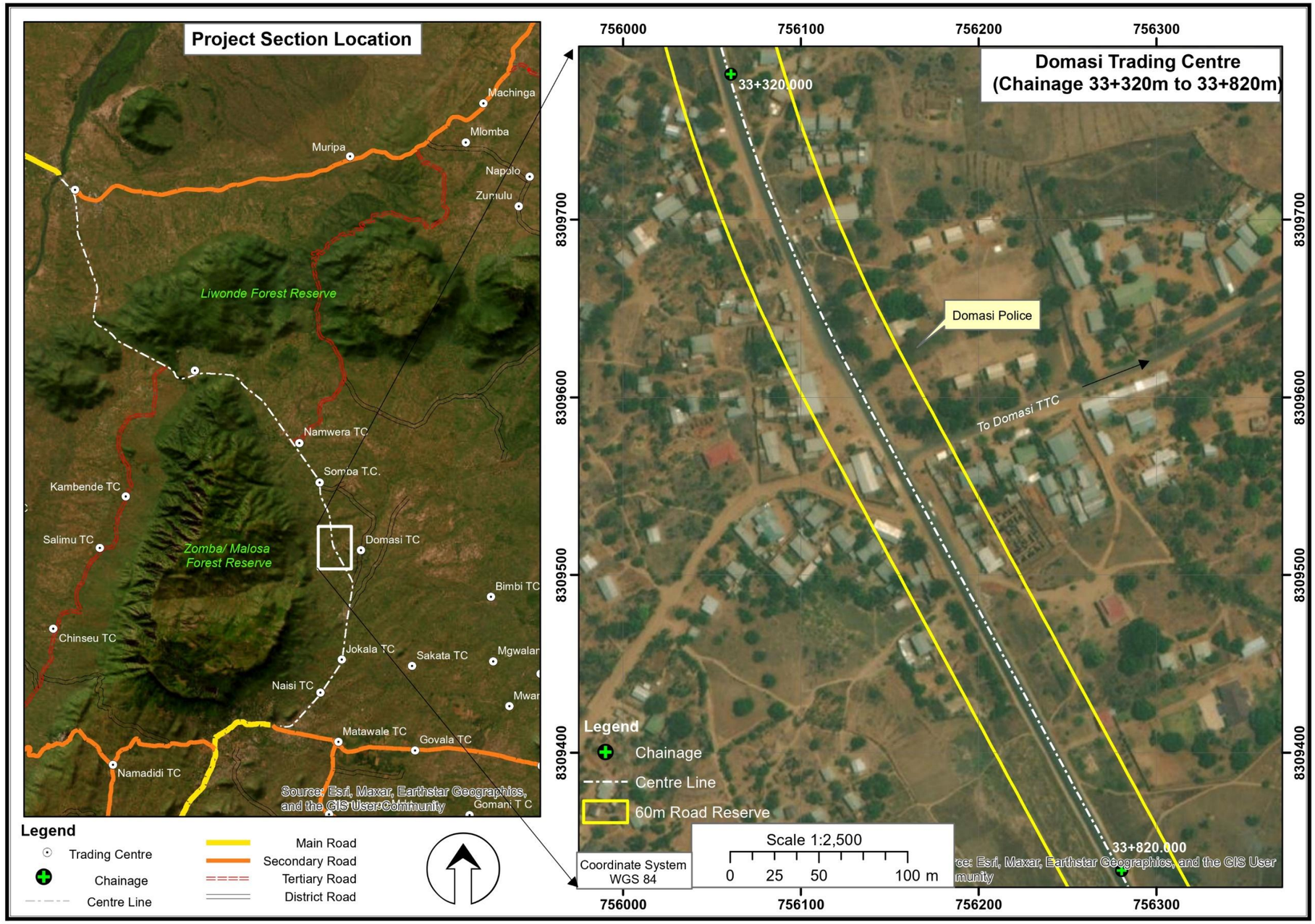
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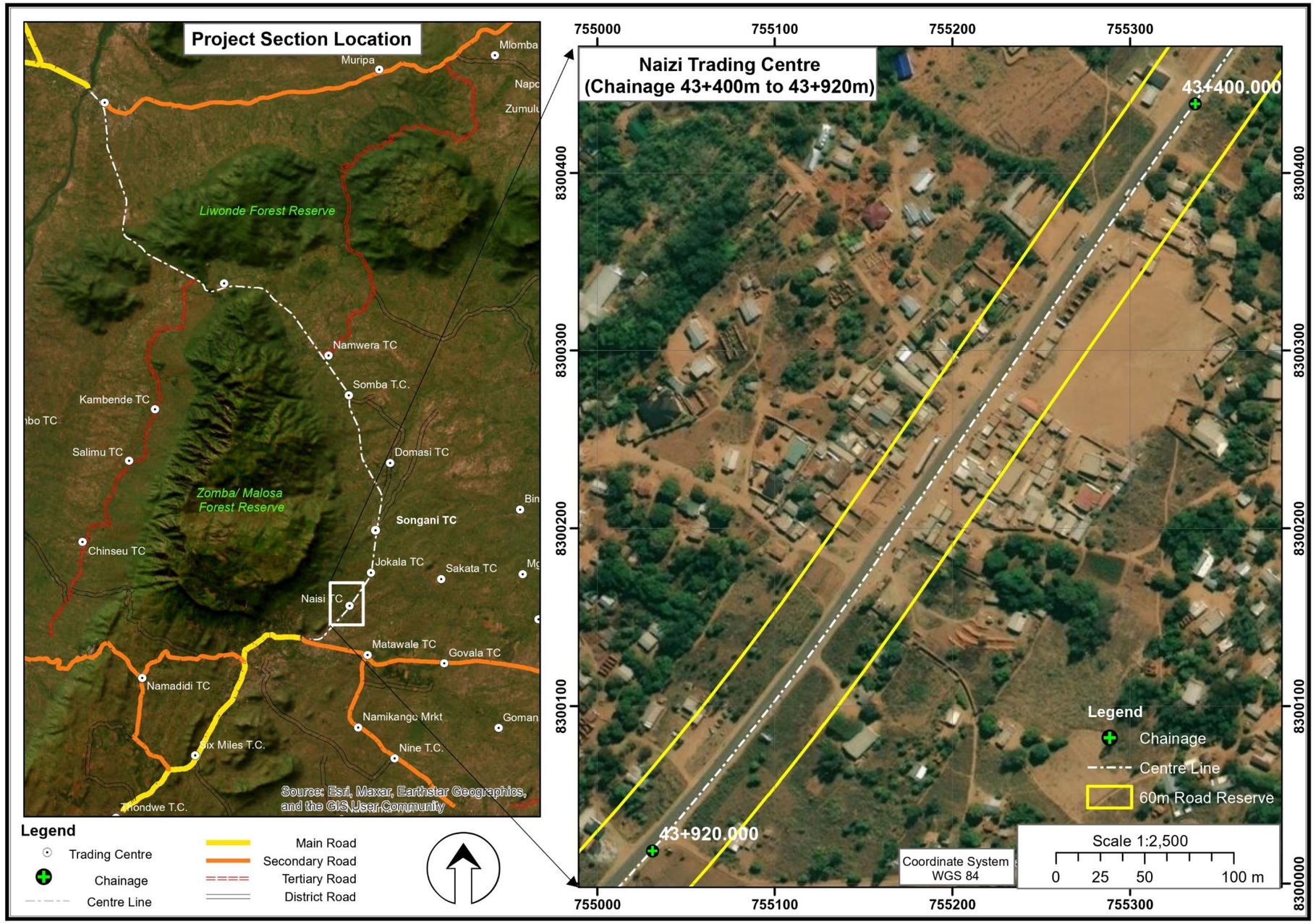
