GOVERNMENT OF THE REPUBLIC OF MALAWI

Republic of Malawi

Roads Authority

REGIONAL CLIMATE RESILIENCE PROGRAM FOR EASTERN AND SOUTHERN AFRICA 2

(P181308)

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) REPORT FOR CONSTRUCTION AND REHABILITATION OF SELECTED BRIDGES ALONG CHINGO–MAKANJIRA ROAD, MANGOCHI DISTRICT

August 2025

Executive Summary

This is an Environmental and Social Impact Assessment report for the construction and rehabilitation of twelve (12) selected Bridges along Chingo-Makanjira Road in Mangochi District. This section provides a summary of the report's key information, organised under subsequent subheadings.

1.0 Background Information

The Government of Malawi, through the Roads Authority (RA), is implementing the Regional Climate Resilience Programme for Eastern and Southern Africa – Phase 2 (RCRP-2) with financial support from the International Development Association (IDA) of the World Bank. As part of this initiative, the RA is undertaking critical infrastructure recovery works to rehabilitate and reconstruct transport assets damaged by Tropical Cyclone Freddy in 2023. One such intervention is constructing and rehabilitating 12 climate-resilient bridges along the Chingo-Makanjira Road in Mangochi District. The Chingo-Makanjira Road is a vital mobility corridor in the eastern part of Mangochi District, where it connects to the M003 road, to Makanjira Trading Centre. The devastating impacts of Cyclone Freddy, particularly flooding, washouts, and scouring, rendered many bridge structures impassable, severely disrupting access to markets, schools, and healthcare. The estimated construction and rehabilitation costs are ….. million. Approximately 300 workers will be engaged during the construction phase, and the project will target the recruitment of at least 40% women in the workforce. Local hiring will be prioritised, emphasising creating employment opportunities for residents within the impacted Traditional Authorities (TAs) of Namavi, Makanjira and Chowe.

2.0 Nature and Scope of the Proposed Project

The proposed intervention focuses on constructing and rehabilitating the selected 12 bridges along the Chingo-Makanjira Road in Mangochi District. The project spans approximately 93.4 kilometres and targets critical crossing points extensively damaged by Cyclone Freddy. These structures, positioned along rivers and drainage lines, are vital for re-establishing community connectivity and resilience against recurrent flood impacts. Each bridge structure varies in size, ranging from 25 to 70 metres in length, and will be constructed with reinforced concrete. The design of each bridge accommodates a carriageway width of 6.2 metres, with 1.5-metre-wide shoulders on both sides to enhance safety and allow for the passage of pedestrians and cyclists. Similarly, approach roads of 200 metres on either side of each bridge will be developed or upgraded to match these cross-sectional dimensions, improving continuity and traffic safety. The works will involve removing failed Bailey bridges and debris, construction of new piers, abutments, and decks, approach roads, protection works, and associated drainage infrastructure.

3.0 Objective of the project

The primary objective of the proposed project is to reconstruct and upgrade the selected 12 critical bridges to climate-resilient standards. These bridges are essential for ensuring uninterrupted connectivity across Traditional Authorities Namavi, Makanjira and Chowe.

particularly during the rainy season when flooding events frequently isolate communities. This project aims to restore access to economic, educational, and healthcare services that are central to local livelihoods. The project also seeks to promote equitable access to services and economic benefits, with particular attention to vulnerable groups, including women, children, and persons with disabilities. This is being achieved through universal design standards, stakeholder inclusion, and safeguards compliance under the World Bank ESF. In turn, this supports national resilience-building efforts and local economic revitalisation through improved infrastructure.

4.0 Rationale for the Proposed Project

The selected 12 bridges represent critical infrastructure that supports the livelihoods and well-being of communities residing within the Traditional Authorities of Namavi, Makanjira and Chowe in Mangochi District. These communities heavily depend on the Chingo-Makanjira Road for accessing healthcare facilities, educational centres, markets, and fishing zones along Lake Malawi. The impact of Cyclone Freddy severely compromised the mobility and resilience of the road network, with numerous bridge washouts cutting off vital connections. The rehabilitation and reconstruction of these bridges under RCRP-2 is aligned with the Government of Malawi's broader strategy to 'build back better' by investing in climate-resilient infrastructure. By re-establishing safe and all-weather access to key trading centres, the project will unlock new economic opportunities and foster greater integration within the district.

5.0 Objectives of the ESIA

This ESIA has been undertaken to achieve the following objectives:

i. Determine whether the proposed bridge rehabilitation works are environmentally and socially appropriate;
ii. Identify and analyse the likely environmental and social risks and impacts of the project, with a focus on site-specific conditions;
iii. Recommend appropriate mitigation and enhancement measures to manage potential negative and positive impacts;
iv. Develop an Environmental and Social Management Plan (ESMP);
v. Provide a structured basis for stakeholder consultation, decision-making, and accountability.

6.0 Justification for the ESIA

The need for this ESIA is grounded in both the Environment Management Act (2017) and the World Bank ESF. The project falls under the prescribed activities under the EMA and is listed in Appendix B (List A: Projects for which EIA is Mandatory) of the Guidelines for Environmental Impact Assessment (1997), specifically Section A13 (subsection A13.4), which mandates an EIA for projects in proximity to or which have the potential to affect water bodies. Furthermore, under the World Bank ESF, the project is classified as High Risk. This classification requires a comprehensive ESIA to ensure that all potential risks and impacts, particularly those related to working in flood-prone riverine environments, are thoroughly assessed. This includes issues such as the disposal of bridge debris, potential impacts on sourcing from borrow pits, and risks associated with construction near sensitive habitats.

7.0 ESIA Study Methodology

This ESIA was undertaken in alignment with the EMA (2017), the Guidelines for Environmental Impact Assessment (1997) for Malawi, and the World Bank ESF. The methodology combined desk-based reviews and rigorous fieldwork to ensure a comprehensive assessment of the potential environmental and social impacts associated with rehabilitating and constructing the selected bridges a. The study team drew upon data from the detailed engineering design reports, topographic surveys, and hydrological and flood risk modelling reports already completed by the project. These technical inputs were complemented by site-specific assessments carried out between March and April 2025. Key national instruments and guidelines were reviewed and referenced, including the EIA Guidelines for Malawi and applicable policies and laws. A multidisciplinary team of specialists was mobilised, including experts in environmental assessment, social safeguards and gender inclusion, biodiversity and aquatic ecology, and occupational and community health. Site investigations were carried out to establish baseline conditions, identify potential environmental and social risks, and propose suitable mitigation and enhancement measures.

8.0 Anticipated Project Impacts

8.1 Anticipated Positive Impacts and Enhancement Measures

8.1.1 Enhanced Connectivity to Urban Areas

i. Implement a routine bridge and approach road maintenance program, with drainage inspections and prompt repairs.
ii. Install road signage, guardrails, and pedestrian shoulders for safety at all bridge sites.
iii. Promote road safety awareness through community-based campaigns.
iv. Maintain all-weather access to bridge approaches and connecting roads through routine grading, drainage maintenance, and prompt repair of damaged sections to facilitate uninterrupted public transport services.

8.1.2 Improved Access to Social Services

i. Coordinate with District Health and Education Offices to assess anticipated service demand and implement staffing, supply, and outreach adjustments in affected communities within three (3) months of restored access.
ii. Improve road signage and pedestrian safety infrastructure (e.g. footbridges, crossings) near schools and health centres.
iii. Facilitate mobile health outreach programs through improved access to remote communities.
iv. Include disability-friendly design elements such as ramps at crossing points and adequate pedestrian space near trading centres and schools.

8.1.3 Increased Disaster Resilience and Climate Adaptation

i. Conduct quarterly maintenance of drainage systems, including desilting, culvert cleaning, and vegetation clearance, with mandatory inspections and remedial works

completed at least one month before the onset of the rainy season.

ii. Promote community awareness on flood-resilient infrastructure, and involve communities in monitoring and reporting drainage blockages.

iii. Integrate climate risk indicators into the road authority's asset management and maintenance tracking system.

iv. Establish early warning signage and flood markers at bridges with high historical flood levels (e.g., Unga, Lungwena) for improved public safety.

8.2 Anticipated Negative Impacts and their Associated Mitigation Measures

8.2.1 Physical and Economic Displacement

i. Implement all compensation and relocation support prior to commencement of construction, in strict compliance with the RAP and World Bank ESS5.

ii. Provide direct cash or in-kind compensation to PAPs for structures, trees, and crops, in line with the entitlements matrix defined in the RAP, ensuring transparency, fairness, and timely delivery in accordance with the preferences of PAPs.

iii. Complete all agreed compensation payments, including shifting and disturbance allowances, before initiating physical relocation, with verification by the RAP Implementation Committee.

8.2.2 Discriminatory Working Conditions

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

ii. Make deliberate efforts to employ women by conducting a comprehensive skills analysis of female candidates before recruitment begins.

iii. Advertise all job vacancies in both male- and female-targeted channels, shortlist qualified female candidates for at least 40% of non-domestic roles, and include gender pay equity clauses in all employment contracts.

iv. Implement and rigorously monitor a Workers Grievance Redress Mechanism (WGRM) with clear and accessible channels for reporting and investigating incidents of workplace harassment, ensuring that complaints are handled promptly and fairly.

8.2.3 Exposure of Workers to Occupational Health and Safety Hazards

i. Develop and implement a Health and Safety Management Plan (HSMP) covering hazard identification, emergency preparedness, safe equipment use, and risk communication.

ii. Provide task-specific training and induction to all workers, including toolbox talks, hazard awareness, and rights under Malawi's OHS law and ESS2.

iii. Supply certified PPE (helmets, gloves, harnesses, reflective vests) free of charge and enforce its use through supervision and spot checks.

iv. Install and inspect certified scaffolding and fall protection systems at all bridge sites before commencement of deck construction, and conduct weekly safety audits to verify structural integrity and usage compliance.

v. Include OHS measures in all subcontractor contracts and carry out regular site audits.

8.2.4 Exposure of Nearby Communities to Construction-Related Hazards

i. Establish traffic management plans, including speed control, bypass roads, and reflective signs.
ii. Appoint a Community Liaison Officer to coordinate emergency responses and address public complaints.
iii. Provide safe pedestrian crossings and dedicated footpaths where construction interfaces with populated areas.
iv. Immediately restore or fence off all open pits, borrow areas, or culverts once inactive or completed.
v. Implement progressive rehabilitation of borrow sites during construction, restoring each site within two weeks of material extraction completion to minimise the risk of leaving open pits at project closure.

8.2.5 Loss of Trees for Economic Livelihood and Biomass for Energy

i. Conduct pre-construction tree tagging and valuation at each site, guided by the RAP inventory, distinguishing indigenous, exotic, and fruit trees. RAP will include a livelihood restoration program to address loss of income.
ii. Engage community members in nursery establishment, planting, and maintenance, promoting ownership and income diversification.
iii. Prohibit sourcing firewood and charcoal from unlicensed vendors within the contractor's camp; require formal procurement of cooking fuel for worker camps.
iv. Survival audits, with replanting obligations of a ratio of 1:5 in place if survival rates fall below 80% within the first year.

8.2.6 Disruption of River Hydrology and Floodplain Function

i. Design and implement stormwater diversion and control structures to manage flow during active construction, especially at sites with high Q100 values, while always maintaining minimum environmental flow thresholds.
ii. Use precast bridge components and modular installation techniques to minimise in-stream works during peak rainfall periods and reduce duration of e-flow disruption.
iii. Apply erosion control measures immediately after land clearing.
iv. Restore and stabilise disturbed banks with bioengineering techniques (vetiver grass, native shrubs) post-construction.
v. Maintain buffer zones around known floodplains and high-flow areas, as identified in the Hydrology Report, and restrict heavy machinery operations during peak flow days.

8.2.7 Gender-Based Violence and Sexual Exploitation and Abuse (GBV/SEA)

i. Implement a robust Code of Conduct (CoC) for all workers and supervisors, clearly outlining unacceptable behaviour and consequences.
ii. Include GBV/SEA/SH clauses in contractor agreements, requiring proactive training and enforcement.
iii. Conduct mandatory, ongoing GBV/SEA/SH awareness training for all staff and service providers.

iv. Establish a confidential, survivor-centred GRM, with referral pathways to District Social Welfare and local support services.
v. Locate campsites away from sensitive community areas and ensure proper lighting, surveillance, and access control.
vi. Engage a qualified GBV Service Provider within three months of project start to train workers, establish referral pathways, and monitor GBV risk mitigation measures throughout implementation.

9.0 Conclusion and Recommendation

The rehabilitation of 12 selected bridges along the Chingo-Makanjira Road project has undergone a thorough ESIA in alignment with the Environment Management Act (2017), and World Bank Environment. The assessment has identified both significant positive outcomes and potential risks associated with the project. In conclusion, this proposed project is deemed environmentally and socially viable, with significant benefits outweighing the risks when managed effectively. It is recommended that the project be approved, contingent upon the successful implementation of the ESMPs, continuous stakeholder engagement, and strict adherence to national legislation and international standards. The estimated cost of implementing the ESMP is ……, with relevant technical and design measures integrated into the project design and corresponding provisions included in the Bills of Quantities (BoQs). The responsible parties, including the Roads Authority, supervising consultant, contractors, and relevant government agencies, must ensure that all mitigation measures are executed diligently to safeguard environmental and social well-being throughout the project lifecycle. To enhance the overall sustainability of the proposed development, the developer must:

- Implement all mitigation measures outlined in the ESMP.
- Implement the project's RAP and ensure fair compensation and adequate resettlement for all affected persons before construction begins.
- Implement and monitor environmental protection plans, including the Waste Management Plan, ensuring regular dust control and proper handling of hazardous waste. Regularly monitor water quality to prevent contamination from construction activities.
- Establish a robust monitoring and evaluation framework to track the implementation of the ESMP and other mitigation measures.
- Adopt an adaptive management approach that reviews and updates the ESMP based on monitoring results and stakeholder feedback.

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List of Acronyms and Abbreviations

AfCAP	Africa Community Access Partnership
AoI	Area of Influence
CBO	Community-Based Organisation
DBH	Diameter at Breast Height
DESC	District Environment Sub-Committee
EMA	Environment Management Act
ESHS	Environmental, Social, Health, and Safety
ESF	Environmental and Social Framework (World Bank)
ESMF	Environmental and Social Management Framework
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESMMP	Environmental and Social Management and Monitoring Plan
ESS	Environmental and Social Standard (World Bank)
FGD	Focus Group Discussion
GBV	Gender-Based Violence
GIIP	Good International Industry Practice
GRM	Grievance Redress Mechanism
HSMP	Health and Safety Management Plan
IDA	International Development Association
IFC	International Finance Corporation
IUCN	International Union for Conservation of Nature
LMP	Labour Management Plan
MEPA	Malawi Environment Protection Authority
MoTPW	Ministry of Transport and Public Works
NGO	Non-Governmental Organisation
OHS	Occupational Health and Safety
PAP	Project-Affected Person
PIU	Project Implementation Unit
PPE	Personal Protective Equipment
RAP	Resettlement Action Plan
RCRP-2	Regional Climate Resilience Program for Eastern and Southern Africa – Phase 2
ROW	Right of Way
SEP	Stakeholder Engagement Plan
SH	Sexual Harassment
STD	Sexually Transmitted Disease
TA	Traditional Authority
TIP	Trafficking in Persons
USD	United States Dollar
VDC	Village Development Committee
WB	World Bank

Chapter One: Introduction and Background

This chapter introduces the Chingo–Makanjira Road Project, outlining its context, objectives, and justification. It provides a detailed description of the project's location, scope, and potential beneficiaries. The chapter also defines the purpose and rationale for the Environmental and Social Impact Assessment (ESIA), explains the methodology used for the study, and identifies key stakeholders.

1.1 Background Information

The Government of Malawi, through the Roads Authority (RA), is implementing the Regional Climate Resilience Programme for Eastern and Southern Africa – Phase 2 (RCRP-2) with financial support from the International Development Association (IDA) of the World Bank. As part of this initiative, the RA is undertaking critical infrastructure recovery works to rehabilitate and reconstruct transport assets damaged by Tropical Cyclone Freddy in 2023. One such intervention is constructing and rehabilitating 12 climate-resilient bridges along the Chingo-Makanjira Road in Mangochi District. The Chingo-Makanjira Road is a vital mobility corridor in the eastern part of Mangochi District, where it connects to the M003 road, to Makanjira Trading Centre. The devastating impacts of Cyclone Freddy, particularly flooding, washouts, and scouring, rendered many bridge structures impassable, severely disrupting access to markets, schools, and healthcare. The proposed project includes replacing damaged structures with reinforced concrete bridges, removing failed Bailey bridges and associated debris, constructing culverts, and improving road approaches and drainage systems using climate-resilient designs. The estimated construction and rehabilitation costs are ……..million, as captured in the Final Design Reports (Kandoli - AESL JV, 2024). Approximately 300 workers will be engaged during the construction phase, and the project will target recruitment of at least 40% women in the workforce. Local hiring will be prioritised, emphasising creating employment opportunities for residents within the impacted Traditional Authorities (TAs) of Namavi, Makanjira and Chowe. Beyond employment, the project will benefit an estimated 78,000 people by restoring year-round connectivity.

1.2 Project Proponent Details

The project name is "*Construction and Rehabilitation of 12 selected Bridges along Chingo-Makanjira (S129) Road, Mangochi District*". The contact details for the developer are as follows:

Proponent name:	Roads Authority
Postal Address:	Paul Kagame Road, Private Bag B346, Lilongwe 3, Malawi
Contact Person:	The Chief Executive Officer
Phone number:	+265 (0) 1 753 699
Email:	ra@ra.org.mw

1.3 Nature and Scope of the Project

The proposed intervention focuses on constructing and rehabilitating the selected 12 bridges along the Chingo-Makanjira Road in Mangochi District. The project spans approximately 93.4 kilometres and targets critical crossing points extensively damaged by Cyclone Freddy. These structures, positioned along rivers and drainage lines, are vital for re-establishing community connectivity and resilience against recurrent flood impacts. Each bridge structure varies in size, ranging from 25 to 70 metres in length, and will be constructed with reinforced concrete. The design of each bridge accommodates a width for approach carriageway should be 6.2m plus 1.5m shoulder on each side of the road as per design while that for the bridge 6.2m carriageway, 1.3m cyclist path and 1.2m walk way. Similarly, approach roads of 200 metres on either side of each bridge will be developed or upgraded to match these cross-sectional dimensions, improving continuity and traffic safety.

The works will involve removing failed Bailey bridges and debris in ten bridges, construction of new piers, abutments, and decks, approach roads, protection works, and associated drainage infrastructure. Designs incorporate climate resilience measures such as higher clearances, scour protection, and elevated piers to withstand high flood flows. The project footprint includes both the bridge locations and associated support infrastructure such as:

- Approach roads of up to 200 metres on either side of each bridge;
- Temporary construction camps, material storage areas, and equipment yards;
- Sourcing areas for construction materials, including borrow pits and quarry sites;
- Potential haulage routes connecting the bridges to main supply lines.

The project also interfaces with sensitive ecosystems, as some bridges span river systems with ecological and socio-economic value. Though the works are localised at distinct sites, the interventions' scale and simultaneous nature necessitate a cumulative impact perspective. The bridges will reconnect communities and serve as strategic evacuation and relief corridors during climate-related disasters. For two of the bridge sites (Mbwazi and Lilembwe bridges), temporary diversions outside the existing road reserve will be required to facilitate construction, and these will be planned and managed to minimise environmental and social impacts. Therefore, their construction under RCRP-2 is viewed as both a restorative and preventive climate resilience measure. Given the project's high-risk classification, the scope also extends to ensuring the integration of stakeholder views, environmental protection, occupational health and safety standards, gender-based violence (GBV) risk mitigation, and sustainable livelihood considerations into the final design and implementation phases.

1.4 Description of Project Location

The Chingo-Makanjira Road is situated within Mangochi District in the south-eastern part of Malawi. The road corridor spans approximately 93.4 kilometres, starting at Chingo, where it connects to the M003 road at coordinates 748087.62 mE, 8400838.77 mS, and ending at Makanjira Trading Centre, with end coordinates of 721093.11 mE, 8483677.07 mS. The road runs parallel to the shores of Lake Malawi and traverses remote rural communities under the jurisdiction of the Traditional Authorities of Namavi, Makanjira and Chowe. The main trading

centres along the road include Chingo, Chimbende, Malindi, Makanjira, Namalaka, Lungwena, Lugola, and Lukoloma. The selected 12 bridges are located at key river and stream crossings, distributed between chainages 6+000 and 93+400. They include: Chikosere, Kalanje, Lilembwe, Lilore, Litufu, Lugola, Lusalumwe, Lungwena, Lutende, Mbwazi, Nkuli, and Unga. These bridges fall within the area of influence defined by the direct and indirect impacts of construction activities. Table 1-1 provides their approximate chainages and corresponding GPS coordinates.

Table 1-1: Locations of the Selected 12 Bridges Along the Chingo-Makanjira Road Corridor

Bridge Name	**Chainage**	**Coordinates for Chainage Point (UTM, Zone 36S)**
Lusalumwe	6+000	749000 mE, 8407000 mS
Nkuli	17+000	745500 mE, 8415000 mS
Kalanje	24+000	743000 mE, 8422000 mS
Lungwena	25+000	742600 mE, 8423000 mS
Mbwazi	37+000	740700 mE, 8434000 mS
Lutende	42+000	738200 mE, 8438000 mS
Lilembwe	48+000	736800 mE, 8444000 mS
Unga	57+500	733200 mE, 8451000 mS
Lugola	63+000	731000 mE, 8455000 mS
Lithuvu	70+000	728200 mE, 8460000 mS
Chikosere	89+000	723200 mE, 8478000 mS
Lilore	93+400	721500 mE, 8483000 mS

Source: Field Data

The land use within the project corridor is predominantly rural and agricultural, characterised by scattered homesteads, trading centres, and communal gardens. Land tenure systems in the area encompass both customary and leasehold arrangements, with community-held rights prevailing as the majority. The road corridor passes through customary land, and community consent and involvement are essential to the success of the project. Geographically, the Namizimu and Mangochi Forest Reserves are located to the east of the road corridor; however, the road does not pass through these protected areas. The closest point to Namizimu Forest Reserve is approximately 2 kilometres from the road right-of-way, while Mangochi Forest Reserve lies further east. To the west, the expansive Lake Malawi lies in proximity to sections of the corridor, with the nearest point being about 50 metres from the road; however, this is outside the project's direct impact area. Certain sections also fall within the buffer zone of the Lake Malawi National Park, adding to the region's ecological and logistical complexity. These sensitive ecosystems, in conjunction with the lakeshore proximity, underscore the need for robust environmental safeguards. The locality map illustrates the general project alignment and its relationship to surrounding infrastructure, towns, and social service facilities.

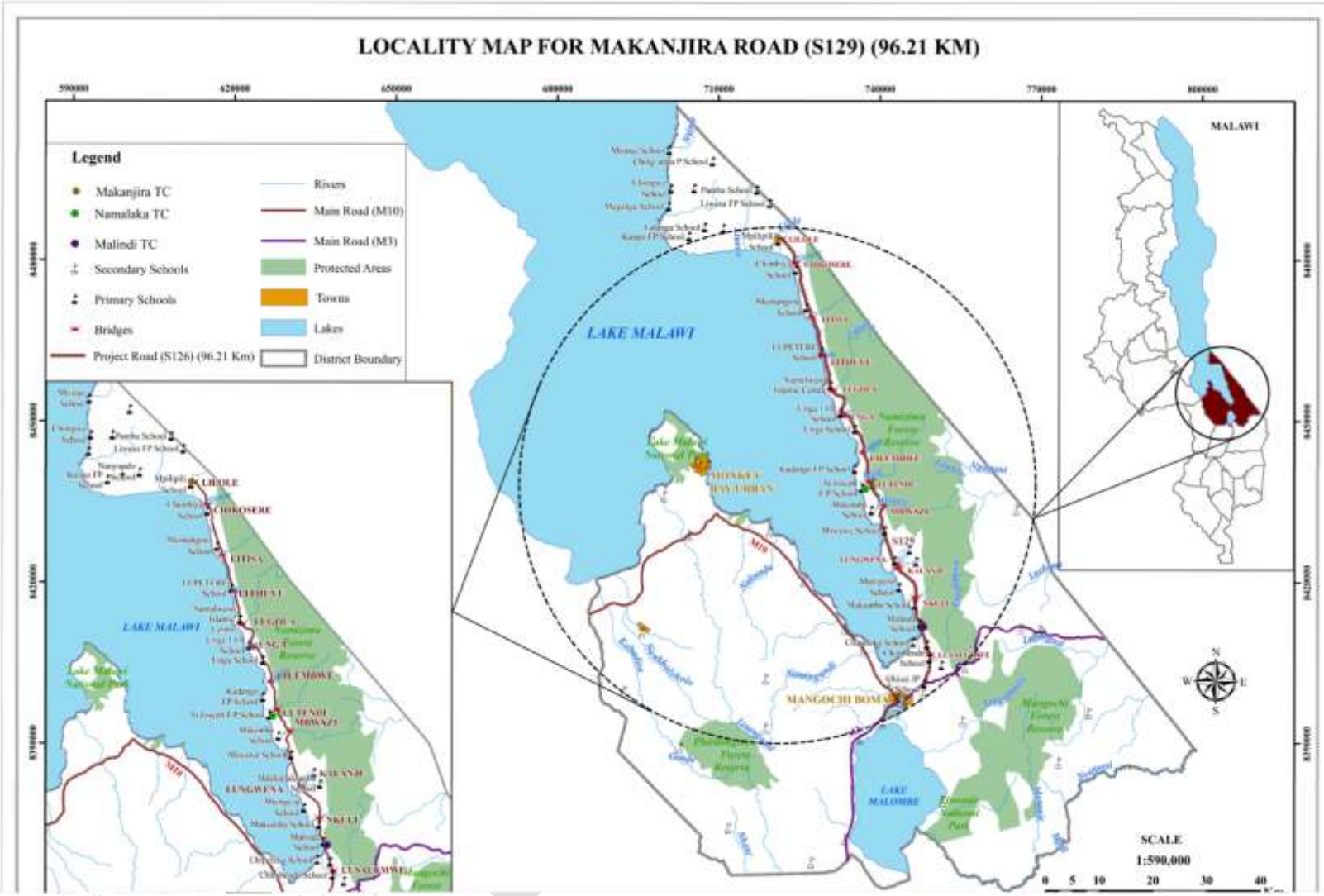

Figure 1-1: Location Map for the Chingo-Makanjira Road Corridor

1.5 Objective of the Project

The primary objective of the proposed project is to reconstruct and upgrade the selected 12 critical bridge crossings to climate-resilient standards. These bridges are essential for ensuring uninterrupted connectivity across Traditional Authorities Namavi, Makanjira and Chowe, particularly during the rainy season when flooding events frequently isolate communities. This project aims to restore access to economic, educational, and healthcare services that are central to local livelihoods. The specific objectives include:

- Restoring key transport links disrupted by Tropical Cyclone Freddy;
- Replacing temporary and damaged Bailey bridges with permanent, structurally sound bridges;
- Enhancing year-round access to trading centres such as Chingo, Malindi, Lungwena, and Makanjira;
- Reducing travel time and transport costs for local populations;
- Facilitating emergency response and disaster preparedness;
- Promoting employment and procurement opportunities for local communities during construction.

The project also seeks to promote equitable access to services and economic benefits, with particular attention to vulnerable groups, including women, children, and persons with disabilities. This is being achieved through universal design standards, stakeholder inclusion, and safeguards compliance under the World Bank ESF. In turn, this supports national resilience-building efforts and local economic revitalisation through improved infrastructure.