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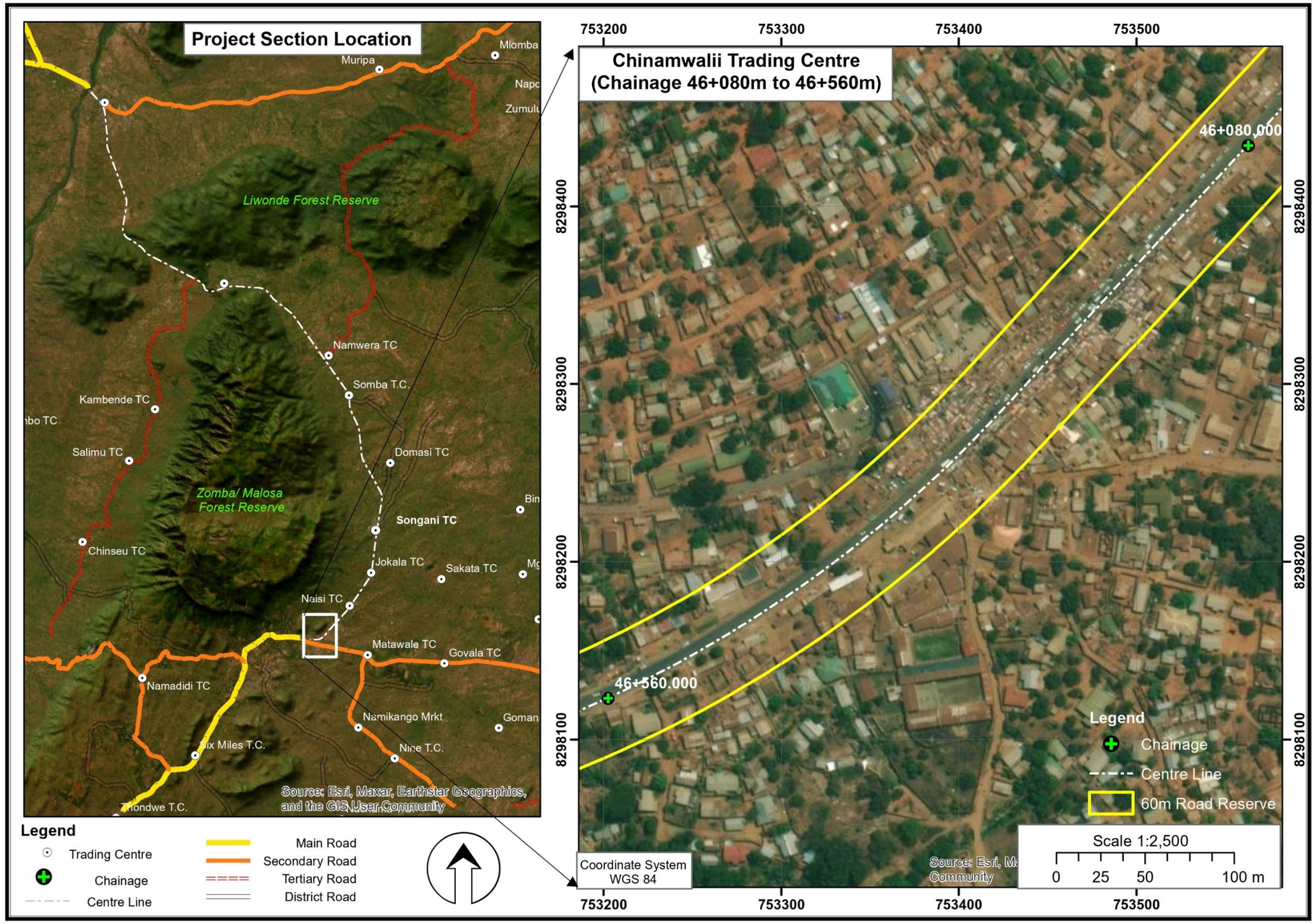
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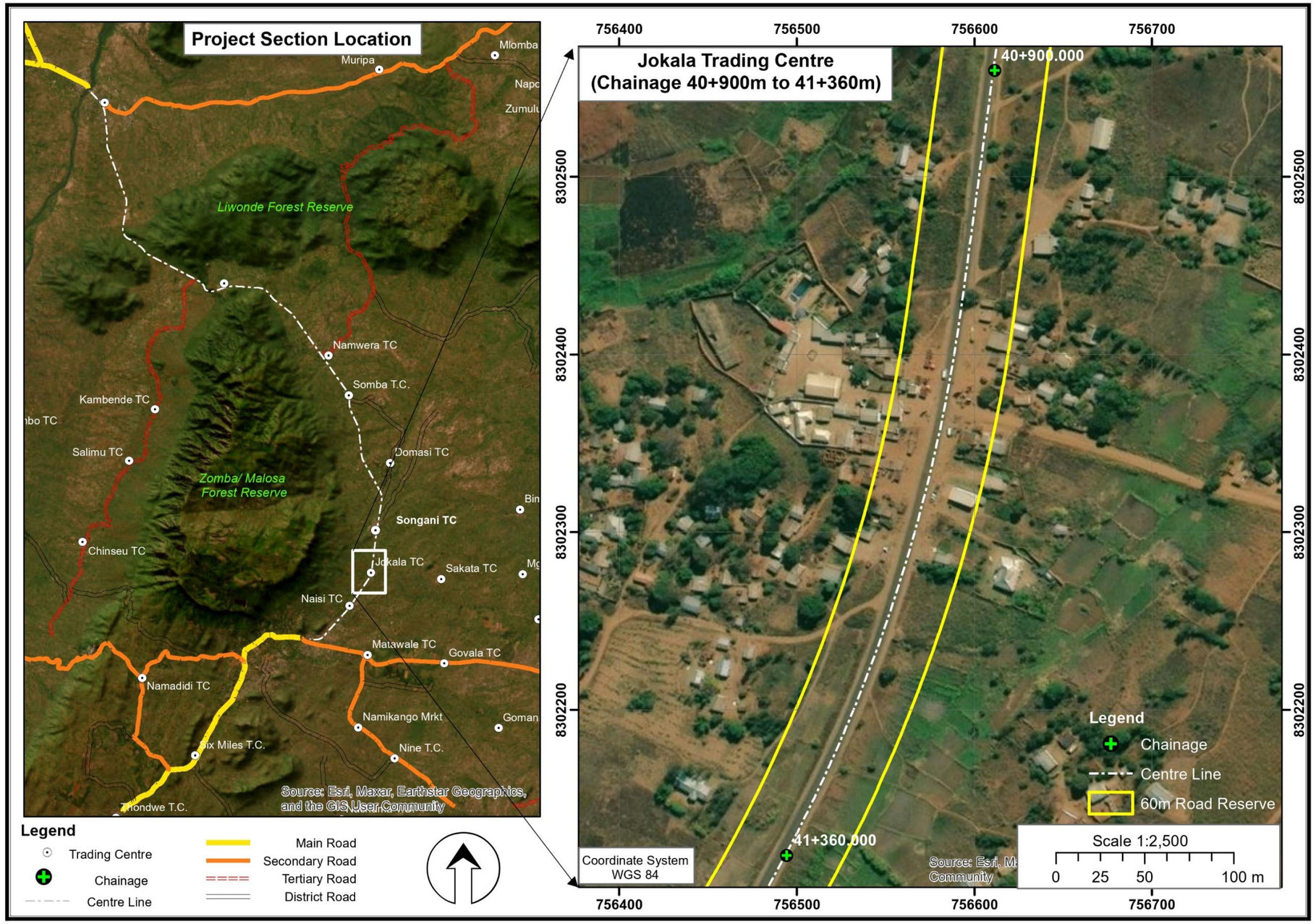
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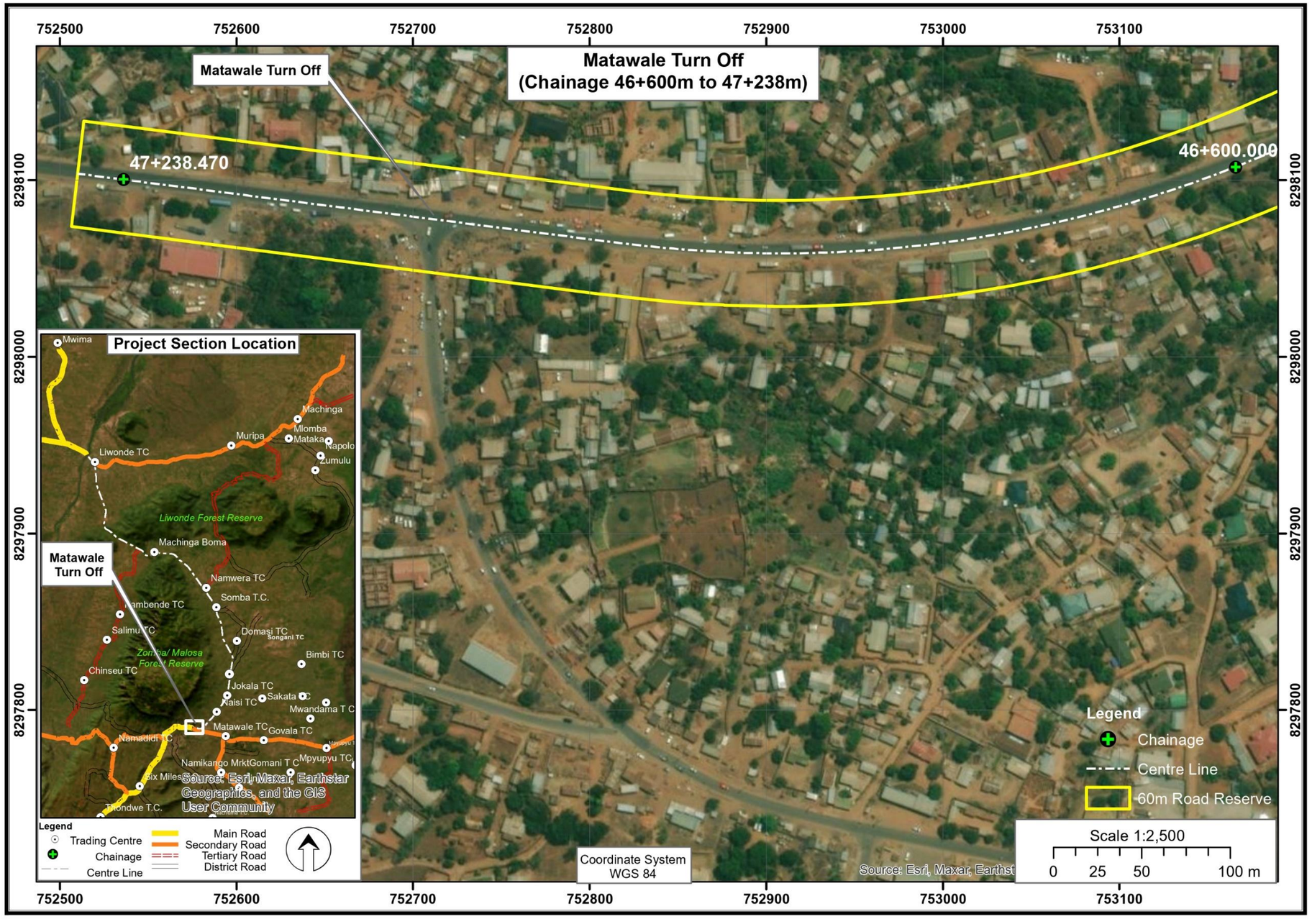
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Annex 27: Letter from the Department of Forestry regarding forest reserve