1.6 Justification for the Project

The selected 12 bridges represent critical infrastructure that supports the livelihoods and well-being of communities residing within the Traditional Authorities of Namavi, Makanjira and Chowe in Mangochi District. These communities heavily depend on the Chingo-Makanjira Road for accessing healthcare facilities, educational centres, markets, and fishing zones along Lake Malawi. The impact of Cyclone Freddy severely compromised the mobility and resilience of the road network, with numerous bridge washouts cutting off vital connections. The rehabilitation and reconstruction of these bridges under RCRP-2 is aligned with the Government of Malawi's broader strategy to 'build back better' by investing in climate-resilient infrastructure. The project also directly contributes to achieving Malawi's Nationally Determined Contributions (NDCs) under the Paris Agreement by enhancing adaptive capacity, improving disaster preparedness, and safeguarding socio-economic gains against climate-induced shocks. By re-establishing safe and all-weather access to key trading centres such as Chingo, Malindi, Makanjira, and Lungwena, the project will unlock new economic opportunities and foster greater integration within the district. It also enhances public service delivery, facilitates emergency response, and promotes long-term resilience in a region prone to flooding and isolation.

1.7 Objective of the ESIA

The main objective of the ESIA is to ensure that environmental and social considerations are integrated in the project planning and implementation so that the proposed project can be implemented in an environmentally sustainable and socially acceptable manner. The ESIA study recommends avoiding, minimising and reducing the anticipated adverse project risks and impacts when possible. This ESIA has been undertaken to achieve the following objectives:

i. Determine whether the proposed bridge rehabilitation works are environmentally and socially appropriate;
ii. Identify and analyse the likely environmental and social risks and impacts of the project, with a focus on site-specific conditions;
iii. Recommend appropriate mitigation and enhancement measures to manage potential negative and positive impacts;
iv. Develop an Environmental and Social Management Plan (ESMP) that outlines mitigation, monitoring, and reporting mechanisms to ensure regulatory compliance and environmental performance during project implementation;
v. Provide a structured basis for stakeholder consultation, decision-making, and accountability.

1.8 Rationale for the ESIA

The need for this ESIA is grounded in both national and international regulatory obligations. In Malawi, the Environment Management Act (2017) and the Guidelines for Environmental Impact Assessment (1997) require road infrastructure developments, particularly the construction and rehabilitation of bridges, to undergo detailed environmental scrutiny. The project falls under the prescribed activities listed in Appendix B (List A: Projects for which EIA is Mandatory) of the Guidelines for Environmental Impact Assessment (1997), specifically Section A13 (subsection A13.4), which mandates an EIA for projects in proximity to or which have the potential to affect water bodies. Furthermore, under the World Bank ESF, the project is classified as High Risk. This classification requires a comprehensive ESIA to ensure that all potential risks and impacts, particularly those related to working in flood-prone riverine environments, are thoroughly assessed. This includes issues such as the disposal of bridge debris, potential impacts on sourcing from borrow pits, and risks associated with construction near sensitive habitats. The applicable Environmental and Social Standards (ESS) for this project include:

- ESS1: Assessment and Management of Environmental and Social Risks and Impacts;
- ESS2: Labour and Working Conditions;
- ESS3: Resource Efficiency and Pollution Prevention and Management;
- ESS4: Community Health and Safety;
- ESS5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement;
- ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources;
- ESS8: Cultural Heritage; and
- ESS10: Stakeholder Engagement and Information Disclosure.

The ESIA will also integrate site-specific environmental and social considerations into project planning and ensure that mitigation measures are operationalised and monitored throughout the project lifecycle.

1.9 Methodology of the ESIA

This ESIA was undertaken in alignment with the EMA (2017), the Guidelines for Environmental Impact Assessment (1997) for Malawi, the World Bank ESF, and Good International Industry Practice. The methodology combined desk-based reviews and rigorous fieldwork to ensure a comprehensive assessment of the potential environmental and social impacts associated with rehabilitating and constructing the selected bridges a. The study team drew upon data from the detailed engineering design reports, the E&S rapid assessment report, topographic surveys, and hydrological and flood risk modelling reports already completed by the project. These technical inputs were complemented by site-specific assessments carried out between March and April 2025. Key national instruments and guidelines were reviewed and referenced, including the EIA Guidelines for Malawi and applicable policies and laws. These are elaborated in Chapter 2 of this report. A multidisciplinary team of specialists was mobilised, including experts in environmental assessment, social safeguards and gender inclusion, biodiversity and aquatic ecology, and occupational and community health. Site investigations were carried out to establish baseline conditions, identify potential environmental and social risks, and propose suitable mitigation and enhancement measures. Table 1-2 outlines the schedule of activities conducted in the field.

Table 1-2: Schedule of community consultations and baseline data collection

SN	Activity	Team Composition	March				April			
			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								
		Water Quality Expert								

1.9.1 Detailed Data Collection

The study team conducted site investigations at the proposed project site in March 2025 to familiarise themselves with the project site's setup, identify, analyse, and assess the potential negative and positive impacts that the project would bring about.

1.9.1.1 Land Use

Land use classification schemes addressed both land use and land cover. For this study, data were collected based on information provided by the village headman, Village Development Committees (VDCs), and information obtained from the Surveys Department. The data were 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, agricultural land/ bare land and water (wetlands, streams, and reservoirs). The area was mapped to determine the rock type and lithological boundaries.

1.9.1.2 Flora (vegetation) survey methodology

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. During the site visit, the field team conducted a rapid reconnaissance survey in March 2025. This exercise rapidly documented the vegetation types, provided insight into the project area, and helped determine the number of sample plots to be allocated.

1.9.1.3 Fauna Survey Methodology

Faunal surveys were conducted in March 2025 at sampling points along the road corridor (Table 13). Bird species were assessed using the Watson (2003) standardised search method and direct observation within vegetation communities during early daylight hours, with unidentified species photographed for later identification. Mammals were surveyed through criss-cross transect walks, direct observation, and searches for signs such as tracks and droppings, supplemented by community interviews. Reptiles and amphibians were recorded opportunistically during bird and mammal surveys, using visual searches in likely habitats, with unidentified specimens photographed for later identification. Macro-invertebrates were surveyed opportunistically through observation, active searches, and baited traps, with species identified on-site or from photographs. Across all taxa, local knowledge was incorporated through interviews with community members.

1.9.2 Stakeholder Consultations

Purposive sampling was used to select participants with relevant information for this study. The sample at the district level included members of the District Environment Sub-Committee (DESC), which the Director of Natural Resources and Environment chairs. Other members of

the DESC include the District Environment Office, District Community Development Office, District Land Office, District Forestry Office, District Social Welfare Office, District Environmental Health Officer, and District Water Development Officer. The DESC members were first consulted through a consultative meeting on 27 March 2025 (Figure 1-2). After the consultative meeting, key informant interviews were conducted from 27 March to 5 April 2025 with individual DESC officers to gather specific information from their sectors.

Figure 1-2: DESC meeting during Consultations

Community consultations were done from 31 March to 12 April 2025 in the villages along the road. Focus Group Discussion (FGD) was used, and it involved a small group of respondents (usually 6-15 respondents) who were interviewed together in a common location. Three different groups were interviewed at each location: men only, women only, and a mixed youth group. The social expert and field assistants were the interviewers who led the discussions and ensured that every person had an opportunity to respond. A total of 265 people were consulted through the FGDs with 100 males, 75 females and 90 local chiefs (Table 1-3). Evidence of stakeholder consultations and critical findings from the consultation process is provided in Annexe 3.

Table 1-3: Details of FGDs conducted along the road

Name of Site	**Group Village Head**	**Number of FGDs**	**Males FGD (Number of Participants)**	**Female FGD (Number of Participants)**	**Local Chiefs FGDs**	
					Males	***Female***
Chikosere	Selemani	2	11	6	6	0
Kalanje	Abiti Kalanje	2	17	3	3	0
Lilembwe	Kadango	3	8	7	2	0
Lilore	Makanjira	3	16	8	10	0
Litufu	Binali	3	9	4	3	0
Lugola	Bakili	2	7	13	4	1
Lusalumwe	Chimbende	3	1	6	18	1
Lungwena	Ng'ombe	3	9	2	7	0
Lutend	Kubuli & Namalaka	3	5	5	12	1

Name of Site	Group Village Head	Number of FGDs	Males FGD (Number of Participants)	Female FGD (Number of Participants)	Local Chiefs FGDs	
					Males	*Female*
Mbwazi	Mdoka	3	7	9	6	1
Nkuli	Makumba	3			10	1
Unga	Saiti	3	10	12	3	1
Total		**33**	**100**	**75**	**84**	**6**

1.9.2.1 Stakeholder Identification

In accordance with Environmental and Social Standard 10 of the World Bank ESF, stakeholders are defined as "*individuals, groups, or communities who may be affected by the project, or who may have an interest in the project*." These are typically categorised as:

- ***Affected Parties:*** those who are or may be directly impacted by the project's activities; and
- ***Other Interested Parties:*** those who may not be directly impacted, but have a legitimate interest in the project's planning, implementation, or outcomes.

Stakeholder identification was conducted through a structured process informed by the project's Stakeholder Engagement Plan (SEP). The process considered spatial proximity, socio-economic linkages, institutional mandates, and the likelihood and significance of environmental and social impacts. Affected stakeholders include individuals, households, or groups located near or dependent on the project's right of way, particularly within the 500-metre radius of the 12 selected bridge sites. These communities are expected to experience both beneficial and adverse impacts, including:

- Improved connectivity and access to markets, health, and education facilities;
- Temporary disruptions due to construction activities;
- Involuntary land acquisition or displacement of assets and economic activities;
- Alteration of local hydrology and drainage patterns at bridge sites.

Key affected stakeholders include:

i. Local communities living in villages along the Chingo-Makanjira road corridor;
ii. Project Affected Persons (PAPs) whose land, livelihoods, or properties may be affected;
iii. Vulnerable groups, such as female-headed households, elderly persons, persons with disabilities, and youth;
iv. Local farmers and small-scale traders who depend on road access and nearby watercourses for their livelihoods.

These stakeholders are not directly affected by the project but have legal, operational, or advocacy roles in its implementation and monitoring. They include:

i. Traditional Authorities and Group Village Heads, who facilitate local planning and grievance redress;
ii. Mangochi District Council and its technical departments (e.g., Lands, Agriculture, Water, Health, Education, Forestry), which are responsible for overseeing local

development and ensuring alignment with District Development Plans;

iii. DESC, which provides environmental oversight and integration of safeguards in district-level planning;

iv. Non-Governmental Organisations (NGOs) and Community-Based Organisations (CBOs) operating in the project area, especially those supporting livelihoods, environmental protection, and gender inclusion;

Regulatory bodies and sector ministries, including:

i. Malawi Environment Protection Authority (MEPA),
ii. Roads Authority (RA),
iii. Ministry of Transport and Public Works,
iv. Ministry of Lands,
v. Department of Forestry,
vi. National Water Resources Authority,
vii. Ministry of Gender, Community Development and Social Welfare.

Stakeholder mapping was carried out to determine their relevance and influence on the project. A differentiated approach will continue to be applied to ensure that consultations are inclusive, context-specific, and tailored to the interests and capacities of each stakeholder group. Particular attention has been paid to vulnerable and marginalised groups, ensuring that their views and concerns are meaningfully integrated into the ESIA process.

1.9.2.2 Gender and Social Inclusion

The FGDs were done to promote gender and social inclusion but also ensured the inclusion of the disadvantaged and the vulnerable. Views of women and other vulnerable groups on the Project are valuable as they represent a more holistic picture of the potential risks and impacts the Project may pose. In addition, groups that include women and other vulnerable groups provided effective mitigation measures that considered the different impacts the project would have on men and women. The study also ensured there was representation and participation of women and other vulnerable groups, including people living with disabilities, people living with HIV and AIDS, and youth and children, in all community consultations, meetings, and interactions. The meeting venues were held at locations within walking distance of the communities. They were conducted when communities were free from their daily duties, mainly from 9:00 to 11:30 and 14:00 to 16:30. Information was provided in Chichewa, the national local language. All data collected was disaggregated by gender for effective decision-making. Hence, the number of men and women was recorded for each meeting and information is provided in Table 1-3. Special FGDs were held for men only and women only to ensure that views of different categories of people were captured.

1.9.2.3 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 191 respondents were interviewed during the survey.

1.9.2.4 Data analysis and reporting

All the collected data was analysed using Microsoft Excel to have descriptive statistics on the baseline conditions. A descriptive analysis was run to generate means, minimum and maximum values, frequencies, and percentages. Deductions were based on a triangulation of findings from quantitative and qualitative analyses. This was the basis for preparing the reports for both the baseline and environmental and social assessment study.

1.10 Potential Users of the ESIA

This ESIA report is intended to serve a range of stakeholders involved in the planning, design, funding, implementation, and oversight of the proposed project. This ESIA report will be used by:

- Government **e**ntities such as the Malawi Environment Protection Authority (MEPA), Mangochi District Council, Ministry of Transport and Public Works, Roads Authority, and the Ministry of Labour will use the report to verify compliance with environmental, social, labour, and occupational safety regulations.
- Technical teams responsible for project planning and design will rely on the report to ensure that infrastructure designs are informed by environmental and social considerations, including hazard risks and mitigation requirements.
- The report will provide guidance on the specific environmental and social standards that contractors must adhere to during project implementation.
- Communities residing in the project impact areas, including TAs Namavi, Makanjira, Chowe, and Chapola, will use the report to understand the project's scope, impacts, and available grievance redress mechanisms.
- The World Bank and other stakeholders will utilise the ESIA report to assess the project’s compliance with environmental and social safeguards, risk classification, and proposed mitigation plans.

Chapter Two: Project Description

This chapter provides a description of the proposed reconstruction and upgrading works for the selected 12 bridges. It outlines the project phases (planning, construction, operation, and decommissioning), required materials and resources, infrastructure layout, labour requirements, and anticipated waste generation. It further establishes the project's area of influence, which will form the geographical boundary for identifying environmental and social impacts.

2.1 Project Area of Influence

The road reserve is 36 metres wide, and all major civil works, including bridge construction and associated road approaches, will occur within this demarcated corridor. However, temporary project facilities (e.g., contractor camps, borrow pits, laydown areas, equipment yards) may extend beyond this and will be confirmed and assessed during contractor mobilisation. In line with ESS1 of the World Bank's ESF, the Area of Influence (AoI) has been defined using topographic, satellite, and GIS data, supplemented by ground verification. It includes both environmental and social dimensions critical for impact identification, mitigation, and monitoring:

- **Direct Impact Zone:** Defined as the 36-metre road reserve and footprint of each bridge site, including construction zones for approaches, abutments, and river channel modifications. These areas will experience direct biophysical disturbances, including vegetation clearance, excavation, noise, dust, and surface runoff. Construction buffer zones have been established at each bridge site. At bridge sites, temporary construction buffer zones will vary between 50 and 100 metres from the riverbanks may be required to facilitate safe equipment manoeuvring, material storage, slope stabilisation, drainage works, and ecological protection (e.g., riparian buffers and floodplain function). These temporary buffer zones will only be used during construction, will not constitute permanent works, and will be restored upon completion. Their extent will depend on river width, flow patterns, proximity to settlements, ecological sensitivity, and topographic features prone to erosion or flooding. The use of such areas will be subject to land access agreements and environmental management measures to ensure compliance with national regulations and safeguard community safety
- **Indirect Impact Zone:** This zone extends up to 150 metres from each bridge centreline, capturing areas exposed to indirect impacts.
- **Associated Facilities Zone:** Potential areas for borrow pits and quarries, construction camps and workers' accommodation, and waste storage and disposal areas, construction staging areas, and temporary traffic diversionswill be assessed separately through targeted E&S screenings prior to use.
- **Socio-Economic Influence Zone:** This includes the communities within the project's sphere of influence, typically within a 500-metre radius of the 12 bridge sites. It encompasses villages, trading centres, and urban clusters, schools, religious sites and markets. The zone is central for stakeholder engagement and for monitoring socio-

economic effects such as livelihood disruption, access to services, and construction-related risks.

2.2 Description of Project Components

The proposed project works aim to improve connectivity, ensure structural safety, and enhance resilience to hydrological extremes across critical river crossings. The project components are categorised into (i) physical bridge rehabilitation works and (ii) associated support infrastructure.

2.2.1 Bridge Rehabilitation Works (12 Sites)

The bridges planned for rehabilitation were severely affected by extreme weather events, particularly Tropical Cyclone Freddy, which highlighted significant deficiencies in their hydraulic capacity and structural integrity. The existing Bailey bridges or culvert structures were rendered functionally inadequate or destroyed. The bridge designs aim to restore safe connectivity while incorporating climate resilience features in compliance with the Malawi Ministry of Transport and Public Works (MoTPW) Guidelines on Climate Adaptation (2020) and the Africa Community Access Partnership (AfCAP) recommendations. The standard bridge type across most sites is a Reinforced Cement Concrete (RCC) T-Girder, either in single or multi-span formats, with typical span lengths of 15 m, 20 m, or 25 m (Table 2-1).

Each bridge includes a 400-metre approach section (200 m on either side), designed with a 6.20-metre wide carriageway (two 3.10 m lanes) and 1.50-metre shoulders on both sides, while the bridge deck itself incorporates a 6.20-metre carriageway, a 1.30-metre cyclist path, and a 1.20-metre walkway, in accordance with the approved design standards. This conforms to Design Class C6 for two-lane, two-way roads. The bridge locations traverse rivers or seasonal streams and require ancillary works such as river training structures, wing walls, erosion control measures, and reinforced embankments. The bridge designs have been informed by updated hydrological, hydraulic, and geotechnical studies to ensure structural adequacy and alignment with climate adaptation standards. Key associated components include energy dissipators, culvert transitions, and road safety features like signage and guardrails.

Table 2-1: Site-Specific Bridge Rehabilitation Details

Bridge Name	Proposed Type	Span Configuration (m)	Estimated Height (m)	Condition of Existing Structure
Lusalumwe	RCC T-Girder	20 x 20 x 20	7.62	Existing bridge washed away; hydraulically and structurally inadequate.
Nkuli	RCC T-Girder	15 x 20 x 15	4.67	Washed away; replacement needed due to total failure.
Kalanje	RCC T-Girder	25 (single span)	4.15	Existing culvert inadequate; severe approach damage.
Lungwena	RCC T-Girder	20 x 20 x 20	6.3	Erosion-induced abutment failure; replacement required.
Mbwazi	RCC T-Girder	20 x 20	6.05	Existing bailey structure lost; full reconstruction needed.

Bridge Name	Proposed Type	Span Configuration (m)	Estimated Height (m)	Condition of Existing Structure
Lutende	RCC T-Girder	20 x 20 x 20 x 20	6.32	Multiple span failure; all spans to be replaced.
Lilembwe	RCC T-Girder	20 x 20 x 20	5.5	Severe scouring; abutment loss on Mangochi side.
Unga	RCC T-Girder	20 x 20	5.25	Total bridge loss; new structure required.
Lugola	RCC T-Girder	15 x 15	5.17	Bridge completely washed away.
Lithuvu	RCC T-Girder	15 x 15	5.02	Existing structure damaged beyond repair.
Chikosere	RCC T-Girder	15 x 20 x 15	6.4	Old bridge washed away; climate-resilient design required.
Lilole	RCC T-Girder	15 x 20 x 20 x 15	7.5	Major damage due to flooding; full span replacement proposed.

The rehabilitation works will also involve realigning adjoining approach roads and erosion protection on embankments and riverbanks. All activities will be confined within the defined 36-metre road reserve. However, temporary land acquisition may be required for construction staging areas, subject to separate environmental and social assessment before use.

2.2.1.1 Lusalumwe Bridge (Chainage 6+000)

The Lusalumwe Bridge is designed as a triple-span RCC T-girder bridge, with three 20-metre spans, giving a total bridge length of 60 metres (Figure 2-1). With a height of 7.620 metres, the structure is significantly elevated to accommodate the increased water levels typical of seasonal flooding in the area. The original bridge, likely a bailey-type, was completely destroyed during Cyclone Freddy, revealing its hydraulic insufficiency and lack of structural robustness. Key design elements include elevated piers and abutments protected against scouring through reinforced concrete cut-off walls, riprap armouring at foundations, and gabion mattresses along the riverbanks, robust earth-retaining structures on approaches, and a climate-adapted deck drainage system to prevent water accumulation. The adjacent approach roads, each 200 metres long, are reinforced and designed with a 6.20-metre carriageway and 1.50-metre shoulders on both sides, consistent with Class C6 two-lane rural road standards. The bridge ensures year-round connectivity between agricultural communities and local markets.

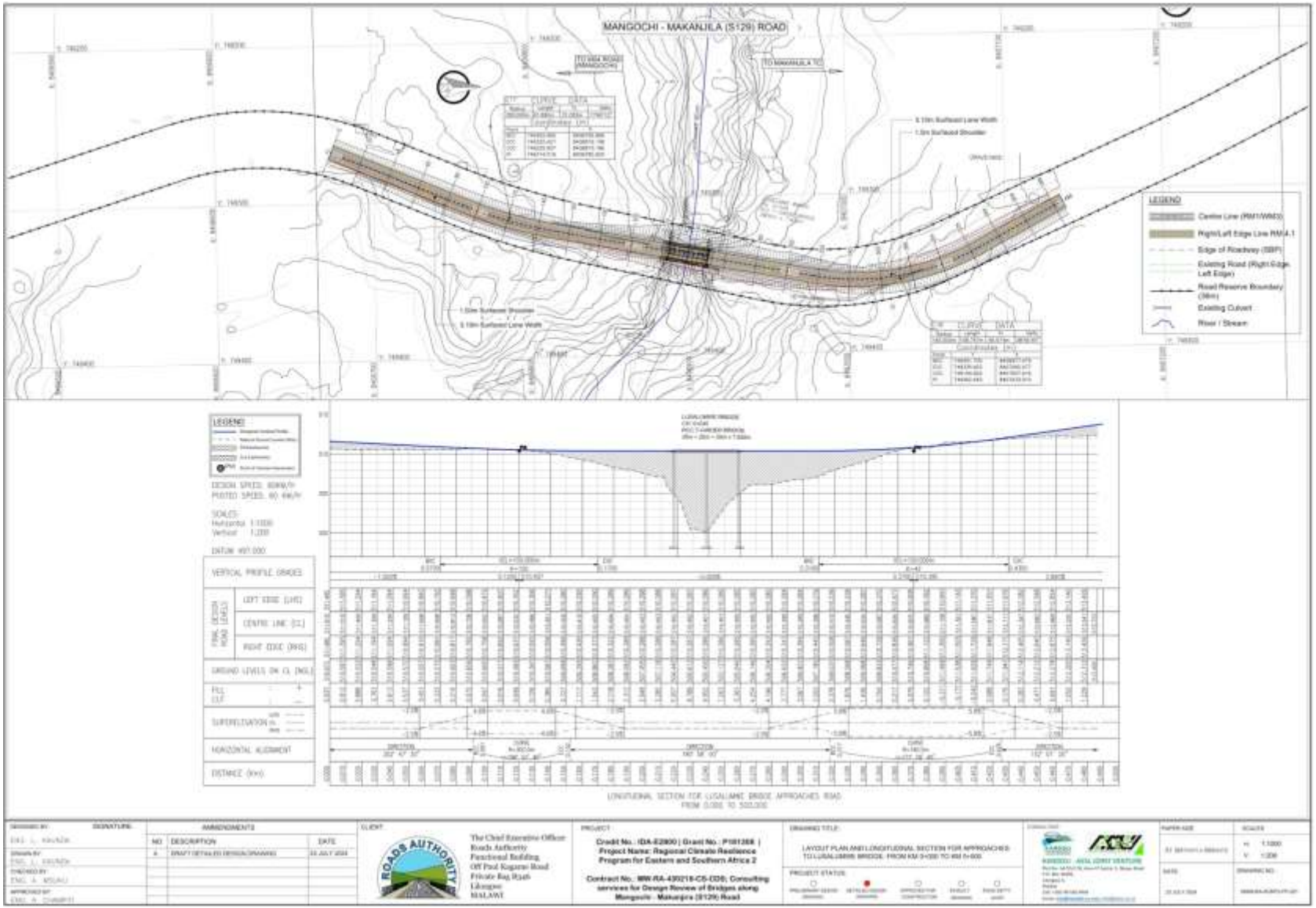

Figure 2-1: Lusalumwe Layout Plan and Longitudinal Section for the Road

2.2.1.2 Nkuli Bridge (Chainage 17+000)

The Nkuli Bridge adopts a three-span RCC T-girder configuration of 15m–20m–15m, yielding a total span length of 50 metres and a pier-to-deck height of 4.670 metres (Figure 2-2). As with Lusalumwe, the original bailey bridge was rendered dysfunctional by floodwaters during Cyclone Freddy. The design is optimised to distribute hydraulic forces evenly across all spans, thereby minimising stress concentration. Substructures are elevated to reduce overtopping risk, and advanced drainage systems are integrated into the deck and approaches. The upgraded road approaches are also 200 metres long on either side, aligned to prevent backwater effects and erosion. This bridge serves as a strategic crossing for upland communities vulnerable to isolation during the rainy season.

2.2.1.3 Kalanje Bridge (Chainage 24+000)

At Kalanje, the bridge design consists of a single 25-metre RCC T-girder span with a height of 4.150 metres (Figure 2-3). This bridge replaces a four-cell box culvert (2m x 2m) that failed to withstand high discharges, resulting in washed-out approaches. The new single-span design facilitates free and efficient water flow under high discharge events. Its construction employs flood-resistant concrete and reinforced deck slab systems. Both 200-metre approaches are reconstructed to a higher elevation, with adequate camber and side drains to prevent pooling. Kalanje Bridge exemplifies hydraulic efficiency and structural simplification for lower-volume, high-impact flood crossings.

2.2.1.4 Lungwena Bridge (Approx. Chainage 25+000)

The triple-span RCC T-girder Lungwena Bridge spans 60 metres (3 x 20m) and rises to 6.30 metres in height (Figure 2-4). The original structure's abutment failed due to erosion, likely exacerbated by the narrow hydraulic cross-section and inadequate scouring protection. The revised design increases the hydraulic opening and features rip-rap protected piers, cutoff walls, and side channels that facilitate safe flow dispersion. The 200-metre approach roads on either side include embankment stabilisation through reinforced earth walls and erosion-resistant side drains. The bridge is a vital link for communities on both sides of the Lungwena River.

2.2.1.5 Mbwazi Bridge (Approx. Chainage 37+000)

This dual-span RCC T-girder bridge measures 40 metres in total length (2 x 20m) and 6.050 metres in height (Figure 2-5). The original structure was entirely swept away, underscoring the need for more durable and hydrologically appropriate infrastructure. The design includes elevated piers, reinforced wing walls, and energy-dissipating aprons. The bridge deck features cross drains and scuppers to discharge surface runoff efficiently. The redesigned 200-metre approaches incorporate culverts and embankment toe protection. The location is important for maintaining school and health facility access in the region.