Telephone: 01 773 462
01 771 068
01 771 084
01 771 178/132
01 770 585
Fax: 01 774 268

DEPARTMENT OF FORESTRY
P.O. BOX 30048
LILONGWE 3
MALAWI

Ref. No. 14/9/0

23rd April, 2025

The Chief Executive Officer
National Roads Authority
Off Paul Kagame Road
Function Building
Private Bag B346
Lilongwe

Dear Sir,

REHABILITATION OF LIWONDE MATAWALE ROAD: NOTIFICATION OF INTENTION TO WIDEN THE ROAD WITHIN THE LIWONDE FOREST RESERVE

The Department of Forestry acknowledges receipt of your letter of 1st April, 2025 on the above subject matter.

Our office is giving permission for the rehabilitation works through Liwonde Forest Reserve. However, before commencement, the Department of Forestry has to do an assessment of tree volume and species that will be felled down in order to determine the cost which will be billed to your office for payment. The disposal of such wood lies with the Director of Forestry.

In addition, our office and yours will have to identify an area and enter into an agreement to do reforestation or afforestation activities to offset the removal of trees.

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The Department of Forestry looks forward to continuous collaboration with your office during the rehabilitation process so that any emerging issues are resolved within the shortest time possible.

Yours Sincerely,

P.E. Masupayi
For: **DIRECTOR OF FORESTRY**

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GOVERNMENT OF MALAWI

MINISTRY OF NATURAL RESOURCES AND CLIMATE CHANGE

ROAD SIDE TREE ASSESSMENT REPORT FOR LIWONDE-MATAWALE TURN-OFF ROAD CONSTRUCTION WORKS



BY

DEPARTMENT OF FORESTRY

MAY 2025

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1.0 INTRODUCTION

1.1 Background

The Malawi Government plans to carry out road maintenance from Liwonde in Machinga to Matawale Turnoff in Zomba. The road design includes a climbing lanes through Liwonde Forest Reserve. These lanes will facilitate the smooth flow of traffic by allowing heavy trucks to move separately from smaller vehicles, thereby enhancing road safety and efficiency.

The construction will involve a road extension of 20 meters on both sides from the centerline, thereby affecting road side trees of the Liwonde Forest Reserve. The section A starts near Machinga Teachers Training College and extends approximately 2.0 kilometers. The section B begins at Chingale turn-off and extends about 1.3 kilometers.

Given the potential environmental impact, the Roads Authority (RA) has prepared an Environmental Impact Assessment (EIA) report which evaluates the potential impact of the road construction on the forest reserve. The road side tree assessment exercise started on 27th April, 2025 with a briefing meeting which took place at Machinga District Forestry Office and then the site visit on the same day. The actual tree assessment exercise was conducted from 29th April, 2025. This assessment focused specifically on the sections of the road that pass through the gazetted forest reserve.

The assessment has been done following the provisions of the Forestry Act (Chapter 63:01) which requires that any activities carried out within the forest reserve, protected forest areas require a license. Specifically, Section 46 of the act stipulates that, unless under a license, no person shall;

- *Cut, take, fell, destroy, uproot, collect, or remove forest produce from a forest reserve, customary land, public land, or protected forest area.*

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2.0 Methodology

2.1 Vegetation Sampling

Vegetative sampling was conducted separately in each forest reserve section using systematically positioned 10m x 10m ($100m^2$) sample plots. Coordinates for each plot were also recorded using handheld Garmin GPS. The plots were demarcated along forested area using measuring tape.

Vegetative sampling started with the section B. At northern-side of road, four sample plots were established at 400-meter intervals along the 1.3 kilometer forested strip. Apart from that, two more sample plots positioned in the southern part of the road were established at 200-meter interval along the 0.2km forested strip.

The exercise proceeded with vegetative sampling at section A where a total of eight 10m x 10m sample plots were systematically established at 500-meter intervals on both sides of the road along 2.0 kilometer forested strips.

Within each sample plot, every tree with diameter at breast height (DBH) of equal to or greater than 5 centimeters was recorded. For each tree, the following parameters were recorded: species name, diameter at breast height (DBH) in centimeters and total tree height in meters. Additionally, other small trees were also included as these will be cleared by the project.

3.0 Findings

The collected sample data were then extrapolated to estimate the total number and volume of trees that will be removed from the entire affected area as indicated in the tables 1,2 and 3 below. Generated information provides a basis for environmental planning and mitigation.

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Table 1: Field data

Parameter	Value
Total Sampled Plots	14
Plot size	10mx10 m (100m^2)
Total Forested Area to be Affected	6.2 ha
Average Tree Density (stems/ha)	843
Dominant Tree Species	*Brachystegia* spp.
Estimated Number of Trees to be Removed	5,226
Estimated Volume of Trees to be Removed	1,080 m^3
Small trees with diameters at breast height (DBH) of less than 5 centimeters	e.g. 2,000 per ha
Average Tree Density (stems/ha)	e.g 12,400

Table 2: Volume tabulation

Using kachamba model		**V = a*(dbh2*ht)b**			
Coefficients		Vol/plot (10x10)m^2	Vol/ha	Total area	**Total vol. (m^3)**
a	0.000218	1.74	174.3	6.2	**1080**
b	0.896561				

Table 3: Valuation (optional)

Species	Total Vol. (M^3)	Price per M^3	Total Amount (MKW)
Branchystegia	1080.4	15,000	**16,206,566**

4.0 Stakeholders Involved

The key stakeholders who participated in the assessment:

- Senior Deputy Directors and technical staff from Department of Forestry

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- Technical Officers from Roads Authority.
- Technical Officer from Eastern Zone Forestry Office.
- Technical staff from Machinga District Forestry Office.
- An independent GIS Consultant.

The Stakeholders agreed to:

- Conduct community engagement meetings following the assessment to share the findings and discuss mitigation measures.
- Identify and secure suitable land parcels for tree planting to offset losses within the forest reserve.
- The disposal and utilization of the felled trees will be the responsibility of Department of Forestry.
- Since the assessed trees are within the road reserve, the NRA doesn't have to pay for the damages.