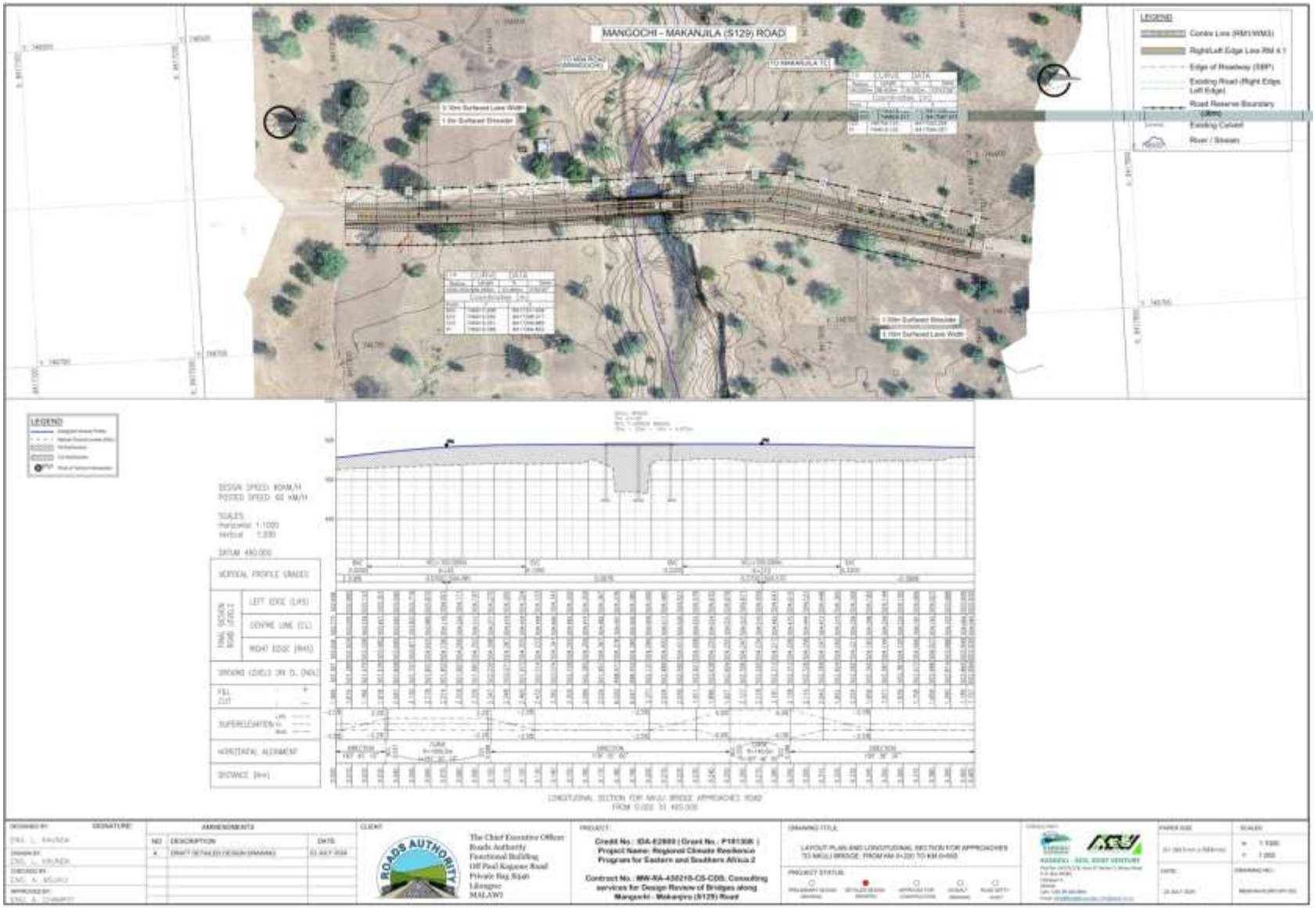

Figure 2-2: Nkuli Bridge Layout Plan and Longitudinal Section for Road Approaches

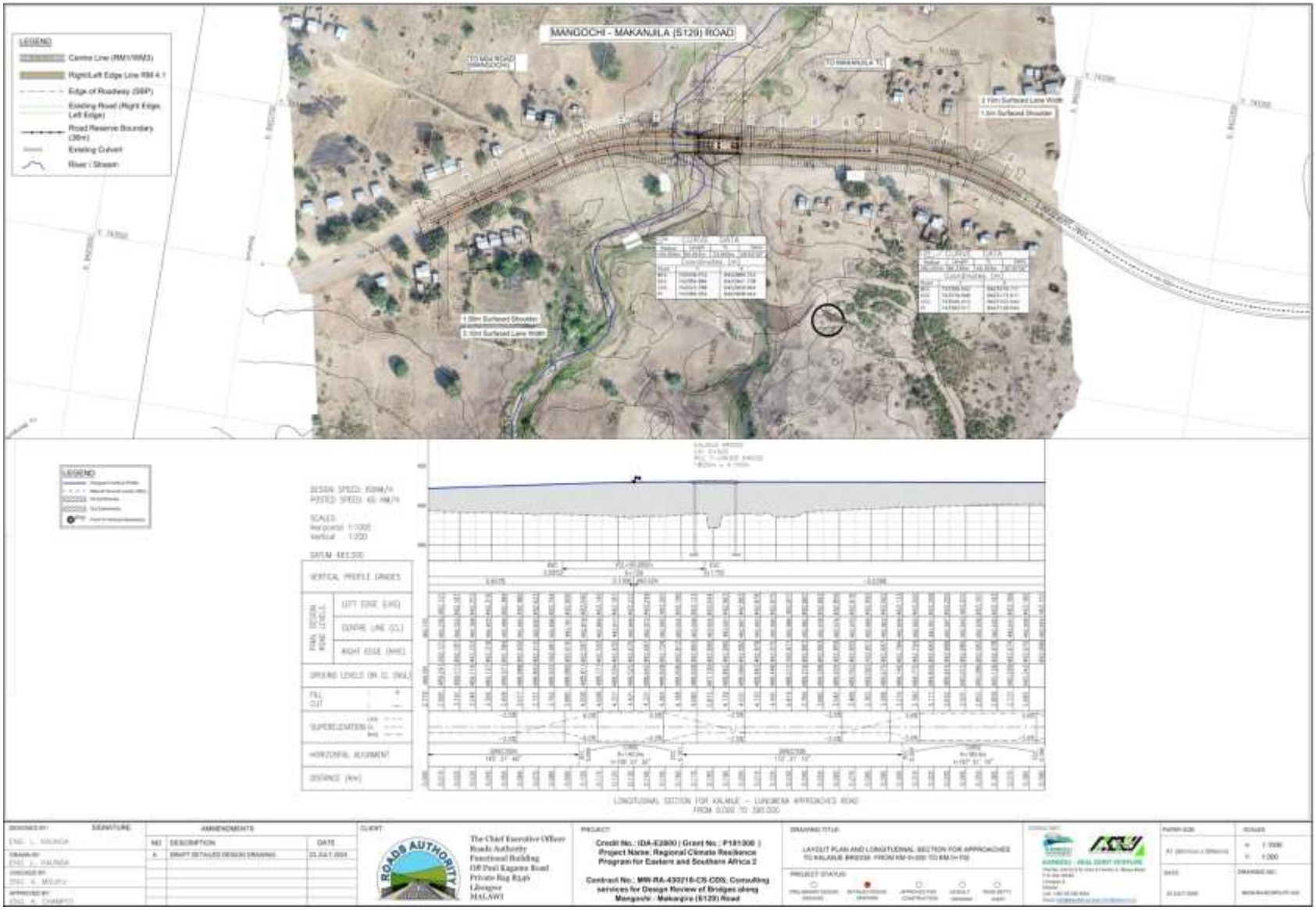

Figure 2-3: Kalanje Bridge Layout Plan and Longitudinal Section for Road Approaches

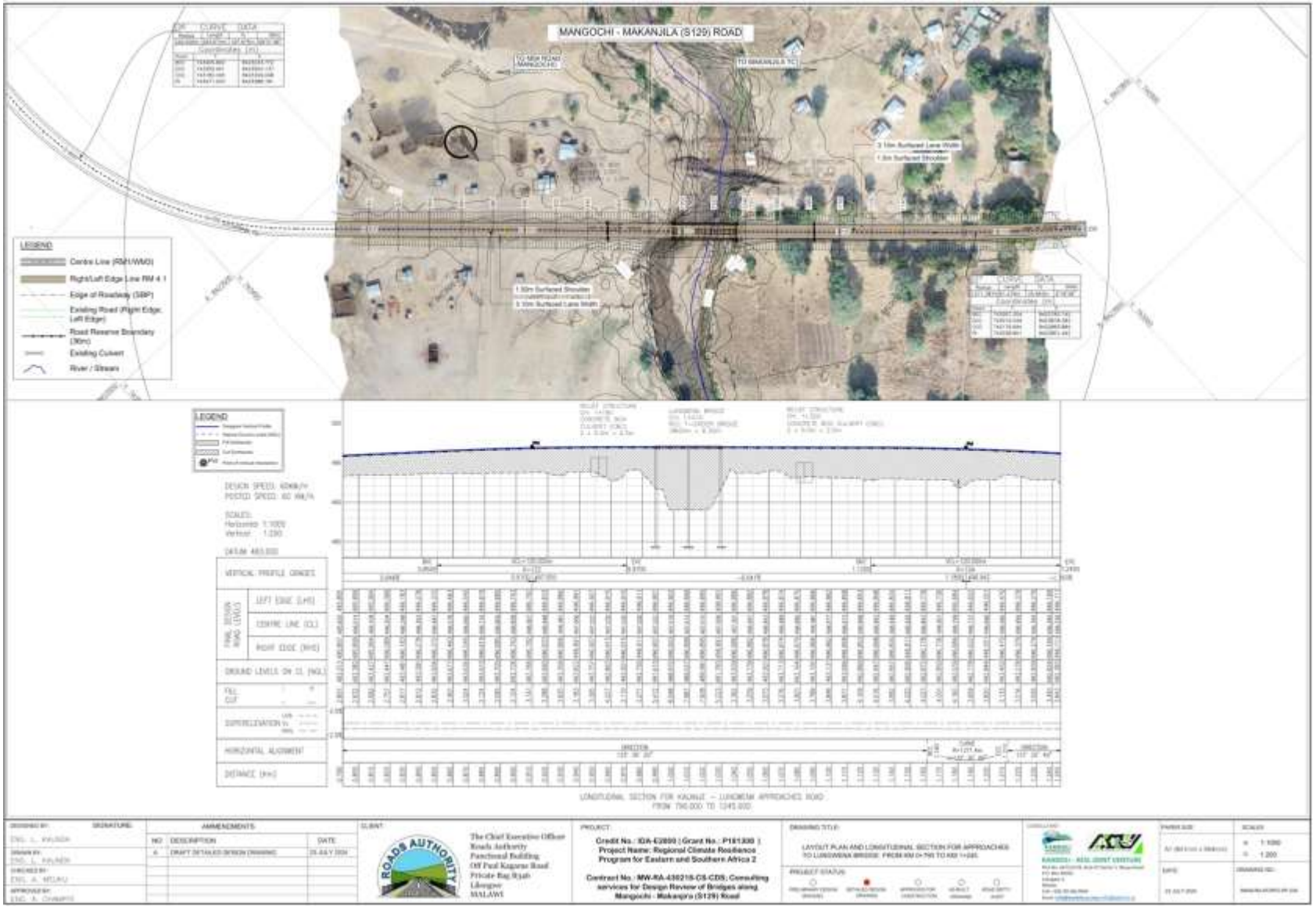

Figure 2-4: Lungwena Bridge Layout Plan and Longitudinal Section for Road Approaches

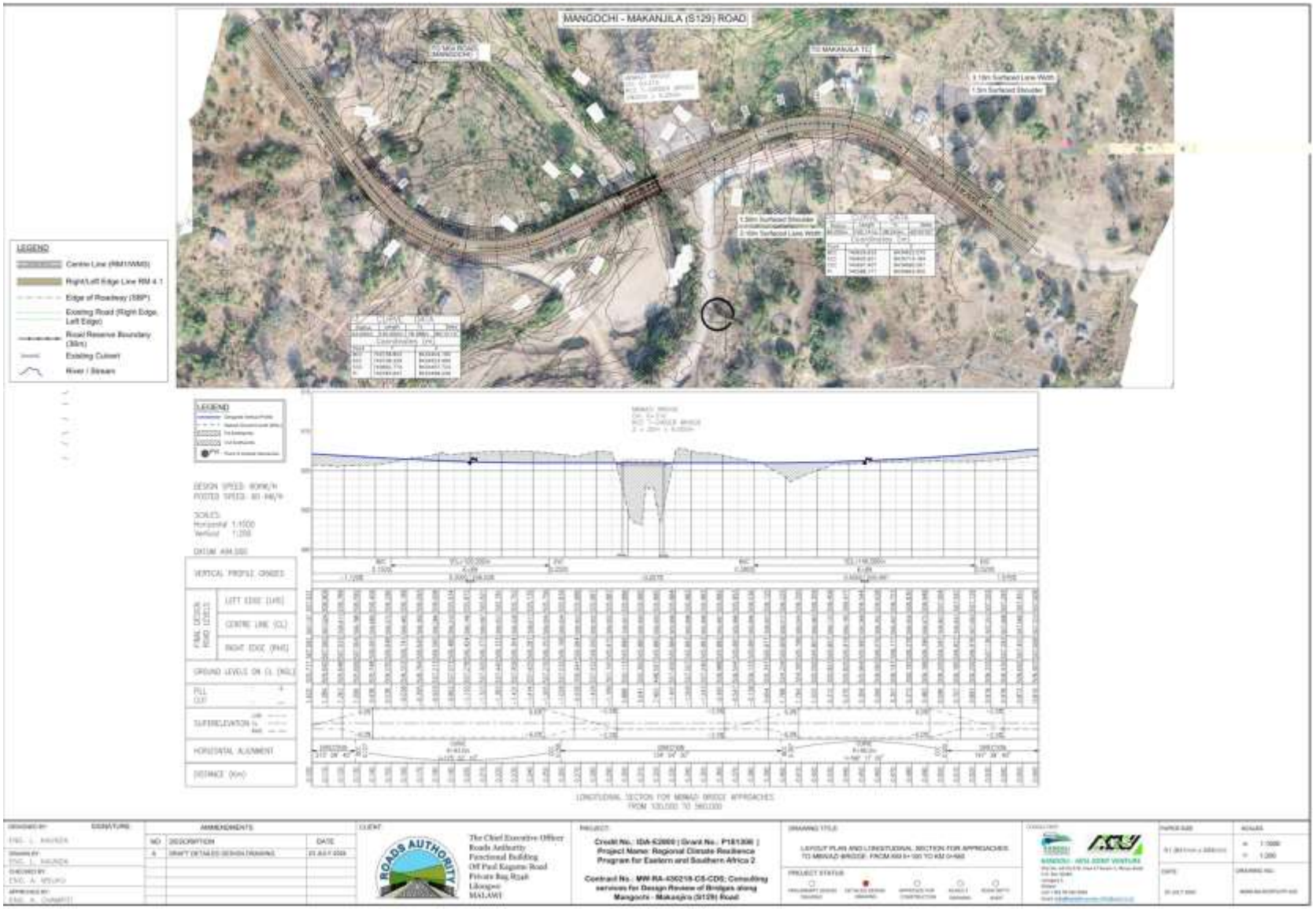

Figure 2-5: Mbwazi Bridge Layout Plan and Longitudinal Section for Road Approaches

2.2.1.6 Lutende Bridge (Approx. Chainage 44+000)

Spanning 80 metres with four 20-metre RCC T-girder spans, the Lutende Bridge is the longest in the project corridor (Figure 2-6). With a height of 6.320 metres, it accommodates wide channel flow resulting from upstream catchment convergence. Its structural system includes reinforced abutments, energy-dissipating stilling basins, and a bridge deck with multiple weep holes to manage hydrostatic pressure. The long approach embankments are stabilised with geogrid layers and gabions. This crossing is one of the most flood-vulnerable segments, and the structure's resilience ensures year-round accessibility.

2.2.1.7 Lilembwe Bridge (Approx. Chainage 48+000)

The Lilembwe Bridge is a three-span RCC T-girder bridge with a total length of 60 metres (3 x 20m) and a height of 4.930 metres (Figure 2-7). The Mangochi-side approach of the original bridge was eroded and failed, necessitating a robust replacement. The new design includes reinforced abutments with scour protection, parapets, and rip-rap protection extending beyond the pier toe. The 200-metre approach roads are elevated and realigned to reduce bend curvature, improving traffic safety during floods. Special effort was made to improve soil compaction and drainage to prevent undermining.

2.2.1.8 Unga Bridge (Approx. Chainage 54+000)

Unga Bridge is a two-span RCC T-girder bridge spanning 60 metres (3 x 20m) and standing 8.44 metres high (Figure 2-8). Built to replace a washed-away bridge, it offers improved resilience to hydrostatic pressure. The bridge features raised piers with flood venting below deck, and the structural deck is designed to remain operable during high flows. Gabion mattresses stabilise the banks and avoid undermining. Approach roads include catch basins and embankment fill protection with turfing to limit erosion.

2.2.1.9 Lugola Bridge (Approx. Chainage 58+000)

The Lugola Bridge spans 15m-20m-20m-15m (70m) RCC T-girder spans and a deck height of 4.70 metres (Figure 2-9). The original structure failed during Cyclone Freddy. Reinforced with high-strength concrete and founded on deep piles, the bridge is built for hydraulic resilience. Scour protection measures include extended wing walls and compacted rock fill. The approaches are supported by retaining walls and properly graded slopes to prevent erosion and flooding.

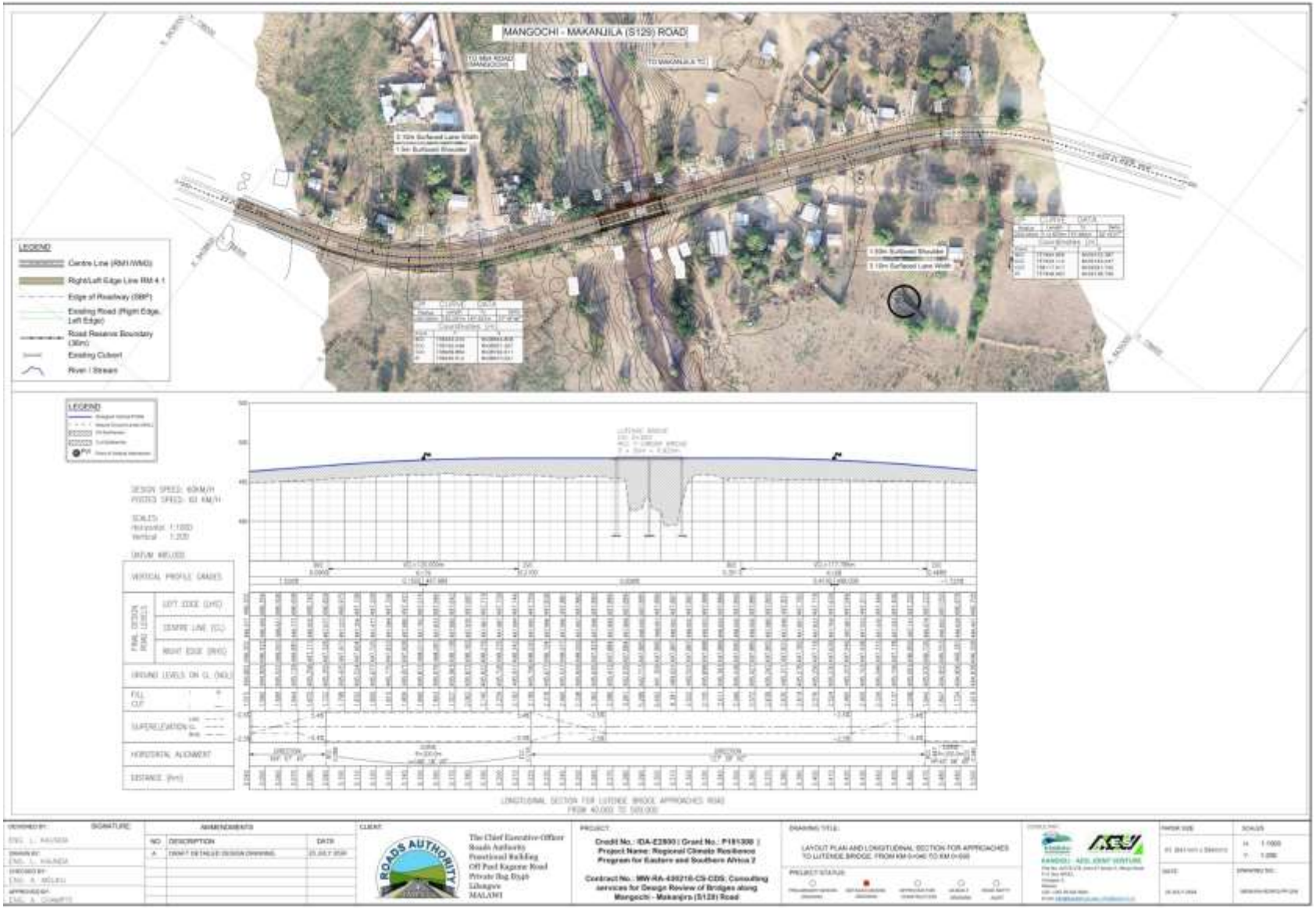

Figure 2-6: Lutende Bridge Layout Plan and Longitudinal Section for Road Approaches

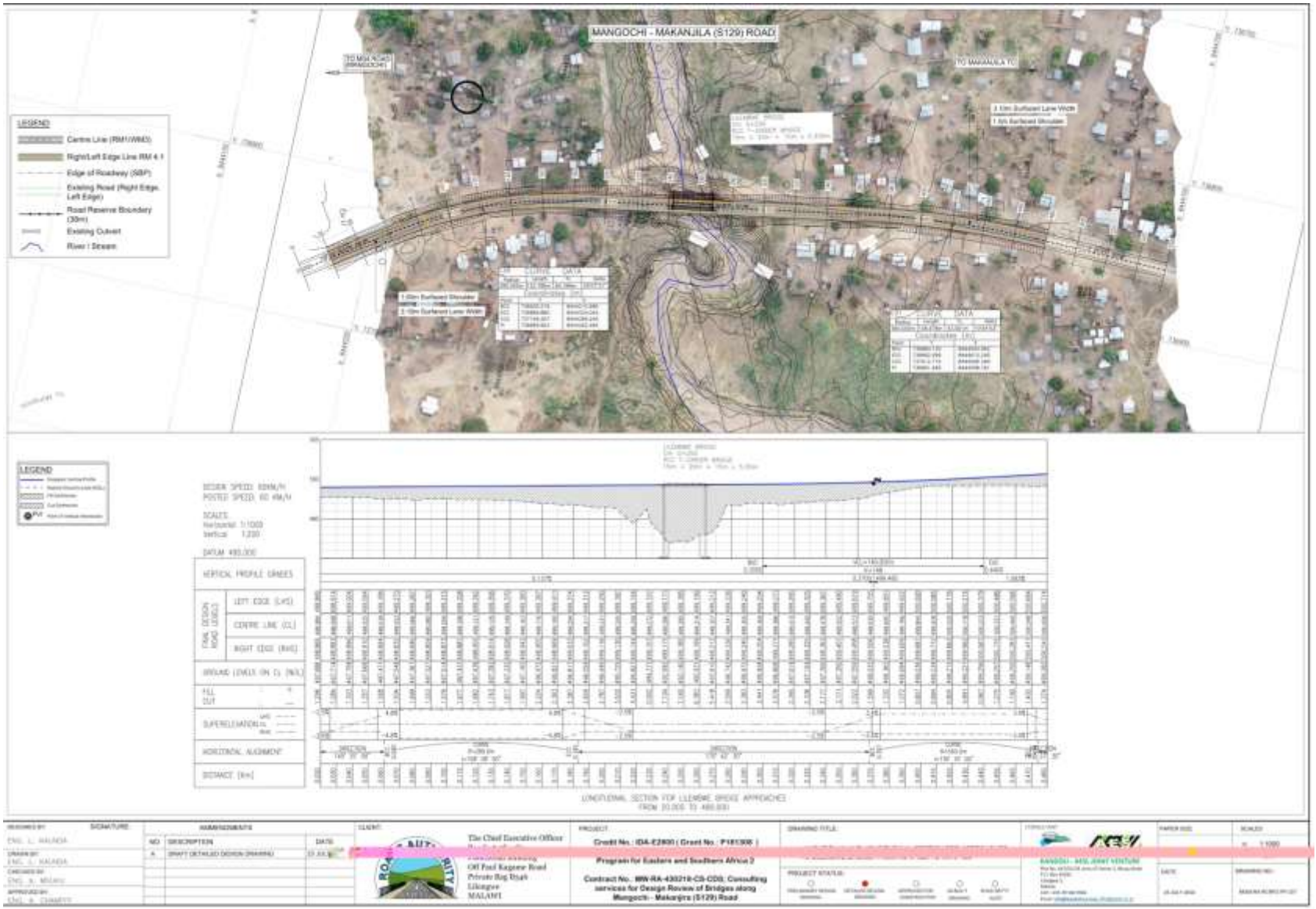

Figure 2-7: Lilembwe Bridge Layout Plan and Longitudinal Section for Road Approaches

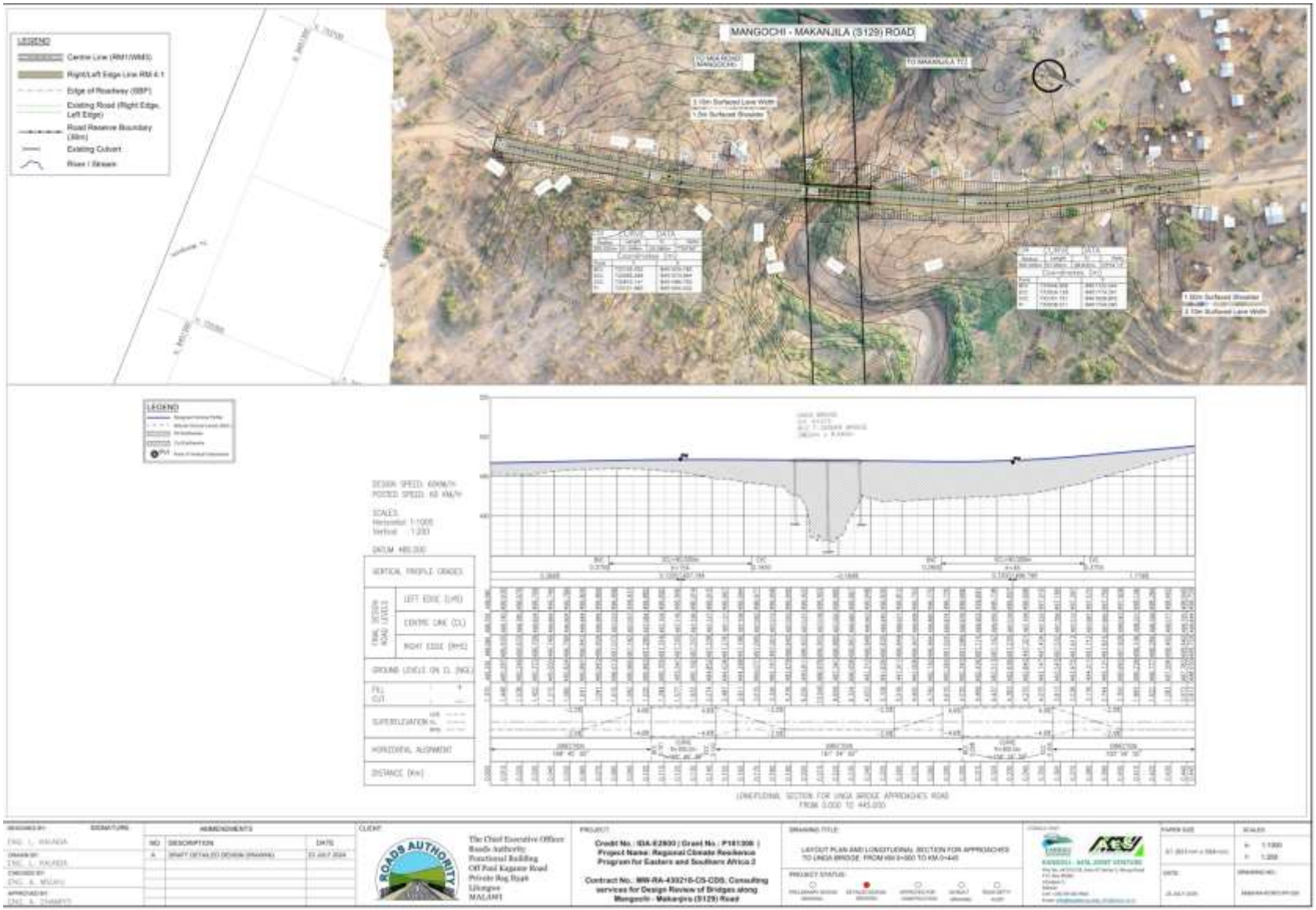

Figure 2-8: Unga Bridge Layout Plan and Longitudinal Section for Road Approaches

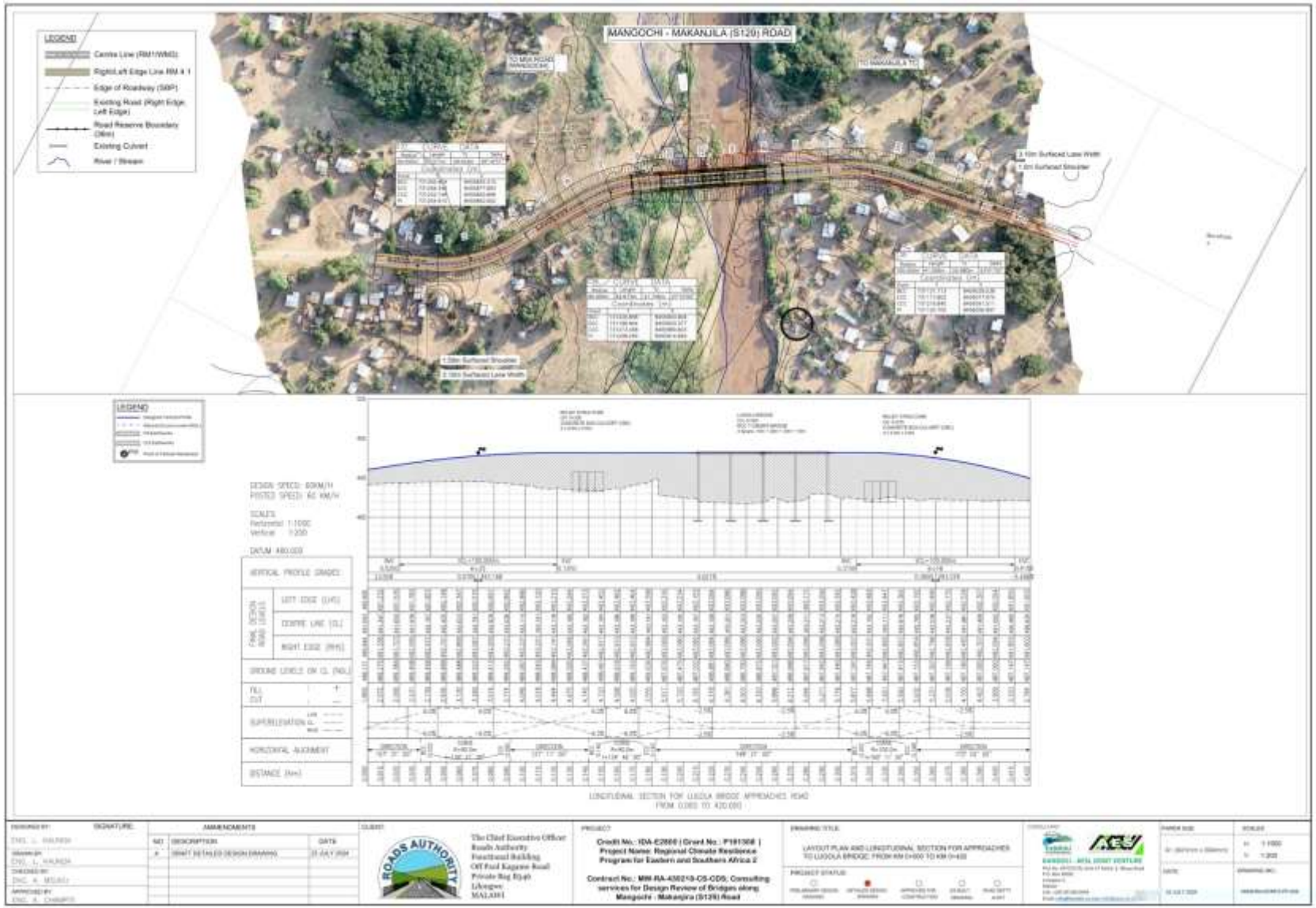

Figure 2-9: Lugola Bridge Layout Plan and Longitudinal Section for Road Approaches

2.2.1.10 Lithuvu Bridge (Approx. Chainage 66+000)

A two-span RCC T-girder bridge (2 x 15m) with a height of 3.83 metres, Lithuvu replaces a low-capacity structure vulnerable to overtopping (Figure 2-10). The revised design incorporates pier protection, a raised deck, and downstream energy dissipation structures. Drainage outlets are optimised to handle the steep terrain. The 200-metre approaches are widened slightly to improve turning radius and sight distance.