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Conclusion and recommendations

The Department of Forestry supported the assessment of the sections of the forest reserve to be affected by the road rehabilitation project. However, it is important that the Roads Authority carries out the forestry restoration activities in collaboration with the Department of Forestry. Restoration activities will be informed by the tree assessment data and species composition recorded during the environmental assessment (of which detailed species assessment is required to be carried out by the Botanist). The Department of Forestry, in partnership with the Roads Authority and the Block Committees, will jointly identify and manage restoration sites within the communities whereby the Village Forest Areas will be identified mainly those degraded areas adjacent to the impacted zones of the forest reserve. These efforts will include replanting indigenous species, particularly *Brachystegia spp and other species specified in the detailed biodiversity assessment*.

It is recommended that an independent service provider with expertise in forest ecology and native species restoration be engaged to lead the reforestation and ecosystem rehabilitation activities. The service provider must be familiar with Miombo woodland species and restoration protocols, as reflected in the vegetative survey findings, which identified *Brachystegia spp.* as the dominant species. The service provider will work closely with local forestry blocks and community stakeholders to build local capacity, ensure compliance with restoration guidelines, and monitor post-restoration success over time. This coordinated approach will not only mitigate the environmental impact of the road construction but also strengthen community co-management of forest resources and enhance the long-term sustainability of the Liwonde Forest Reserve.

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Additionally, the Roads Authority will need to apply for the license to carry out construction works within the forest reserve. The license will be reviewed and considered by the Director of Forestry, of which will have conditions to be fulfilled by the Roads Authority.

Titus Zulu
DoF
17/07/25

5.0 APPENDICES

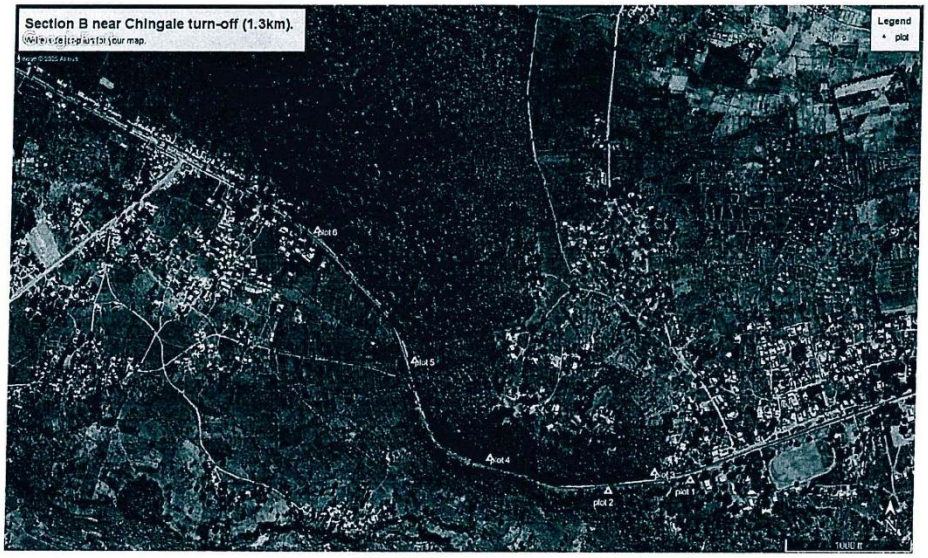
Appendix 1. Section A near Machinga Teachers Training College (2km)