2.2.1.11 Chikosere Bridge (Approx. Chainage 72+000)

The Chikosere Bridge features a three-span RCC T-girder layout of 15m–20m–15m, totalling 50 metres in length and 6.400 metres in height (Figure 2-11). It replaces a structure lost to flooding. Piers are protected by concrete aprons and cutoff walls, and the deck is cambered to discharge stormwater efficiently. The 200-metre approach roads incorporate road safety elements including reflectors and side slope protection. The bridge plays a vital socio-economic role in connecting hinterland villages to larger trading centres.

2.2.1.12 Lilole Bridge (Post-Chainage 78+000)

Lilole is a four-span RCC T-girder bridge with 15m–20m–20m–15m configuration, spanning 70 metres and standing 7.500 metres tall (Figure 2-12). This site experienced complete structural failure during Cyclone Freddy. The bridge is designed to withstand high water flows with a wide hydraulic opening, tall piers, and upstream silt deflectors. Road safety signage and pedestrian shoulders are included. The approach roads are protected with stone pitching and berm drains, with vegetation reestablishment planned post-construction for slope stabilisation.

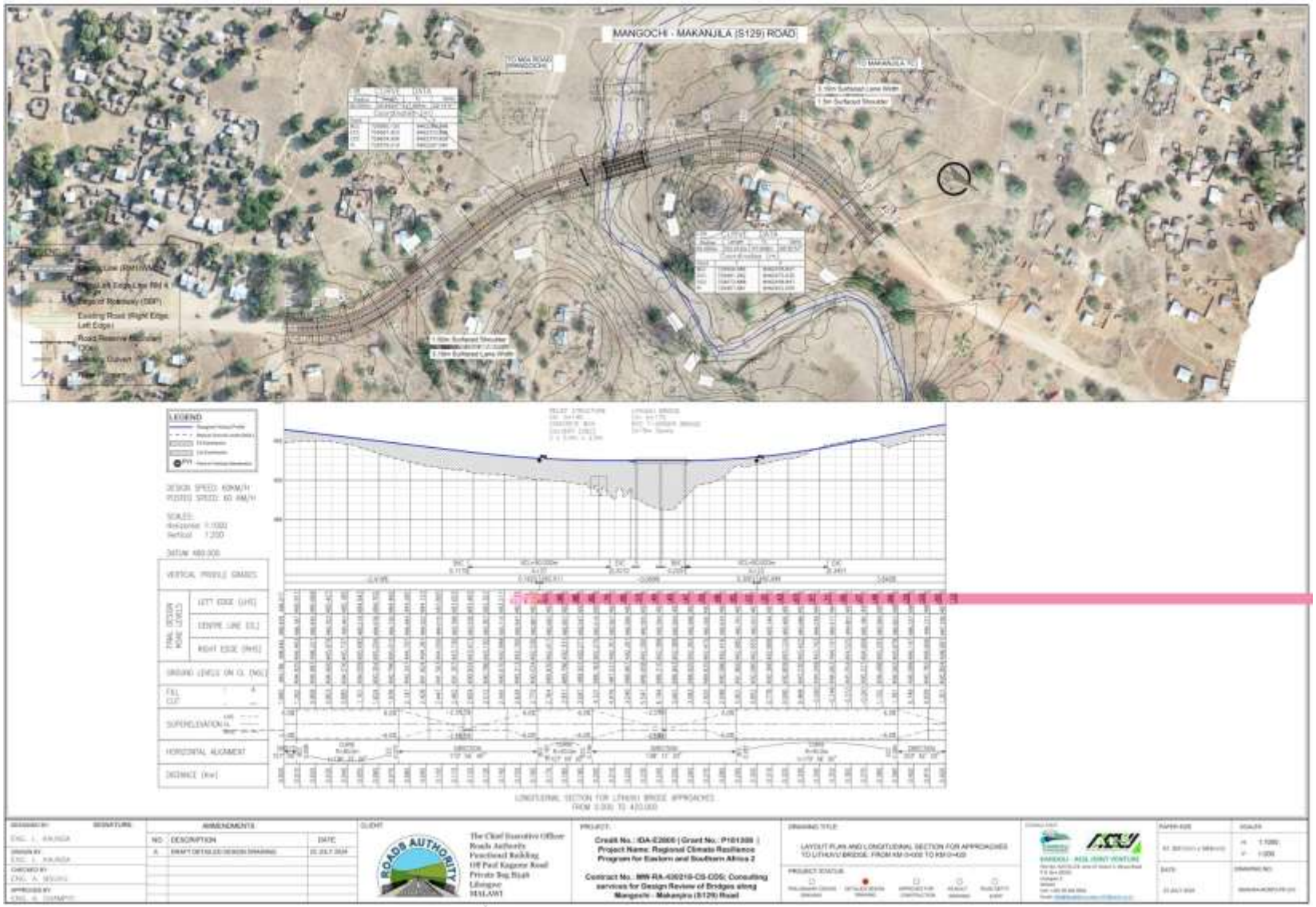

Figure 2-10: Lithuvu Bridge Layout Plan and Longitudinal Section for Road Approaches

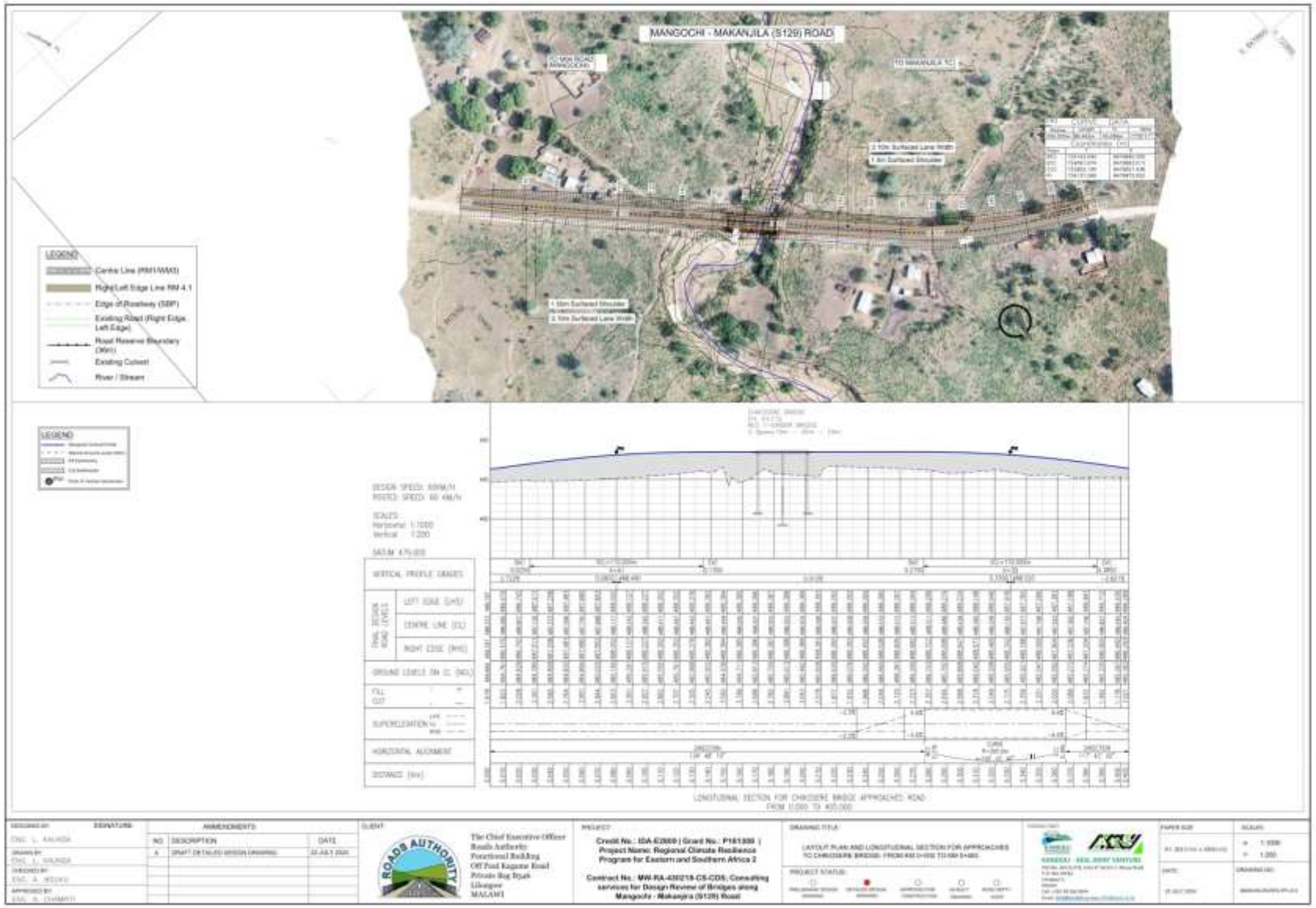

Figure 2-11: Chikosere Bridge Layout Plan and Longitudinal Section for Road Approaches

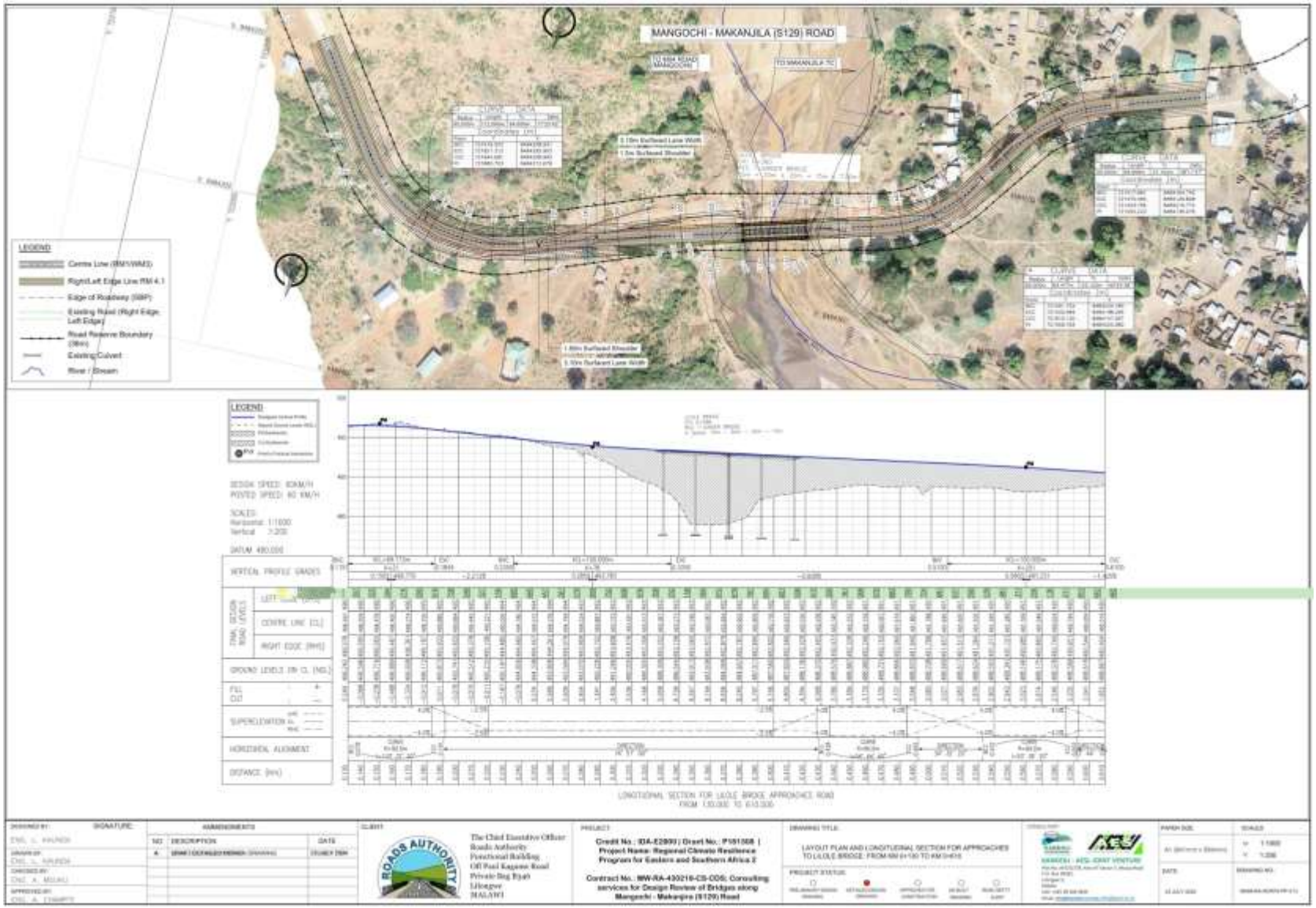

Figure 2-12: Lilole Bridge Layout Plan and Longitudinal Section for Road Approaches

2.2.2 Associated Bridge Structures

The detailed engineering designs for the twelve selected bridges incorporate a range of associated bridge structures to ensure technical integrity, climate resilience, and operational safety. These structures, comprising embankments, wing walls, river training works, and scour protection measures, are integral to the bridge infrastructure's functionality and sustainability in a context of increasing climate variability and hydrological stress.

2.2.2.1 Embankments

Each bridge site design includes road approaches extending 200 metres on either side, resulting in a 400-metre road section per crossing. These approaches are critical for the structural transition between the roadway and the bridge deck. To enhance climate resilience, the embankment designs include a flattened embankment slope, which reduces the rate of water runoff and risk of overtopping during storm events. There is also stabilised fills using selected material layers to resist erosion and settlement, and drainage infrastructure, including culverts and lined side drains, to manage surface runoff and maintain embankment stability.

2.2.2.2 Wing Walls and End Structures

The engineering review identified widespread failure of wing walls, headwalls, and other end structures in the previous Bailey bridge installations. The new designs, therefore, emphasise reinforced concrete wing walls, dimensioned to withstand lateral earth pressures and deflect surface runoff away from the bridge abutments. The designs also provide improved interface detailing between wing walls and bridge decks to prevent seepage and soil erosion. Embankment toes are protected, especially where transitions from road to bridge are vulnerable to washout.

2.2.2.3 River Training Works

The project integrates river training measures at most bridge sites to mitigate risks from lateral erosion, meandering, and high flow velocities. Specific interventions include channel widening and trimming, particularly at upstream approaches, to improve hydraulic performance and lower peak flow velocities. Earthworks that direct the main current centrally beneath the bridge deck, preventing water from attacking the abutments or approach fills, will also be part of the works. Training walls or bunds may be installed where required to realign the flow path and prevent river encroachment on embankments.

2.2.2.4 Scour and Erosion Protection

To address the risk of scour, a leading cause of bridge failure, detailed hydraulic and sedimentation analyses were conducted during the bridges' design. The designs incorporate riprap protection and gabion boxes/mattresses around abutments, piers, and riverbanks, tailored to predicted scour depths. The designs also use Reno mattresses filled with appropriately sized stone to stabilise both the bed and banks. Toe protection and cutoff walls were necessary to prevent undermining of structural foundations. These protection features' site-specific placement is informed by flow direction, depth, and sediment load dynamics.

2.2.3 Road Works and Approaches

In conjunction with the design of the new bridge structures, substantial attention has been dedicated to upgrading and realigning associated road approaches. Each bridge site includes approach roads extending 200 metres on either side, making a total of 400 metres of designed road works per bridge. The standard geometric cross-section for all approach roads follows the parameters of Design Class C6, suitable for a two-lane rural road with sealed shoulders. The approach configuration comprises a 6.20-metre carriageway, formed by two 3.10-metre lanes, with 1.50-metre sealed shoulders on both sides, giving a total platform width of 9.20 metres. The bridge deck configuration provides a 6.20-metre carriageway, a 1.30-metre cyclist path, and a 1.20-metre walkway, in accordance with the approved design standards (Figure 2-13). To ensure effective surface drainage, the cross-section includes a 2.5% cross fall on both lanes and shoulders. Depending on the topography and drainage considerations, the shoulder slope ranges between 1:1 and 1:4 (horizontal: vertical).

The road pavement structure on the approaches is designed to cater for both current and projected traffic volumes and to enhance climate resilience. The pavement layers (Figure 2-13) are constructed as follows:

- ***Asphalt Concrete (AC) Wearing Course:*** 50 mm thickness, forming the surface layer to provide a smooth, durable, and waterproof finish.
- ***Crushed Stone Base Layer:*** Thickness as per final pavement design, offering structural load-bearing support.
- ***Sub-base Layer:*** Typically cement-stabilised gravel or crushed stone, contributing to load distribution and water resistance.
- ***Selected Layer:*** Well-graded gravel fill material placed to enhance subgrade conditions.
- ***Prepared Existing Subgrade:*** Cleared and reprocessed to a depth of 150 mm and compacted to 93% Modified AASHTO density, to ensure a solid foundation.

All approach roads are integrated with longitudinal and cross drainage systems to prevent erosion and water accumulation. Side drains, lined channels, culverts, and scour protection structures are included where needed to address stormwater conveyance and reduce waterlogging risks. To facilitate traffic flow during construction phases, temporary bypasses and detours will be provided within the existing 36-metre-wide road reserve. These detours will be compacted gravel or sealed surfaces where necessary and will comply with safety and visibility standards. Signage and traffic control measures will be implemented to ensure minimal disruption and public safety throughout construction.

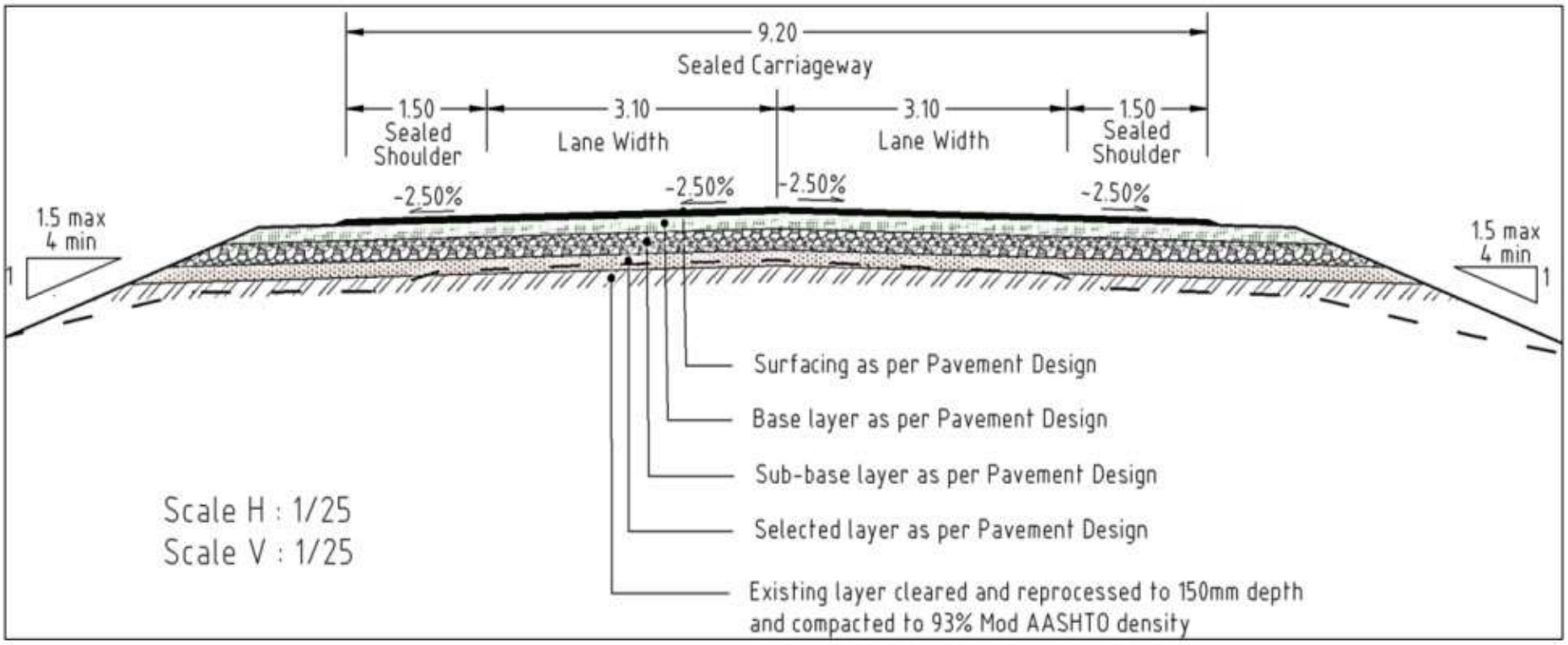

Figure 2-13: Typical Road Cross Section

2.2.4 Associated Facilities

The successful implementation of the bridge rehabilitation works and associated road approaches will require establishing Associated Facilities to support construction activities. These facilities may include, but are not limited to, workers' accommodation camps, construction camps, equipment and material storage yards, borrow pits, quarry sites, and waste disposal and spoil stockpile areas. While the Final Main Detailed Engineering Design Report provides broad guidance on construction material needs and logistical arrangements, it does not identify specific sites or quantify land requirements for Associated Facilities. The responsibility for these facilities' planning, siting, development, and management rests with the appointed Contractor, subject to regulatory and supervisory oversight. Prior to the establishment or operation of any ancillary facility, the Contractor shall be required to:

i. Conduct site-specific environmental and social screening and impact assessments, consistent with the EMA (2017) requirements, the World Bank ESS1 (Assessment and Management of Environmental and Social Risks and Impacts), and other applicable ESSs.
ii. Prepare Environmental and Social Management Plans (ESMPs) for each facility, addressing key risks such as land take, community safety, waste generation, pollution prevention, biodiversity loss, labour conditions, and GBV/SEA risks. Site identification shall be undertaken in close consultation with the E&S safeguards teams to avoid or minimise potential E&S risks. Furthermore, all sites, whether acquired on a temporary or permanent basis, must be secured under the guidance of the Project Implementation Unit and the Ministry of Lands. Appropriate land agreements shall be formalised prior to site occupation or use.
iii. Ensure inclusive stakeholder engagement, particularly with traditional authorities and affected community members, as per ESS10 (Stakeholder Engagement and Information Disclosure).
iv. Obtain formal approvals from relevant regulatory bodies, including the Malawi Environmental Protection Authority, and the Supervising Engineer.

2.2.4.1 Workers' Accommodation and Construction Camps

Workers' accommodation and construction camps will be established to house labourers and technical staff, especially in remote sections of the road corridor. To optimise logistics, these are expected to be located within a reasonable proximity (2–5 km radius) of bridge clusters. These will also be on temporarily leased land, avoiding areas of high ecological or social sensitivity. Camps will include basic amenities such as sleeping quarters, sanitation, clean water, and canteens, and will comply with the requirements of ESS2 (Labour and Working Conditions). The land take per camp is estimated to be 0.5 to 2 hectares, subject to detailed site selection that incorporates IFC guidelines on worker accommodation. The land acquisition of associated facilities must follow the World Bank requirements of ESS5 and national land acquisition and compensation act.

2.2.4.2 Construction Equipment Yards and Material Storage Areas

Each bridge construction site will require nearby staging areas for equipment maintenance, material handling, and fuel storage. Where space and terrain permit, these will likely be located within or adjacent to the 36-meter-wide road reserve. Alternatively, they may be consolidated at central locations to serve multiple bridge sites. The typical land requirement is expected to be less than 0.5 hectares per staging area, depending on the scale of operations. All staging areas shall also include designated workers' resting areas equipped with adequate shelter from sun and rain, and storage facilities for safe drinking water in line with occupational health and safety requirements.

2.2.4.3 Borrow Pits and Quarry Sites

The construction of the twelve bridges and associated roadworks will require significant quantities of construction materials, including sand, gravel, water, and aggregates. These materials will be sourced to ensure both technical feasibility and environmental sustainability. The project will not require the opening of new quarry sites. The project will require an estimated volume of 2,975 m³ of quarry aggregate (Table 2-2). All quarry aggregates, such as crushed stone and coarse aggregates for concrete and road base construction, will be procured from existing, licensed commercial quarries located within Mangochi District or in neighbouring districts such as Balaka and Machinga. These quarries are regulated under the Mines and Minerals Act (2019) and must demonstrate environmental compliance through valid licenses and environmental approvals.

The project will require an estimated 1190 m³ of sand (Table 2-2) that will be extracted from approved borrow pits and riverbanks near the project sites, subject to environmental permits and approval from the Mangochi District Council. In addition to obtaining the necessary permits, the contractor shall prepare and implement a site-specific Borrow Pit and Riverbank Extraction Management Plan to address environmental and social risks and impacts, in line with the ESMP and regulatory requirements. The likely river systems identified for sand mining and water abstraction include the Lungwena, Nkuli, and Unga rivers, which are located within 2 - 5 km of the respective bridge construction zones. The exact abstraction points will be determined by the Contractor during the mobilisation phase, and water use will be subject to approval under the Water Resources Act (2013). Key considerations include avoiding over-abstraction or ecological degradation of water bodies and ensuring sedimentation and erosion control at sand mining sites.

Temporary borrow pits will be required to source gravel and selected fill materials for road approaches and embankment works and a volume of 135,419.77 m³ will be required. These borrow pits will be located within 10 km of the construction zones to optimise haulage and reduce emissions, and sited on degraded or low-productive land where possible, and not within ecologically sensitive areas. All borrow pits must receive approval from the Mangochi District Council and MEPA prior to use, with site acquisition and access undertaken in consultation with the District Lands Office and the Project Implementation Unit (PIU). Each borrow pit

shall be rehabilitated at the end of its operational life, following closure and restoration plans consistent with ESS6.

Table 2-2: Estimated Material Quantities for the 12 Bridges

Bridge Name	Sand (m^3)	Aggregate (m^3)	Gravel/Soil (m^3)
Lusalumwe	120	300	13213.5
Nkuli	100	250	9344
Kalanje	50	125	9344
Lungwena	120	300	10769.02
Mbwazi	80	200	10769.02
Lutende	160	400	10769.02
Lilembwe	120	300	13144
Unga	80	200	13213.5
Lugola	60	150	10769
Lithuvu	60	150	11361.57
Chikosere	100	250	11361.57
Lilole	140	350	11361.57
Total	**1,190.00**	**2,975.00**	**135,419.77**

2.2.4.4 Cement

The project will require approximately 4713 MT of cement to construct bridges and other masonry works. This volume will be used to construct reinforced concrete structures such as abutments, piers, bridge decks, headwalls, and minor masonry works within the project corridor. Cement is expected to be procured from local suppliers in Malawi, including commercial depots in Mangochi, Zomba, and Lilongwe. Major suppliers such as Shayona Cement Corporation or Lafarge Malawi are likely sources. To facilitate mixing of concrete on-site, the contractor will establish a batching plant within the main construction camp. The batching plant will require approximately 0.04 hectares, which will be integrated into a larger 2-hectare camp site.

2.2.4.5 Bitumen

The project will use bitumen for the surfacing of approach roads at each of the 12 selected bridge sites, with a total surfacing requirement of 4.8 km (i.e., 400 m per site). Based on BoQs and the standard application rates, the total bitumen requirement is estimated at 70.6 MT. Depending on pricing and availability, Bitumen will most likely be sourced from South Africa or imported from the Middle East. About 393 drums will be required. The bitumen will be transported by road and directly delivered to the storage yard at the site camp. The bitumen will be heated to liquefy at the camp and transferred to bulk storage tanks. Bitumen is solid or semi-solid at temperatures below about 120 degrees Celsius. Therefore, specific health and safety measures will need to be adopted as specified in the project's health and safety plan.

2.2.4.6 Water Sources

On average, 200 m^3 of water will be required for construction purposes per day and around 15.6 m^3 of potable water will be required per day. Water is required during construction mainly

for (i) mixing or curing cement concrete, mortar, or grout; and (ii) earthworks, pavement courses, dust control, and incidental construction. The contractor is expected to utilise Water Tankers with a capacity of 10 m^3 and, as such, will be making about 12 trips per day to the water points. Potable water will be sourced from groundwater by constructing high yielding boreholes mainly at campsites. Portable water will also be provided in returnable bottles for drinking purposes on sites outside the camp. The final locations of the extraction points (for both construction and potable water) will require the approval of the National Water Resources Authority before the start of the extraction to ensure that over-extraction of water resources does not occur. Potable water will need to be tested regularly throughout the construction period to ensure it meets Malawi's drinking water standards.

2.2.4.7 Waste Disposal and Spoil Stockpile Areas

Waste will include cleared vegetation, spoil from earthworks, packaging, and construction debris. The Contractor must designate temporary stockpile areas within the road reserve or at nearby off-road sites. The contractor must also identify and use approved disposal facilities in coordination with the Mangochi District Council and MEPA. Most of the existing bridges on the Chingo-Makanjira Road are Bailey bridges, many of which were damaged or rendered hydraulically insufficient following Tropical Cyclone Freddy. The Bailey bridge components are owned by the Ministry of Transport and Public Works (MoTPW) and are not classified as construction waste. The Contractor will dismantle them under the supervision of the Supervising Engineer and representatives from the MoTPW and Roads Authority (RA). Storage of these components will be arranged in consultation with the MoTPW and RA, with temporary storage proposed at the Mangochi District Council premises, where they will be secured until the MoTPW, in coordination with the RA, reallocates them for use in other parts of the country. Transportation and storage will take into consideration all applicable requirements on OHS Community Health and Safety prescribed under the project.

2.2.5 Need for Resettlement

The rehabilitation works will result in both physical and economic displacement of certain individuals and households residing or conducting economic activities within the project's right of way. Although the project is confined to the existing 36-metre-wide road reserve, years of informal encroachment have led to the presence of residential structures, cultivated land, fruit trees, and small-scale businesses within this corridor. As such, resettlement interventions are necessary to address the associated loss of land, assets, and livelihoods. To address these impacts in a socially responsible and lawful manner, a separate Resettlement Action Plan (RAP) has been developed. This RAP provides a detailed account of the project-affected persons (PAPs), their entitlements, the types of losses incurred, and the compensation measures adopted to restore or improve livelihoods. Through census and asset verification processes, 203 Project Affected Persons (PAPs) have been identified (Table 2-3). This includes 122 female-headed households, 81 male-headed households, and five institutions. The affected land amounts to 3,632 square metres, and asset losses include 93 structures, of which 34 are residential structures. In addition, the project will affect 1,677 Indigenous trees, 204 fruit trees, and 517 exotic trees.

Table 2-3: Summary of Property Affected by Project

SN	Name of Bridge	No. of PAPs, Female	No. of PAPs, Male	No. of PAPs, Other	Total No. of PAPs	Land Affected (sqm)	Indigenous Trees	Exotic Trees	Fruit Trees	Structures
1	Lusalumwe	13	4	0	17	0	90	69	45	3
2	Nkuli	10	3	0	13	0	30	1	0	0
3	Kalanje	3	5	0	8	0	6	36	4	1
4	Lungwena	3	5	1	9	0	27	33	0	1
5	Mbwazi	10	3	0	13	0	141	49	1	0
6	Lutende	15	13	2	30	0	615	131	92	19
7	Lilembwe	18	19	1	38	22	9	19	7	34
8	Unga	7	3	0	10	0	154	25	0	4
9	Lugola	10	7	0	17	0	1	8	20	11
10	Lithuvu	13	3	0	16	0	89	6	3	3
11	Chikosere	10	10	1	21	3,610	49	86	5	5
12	Lilole	10	6	0	16	0	466	54	27	12
	Total	**122**	**81**	**5**	**208**	**3,632**	**1677**	**517**	**204**	**93**

While the standard design for each bridge site includes approach roads extending 200 metres on both the north and south sides, the actual distances assessed for compensation vary across sites due to differences in land use and the extent of community encroachment. In some locations, particularly those situated within floodplains or low-lying areas, there is little to no active land use by communities. However, if land outside the legally designated road reserve is temporarily or permanently acquired for construction activities (e.g., for camps, material storage, diversions, or access roads), compensation shall be provided in accordance with ESS5 and national legislation. This includes payment for any land, assets, or livelihoods affected, regardless of whether the land falls within the broader project footprint. Conversely, at sites where communities have occupied land closer to the road reserve, whether for farming, access paths, or structures, the total area assessed for compensation is larger. In such cases, additional land will be requiered not only for the approaches but also for ancillary works such as access routes, site clearance, and safety buffers. Where this land falls outside the legally designated road reserve, it will be subject to acquisition in line with national laws and ESS5 requirements, including the provision of compensation for any affected land, assets, or livelihoods. The figures presented in Table 2-4 therefore reflect only the actual impact on land and the corresponding land requirements for which land where compensation is required based on verified land use and disturbance, rather than the full standard construction footprint.

Table 2-4: Total Area Assessed for Compensation per Site

Bridge Section	North Side (metres)	South Side (metres)	Total Assessed (metres)
Lilole	257	336	593
Chikosere	215	188	403
Lithuvu	186	225	411
Lugola	198	169	367

Bridge Section	North Side (metres)	South Side (metres)	Total Assessed (metres)
Unga	210	200	410
Lilembwe	277	219	496
Lutende	328	242	570
Mbwazi	213	280	493
Lungwena	203	175	378
Kalanje	193	170	363
Nkuli	184	156	340
Lusalumwe	216	209	425

2.3 Project Phases and Activities

The Project will be implemented across four well-defined phases: (i) Planning and Design, (ii) Construction, (iii) Operation and Maintenance, and (iv) Demobilisation and Site Rehabilitation. Each phase involves specific project activities that are distinct in purpose, scope, and environmental and social implications.

2.3.1 Planning and Design Phase

The Planning and Design Phase commenced in 2023 and forms the foundation for all subsequent works. Key studies have been completed to inform the bridge design process. These include hydrological assessments using HEC-RAS modelling, structural capacity evaluations, geotechnical investigations, and topographic mapping of bridge locations and surrounding terrains. These studies helped define appropriate span configurations, scour protection needs, and embankment designs. The bridge designs have been updated to incorporate climate-resilient features in response to Tropical Cyclone Freddy's damage. These include increased span lengths, deeper foundations, river training works, erosion control, and improved hydraulic conveyance.

Consultations with Traditional Authorities, PAPs, and community members were conducted to share project objectives, verify land boundaries within the road reserve, and discuss potential impacts. Feedback from communities helped inform the updated designs. Surveys were conducted to establish existing environmental and social conditions, covering biodiversity, land use, vulnerable groups, and cultural heritage. These findings inform the ESIA and Resettlement Action Plan (RAP). Estimates of skilled and unskilled labour requirements were made. Early planning for sourcing local workers, preparing worker accommodation, and identifying logistics needs such as equipment yards and borrow pits began under this phase. However, specific sites for these facilities had not been confirmed at the time of this ESIA and will therefore be subject to separate environmental and social screening and assessment once locations are identified, in line with national requirements. At the end of this phase, final construction drawings, BoQs, and safeguards instruments were prepared, and the procurement process for contractors was initiated.

2.3.2 Construction Phase

The construction phase represents the transition from design to physical implementation. All construction activities will be confined within the road reserve boundary of 36 meters to

minimise land acquisition and environmental disturbance. A National Construction Industry Council (NCIC), certified contractor will be engaged to execute the works in accordance with the detailed engineering design and applicable standards, particularly those related to climate resilience. This phase is expected to span 24 months from 2025 to 2027.

2.3.2.1 Site Preparation and Access

All bridge sites will undergo systematic site preparation, which includes vegetation clearance, levelling of terrain, and grading of approach roads. Temporary bypasses and detour routes for traffic will be created entirely within the road reserve to maintain uninterrupted connectivity during bridge construction. For sites crossing active rivers, access roads and temporary platforms for machinery will be carefully designed to avoid encroachment into sensitive riverbanks beyond the designated corridor, with clearly visible markers installed to demarcate no-go zones and ensure construction activities remain within approved limits. Where existing bailey bridges are in place, these will be dismantled and removed as part of site preparation. The removal process will be undertaken in accordance with the ESMP provisions, with specific measures to manage OHS risks, traffic safety, and community health and safety during dismantling operations. This will include controlled dismantling sequences, restricted access zones, advance public notification of works, and safe handling and disposal or reuse of bridge components. Concrete rubble and other demolition debris from damaged infrastructure will be collected and transferred to designated temporary storage areas prior to reuse, recycling, or disposal in line with the Waste Management Plan. Construction support facilities, such as worker camps and equipment yards, will be located in pre-approved, environmentally screened zones within the reserve where feasible. All topsoil removed during preparation will be stockpiled stockpiled in temporary storage areas to be identified by the contractor, subject to prior environmental screening and approval by the supervising engineer. These sites will be selected to ensure sufficient capacity, be located away from drainage lines and erosion-prone areas, and incorporate bunding, silt fencing, and protective cover (e.g., mulching) to preserve soil quality for use in post-construction site restoration.

2.3.2.2 Foundation Construction

The foundation phase includes deep excavation, installation of piles (where required), and placement of concrete footings, all tailored to local geotechnical and hydrological conditions. At bridge sites intersecting live rivers or streams, any in-stream works required to facilitate construction will be undertaken using methods specified in the contractor's approved method statement. If temporary isolation of the construction zone from water flow is necessary, the contractor will select appropriate materials and techniques (e.g., biodegradable sandbag barriers, sheet piles, or other approved methods) that minimise sediment release and disturbance to aquatic habitats. All such works will be implemented in accordance with ESMP measures for erosion control, water quality protection, OHS, and community health and safety. These temporary diversion structures will be installed during the dry season to minimise hydrological disruption and ensure safe working conditions. Cofferdam construction will follow site-specific risk assessments and include sedimentation controls, flume pipes, and

energy dissipaters to reduce downstream impacts. The temporary diversions will be removed once foundations are complete and prior to reinstatement of natural flow paths.

2.3.2.3 Superstructure Construction

Following successful foundation works, superstructure construction will commence using Reinforced Cement Concrete (RCC) T-Girder beams pre-fabricated offsite or cast in situ. Erection of girders, bridge decking, parapets, and road furniture (e.g., guardrails, lighting, signage) will be executed using mobile cranes stationed within the road reserve. The construction sequence will be carefully managed to limit noise, dust, and traffic disruption. Curing of concrete elements will be done under shaded or insulated covers to ensure quality control in varying climatic conditions.

2.3.2.4 Transportation and Material Handling

Transport of gravel, sand, crushed stone, cement, steel, and asphalt will be managed through secure trucking routes that do not exceed the 36-metre corridor. All haulage vehicles will be covered to prevent material spillage and dust generation during transport. Wheel washing will be undertaken at site-based washing stations installed at all site exits to remove dirt, mud, and debris from vehicle wheels before they join public roads, thereby avoiding spillage and dust pollution. Material stockpiling and batching will occur in designated temporary areas within the corridor, and runoff controls, including silt fences, sediment traps, compacted berms, and lined drainage channels, will be established to prevent contamination of nearby soils and water bodies.

2.3.2.5 Core Construction Works

Across all twelve bridge sites, core construction activities will include:

- **Excavation and river training:** To prevent channel migration and erosion, riverbanks will be trimmed and lined with stone pitching or gabions. Excavated material will be either reused or disposed of in approved spoil areas.
- **Concrete works and reinforcement:** Reinforced concrete footings, piers, and abutments will be constructed using quality-controlled mixes. Deck casting and girder installations will follow specifications set out in the design report.
- **Road and pavement surfacing:** Each bridge will include 400 metres of asphalted road approach (200 m on either side), with a cross-section comprising 6.20 m of carriageway and 3.00 m of shoulders.
- **Drainage and scour protection:** Box culverts, cross drains, and side channels will be installed to direct stormwater away from roadbeds. Riprap and gabion mattresses will stabilise slopes and protect against future flooding.

2.3.2.6 Installation of Auxiliary Elements

Following the completion of the bridge superstructure and substructure works, the installation of auxiliary elements will be carried out to enhance both the functionality and safety of the bridges. This includes the mounting of handrails and guardrails along bridge edges and

approach roads to ensure vehicular and pedestrian safety. Where appropriate, bridge lighting systems may be installed, especially in more densely settled areas or at high-risk traffic points. The lighting systems will be solar-powered where feasible, aligning with environmental sustainability goals.

Drainage infrastructure, including deck scuppers, side drains, and edge channels, will also be installed at this stage to ensure proper stormwater runoff management and to prevent water accumulation on the bridge deck. Expansion joints, essential for accommodating structural movement due to temperature changes or traffic load, will be inserted to preserve the bridge's structural integrity and prevent cracking. The integration of these elements ensures long-term durability and operational safety.

2.3.2.7 Roadway Surfacing and Finishing

Once auxiliary structures are in place, the construction will proceed with the final surfacing of the approach roads and bridge deck. A typical surfacing system will comprise multiple layers, including the granular subbase, base course, and a 50 mm thick asphalt concrete wearing course, applied to both the deck and approach roads. These layers provide structural strength and a smooth, durable riding surface. Markings, signs, and other road safety features, including speed-calming measures and traffic signage will also be installed. Special care will be taken to ensure all road furniture complies with the Roads Authority's design standards. Final landscaping and erosion control features, such as grassing or stone pitching of embankments, will be undertaken to restore and stabilise the surrounding environment.

2.3.2.8 Inspection and Testing

Upon completion of all structural works, a comprehensive inspection and testing programme will be undertaken. Structural engineers will carry out integrity checks on all components, including piers, abutments, deck slabs, and bearings. Non-destructive testing techniques may be applied where necessary to assess the quality of the reinforced concrete and welding joints. Load testing will be conducted under controlled conditions to verify that the bridges can safely carry the intended vehicular and pedestrian loads. This may involve placing static or moving weights across the deck and measuring stress responses. Any anomalies identified during the inspection or testing will be addressed before formal commissioning of the bridge.

2.3.2.9 Environmental and Social Monitoring

Throughout the construction period, the contractor will implement a Contractors-Environmental and Social Management Plan (C-ESMP), developed based on this ESIA. The supervising engineer will verify that mitigation measures are effectively enforced and adjusted as necessary. Particular attention will be paid to maintaining water quality and water flows at bridge sites where cofferdams are used. Temporary sediment basins and silt fences will be installed to trap eroded materials before discharge.

2.3.2.10 Occupational Health and Safety

A robust Occupational Health and Safety Management Plan (OHSMP) will be implemented. Construction zones will be fenced, and marked with clear signage. All workers will be equipped with PPE and undergo OHS training prior to commencing work and refresher trainings during the construction period. Medical check-ups will be conducted twice a year, at the start of employment and mid-year, to confirm fitness for duty. First aid stations and firefighting equipment will be stationed at all active sites, and an emergency preparedness protocol will be in effect throughout the construction period.

2.3.2.11 Community Health and Safety

To mitigate risks to surrounding communities, construction activities will be limited to daylight hours, and these measures will be supported by the preparation and implementation of a Traffic Management Plan (TMP) and a Community Health and Safety Plan (CHSP). The TMP will detail safe traffic diversions, signage, and speed control measures, while the CHSP will outline measures for dust and noise control, management of construction site access, and emergency preparedness and response for incidents that may affect the public. Contractors will maintain clear communication with local leaders regarding construction schedules and disruptions. Safety marshals will control pedestrian and vehicle movement near active work zones. Awareness campaigns will inform residents about risks associated with moving equipment and open excavations. The project will also maintain a functional Grievance Redress Mechanism (GRM), allowing affected persons to raise complaints or suggestions, which will be tracked and resolved in coordination with the with community and district GRMC. In addition, the road designs will integrate safety features in settlement areas, including speed calming measures such as speed humps, rumble strips, pedestrian crossings, guardrails, and adequate signage to protect road users.

2.3.3 Operation and Maintenance Phase

The operation phase marks the transition from construction to the functional use of the infrastructure. This phase includes ongoing maintenance, safety oversight, and structural performance monitoring. All activities are aimed at sustaining the integrity, usability, and safety of the rehabilitated road and the twelve new bridge structures over their expected design lifespan.

2.3.3.1 Bridge Monitoring and Routine Maintenance

Each of the twelve RCC T-Girder bridges constructed under this project is designed for a minimum service life of 30 to 50 years, provided regular inspection and maintenance are conducted as per standards outlined in the Malawi Ministry of Transport and Public Works guidelines and the Roads Authority maintenance protocols. Routine maintenance includes:

- Visual inspections for cracks, joint deterioration, or concrete spalling
- Clearing of debris from expansion joints, parapets, and bridge decks
- Lubrication or replacement of bearings, where applicable
- Drainage system cleaning and vegetation control around bridge abutments and approaches

The integrity of the bridges will be monitored through a scheduled inspection regime, with maintenance interventions planned based on inspection outcomes.

2.3.3.2 Safety Audits and Feature Maintenance

Periodic safety audits will be carried out to verify the condition and functionality of safety features such as road markings, traffic signage, guardrails, and pedestrian walkways. Any worn or damaged features will be repaired or replaced as necessary. Although lighting infrastructure has not been included in the current bridge designs, any future inclusion of lighting systems by local authorities or other projects would also be subject to operational phase inspections and maintenance protocols.

2.3.3.3 Reporting and Record Keeping

The Roads Authority or its designated implementing agency will maintain records of inspection reports, maintenance activities, and incidents requiring urgent repair or emergency response. These records support long-term planning for rehabilitation and inform future upgrades based on performance trends and structural assessments.

2.3.3.4 Localised Drainage and Erosion Control

To prevent clogging, culverts, inlets, and stormwater drainage structures will be regularly desilted and cleared. Erosion around bridge abutments and wing walls will also be monitored, and necessary protection works, such as riprap replacement or re-compaction, will be implemented where erosion is identified. All drainage structures must be designed and aligned to discharge into stable areas ensuring that stormwater is not directed into settlements or cultivated farmland. Where outlets are near sensitive receptors, sediment traps will be incorporated to reduce erosion and sedimentation risks.

2.3.4 Demobilisation and Rehabilitation Phase

The Demobilisation and Rehabilitation Phase marks the formal conclusion of construction activities for the Project. It involves the systematic dismantling of temporary construction facilities and the restoration of all disturbed sites in accordance with national environmental regulations and project-specific environmental and social management measures. This phase is essential for ensuring that temporary impacts from construction are fully addressed and that the project leaves behind a safe, stable, and environmentally sound landscape. Prior to the commencement of demobilisation, the Contractor will prepare and submit a detailed Demobilisation and Site Rehabilitation Plan for review and approval by the Supervising Engineer. The plan will specify the schedule, methods, waste disposal arrangements, site restoration measures, and environmental protection practices to be followed during demobilisation.

2.3.4.1 Removal of Temporary Facilities

At the end of the construction period, all temporary facilities, including construction camps, workers' accommodation, equipment storage yards, batch plants, temporary soil stockpiles, coffer dams, and diversion roads, will be systematically dismantled and cleared. This will be done in a manner that avoids further disturbance to the surrounding environment and communities. All reusable and recyclable materials will be sorted and removed from the sites for appropriate disposal or reuse. The removal process will be supervised by the Supervising Engineer, with environmental oversight by the Contractor's Environmental and Social Safeguards team.

2.3.4.2 Rehabilitation of Borrow Pits, Sand Mining Areas and Spoil Areas

All borrow pits used for gravel and fill extraction will be progressively rehabilitated in line with the project's ESMP. This includes reshaping the excavated areas to ensure stability, filling where necessary, and covering exposed surfaces with topsoil. Native vegetation will be replanted to reduce erosion and restore ecological function to baseline conditions. Similarly, spoil stockpiles and waste areas will be flattened and stabilised to prevent further environmental degradation. Where pits were located on community or private land, the sites will be restored to a condition agreed upon with landowners or customary authorities prior to handover. Certification will be required from the district and MEPA before handover.

2.3.4.3 Waste Disposal and Site Cleaning

All remaining construction debris, including non-hazardous and hazardous waste, will be collected and disposed of at designated disposal facilities approved by the Mangochi District Council and MEPA, and in line with the EHS guidelines. Open burning and indiscriminate dumping will be strictly prohibited. Any residual materials, such as fuel or oil spills, will be cleaned in accordance with the project's spill response plan and environmental mitigation measures.

2.3.4.4 Restoration of Road Reserve and Surroundings

The 36-metre road reserve that hosted construction activities, stockpiles, detours, and machinery will be cleared and restored. This includes:

- Reinstating vegetative cover in disturbed areas
- Removing temporary diversions and reinstating natural drainage patterns
- Repairing any damaged community infrastructure such as paths, culverts, or water points

Restoration activities will be verified by the supervising engineer and documented through a final environmental inspection report.

2.3.4.5 Handover and Community Re-engagement

After all rehabilitation and demobilisation activities are complete, a joint site verification involving the Roads Authority, Contractor, Environmental and Social Specialists, and local

stakeholders will be conducted. This final inspection will confirm compliance with all environmental and social obligations. Handover of rehabilitated land (e.g., borrow pits or access roads) will be carried out in consultation with affected landowners or community representatives. Lessons learned from this phase will be compiled and submitted as part of the project's final Environmental and Social Completion Report.

2.4 Workforce and Employment

The implementation of the Project is expected to engage a significant number of workers during the planning, construction, and operation phases. Labour will be drawn from both local and non-local sources, with a deliberate emphasis on maximising local employment and ensuring inclusive participation in line with the Malawi Gender Policy and international best practices. Workforce planning will also adhere to the requirements of the World Bank's ESS2 on Labour and Working Conditions.

2.4.1 Workforce Estimates by Project Phase

During the planning and design phase, approximately 30 professionals and support staff, including engineers, surveyors, environmental and social experts, and planning officers, were involved. These were primarily technical personnel engaged on a short-term consultancy basis. During the construction phase will employ up to 300 workers, disaggregated as follows:

- ***Skilled workers:*** 50 (e.g., engineers, technicians, plant operators)
- ***Unskilled workers:*** 200 (primarily from surrounding communities)
- ***Management and supervisory staff:*** 50 (including site managers, foremen, health and safety officers).

During the operation and maintenance phase, a smaller core team of approximately 20–25 people will be required to carry out routine maintenance, inspections, and emergency works. This team may include Roads Authority personnel and contracted service providers.

2.4.2 Labour Composition and Inclusivity

The project is committed to fostering diversity and inclusion within its workforce. A minimum of 40% of the workforce will be female, including in unskilled and semi-skilled roles. Opportunities will be tailored to encourage female participation in road safety management, environmental monitoring, catering, administration, and community liaison activities. Labour will be categorised into skilled, semi-skilled, and unskilled groups. Unskilled workers will be prioritised for local hiring and offered on-the-job training to improve their skill sets. It is estimated that at least 70% of the total workforce will be locally sourced from within the project area (TAs Namavi, Makanjira, Chowe, and Chapola in Mangochi District), with the remaining 30% being non-local or expatriate personnel offering specialised technical inputs.

2.4.3 Worker Accommodation and Transport

The contractor will be required to provide temporary worker accommodation facilities for non-local workers in accordance with the World Bank's worker accommodation standards. These will be located within designated contractor camp sites, which will not exceed 2 hectares in

total area. The project will ensure transport for local workers from nearby villages to bridge construction sites and back, with designated pickup and drop-off points to minimise risks and delays. The Project must ensure that transportation meets minimum standard safety requirements. The project will also provide separate sanitation facilities for men and women, potable water, medical first aid, and recreation spaces within the accommodation area and at all active sites.

2.4.4 Occupational Health and Safety (OHS) Provisions

A comprehensive OHS Management Plan will be developed and implemented by the contractor, which will include:

- Provision of Personal Protective Equipment (PPE) to all workers, including helmets, gloves, boots, and reflective jackets.
- Regular safety training, including toolbox talks, induction sessions, and emergency response simulations.
- Monitoring of worker health, particularly for heat stress, malaria, and respiratory risks associated with construction dust.
- Fire safety and accident prevention measures, including the installation of firefighting equipment and the assignment of trained emergency marshals.
- Grievance redress mechanisms specific to labour, ensuring confidential and accessible reporting channels for complaints or safety concerns.
- Basic pre-employment and periodic medical assessments for workers engaged in high-risk activities to confirm fitness for duty and detect any health conditions that may increase vulnerability.

2.4.5 Working Conditions and Labour Rights

All workers will be employed under conditions consistent with Malawi's Employment Act (2000), the Occupational Safety, Health and Welfare Act (1997), and the World Bank's ESS2. The project will:

- Uphold freedom of association and prohibit child labour and forced labour.
- Ensure non-discrimination in recruitment, remuneration, and career advancement.
- Provide contracts, and be interpreted to local language, with clear terms and conditions, including payment schedules, leave entitlements, and responsibilities.
- Establish a Worker Code of Conduct, and be interpreted to local language, to promote discipline, non-violence, respect for communities, and ethical behaviour on and off-site.