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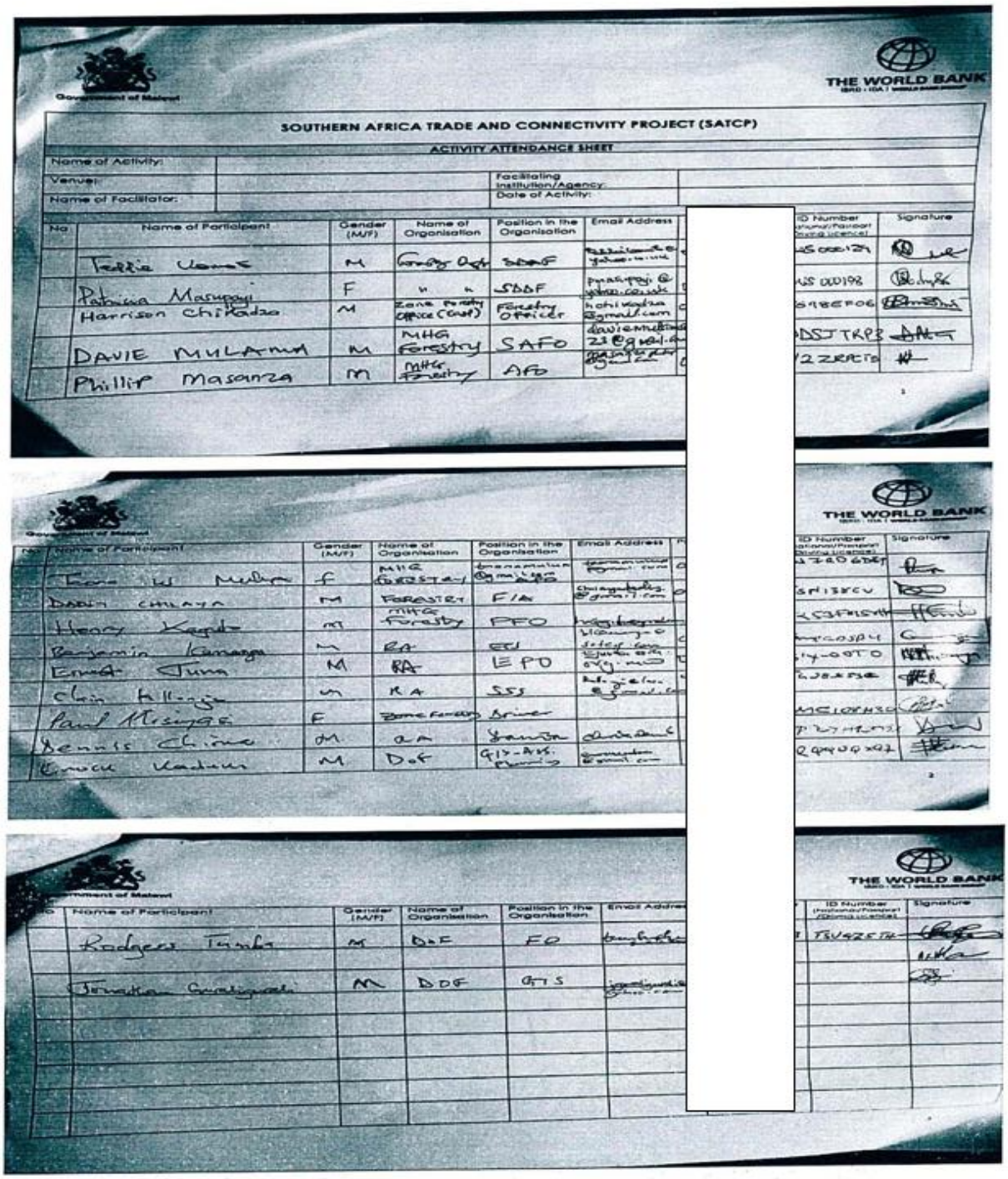
Appendix 2. Section B near Chingale Turn Off (1.3km).

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Appendix 3. Attendance register

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SOUTHERN AFRICA TRADE AND CONNECTIVITY PROJECT (SATCP)

ACTIVITY ATTENDANCE SHEET

Name of Activity:
Venue:
Name of Facilitator:
Facilitating Institution/Agency:
Date of Activity:

No	Name of Participant	Gender (M/F)	Name of Organisation	Position in the Organisation	Email Address	ID Number	Signature
	Tessia Usman	M	Forestry Dept	DDOF			
	Patricia Masupayi	F	" "	SDOF			
	Harrison Chirwa	M	Zone Forestry Office (Coast)	Forestry Officer			
	DAVIE MULAMBA	M	MHG Forestry	SAFO			
	Phillip Masamba	M	MHG Forestry	AFO			

No	Name of Participant	Gender (M/F)	Name of Organisation	Position in the Organisation	Email Address	ID Number	Signature
	Esau W Mulwa	M	MHG Forestry				
	Dabin Chilanga	M	Forestry	FIA			
	Henry Kapute	M	MHG Forestry	PFO			
	Benjamin Kamanga	M	RA	EDI			
	Emma Juma	M	RA	EPO			
	Chin Hillogie	M	RA	SSS			
	Paul Misupas	F	Zone Forestry	Driver			
	Dennis Chima	M	DA	Tourism			
	Enock Kadawa	M	DoF	GIS-AM			

No	Name of Participant	Gender (M/F)	Name of Organisation	Position in the Organisation	Email Address	ID Number	Signature
	Rodgers Tembo	M	DoF	FO			
	Jonathan Gwadigwadi	M	DDF	GIS			

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