2.5 Waste Generation and Management

The project is expected to produce different types of waste, including hazardous and non-hazardous waste. Table 2-5 shows the expected type of waste and proposed management measures. To manage solid waste effectively, the contractor will be required to construct a temporary waste storage facility with sufficient capacity to store waste produced over a 30-day period. Specifically, the contractor must ensure that their facility has a minimum storage capacity of 2,500 kilograms per month. For liquid waste, the contractor will be responsible for

constructing a septic tank with a minimum capacity to handle 300 litres per day. 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.

2.5.1 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 Mangochi District. 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.

2.5.2 Liquid Waste Management

During the construction phase, more than 15.6 cubic litres 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.

2.5.3 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 Mangochi District. 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.

Table 2-5: Type of Waste Expected from the Project

Waste Stream	Possible Sources	Working Estimate	Estimated Quantity	Proposed Waste Management Measures
Empty 200-Litre Bitumen Drums	Road surfacing operations	70.6 tonnes of bitumen, at 200L/drum	~353 drums	Drums to be incinerated or cleaned and recycled through licensed facilities. Storage in a secure area on site.
Used Batteries	Mobile machinery and plant	1 battery per equipment unit; ~100 units	~100 batteries	Store in leak-proof containers and return to certified recyclers or hazardous waste handlers.
Metal Scrap	Demolition, equipment maintenance	~1 tonne/site × 12 sites	~12 tonnes	Collect, sort, and recycle through certified scrap dealers. Store securely on site.
Used Oils	Vehicle and machinery maintenance	500L/fleet unit × 40 fleet units	~20,000 litres	Collect in sealed drums; dispose through certified hazardous waste contractors. Spill kits to be deployed on site.
Cleaning Chemicals (Detergents)	Equipment/facility cleaning	3L/month × 5 sites × 30 months	~450 litres	Use eco-friendly detergents. Collect and dispose of containers in compliance with MEPA waste guidelines.
Excavated Soil and Debris	Earthworks, drainage, road works	1m³ per 10m²; ~705,500m²	~70,550 m³	Reuse for backfilling or landscaping. Dispose of surplus in MEPA-approved dumpsites.
Concrete Waste	Bridge and culvert works	5% of 4,713MT of cement used	~236 MT	Crush and reuse for pavement or shoulder fill. Non-reusable waste sent to designated facilities.
Construction Rubble	Demolition of structures, culverts	0.01T/10m² construction area	~70.5 tonnes	Reuse or send to council-approved disposal sites.
Cement Bags (Packaging Waste)	Cement batching and handling	20 bags/MT of cement × 4,713 MT	~94,260 bags	Reuse or recycle. Non-recyclable waste to be disposed of per MEPA guidelines.
Wood Waste (Formwork, Temporary Structures)	Formwork, scaffolding	0.02T/100m² × 25,000m²	~5 tonnes	Reuse or donate locally. Non-usable wood disposed of per regulation.
Domestic Waste	Worker camps, site offices	0.2 kg/day × 250 workers × 900 days	~45 tonnes	Sort at source, compost organic waste, recycle plastic and paper. Non-recyclables taken to licensed dumpsites.
Plastic Waste	Packaging, food containers	0.5 kg/month × 250 workers × 30 months	~3.75 tonnes	Minimise single-use plastics. Recycle wherever possible; dispose of non-recyclables properly.
Sewage	Worker camps, site offices	15.6 m³/day × 900 days	~14,040 m³	Septic tanks or mobile treatment systems to be used. Discharge only with MEPA-approved methods.

2.5.4 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; this pit will have to comply with safety, environmental protection and regulatory requirements. 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 MEPA, which might not be definite. However, the project must construct a hazardous waste storage facility, i.e., a lined shed, within the temporary waste disposal site. The facility will be designed and sized in accordance with the World Bank General EHS Guidelines, ensuring sufficient capacity to safely store the maximum expected volume of hazardous waste generated between collection intervals. Storage capacity will be determined based on the estimated hazardous waste generation rate (in m^3/month), the frequency of waste collection or off-site transfer, and the nature of the materials. 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. This storage facility must adhere to capacity and containment standards, ensuring that secondary containment can hold at least 110% of the volume of the largest stored container, preventing leaks or spills from reaching the environment

Hazardous waste management will be complemented by licensed waste collectors who can identify the companies that recycle such waste. Empty drums containing bitumen will first be stored in the hazardous waste storage facility until they are cleaned and prepared for transfer. They will then be disposed only to licensed recycling companies that process scrap metals, in compliance with the project's hazardous waste handling procedures. The project will verify the entire supply chain to ensure that the waste products do not reach unauthorised personnel. However, the project will follow the whole supply chain to mitigate any potential scenario whereby the waste product has unauthorised personnel. For automobile batteries and other waste, the contractors will identify licensed waste collectors to recycle the mentioned waste.

2.6 Equipment, Technology, and Machinery

The successful execution of the Project, particularly the construction of twelve reinforced concrete bridges and the upgrading of road sections, will depend significantly on the deployment of appropriate machinery, equipment, and construction technologies. The selection and use of this equipment are guided by the technical requirements of the works, site-specific conditions, and the need to mitigate environmental, health, and safety risks throughout the project lifecycle. The construction contractor will be required to mobilise a wide range of heavy and light machinery to support civil works such as earthworks, material processing, road surfacing, drainage installations, bridge construction, and logistical operations. All equipment will be operated in line with manufacturer safety specifications and environmental regulations.

The core types of machinery anticipated to be used across the bridge construction sites and associated road works are listed in Table 2-6. This inventory reflects the standard requirements for medium to large-scale road and bridge infrastructure projects in Malawi and complies with

the project's technical specifications. It represents the minimum number of machines expected to be deployed across the 12 bridge sites during peak construction periods.

Table 2-6: Machinery and Equipment to be Used Onsite

Equipment Type and Characteristics	Use of Equipment	Minimum Required
Bulldozer (>D7)	Clearing, grubbing, and earthmoving for site preparation	4
Excavator (>920HP)	Excavation of foundations, trenches, and removal of debris	6
Mobile Crushing and Screening Plant (≥150 m³/h) – incl. washing unit	Processing aggregates for concrete and pavement works	2
Chip Spreader	Even application of aggregate chips for surface dressing	2
Bitumen Distributor	Spraying bitumen for road surfacing works	2
Front-End Loader (>135HP)	Loading aggregates, sand, and other materials	2
Concrete Batching Plant (≥60 m³/h)	Producing concrete for bridge and approach works	2
Motor Grader (>135HP)	Grading and levelling road approaches	6
Steel Drum Roller (>10T)	Compacting asphalt and granular materials	4
Sheep Foot Roller	Compacting cohesive soils	2
Pedestrian Roller	Compacting small or confined areas	2
Pneumatic Tire Roller	Sealing asphalt surfaces and compacting granular layers	2
Bitumen Storage Plant	Storage of bulk bitumen for surfacing operations	2
Tipper Truck (10T capacity)	Transporting construction materials and spoil	20
Water Bowsers (10 m³ capacity)	Dust suppression and provision of water for construction	4
Concrete Mixer	Mixing concrete on-site for small works	2
Concrete Truck	Transporting ready-mix concrete to site	2
Mobile Crane	Lifting heavy bridge components	2
Flatbed Truck	Transporting large structural components	2
Low Bed	Transporting heavy equipment	2
Pick-Up Vehicles	Small equipment transport	8

All machinery will be operated by trained personnel certified in occupational safety and equipment handling. Additionally, all equipment will be clearly labelled, securely parked in designated machinery yards, and monitored regularly by site supervisors. The contractor shall ensure:

- Routine maintenance and servicing of equipment to prevent air and noise pollution, oil leaks, and mechanical failures.
- Fuel and chemical storage areas are located away from sensitive receptors and include spill prevention systems.
- Machine operation schedules are managed to limit disruption to nearby communities, especially in densely populated settlements.
- Noise-reducing equipment or enclosures are installed where operations are expected to exceed acceptable sound levels.
- All construction machines must comply with Malawi Bureau of Standards (MBS) requirements and MEPA environmental regulations.

Chapter Three: Review of 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.

3.1 Relevant Malawi Policies and Legislation

Malawi as a signatory to the 1992 Rio Declaration on Environment and Development, Principle 17 of the declaration commits it to undertake environmental impact assessments (as a national instrument for environment management), subject to a decision of a competent authority, on all proposed activities likely to have a significant adverse impact on the environment. Following the declaration, several policies and legislation on environmental management have been developed, the overarching legislation of which is the Environment Management Act (EMA). Apart from EMA, the Malawi guidelines for Environmental Impact Assessment were developed in 1997.

The proposed project is responsive to policies and legislation related to water, land, environment, human settlements, gender, and others. In addition, Malawi is a signatory to key International Labour Organization (ILO) Conventions relevant to labour rights and occupational safety, including the Forced Labour Convention, 1930 (No. 29), the Abolition of Forced Labour Convention, 1957 (No. 105), the Discrimination (Employment and Occupation) Convention, 1958 (No. 111), the Equal Remuneration Convention, 1951 (No. 100), the Minimum Age Convention, 1973 (No. 138), and the Worst Forms of Child Labour Convention, 1999 (No. 182). By implication, therefore, the proposed project must ensure that the requirements in all relevant sectorial policies and legislations are understood and compiled to enhance sustainable environmental management and utilization of other resources. Therefore, this section presents an outline of selected policies that are directly relevant to the project.

3.1.1 The National Environmental Policy (2004)

The National Environmental Policy (NEP) is the key instrument that provides standards or benchmarks for environmental and natural resources policies and legislation in Malawi. The overall goal of the NEP is "The promotion of sustainable social, economic development through sound management of the environment in Malawi", and some of the goals that the NEP seeks to accomplish are:

a) It emphasizing the need for environmental impact assessments to mitigate the ecological footprint of such projects. An independent EIA has been prepared to identify the anticipated impact during project construction and operation.
b) It stresses the importance of planning and development in a manner that avoids significant alteration or damage to the environment. The policy also underscores the necessity of incorporating environmental sustainability into all phases of bridge rehabilitation projects, ensuring that they do not adversely affect natural habitats and

biodiversity.

c) Additionally, integration of environmental management principles into the project planning and implementation phases to prevent environmental degradation and promote the conservation of natural resources. This includes the management of impacts on water bodies, air quality, and local ecosystems, which are relevant to bridge rehabilitation projects that can significantly alter landscapes and local environmental conditions.

The rehabilitation of selected bridges will result in improved economic activity in the districts and the region. The project construction activities should be planned in a manner to minimize impact on regional biodiversity, water resource utilization and its management, less emission of pollutants by adopting control measures. The project must ensure community participation by repetitive consultation in project influence area, integration of community advise in project design. Involving less productive land within carriage way, to align with national goal for environmental protection and sustainable development.

Additionally, the project must establish mechanisms for ongoing environmental monitoring and management to address any unforeseen impacts, thereby ensuring compliance with the policy's objectives for safeguarding Malawi's natural resources.

3.1.2 The Malawi National Land Policy (2002)

This policy addresses the need for improved land administration, environmental conservation, and inter-sectoral coordination. These elements are crucial for infrastructure projects like bridge rehabilitation, as they provide a framework for land acquisition, compensation, and environmental considerations, ensuring that such projects align with national development goals and land use planning objectives.

- Section 4.15 discusses the government's authority to acquire private land for public use or redevelopment, ensuring that such provisions are stipulated to prevent abuses of this power.
- Section 4.16 elaborates on the government's obligation to protect legally acquired property rights and the entitlement of landholders to compensation if the government acquires their property for public use. The section stresses the importance of fair and adequate compensation.
- Section 5.1 covers the comprehensive scope of land administration, including land rights delivery, land use planning, survey and demarcation, registration and maintenance of land information, and environmental impact monitoring of land-based activities.
- Sections 9.9 and 9.10 provide guidelines for managing sensitive ecosystems, such as wetlands, by requiring environmental impact assessments before permitting development activities.

Based on this Policy, the Project should adhere to rigorous standards for land acquisition, ensuring fair compensation and protection of property rights as outlined in Sections 4.15 and

4.16. It must also incorporate comprehensive land administration measures from Section 5.1, including accurate surveying, demarcation, and registration, alongside robust environmental impact assessments for activities in sensitive ecosystems per Sections 9.9 and 9.10. This adherence will guarantee that the ML road project aligns with national development goals while safeguarding natural resources and community interests, particularly in the development of the RAP.

3.1.3 The National Water Policy (2005)

The overall policy goal is sustainable management and utilization of water resources to provide water of acceptable quality and of sufficient quantities and ensure the availability of efficient and effective water and sanitation services that satisfy the basic requirements of every Malawian and for the enhancement of the country's natural ecosystems. The policy is based on the premise that all people should have access to potable water and adequate sanitation services to reduce incidences of water-related diseases.

The Policy guides bridge and road construction in Malawi through a commitment to sustainable management and utilization of water resources. It emphasizes the protection of water resources during infrastructure projects to ensure they do not contribute to degradation and depletion. The rehabilitation of the selected bridges must incorporate measures to prevent significant environmental impacts on water bodies and include the public in water use and management discussions.

3.1.4 The National Gender Policy (2015)

As stipulated in Section 1.3, the national Gender policy provides guidelines for mainstreaming gender in various sectors of the economy to reduce gender inequalities and enhance the participation of women, men, and youth for sustainable and equitable development and poverty eradication in the country. According to Section 3.6 of the policy, persistent gender inequalities and under-representation of women in decision-making positions at all levels necessitated developing and implementing the gender policy to address such gender imbalances and other related issues. The proposed project will economically empower women to increase household income, reducing poverty. Increasing women's labour force participation, productivity and earnings will directly impact poverty reduction and stimulate economic growth and development.

Section 3.7 of the policy recognises that Gender Based Violence (GBV), especially violence against women, girls, and vulnerable groups, is a severe impediment to social well-being and poverty reduction. In alignment with the National Gender Policy, the bridge rehabilitation project must ensure gender mainstreaming throughout its planning and implementation phases. This includes equitable employment opportunities for women and men, ensuring that women are involved in decision-making processes, and that the benefits of the infrastructure development, such as access and utility, are equally accessible to both genders.

3.1.5 The National Climate Change Management Policy (2016)

This National Climate Change Management Policy provides comprehensive guidance on integrating climate change mitigation and adaptation into proposed road projects. It emphasizes the importance of incorporating climate-resilient measures to reduce the vulnerability of infrastructural developments to the adverse effects of climate change. It includes designing roads that can withstand extreme weather conditions and incorporating landscape and environmental considerations to minimize the carbon footprint of construction activities.

By adhering to this policy, the bridge rehabilitation project must incorporate climate change adaptation and mitigation strategies. This includes using environmentally sustainable materials, implementing designs that are resilient to climate variability and ensuring that the construction and maintenance phases consider the reduction of greenhouse gas emissions and enhancement of local ecosystems.

3.1.6 National Sanitation Policy (2008)

The National Sanitation Policy provides a vehicle to transform Malawi's hygiene and sanitation situation. Section 1.2 of the policy mentions that it provides both guidelines and an action plan where, by 2020, all the people of Malawi will have access to improved sanitation, safe, hygienic behaviour will be the norm and recycling of solid and liquid waste will be widely practised leading to healthier living conditions, a better environment, and a new way for sustainable wealth creation. One of the policy objectives, as highlighted in section 3.1.1, is the improvement of hygiene, sanitation, and recycling of waste in the country. The proposed project must implement liquid and solid waste management measures ensuring the waste management hierarchy to prevent, reuse, recycling, reduce and dispose, hence complying with the provisions of the policy.

3.1.7 National HIV and AIDS Policy (2022 to 2027)

The main purpose of the "National HIV and AIDS Policy 2022-2027" is to guide the achievement of game-changing strategies that will move Malawi toward HIV epidemic control in line with SDG 3.3 of ending AIDS as a public health threat. The policy aims to reduce new HIV infections, AIDS-related morbidity and mortality, improve social support services for people living with HIV (PLHIV) and affected households, and create an enabling environment for effective implementation of HIV and AIDS interventions. Section 3.7: Policy Priority Area 7 - Sustainable and Enabling Environment for HIV and AIDS Response outlines the need for resilient and sustainable systems for delivering HIV and AIDS services, including within the workplace. It focuses on strengthening governance, leadership, and coordination at all levels, including workplace settings, to ensure that HIV interventions are effectively implemented. Section 4.1.7: Institutional Arrangements tasks the Ministry of Labour with overseeing the implementation of HIV and AIDS workplace policies across public and private sectors. It highlights the importance of workplace inspections and programming to ensure compliance with national HIV and AIDS policies.

In compliance with this Policy, the Project must develop and implement a workplace HIV and AIDS policy, conduct training sessions for all employees, and regularly review the policy for

effectiveness and compliance with national guidelines. Integrate non-discrimination clauses into employment contracts, provide regular training to management and staff on diversity and inclusion, and establish a confidential reporting system for discrimination cases.

In addition, the project should partner with health service providers to offer regular on-site health checks, HIV testing, and counselling sessions; distribute educational materials and hold workshops on HIV prevention and health maintenance; and organize awareness campaigns, establish support groups for employees affected by HIV, and engage leadership to champion HIV and AIDS initiatives within the organization. It should also conduct audits to ensure compliance with HIV and AIDS-related laws and provide training to human resource and management teams on legal compliance.

3.1.8 National Transport Policy (2015)

The National Transport Policy encompasses a comprehensive framework to enhance the transport sector's efficiency, safety, and sustainability. It provides the direction and intent of the Government of Malawi in developing the transport sector for it to contribute towards the country's development objectives effectively. The Policy guides operations in the transport sector by providing a course of action to determine present and future decisions in the sector in response to national development goals. Section 1.2.1.1 details that road transport remains the major mode of transport in Malawi, handling more than 70% of the internal freight traffic and 99% of passenger traffic.

Section 2.1 provides the policy goal to ensure the development of a coordinated and efficient transport infrastructure that fosters the safe and competitive operation of viable, affordable, equitable and sustainable transport services. Section 3 provides policy priority areas with improving transport infrastructure, including rural transportation. The policy promotes the following:

- Use and enforce appropriate road design standards that consider road safety measures and traffic levels and include adequate provision for non-motorised transport.
- Establish mechanisms for providing and managing local transport infrastructure, emphasising farm-to-market connectivity and improved access to social facilities.
- Encourage community participation, particularly of women, in infrastructure planning, development and maintenance using labour-based technologies.
- Ensure that small-scale community contractors have the capacity and opportunity to undertake civil works on district and community roads.
- Provide for safe movements of pedestrians and non-motorised vehicles.

Section 3.8 covers crosscutting issues that include social and environmental management, gender mainstreaming, disaster risk management and developing a climate-resilient transport network.

Implications of the policy to the project are that the road design must consider the needs of the rural population, especially those of women, children, physically challenged people, and all

other vulnerable groups. The road design must ensure compliance with relevant standards and regulations that mitigate disaster risks and climate change.

3.1.9 National Labour and Employment Policy (2012)

The National Employment and Labour Policy (NELP) seeks to place employment as a central objective of social and economic policies, making it one of the major drivers of poverty reduction. It represents deliberate efforts by the Government to put together measures that promote employment growth in terms of quality and quantity, whether directly or indirectly.
The overriding goal of this policy, as indicated in section 2.1, is to promote the attainment of full employment and decent work in the country. Section 3.2 provides priority area for labour market information which is critical in bridging the information gap in the labour supply and its demand by employers. The policy statement provided in section 3.2.1 points to reliable and timely labour market information is made available and accessible.

Section 3.6 details priority area 6 (Employment of Vulnerable Groups and Promotion of Gender Equality), which mentions that the Government recognises that employment of vulnerable groups such as women and persons with disabilities is important for wealth creation and poverty eradication. The policy statement in the section mentions that the policy will ensure:

- The promotion of gender and disability mainstreaming in employment.
- Provision of appropriate skills to women, persons with disabilities and other vulnerable groups to enable their full participation in the labour market.
- Provision of equal opportunity for participation of the vulnerable in economic activities.

In compliance with the National Labour and Employment Policy, the project must: Prioritize hiring local labour and offer fair wages, safe working conditions, and respect for workers' rights; Implement a system for regular monitoring and reporting on employment data, including the number of jobs created, the types of jobs, and the demographics of the workers employed; and ensure that recruitment processes are inclusive, offering equal opportunities to women, persons with disabilities, and other vulnerable groups.

In addition, the project should provide on-the-job training and skills development for all workers, with a focus on upskilling vulnerable groups to enhance their employability in the construction industry; establish and enforce non-discriminatory hiring practices to ensure that all employees have equal access to employment opportunities and career advancement within the project.

3.1.10 Malawi 2063 Vision

Malawi 2063 (MW2063) is the country's long-term development strategy aimed at transforming Malawi into an inclusively wealthy and self-reliant industrialised upper-middle-income country by 2063. It focuses on key pillars, including agriculture commercialisation, industrialisation, and urbanisation. The vision also highlights key enablers, such as

infrastructure development, human capital development, and environmental sustainability. The MW2063 includes several sections relevant to infrastructure and transportation projects:

a) Enabler 5: Infrastructure Development

- MW2063 emphasises the importance of developing a comprehensive and efficient transport infrastructure network, including road systems, to support economic growth. For this proposed project, this enabler aligns with improving regional connectivity, facilitating trade, and enhancing accessibility to markets and services.

b) Pillar 1: Agricultural Productivity and Commercialization

- One of the primary goals of MW2063 is to transform Malawi's agriculture sector from subsistence farming to a commercialised industry. Improved road networks, especially in agricultural hubs, are crucial for transporting agricultural produce to markets, processing centers, and export points efficiently.

c) Pillar 3: Urbanization

- MW2063 seeks to promote urbanisation and the development of secondary cities to foster economic growth. Developing road infrastructure in rural and peri-urban areas such as Mangochi is pivotal for connecting these areas to urban centres, supporting urbanisation, and easing the movement of people and goods.

In summary, the project aligns with several pillars and enablers outlined in Malawi 2063. Its implications include:

- Aligning with infrastructure development goals by upgrading transport systems is crucial for socio-economic growth.
- Supporting agricultural commercialisation by improving market access for farmers.
- Facilitating urbanisation and economic development through enhanced connectivity and regional trade.

3.1.11 National Disaster Risk Management Policy (2015)

The policy provides Malawi's strategic framework for reducing disaster risks, enhancing resilience, and ensuring coordinated disaster response. It aligns with international frameworks such as the Hyogo Framework for Action and addresses the country's vulnerability to hazards like floods, droughts, cyclones, and earthquakes. The policy focuses on prevention, mitigation, preparedness, response, and recovery, with an emphasis on mainstreaming disaster risk management into development planning. Key policy objectives include:

- Strengthening institutional frameworks for DRM at national and local levels, ensuring coordination between government, NGOs, and communities.
- Mainstreaming DRM into sectoral policies and development plans to reduce vulnerabilities.
- Enhancing early warning systems and improving the use of hazard and risk information.
- Promoting risk reduction measures in land use, infrastructure development, and environmental management.
- Improving disaster preparedness and response capacity, including community-based DRM approaches.
- Facilitating recovery and rehabilitation with a focus on building back better.

This policy is highly relevant because the project area may be exposed to hazards such as floods, heavy rains, and extreme weather events, especially during the construction phase. The policy underscores the need for integrating disaster risk considerations into infrastructure design, which implies the bridge designs should be climate-resilient and withstand extreme weather. It also supports community preparedness, meaning local stakeholders should be engaged in emergency planning related to construction works. Furthermore, the project should establish site-specific disaster preparedness measures, including evacuation routes and protocols for severe weather events, in line with the policy's emphasis on reducing loss of life and property.

3.2 Relevant Malawi Legislative Framework

3.2.1 Constitution of the Republic of Malawi, 1995

The constitution of the Republic of Malawi is supreme over any legal policy or Act in Malawi. Any Act of Government or any law inconsistent with the constitution's provisions will be invalid to the extent of such inconsistency (Section 5). The reviewed policies and legislation relevant to the project must align with the Constitution.

The proposed project must promote gender equality and human rights. Under Section 12 (e), it is stated that it is the responsibility of the state to achieve gender equality for women through total participation of women in all spheres of the Malawian society, based on equality with men; Implementation of principles of non-discrimination of policies to address social issues such as domestic violence, security of the person, maternal benefits, economic exploitation, and property rights.

Part (d) of section 13 addresses the need for managing the environment and sustainable development of natural resources to prevent degradation, provide a healthy living and working environment for the people of Malawi, accord full recognition to the rights of future generations, and to conserve and enhance the biological diversity of Malawi. In compliance with the Constitution, the proposed project must conduct an ESIA, develop and implement an ESMP and associated sub-plans. The project must obtain approval and clearance from MEPA.

3.2.2 Environmental Management Act, 2017

The Environment Management Act provides the protection and management of the environment and the conservation and sustainable utilization of natural resources. The Act is the principal piece of legislation on protecting and managing the environment. Under section 6, the Act states that 'subject to the constitution, where a written law on the protection and management of the environment or the conservation and sustainable utilization of natural resources is inconsistent with any provision of the Act, the written law will be invalid to the extent of the inconsistency. To integrate environmental and social considerations in this project, the Act provides for environmental planning and the need for Environmental and Social Impact Assessment (ESIA). Environmental planning is required to be done both at national and district levels. Section 31 of the Act is on environmental and social impact assessments. The Act stipulates that the board may, on the recommendation of the Authority,

specify by notice published in the Gazette the type and size of projects which will not be implemented unless an Environmental and Social Impact Assessment is carried out. It also specifies that a person will not undertake any project for which an Environmental and Social Impact Assessment is required without the written approval of the Authority and except per any conditions imposed in that approval.

Section 26 (3) of the Act provides that a licensing authority will not issue any license concerning a project for which an ESIA is required under the Act unless the Director General has certified in writing that the board has approved the project or that an ESIA is not required under the Act. Guidelines for Environmental Impact Assessment were put in place in December 1997. These guidelines list projects for which an ESIA is mandatory and the steps to be followed when preparing an ESIA. The road upgrade project falls under the list of prescribed projects in the EIA guidelines, of which ESIA is mandatory, hence this ESIA study. To fulfil the requirements of this Act, the following procedure was followed:

- A project brief on the proposed project was prepared by the project proponent and submitted to the MEPA for scrutiny and advice to the proponent.
- The Director General of MEPA communicated to the Project Proponent the need for the proponent to conduct an ESIA, and the information provided included the Terms of Reference (TORs) for the ESIA study.
- Must conduct an ESIA and obtain MEPA approval as required by the EMA 2017.

3.2.3 Land Laws

Land Act, 2016

The Act was enacted to provide for land administration and management in Malawi. The Act groups land into two categories, "private land" and "public land". Public land comprises Government land and unallocated customary land. The Land Act also makes provisions for land acquisition, including compensating people affected by any project. Section 13 sub-sections (1), (2), and (3) states that "any person who, because of any acquisition, suffers any disturbance or loss or damage to any interest which he may have or immediately before the occurrence of any of the events referred to in this section, may have had in such land will be paid such compensation for such disturbance, loss or damage as is reasonable."

Land (Amendment) Act, 2022

The Act categorizes Land as public, customary, or private. "Public land" means land held in trust for the people of Malawi and managed by the Government. "Private land" means all land owned, held, or occupied under a freehold title, leasehold title or as a customary estate or registered as private land under the Registered Land Act. "Customary land" means land held, occupied, and used following customary law and practice prevailing in the traditional land management area.

Customary Land Act, 2016

In this Act, Customary Land is defined as all land held, occupied, or used under customary law but does not include public land. Section 17 Subsection 4 says, "Where any portion of the

customary land to be transferred has been allocated to a person or a group of persons under a customary estate or a derivative right to use the land, the land committee will inform those persons or, where any one of those persons is absent, a member of the family occupying or using the land with that person, of the contents of the notice". Section 17 subsection 8 states that customary land will be transferred subject to payment of appropriate compensation as assessed by a registered valuer and agreed upon by the land committee and the Commissioner. Section 20 (1) (c) says that a land committee will allocate customary estate to a partnership or corporate body, most of whose members or shareholders are citizens of Malawi.

Customary Land (Amendment) Act, 2022

Sections 4 and 6 of the Act state that a land committee and a Traditional Authority will manage the customary land within their jurisdiction following the prevailing customary law, on trust, as if the committee or the Traditional Authority were a trustee. The residents in the area were beneficiaries under a trust of the customary land.

Land Acquisition and Compensation (Amendment) Act, 2022

The Act gives powers to the Minister or local government authority to acquire land for public utility, either compulsorily or by agreement, and pay appropriate compensation thereof. Section 4 of the Act gives powers to the acquiring authority to enter, dig, clear, set out and mark the boundaries of the proposed land, do all other acts necessary to ascertain whether the land is or may be suitable, provided such entry is preceded by a notice to the occupier seven days before; and the acquiring authority is ready to pay for the damage done by the persons entering such land. Section 9, states that the acquiring authority will pay appropriate compensation and be in one lump sum. Section 10 lists the grounds for compensation as loss of occupational rights, loss of land, loss of structure, loss of business, relocation costs, loss of goodwill, costs of professional expenses, injurious affection, nuisance, loss or reduction of tenure or disturbance.

Physical Planning (Amendment) Act (2022)

The Physical Planning Act governs physical planning and the orderly development of land in Malawi's urban and rural areas. It aims to preserve and enhance the amenities of these areas while regulating land use and development. The Act provides guidelines for obtaining development permits and empowers authorities to control land use effectively. Section 8 of the Act establishes the Physical Planning Council, which has overarching powers and responsibilities for physical planning across Malawi. Section 19 mandates local government authorities to appoint a planning committee within their jurisdiction. This committee serves as the responsible planning authority, exercising duties conferred by the Act. A joint planning committee may be appointed to oversee the project if a proposed development spans the boundaries of two or more local government areas.

Section 44 outlines the types and classes of development considered permitted under the Act, as specified in the First Permitted Schedule. One of these permitted developments includes changes in land use within the same class of uses, provided conditions set by the responsible authority are met. In road construction, constructing a road within a public land area designated

as a road reserve is generally permitted since road reserves are expressly set aside for infrastructure development and utilities.

Implications for the Land Laws

RA will not only be using public land for the RCRP-II but also portions of customary land and even private land will have to be acquired for the project. This means the project will also involve the involuntary acquisition of land, and the owner will probably suffer disturbance loss or damage to any interest they may have before the occurrence of the project. Therefore, RAP must be prepared to guide the project on land acquisition, compensation (at full replacement cost), resettlement and support to the PAPs in line with the national regulations and the World Bank ESF.

The law permits the construction of roads within designated road reserves. This means that the project can proceed without extensive land-use changes, provided it complies with conditions set by the planning authorities. Even if the bridge and road construction is classified as a permitted development, it remains subject to conditions imposed by responsible planning authorities.

In aligning with the land laws, RA must ensure the proper categorization of land for the project and adhere to legal procedures for land acquisition, compensation, and resettlement. Resettlement Action Plans (RAPs) must be prepared and implemented to guide these processes in compliance with national laws and World Bank ESF. Additionally, RA must provide timely notifications to affected communities and ensure fair compensation at full replacement cost for any disturbances or losses incurred.

3.2.4 The Water Resources Act, 2013

The water resources Act provides for the management, conservation, use and control of water resources; for the acquisition and regulation of rights to use water; and for matters connected therewith or incidental thereto. Section 4 (b) states that one of the objectives of the act is to "allow for the orderly development and use of water resources for all purposes including domestic use, the watering of stock, irrigation and agriculture, industrial, commercial and mining uses, the generation of hydroelectric or geothermal energy, navigation, fishing, preservation of flora and fauna and recreation in ways which minimize harmful effects to the environment". And Section 4 (c) provides another objective of the Act as follows: "*to control pollution and to promote the safe storage, treatment, discharge and disposal of waste and effluents which may pollute water or otherwise harm the environment and human health.*"

The Act is administered by the National Water Resources Authority under the Ministry of Water and Sanitation as provided for in Part II, Section 8. Regarding abstraction and use of water Section 39(1&2) states the following:

- No person will abstract and use water unless authorized to do so under this Part.
- A licence under this Part will be required for any of the following purposes-
    - the abstraction, impoundment, and use of water from a water resource; and
    - the drainage of any swamp or other land.

In aligning with this law, the Project must:

- Obtain the necessary licenses for all water abstraction, impoundment, and drainage activities from the National Water Resources Authority before commencing any water-related project operations.
- Implement strict pollution control measures by establishing safe procedures for the storage, treatment, and disposal of waste and effluents, ensuring no contamination of water resources occurs during the project.
- Minimize environmental harm by responsibly managing water resources for construction and related activities, ensuring that all water use aligns with sustainable practices and conservation goals as mandated by the Water Resources Act.

3.2.5 Occupation Safety Health and Welfare Act, 1997

Occupation Safety Health and Welfare Act (OSHWA) is an Act which makes provision for the regulation of the conditions of employment in workplaces as regards the safety, health and welfare of persons employed therein; for the inspection of certain plant and machinery, and the prevention and regulation of accidents occurring to persons employed or authorized to go into the workplaces; and to provide for matters connected with or incidental to the foregoing the provisions for a safe working environment for the people of Malawi.

Part II of the OSHWA gives provisions on registration of a workplace as indicated in Section 6 that the director will keep a register of workplaces in which he will cause to be entered such particulars in relation to every workplace required to be registered under this Act as he may consider necessary or desirable. Section 7(1) continues to stress that premises are not to be used as workplaces unless registered.

In compliance with this act, the RA must do the following:

- Ensuring all the contractors have registered with the ministry of Labour before commencing operations, ensuring that all premises meet the legal requirements for a safe working environment.
- Implement and maintain safe work systems and procedures, ensuring that all plant, machinery, and equipment used in the project are operated and maintained in a manner that minimizes risks to health and safety.
- Ensure the safe handling, storage, and transportation of materials and substances, providing clear instructions, training, and supervision to all employees to prevent accidents and health risks.
- Regularly inspect and maintain access points and working environments to ensure they are safe and free from health hazards, providing adequate facilities and arrangements for employee welfare.
- Continuously monitor and enforce compliance with Occupational Safety and Health (OSH) standards throughout the project's lifecycle, taking proactive measures to address any emerging safety concerns.

3.2.6 Employment Act, 2000

The Employment Act of 2000 reinforces and regulates minimum standards of employment with the purpose of ensuring equity necessary for enhancing industrial peace, accelerated economic growth and social justice; and for matters connected therewith and incidental thereto. Part II of the Act states fundamental principles guiding the act, and these include:

- Section 4(1) - Prohibition against forced labour
- Section 5(1) - Anti-discrimination
- Section 6(1) - Equal pay
- Section 7 - Remedies for infringement of fundamental rights

Part IV of the Act prevents employment of young persons and the restrictions are provided in detail in sections 21(1) and 22(1) as follows:

> *"21. (1) subject to subsection (2), no person under the age of fourteen will be employed or work in any public or private agricultural, industrial or non-industrial undertaking or any branch thereof.*
>
> *22. (1) No person between the age of fourteen and eighteen years will work or be employed in any occupation or activity that is likely to be - (Hazardous work)*
>
> a) Harmful to the health, safety, education, morals or development of such a person; or
> b) Prejudicial to his attendance at school or any other vocational or training programme."

In compliance with the Act, RA must:

- Prohibit any form of forced labour throughout the project, ensuring that all employment is voluntary and in line with legal standards
- Implement strict anti-discrimination policies in hiring and employment practices, ensuring that all workers are treated regardless of gender, age, race, religion, or other characteristics.
- Ensure equal pay for equal work, guaranteeing that all employees receive fair compensation without discrimination based on gender or any other unjust criteria.
- Strictly enforce regulations that prevent the employment of children under the age of fourteen and ensure that no person between the ages of fourteen and eighteen is employed in hazardous work or conditions that could harm their health, safety, or development.

3.2.7 Gender Equality Act, 2013

The Gender Equality Act's purpose is to act and address the inequalities that exist between men and women in many aspects of daily life in Malawi. The Act seeks to promote gender equality, equal integration, influence, empowerment, dignity and opportunities for men and women in all functions of society; to prohibit and provide redress for sex discrimination, harmful practices and sexual harassment; to provide public awareness on promotion of gender equality. The Act applies to all persons and to all matters. This means it will apply to private and public institutions, including religious settings and chiefs. It also applies to the government. It affects all aspects of life in Malawi. The Act in Part 2 prohibits of sexual discrimination and harmful

social or cultural practices; Section 7 calls for all workplace policy to ensure that sexual harassment is avoided. The Project is as such obligated to ensure these principles are included in all its activities specifically in relation to employment and providing a conducive environment without sexual harassment and any other types of gender discrimination.

In compliance with the Gender Equality Act, RA must:

- Implement gender equality policies across all project activities, ensuring equal opportunities, influence, and empowerment for both men and women in employment and decision-making processes.
- Strictly prohibit and address any form of sex discrimination or harmful cultural practices within the project, ensuring that all actions and policies promote the dignity and equality of all employees.
- Develop and enforce a robust workplace policy to prevent sexual harassment and Sexual Exploitation and Abuse, providing a safe and conducive working environment where all employees are treated with respect and can work free from harassment and discrimination.

3.2.8 HIV and AIDS (Prevention and Management) Act, 2018

The HIV and AIDS (Prevention and Management) Act makes provision for the prevention and management of HIV and AIDS; provisions for the rights and obligations of persons living with HIV or affected by HIV and AIDS; provisions for the establishment of the National AIDS Commission; and provisions for matters incidental thereto or connected therewith. Part 4, Section 6 (1) states that discrimination on a basis related to HIV or AIDS is prohibited. Part 5, Section 9 (1) states that a person living with HIV has the right to privacy and confidentiality regarding information concerning their status. Part 8 of this Act gives provisions to employers by stipulating requirements in several sections quoted as follows:

- Section 26 states that an employer will not require any person to undergo HIV testing as a pre-condition for recruitment;
- Section 27 (1) states that an employer will not terminate the employment of an employee solely on the ground that the employee is living with HIV or is perceived to be living with HIV;
- Section 28 (1) states that an employee will not be discriminated against or be subjected to unfair treatment solely on the ground that he is perceived to be or is living with HIV; and
- Section 32 (1) states that the State will ensure that employers adopt and implement an HIV and AIDS policy at the workplace.

In accordance with this act, the Project has to ensure that HIV and AIDS intervention measures are put in place that respond to the requirements of the act. The project will need to have an HIV and AIDS workplace policy as a guide to implementing the interventions.

In compliance with the HIV and AIDS (Prevention and Management) Act, RA must:

- Prohibit any requirement for HIV testing as a pre-condition for recruitment, ensuring

that no job applicant is compelled to undergo testing to secure employment.

- Ensure that the employment of any employee is not terminated solely because they are living with HIV or are perceived to be living with HIV, upholding the right to job security for those affected.
- Prevent any form of discrimination or unfair treatment against employees based on their actual or perceived HIV status, fostering an inclusive and supportive workplace environment.
- Develop and implement a comprehensive HIV and AIDS workplace policy, providing clear guidelines for the prevention, management, and support related to HIV and AIDS within the project.

3.2.9 Public Health Act, 1948

The Act provides legal framework on planning and management of a wide range of health-related issues including environmental health, occupational health, and solid wastes management. Section 79 parts (a) and (b) provide legal powers for the local authority to enforce the provision of sewage works for large scale development projects. Section 80 stipulates the requirements for preparation of detailed plans for planned sewage works for implementation. Section 82 outlines some activities which can limit the free flow of wastes into sewage works and which must be avoided as much as possible. These activities include disposal of solid wastes in oxidation ponds, disposal of chemical refuse, waste stream, and petroleum spirit or carbon calcium. Section 87 of the Public Health Act stipulates the need for proper drainage works for new buildings. Section 88 stipulates the requirements for separate toilets for both female and male persons in public buildings or buildings which will be used by both male and female employees.

The implication Act on the proposed project is that the developer must ensure that there are appropriate and adequate waste disposal facilities, provision of sanitary toilets and proper storm water drains. The toilets will be demarcated according to sexual category. In addition, the contractors must have in place temporary toilets for both female and male workers during construction period.

3.2.10 Environment Management (Chemicals & Toxic Substances) Regulations, 2008

Part I, Section 3(1) of the regulation mention application by stating that "these Regulations apply to any person in Malawi whose undertaking involves or includes the manufacturing, repackaging, importation, exportation, transportation, distribution, sale or other mode of handling toxic substances and chemicals and in respect of any activity in relation to toxic substances and chemicals which involves a risk of harm to human health or the environment." Part II of the regulations stipulate the management of chemicals and toxic substances. Section 4 (1) puts a requirement for licences as it points the need to obtain a licence issued by the Director for manufacturing, repackaging, importing, exporting, transporting, distributing, sale or other mode of handling chemicals and toxic substances. Section 26 stipulates regulations regarding treating of chemical wastes and requires that no industry will discharge any chemical wastes in any state into the environment unless such wastes have been treated in accordance

with acceptable international methods that are approved by the director in consultation with the relevant local authority.

This implies that the project must obtain transporting, handling, and storage licences of chemical and toxic substances from the Malawi Environment Protection Authority.

3.2.11 Environment Management (Waste Management & Sanitation) Regulations, 2008

The regulations apply to the management of general and municipal waste in Malawi. Part III of the regulations has provisions on management of general or municipal solid waste with Section 7(1) regulating that any person who generates solid waste will sort out the waste by separating hazardous waste from the general or municipal solid waste. Section 8(1) regulates that every generator of waste will be responsible for the safe and sanitary storage of all general or municipal solid waste accumulated on his or her property so as not to promote the propagation, harbourage or attraction of vectors or the creation of nuisances. Section 10(1) has provisions for collection of municipal solid waste as being the responsibility of a local authority. Section 11 has provisions that general or municipal solid waste may be disposed of at any waste disposal site or plant identified and maintained by a competent local authority or owned or operated by any person licensed to do so under these regulations. Part V of the regulations has provisions on management of municipal liquid waste with a general requirement stipulated in Section 23 that no person will discharge effluent into the environment unless it meets prescribed environment standards. Section 36 has provisions on hazardous waste that state that:

1) No industry, business or medical facility will discharge any hazardous waste in any state into the environment unless such wastes have been treated in accordance with acceptable international methods that are approved by a competent local authority in consultation with the director.
2) Hazardous wastes whether treated or not will not be discharged into a disposal site or plant unless such disposal site or plant has been approved and licensed for that purpose in accordance with these regulations.

The project must encourage waste separation at sources, provide proper and adequate waste receptacles, suitable waste storage, transportation and treatment facilities. The project management team must work with Mangochi District Council to ensure proper waste collection alternatives are put in place as well as waste disposal.

Ensure that no hazardous waste is discharged into the environment unless it has been treated according to internationally accepted methods and is disposed of at a site approved and licensed for that purpose by the competent local authority.

3.2.12 Forestry (Amendment) Act, 2020

The Forestry Act's core areas are forestry participation, forest education, forest management, forest industries, protection and rehabilitation of environmentally fragile areas and international cooperation in forestry. It prohibits the construction and operation of projects in

fragile areas like riverbanks and water catchment areas. The Act also illustrates that no person will cut, take, fall, destroy, uproot, collect, or remove forest products from customary land, forest reserve, public land or any protected area unless they have a license. Removal of forestry products attracts fines.

The project must:

- Obtain the necessary licenses before cutting, taking, felling, destroying, uprooting, collecting, or removing forest products from customary land, forest reserves, public land, or any protected area.
- Provide appropriate compensation according to forestry gazette rates when forestry products are unavoidably impacted, including the cutting of trees. In line with the Forestry Rules 2024, compensation rates for affected trees shall follow the official valuation schedules published by the Department of Forestry, which categorise trees by species, size, and economic value.
- Plant three replacement seedlings for each tree cut down to mitigate the environmental impact and contribute to forest conservation efforts.
- Ensure that any actions likely to have significant adverse impacts on national forests and forest resources are subjected to review and approval by a competent authority.

3.2.13 Mines and Minerals Act, 2023

The Mines and Minerals Act is designed to regulate the exploration, extraction, and management of mineral resources in Malawi. Its primary objective is to ensure that mineral development is conducted in a manner that benefits the nation while safeguarding environmental integrity, promoting sustainable development, and protecting the rights and health of communities and ecosystems. Key provisions relevant to Project include:

- Under Section 270, the project must ensure that all quarrying activities adhere to principles of environmental protection and management. This includes implementing measures to minimize environmental damage and promoting sustainable use of natural resources to benefit both present and future generations.
- Section 271 mandates that an Environmental and Social Impact Assessment (ESIA) must be conducted and approved before commencing quarry operations. This assessment is critical for identifying potential environmental and social impacts and proposing appropriate mitigation measures to address these impacts.
- Sections 272-273 require the development of a comprehensive rehabilitation and mine closure plan for the quarry operations. This plan must outline the steps for environmental rehabilitation, social mitigation, and post-closure monitoring to ensure the long-term safety and health of the environment and surrounding communities.
- According to Section 274, the project must provide financial assurance to cover the costs of implementing the rehabilitation and closure plan. This ensures that the necessary funds are available to manage environmental impacts, even if the project fails to fulfill its obligations.
- Section 301 highlights the importance of engaging with local communities affected by quarry operations. The project must develop a community engagement plan that

includes strategies for consultation, addressing grievances, and ensuring that the interests and concerns of local communities are considered and addressed throughout the project's lifecycle.

In compliance with this Act, the Project must:

- Adhere to environmental protection principles by minimizing damage during quarry operations and promoting sustainable resource use (Section 270).
- Conduct and obtain approval for an Environmental and Social Impact Assessment (ESIA) before starting quarry activities (Section 271).
- Develop and implement a comprehensive rehabilitation and mine closure plan, including environmental and social mitigation strategies (Sections 272-273).
- Provide financial assurance to cover the costs of rehabilitation and closure to ensure environmental obligations are met (Section 274).
- Engage with local communities through a structured consultation plan, addressing grievances and ensuring community concerns are considered (Section 301).

3.2.14 Childcare, Protection and Justice Act, 2010

The Child Care, Protection and Justice Act aims to consolidate and provide a legal framework for the care, protection, and justice for children in Malawi. It addresses issues related to child welfare, social development, and the legal procedures involving children to ensure their rights are safeguarded. According to the Act, a "child" is defined as a person below the age of sixteen years (Section 2).

In the context of the bridge and road construction project, the following provisions of the Child Care, Protection and Justice Act are particularly relevant:

- The Act emphasizes the protection of children from any form of exploitation, including hazardous work or activities that could harm their health, safety, or morals (Section 23). This is crucial for ensuring that no child labour is involved in the construction project.
- The Act mandates members of the community to report any child rights infringements, including those potentially arising from the construction activities (Section 36). This reinforces the need for the project to have mechanisms in place for reporting and addressing any child protection concerns.
- The Act provides that any child in need of care and protection due to the project's activities should be brought before a child justice court, which will determine the appropriate care and protective measures (Section 37).

In compliance with this Act, the Project must:

- Ensure that no child under the age of sixteen is employed or involved in any hazardous activities related to the bridge and road construction project.
- Establish a reporting mechanism for community members to voice concerns about potential child exploitation or rights infringements related to the project.
- Cooperate with the relevant child protection authorities ensuring that any child affected by the project is provided with the necessary care and protection, including potential

legal interventions.

- Conduct community awareness campaigns, particularly through local leaders, schools, and parent-teacher associations, to educate parents and guardians about construction site dangers and discourage children from loitering near the works.

3.2.15 Disaster Risk Management Act (2023)

The Disaster Risk Management Act establishes a framework for reducing disaster risks, enhancing preparedness, and coordinating responses to hazards. Its provisions are directly applicable to the construction of the 12 bridges and associated approach roads under the Project. Part IV of the Bill (Sections 18–24) requires infrastructure projects to integrate disaster risk considerations into planning, design, and implementation. This includes hazard and vulnerability assessments and both structural and non-structural measures to reduce disaster impacts. For the bridge works, this entails climate-resilient engineering solutions such as elevated bridge decks to withstand flooding, reinforced foundations to address scour risks, and effective drainage systems for extreme rainfall events. Section 20 mandates structural measures, including robust engineering designs, alongside non-structural measures such as improved land use planning and operational protocols. For the Project, this will involve hydrological designs to accommodate peak flows and measures to prevent obstruction of watercourses.

Section 21 requires that all public infrastructure incorporates disaster risk considerations into location, design, and maintenance. This underscores the need for ongoing inspection and maintenance of the rehabilitated bridges to address climate and hazard impacts. Part V (Sections 25–33) addresses preparedness and response, requiring contingency planning for critical infrastructure. For the bridges, this means site-specific Emergency Preparedness and Response Plans during construction to address flooding, accidents, or hazardous material spills. The Act provides a clear legal basis for ensuring that the bridge rehabilitation works are climate-resilient, hazard-prepared, and compliant with disaster risk management protocols, from design to maintenance, thereby safeguarding communities and infrastructure from future disaster impacts.

3.2.16 Fisheries Conservation and Management Act (1997)

The Fisheries Conservation and Management Act provides the legislative basis for the regulation, protection, and sustainable utilisation of Malawi's fishery resources. It grants the Director of Fisheries authority to oversee the conservation, management, and development of fisheries (Section 4), including issuing fishing licences (Sections 7–13) and regulating fishing gear, methods, and areas (Sections 14–17). Section 18 empowers the Minister to declare protected areas such as fish breeding zones and closed seasons, critical for maintaining sustainable fish stocks. Sections 19 and 20 prohibit destructive fishing practices, including the use of explosives, poisons, and other harmful substances. Section 21 provides for the control of activities that may pollute or degrade aquatic habitats, directly relevant to construction projects near water bodies. The Act also establishes enforcement mechanisms through Fisheries Protection Officers (Sections 28–33) and outlines offences and penalties for non-compliance (Sections 34–36). Importantly, Section 37 allows the Minister to make regulations

for the better carrying out of the purposes of the Act, which can include construction-related safeguards for aquatic habitats.

The Act is relevant to projects, such as bridge construction over rivers, streams, and wetlands, because such activities can directly or indirectly affect aquatic habitats and fish populations. Construction works may alter water flow, cause sedimentation, or lead to pollution, all of which can harm breeding grounds and disrupt fish migration patterns. Under the Act, any project likely to cause such impacts must consider measures to prevent, minimise, or mitigate adverse effects on fisheries. This includes ensuring that bridge works do not obstruct fish passages, avoiding harmful discharges into water bodies, and implementing sediment and erosion control measures.

3.3 World Bank Environmental and Social Requirements

In line with World Bank requirements, projects it finances are expected to be designed and implemented in accordance with applicable national laws, and the Bank's Environmental and Social Framework (ESF). The World Bank emphasises early and inclusive stakeholder engagement, transparent disclosure of information, and the protection of the health, safety, and livelihoods of affected communities. This ESIA has therefore been prepared in compliance with the relevant World Bank Environmental and Social Standards (ESS) and the World Bank Group Environmental, Health, and Safety (EHS) Guidelines, ensuring that both environmental and social considerations are fully integrated into the project's design, construction, and operational phases.

3.3.1 World Bank Environmental and Social Standards (ESS)

The Environmental and Social Framework (ESF) sets out the World Bank's commitment to sustainable development through a Bank Policy and a set of Environmental and Social Standards (ESSs) that are designed to support borrowers' projects with the aim of ending extreme poverty and promoting shared prosperity. The short summary of several relevant ESSs from the Bank's ESF are presented below. The ESSs set out the requirements for borrowers relating to the identification and assessment of environmental and social risks and impacts associated with projects and sub-activities supported by the Bank through Investment Project Financing. The Bank believes that the application of these standards, focusing on the identification and management of environmental and social risks, will support borrowers in their goal to reduce poverty and increase prosperity in a sustainable manner for the benefit of the environment and their citizens.

The standards will:

a) Support borrowers to achieve good international practice relating to environmental and social sustainability;
b) Assist borrowers to fulfil their national and international environmental and social obligations;
c) Enhance nondiscrimination, transparency, participation, accountability and governance;
d) Enhance the sustainable development outcomes of projects through ongoing

stakeholder engagement.

3.3.1.1 ESS1: Assessment and Management of Environmental and Social Risks and Impacts

ESS1 sets out the borrower's responsibilities for assessing, managing, and monitoring environmental and social (E&S) risks and impacts throughout each stage of a project supported by the World Bank through Investment Project Financing. The objective is to achieve environmental and social outcomes consistent with the ESSs. This ESIA has been undertaken in compliance with ESS1. The assessment is based on current and site-specific information, including a detailed description of the 12-bridge rehabilitation and replacement works and associated facilities, as well as environmental and social baseline data at a level of detail sufficient to identify, characterise, and evaluate project risks and impacts. The ESIA evaluates potential adverse and beneficial impacts, including cumulative impacts where applicable, with a focus on those that may disproportionately affect disadvantaged or vulnerable groups. It also examines feasible design and construction alternatives and identifies measures to apply the mitigation hierarchy, avoid or reduce risks, and enhance positive outcomes. The relevance of ESS1 to the construction of the 12 bridges involves activities with potentially significant E&S risks. Given the anticipated risks, ESS1 requires this ESIA to:

i. Provide a comprehensive identification and assessment of all project-related E&S risks and impacts across the bridge sites and associated works.
ii. Integrate site-specific design and technical considerations to minimise E&S risks during planning, construction, and operation.
iii. Ensure that a robust Environmental and Social Management Plan (ESMP) is prepared, with costed and time-bound mitigation measures.
iv. Establish monitoring, reporting, and compliance mechanisms to be applied throughout the project lifecycle.
v. Cascade ESS1 compliance obligations to contractors and subcontractors through contractual clauses and supervision arrangements.

By applying ESS1, this ESIA ensures that the bridge works are designed and implemented in a manner that protects the environment, safeguards community well-being, and promotes sustainable benefits for the populations served by the rehabilitated infrastructure.

3.3.1.2 ESS2: Labour and Working Conditions

ESS2 recognises the importance of creating employment and income generation opportunities as part of poverty reduction and inclusive economic growth. It promotes sound worker–management relationships and ensures that workers are treated fairly and provided with safe and healthy working conditions. This standard applies to all categories of project workers, including full-time, part-time, temporary, seasonal, and migrant workers engaged in the construction of the bridges and associated works. For this project, the Contractor will develop and implement a site-specific Labour Management Procedure (LMP) in line with ESS2, Malawi labour laws, and the World Bank Group EHS Guidelines. The LMP will cover all categories of workers, including direct, contracted, and any community workers, and will require contractors and subcontractors to adhere to ESS2 provisions. The LMP will also

incorporate an OHS Framework to manage risks such as working at heights, handling heavy equipment, and working near or over water, all of which are relevant to bridge construction.

By applying ESS2, this ESIA ensures that labour conditions during bridge construction safeguard the rights, health, and safety of all workers while fostering a fair and respectful work environment. The relevance of ESS2 to the bridge works is significant due to the physically demanding and potentially hazardous nature of the activities.

3.3.1.3 ESS3: Resource Efficiency and Pollution Prevention and Management

ESS3 recognises that infrastructure construction consumes finite resources and can generate pollution affecting people, ecosystem services, and the environment. It requires efficient use of resources, prevention of pollution, and management of emissions, all in line with Good International Industry Practice (GIIP) and the World Bank Group EHS Guidelines. In the context of this project, ESS3 is highly relevant because the rehabilitation and replacement of 12 bridges will require significant raw materials (sand, aggregates, cement, steel), water for construction, and energy for equipment operation. The works will also generate potential pollutants, including construction dust, noise, hazardous materials (e.g., fuels, lubricants, bitumen), and waste from demolished structures. By applying ESS3, this ESIA ensures that bridge works are carried out with minimal wastage of resources, reduced emissions, and effective management of pollution risks, protecting both the environment and nearby communities throughout the project lifecycle.

3.3.1.4 ESS4: Community Health and Safety

ESS4 recognises that project activities, equipment, and infrastructure can increase community exposure to health and safety risks. In the context of this project, bridge rehabilitation and replacement works involve heavy machinery, transportation of materials, demolition of existing structures, and works over and alongside watercourses. These activities present potential hazards to nearby communities, such as increased traffic accidents, noise and dust exposure, risks of injury from construction areas, and potential impacts on access to schools, markets, and health facilities. In areas already vulnerable to flooding and climate change impacts, construction activities could also temporarily heighten disaster risk.

This ESIA addresses these risks through measures consistent with ESS4, the World Bank Group EHS Guidelines, and GIIP. Specific provisions include controlled site access to prevent unauthorised entry, installation of warning signage, community traffic safety management, and coordination with local authorities for emergency preparedness. SEA/SH prevention measures will be integrated, and a dedicated SEA/SH Action Plan will be prepared to address risks linked to labour influx and project–community interactions. The relevance of ESS4 to the bridge works is critical because communities will be in close proximity to high-risk construction activities. Therefore, this ESIA requires:

i. Site-specific Community Health and Safety Plans to manage risks from traffic, machinery, and hazardous materials.
ii. Communication with local communities on construction schedules, access changes, and safety measures.

iii. Development and implementation of an emergency preparedness and response plan, including flood and accident scenarios.
iv. Integration of SEA/SH prevention and response measures, with confidential reporting and referral systems.

3.3.1.5 ESS5: Land Acquisition, Restrictions on Land Use, and Involuntary Resettlement

ESS5 recognises that project-related land acquisition and restrictions on land use can cause physical or economic displacement. For this project, bridge construction and associated approach road works may require temporary or permanent acquisition of small land parcels, relocation of roadside structures, and restrictions on access to land or natural resources during the works. Although the project aims to minimise displacement through careful design, some impacts on land use may be unavoidable. This ESIA applies ESS5 to ensure that where land acquisition or access restrictions occur, they are managed in accordance with national legislation and World Bank requirements. Any displacement, physical or economic, will be minimised, and affected persons will receive fair and prompt compensation, livelihood restoration support, and assistance to restore living conditions. These measures will be documented and implemented through a RAP. By applying ESS5, this ESIA ensures that any land-related impacts from bridge works are managed in a manner that avoids impoverishment and restores livelihoods and community well-being.

3.3.1.6 ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources

ESS6 recognises the importance of conserving biodiversity and sustainably managing living natural resources. The bridge sites in this project are located across various riverine and riparian habitats that may support aquatic life, riparian vegetation, and associated fauna. Construction activities, such as riverbed works, excavation, and material sourcing, have the potential to disturb habitats, alter water quality, and impact species of conservation concern. This ESIA applies ESS6 to ensure that biodiversity values are identified, assessed, and protected. The baseline assessment has identified site-specific ecological sensitivities, and mitigation measures are included to avoid, minimise, and, where unavoidable, offset adverse impacts. Material sourcing will be from approved sites with active environmental management plans to prevent habitat degradation. Rehabilitation of disturbed areas will be undertaken after construction to restore vegetation cover and ecological function. The relevance of ESS6 to the bridge works is significant because the works interface directly with freshwater habitats. This ESIA ensures that bridge construction and rehabilitation protect biodiversity, maintain ecological integrity, and support sustainable natural resource use.

3.3.1.7 ESS8: Cultural Heritage

ESS8 recognises that cultural heritage, both tangible (e.g., archaeological sites, historic structures) and intangible (e.g., traditions, rituals), is an important part of community identity, history, and development. Bridge construction activities, particularly excavation, foundation works, and material sourcing, have the potential to uncover previously unknown archaeological

resources or disturb sites of cultural significance. For the bridge rehabilitation and replacement works, no known cultural heritage sites were identified within the immediate construction footprints during baseline surveys. However, because works involve earth movement and operations near watercourses, areas that can have archaeological potential, there remains a risk of chance finds. In line with ESS8 and the World Bank Group EHS Guidelines, this ESIA incorporates a Chance Find Procedure to be implemented by contractors. The bridge works lies in ensuring that any cultural heritage inadvertently discovered is protected, documented, and managed appropriately. Training for workers on the Chance Find Procedure will be included in site induction programmes to ensure rapid and compliant response if heritage resources are encountered.

3.3.1.8 ESS10: Stakeholder Engagement and Information Disclosure

ESS10 recognises that open, transparent, and inclusive stakeholder engagement is essential for effective environmental and social risk management. For this project works, stakeholder engagement is particularly important because the works are dispersed across multiple communities, each with unique concerns related to access, safety, environmental impacts, and livelihood disruptions. This ESIA has been prepared in line with ESS10 and is supported by a project-specific Stakeholder Engagement Plan (SEP), which outlines how stakeholders will be engaged throughout the project life cycle. Consultations have been conducted with affected communities, local authorities, transport operators, traders, and other interested parties to inform the design, mitigation measures, and scheduling of works. This ESIA ensures that community trust, cooperation, and ownership of the project are maintained, thereby enhancing both environmental and social sustainability and the long-term benefits of the rehabilitated infrastructure.

3.3.2 World Bank Group Environmental, Health, and Safety (EHS) Guidelines

In addition to compliance with national legislation, this ESIA applies the World Bank Group General EHS Guidelines (2007). These guidelines provide performance levels and measures that are recognised by the World Bank as reflecting GIIP. They cover a wide range of environmental, occupational health, community health, and safety issues relevant to construction projects. Where there is a difference between the requirements of national legislation and the EHS Guidelines, the more stringent standard will be applied to ensure the highest level of environmental and social protection. Given the nature of the works, the General EHS Guidelines are supplemented by relevant sector-specific guidance and World Bank good practice documents to ensure that the mitigation measures in this ESIA are consistent with internationally recognised approaches for managing environmental and social risks in major civil works. The following World Bank GPNs have also been referenced to align mitigation measures with international best practice:

i. Addressing Sexual Exploitation and Abuse and Sexual Harassment (SEA/SH) in Investment Project Financing involving Major Civil Works (2020): Provides practical guidance to integrate SEA/SH risk mitigation in project design and implementation, including risk assessment, codes of conduct, worker training, community awareness, and survivor-centred grievance redress mechanisms. For this ESIA, its relevance lies in

managing labour influx and preventing SEA/SH risks at bridge construction sites through contractual obligations, community engagement, and monitoring measures.

ii. ***Addressing Gender-Based Violence (GBV) in Investment Project Financing involving Major Civil Works (2018)***: Offers a structured approach for GBV risk assessment, prevention, and response, including mapping service providers, ensuring confidential reporting channels, and integrating GBV provisions into procurement. In the context of this project, it guides the integration of GBV considerations into contractor ESMPs, with site-specific actions to safeguard vulnerable community members.

iii. ***Gender (2019):*** Provides guidance on mainstreaming gender in World Bank projects, including identifying gender gaps, designing inclusive interventions, and tracking gender-related results. This is relevant to the ESIA by ensuring that employment opportunities, stakeholder consultations, and livelihood restoration measures during bridge works are inclusive and benefit both men and women equitably.

iv. ***Road Safety (2019)***: Sets out measures to assess and manage road safety risks, including safe design, work zone traffic management, speed control, and public awareness. For this ESIA, this GPN is essential given the increased risk of accidents during bridge rehabilitation. It informs mitigation measures for work site demarcation, safe detours, traffic calming, and driver training for construction vehicles.

v. ***Managing the Risks of Adverse Impacts on Communities from Temporary Project-Induced Labour Influx (2016):*** Provides guidance on assessing and mitigating risks linked to an influx of non-local workers, including pressure on local services, social tensions, and communicable disease transmission. Its relevance to this ESIA is in establishing proactive labour influx management measures, such as contractor-managed worker accommodation, health screening, and community liaison protocols.

By integrating the WB General EHS Guidelines and these GPNs into the ESIA, the project ensures that the bridge rehabilitation works are implemented with a strong focus on environmental protection, occupational and community health and safety, gender inclusion, SEA/SH prevention, and sustainable social outcomes. Table 3-1 aligns each WB General EHS Guideline or GPN with its key content and specific relevance to the bridge rehabilitation works.

Table 3-1: Application of WB EHS Guidelines and Good Practice Notes to the Project

EHS Guideline / GPN	**Key Content**	**Relevance to Project**
World Bank Group General EHS Guidelines (2007)	Sets performance levels and measures for environmental protection, occupational health and safety, community health and safety, and construction/decommissioning. Covers air emissions, wastewater, waste management, noise, hazardous materials, emergency preparedness, and traffic safety.	Guides hazard identification and control during bridge works; informs measures for dust suppression, noise reduction, safe handling of materials, prevention of water pollution, traffic control around worksites, and worker/public safety protocols.
SEA/SH in Investment Project	Provides guidance on preventing and responding to sexual exploitation and abuse and sexual harassment, including	Informs measures to manage labour influx and prevent SEA/SH risks at bridge sites through contractual

EHS Guideline / GPN	Key Content	Relevance to Project
Financing involving Major Civil Works (2020)	codes of conduct, training, survivor-centred grievance mechanisms, and community awareness campaigns.	obligations, workforce training, codes of conduct, and local service provider mapping.
Gender-Based Violence (GBV) in Major Civil Works (2018)	Framework for GBV risk assessment, prevention, and response; integrates GBV measures into procurement, contracts, and ESMPs; ensures access to survivor support services.	Ensures GBV mitigation measures are integrated into contractor ESMPs; guides site-specific safeguards to protect vulnerable groups during construction activities.
Gender (2019)	Mainstreams gender considerations in projects; addresses gender gaps in participation, benefits, and decision-making; provides monitoring indicators.	Promotes equitable employment opportunities for men and women during bridge works; ensures consultations are gender-inclusive and livelihood measures benefit both sexes.
Road Safety (2019)	Details assessment and management of road safety risks; includes safe design principles, traffic management, speed control, and public awareness strategies.	Directly applicable to traffic management and detour planning during bridge rehabilitation; reduces accident risks through signage, barriers, and vehicle safety protocols.
Managing the Risks of Adverse Impacts from Temporary Project-Induced Labour Influx (2016)	Identifies risks from an influx of non-local workers, including social tensions, public health impacts, and pressure on local services; provides mitigation strategies for worker accommodation, health checks, and community relations.	Ensures labour influx is proactively managed to prevent negative social impacts in communities near bridge sites; includes contractor-managed accommodation, health screening, and community liaison.

3.4 Regulatory Licenses and Approvals

Table 3-2 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 3-2: 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 Environmental Protection Authority (MEPA)	RA	Three months
2	Approval of disposal of waste	a) Local Government Act, 1998	a) Mangochi District Councils	Contractor	Two Weeks
		b) EMA, 2017	b) MEPA		

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
3	Approval for sand mining from proposed rivers	Local Government Act, 1998	Mangochi District Councils	Contractor	Two Weeks
4	Mining Approval (Gravel, and Sand)	Mines and Minerals Act, (2023)	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 Permission	Physical Planning (Amendment) Act 2022	Mangochi District Council	RA	One Month

3.5 Institutional Framework

3.5.1 Malawi Environment Protection Authority

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 administering the ESIA/ESMP 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. RA shall support the monitoring visits by the Government counterparts.

3.5.2 Road Authority

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

3.5.3 Department of Lands

The Department of Lands focuses on land administration and policies by assisting in acquiring land for road expansion and resettlement, ensuring that land use aligns with road development plans. The department will also be addressing environmental concerns related to land use changes.

3.5.4 Local Government

The local government will be responsible in engaging with local communities to address concerns, gather feedback, and ensure their needs are considered, facilitating land acquisition for road expansion or realignment. The council will also take part in sensitizing the communities to manage traffic flow during construction to ensure safety for residents and road. The local government will also be monitoring construction progress and resolve any aggrieved parties during the project execution

3.4.5.5 Ministry of Finance and Economic Affairs

The Ministry of Finance and Economic Affairs will be responsible for mobilising and disbursing project funds, ensuring compliance with financing agreements, and monitoring the financial performance of the project. It will coordinate with the Roads Authority and development partners to ensure timely release of funds for construction and related environmental and social mitigation activities.

3.4.5.6 National Water Resources Authority (NWRA)

Given that bridge works involve watercourse crossings, the NWRA will play a critical role in regulating activities within water bodies and their catchments. In accordance with the Water Resources Act (2013), the NWRA is mandated to issue water-related permits, ensure sustainable water use, and protect water resources from pollution and degradation during construction. It will also monitor compliance with permit conditions and advise on water management measures to prevent adverse impacts on river ecosystems.

Chapter Four: Analysis of Alternatives

This chapter systematically evaluates feasible alternatives to the proposed project in terms of their environmental, social, economic, technical, and operational implications. Alternatives assessed include the "No-Project" scenario, different project locations, bridge construction technologies, road approach and embankment designs, and temporary construction approaches. Each alternative is analysed based on its potential to meet project objectives, minimise environmental and social risks, comply with national and lender standards, and offer long-term sustainability and resilience under climate stressors. Wherever possible, the analysis quantifies impacts and compares alternatives using well-defined criteria such as cost, environmental footprint, resettlement needs, technical feasibility, and compliance with national policies.

4.1 "No-Project" Alternative

The "No-Project" scenario involves leaving the current situation unchanged, abandoning reconstruction of the damaged or washed-away bridges. While this option avoids immediate construction-related impacts, it sustains the current socio-economic hardship caused by poor road connectivity. Communities remain isolated during rainy seasons, affecting emergency access, agriculture, education, and trade. From an environmental perspective, while no direct construction impact would occur, the unregulated use of informal crossings may cause bank erosion, sedimentation, and uncontrolled degradation of riverine ecosystems. Another scenario is "Undertaking the Project", which entails rehabilitating 12 climate-resilient bridges and upgrading 200 m approach roads on either side. While it involves short-term construction impacts such as vegetation clearance, emissions, and noise, these will be managed through mitigation measures outlined in the ESMP. The long-term benefits include enhanced access, trade facilitation, reduced transport costs, and improved resilience to climate-related disasters.

As described in Table 4-1, from a socio-economic standpoint, the "no-project" scenario would perpetuate inaccessibility, economic marginalization, and social vulnerability of the local population, especially during the rainy season. Communities remain cut off due to bridge collapses and poor road conditions, limiting access to health services, schools, markets, and emergency services. The "undertaking the project" alternative is thus imperative to achieve development goals and enable climate-resilient infrastructure that supports inclusive growth and regional connectivity.

Table 4-1: Comparison of "No-Project" and "Undertaking the Project" Scenarios

Criteria	"No-Project" Alternative	Undertaking the Project
Accessibility	Severely constrained, especially in wet seasons	Year-round, reliable access
Environmental Impact	No new impacts, but potential unregulated degradation	Temporary impacts, mitigated
Social Benefits	Limited; worsens isolation	High; improves services and livelihoods
Climate Resilience	None	High; flood-resistant design
Cost	None	Capital-intensive but long-term return

4.2 Alternative Project Sites

Realigning the road and constructing bridges elsewhere was considered to avoid flood-prone zones. However, this would lead to greater environmental disturbance, higher land acquisition needs, and displacement. The ecological integrity of new areas would also be compromised. Reconstructing bridges on existing sites minimises land take, limits resettlement, and capitalises on existing public land within the 36 m road reserve. Environmental impacts remain within already disturbed areas. However, in specific sections such as Mbwazi and Chikosere, road realignments are proposed to avoid severely degraded sections, and enhance climate resilience. These realignments have been carefully designed to minimise new land take and to avoid sensitive habitats, while ensuring that resettlement impacts are reduced as far as practicable. Table 4-2 compares the alternative sites and it has been analysed that the existing alignment is preferred due to minimal displacement, lower cost, and ease of implementation.

Table 4-2: Comparison of Alternative Sites

Criteria	Alternative Sites	Existing Alignment (Selected)
Resettlement	High	Low
Environmental Impact	High in new locations	Limited to existing corridor
Time & Cost	Higher	Moderate and efficient
Technical Feasibility	Requires new surveys	Readily feasible

4.3 Bridge Construction Technologies

The selection of appropriate bridge construction technologies for the Chingo–Makanjira Road project was guided by the need for durability, climate resilience, long-term cost-effectiveness, and suitability for rural and flood-prone terrains. Two principal options were considered during the design review: modular steel (Bailey) bridges and Reinforced Cement Concrete (RCC) T-Girder bridges.

Bailey bridges are modular, prefabricated steel structures widely used in emergency and temporary applications. Their key advantage lies in rapid deployment, especially in disaster recovery situations or remote locations where conventional construction may be delayed. Bailey bridges are lightweight, can be erected without heavy equipment, and are relatively inexpensive in terms of initial capital cost. However, their short design lifespan (typically 10–15 years), limited load-carrying capacity, and poor resistance to hydrological forces make them less suitable for permanent infrastructure in climate-vulnerable regions like Mangochi District. The failure of several Bailey bridges during Tropical Cyclone Freddy highlighted the technology's inadequacy in high-flow and erosion-prone environments. They are also prone to corrosion and deformation, requiring frequent and costly maintenance to remain operational.

RCC T-Girder bridges, in contrast, are engineered for long-term performance in both rural and urban settings. The T-Girder design comprises reinforced concrete beams shaped like a 'T', which support the bridge deck and distribute loads efficiently. These bridges offer high structural integrity, resistance to floods and soil movement, and are well-suited for integrating with road infrastructure, including drainage channels, embankments, and river training works.

With a design life of over 50 years, RCC T-Girder bridges offer significant long-term economic advantages, even though their initial construction cost is higher than that of Bailey bridges. Maintenance needs are also less frequent and less intensive, reducing life-cycle costs. Moreover, these bridges are better aligned with climate-resilient infrastructure guidelines as stipulated in the Malawi Ministry of Transport and Public Works (MoTPW) Climate Adaptation Guidelines (2020) and the AfCAP Design Manual.

Based on the comparison summarised in Table 4-3, RCC T-Girder bridges were selected as the preferred construction technology for the Chingo-Makanjira bridge rehabilitation project. This choice was made in recognition of the technology's resilience to climate hazards, structural robustness, and long-term economic benefits. The RCC option also supports the project's objective of building back better, in line with the World Bank's climate adaptation priorities and sustainable development goals.

Table 4-3: Comparison of Bridge Construction Technologies

Criteria	Bailey Bridges	RCC T-Girder Bridges
Design Life	10–15 years	50+ years
Structural Integrity	Moderate; prone to corrosion and fatigue	High; reinforced concrete resists environmental stress
Climate Resilience	Low; failed during Cyclone Freddy	High; designed to withstand hydrological forces
Initial Cost	Lower upfront investment	Higher initial cost, but efficient over lifecycle
Lifecycle Cost	High due to frequent repairs	Lower; minimal maintenance required
Deployment Time	Rapid; suitable for emergency use	Longer; requires engineering and construction time
Suitability	Temporary crossings and disaster relief	Permanent public infrastructure
Compatibility with Design Standards	Limited	Fully compatible with Malawi MoTPW and World Bank design standards

4.4 Construction Approaches: On-Road vs. Off-Road Diversions

In bridge and road construction projects, temporary traffic diversions are essential to maintain connectivity and allow construction works to proceed safely and efficiently. Two primary approaches are typically considered for such temporary detours: off-road diversions and on-road diversions within the designated road reserve. Off-road diversions involve creating entirely new temporary bypass tracks outside the current 36-metre road reserve. These may extend into adjacent farmland, forested areas, or riverbanks. While off-road diversions offer flexibility in construction space and sometimes easier logistics, they introduce significant environmental and social challenges. These include the need for additional land acquisition, vegetation clearance, alteration of surface water flows, and disturbance to sensitive habitats or cultural sites.

On-Road Diversions within the 36-metre Road Reserve confines all temporary bypass roads, storage zones, and construction-related movement strictly within the existing 36-metre road reserve, as declared and demarcated under national road management regulations. On-road

diversions are designed to utilize available space adjacent to or overlapping the existing carriageway. While this option may introduce logistical constraints, such as limited space for machinery movement or restricted working widths, it offers a lower environmental and social impact profile. By maintaining works within the designated corridor, the project avoids additional land take, thus preventing further resettlement, disruption to community land uses, and delays due to land compensation processes. However, where on-road diversions pass through riparian zones, clearing of vegetation within these sensitive areas will be avoided to the maximum extent possible, and protective measures will be implemented to safeguard watercourse stability and ecological integrity.

Based on the comparison summarised in Table 4-4, the on-road diversion approach was selected for the Chingo-Makanjira bridge rehabilitation works due to its minimal environmental and social footprint, enhanced community acceptance, and compliance with statutory guidelines. Given that the entire project, including bridgeworks, detours, and support facilities, can be implemented within the existing 36-metre road reserve, the need for additional resettlement and land acquisition is eliminated.

Table 4-4: Comparison of the Construction Approaches Alternative

Criteria	Off-Road Diversions	On-Road Diversions
Land Take	High – requires acquisition beyond road reserve	Low – remains within the designated 36m road reserve. Note that if there are assets within the land for on road diversions, these will have be included in the RAP and compensated for.
Environmental Impact	Elevated – vegetation clearance, erosion, watercourse alteration	Controlled – confined to existing road corridor
Regulatory Burden	High – new screening and RAP may be needed	Lower – activities fall within approved footprint
Stakeholder Acceptance	Potentially contentious – affects private or communal land	Generally acceptable – avoids additional land encroachment
Construction Space	More flexible	Requires detailed traffic and staging management
Cost Implications	Higher – land compensation, post-project restoration	Lower – no additional land acquisition or resettlement required

4.5 Conclusion

The analysis of alternatives confirms that the selected project design and implementation strategy offers the most balanced and sustainable approach to addressing the infrastructural challenges caused by the collapse and degradation of bridges. The “Undertaking the Project” scenario emerged as the only viable alternative that addresses urgent mobility, climate resilience, and rural connectivity issues. Maintaining the existing bridge alignment within the 36-metre road reserve significantly reduces the environmental footprint and social disruption, particularly with regard to resettlement and land acquisition. The choice of RCC T-Girder bridge technology, flattened embankments, and on-road detours reflects a commitment to

climate adaptation, structural longevity, and operational efficiency. These decisions are reinforced by lessons learned during Cyclone Freddy, which exposed the vulnerability of temporary bridge technologies and unprotected slopes. Furthermore, alternatives that considered off-road diversions, steep embankments, or modular steel structures were found to have higher lifecycle costs, increased environmental risks, and greater socio-political sensitivities.

Chapter Five: Assessment of Biophysical and Socio-economic Baseline Information

This chapter describes the existing biophysical and socio-economic conditions within the Area of Influence (AoI) of the Chingo–Makanjira Road Project. It provides baseline data on climate, topography, soils, water resources, vegetation, wildlife, and socio-economic dynamics at and near the twelve bridge sites. The information establishes a reference against which project impacts will be assessed. Data presented are site-specific, sourced from field surveys, stakeholder consultations, and secondary sources, ensuring relevance to decisions about project design, mitigation, and monitoring.

5.1 Physical Environment

5.1.1 Topography

The road traverses the Lakeshore Plain, which is bordered by the Rift Valley Scarp Zone on the immediate West and the Eastern Plateau on the East on the boundary with Mozambique. Due to this topographic layout, the road crosses numerous streams and rivers that are tributaries to Lake Malawi. The project road essentially traverses a flat to rolling terrain, sandwiched between the rift valley plains and Lake Malawi on the eastern side and the Mangochi-Namizimu escarpment on the western side. The Mangochi-Namizimu escarpment on the north-east of Mangochi town marks the start of a large upland area east of the Rift Valley which extends into Mozambique and southern Tanzania. It encompasses a wide altitudinal range, rising steeply from the Lake shore plain (500 m) to Msondole peak (1,800 m), with some ten hills reaching over 1,500 m.

5.1.2 Geology

Mangochi District, where the Chingo–Makanjira Road Project is located, occupies the southern portion of this rift system and exhibits diverse lithological formations associated with the ancient crystalline basement complex and younger tectonic intrusions. According to the national geological map (Figure 5-1), the project area traverses a zone dominated by Charnockitic suite rocks, with adjacent exposures of Biotite–Hornblende Gneiss and minor Granite intrusions. The Charnockitic suite represents high-grade metamorphic rocks commonly formed under granulite-facies conditions. These rocks are typically composed of orthopyroxene-bearing granite, syenite, and tonalite, and are often associated with older crustal blocks that date back to the Precambrian era. Their presence indicates a stable and consolidated geological basement, which is advantageous for the design of bridge foundations and heavy engineering works.

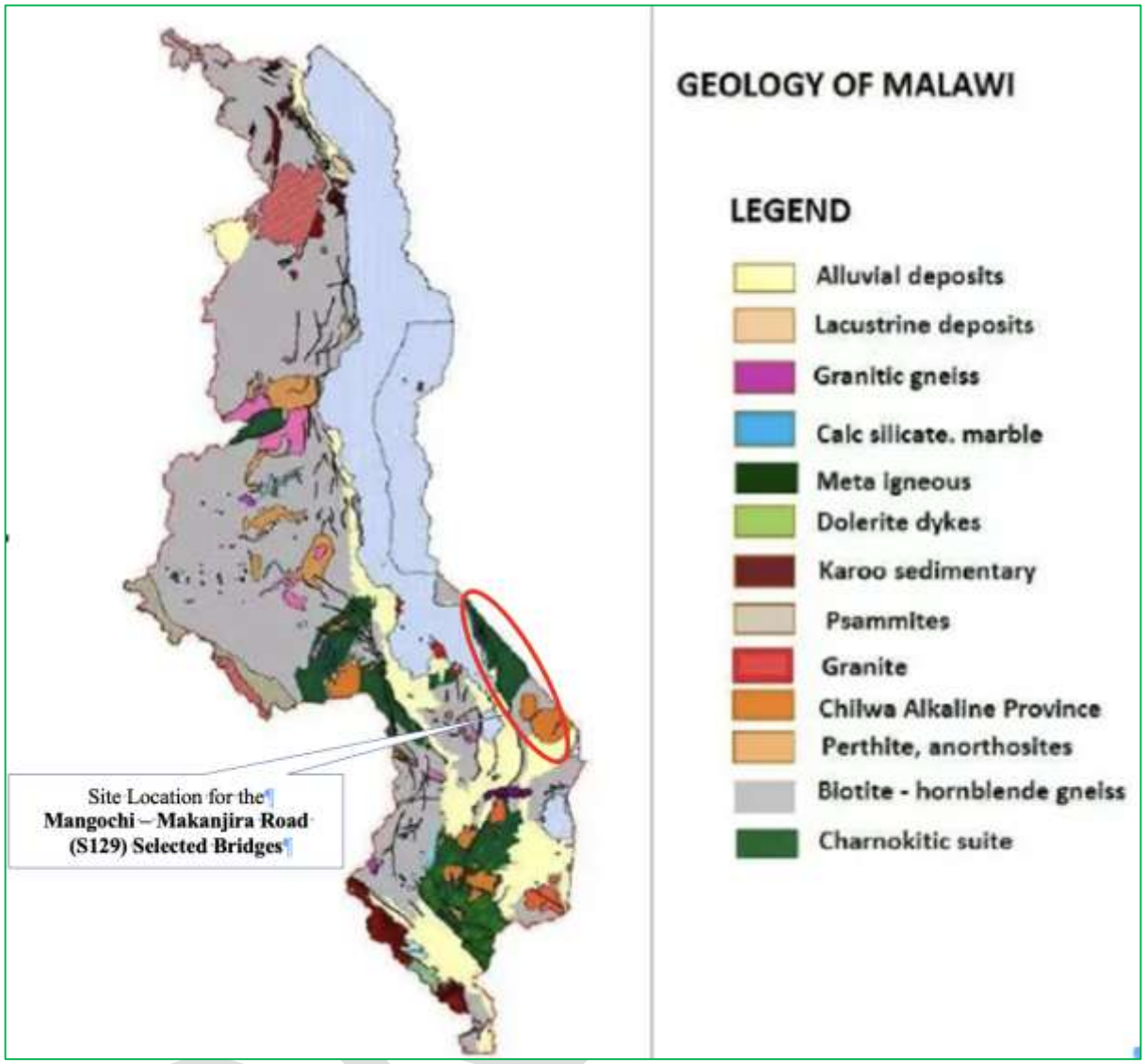

Figure 5-1: Geology Map for the Project Area

In the immediate vicinity of the project site, particularly toward the transition zones, Biotite–Hornblende Gneiss appears intermittently, forming part of the ancient crystalline complex that underlies much of southern Malawi. These rocks are characterised by alternating bands of mafic and felsic minerals and are often intersected by veins of quartz and feldspar. Their foliation patterns and structural fabric provide insight into the region's tectonic history and stress regimes. Additionally, small intrusions of Granite and Psammites are present, particularly in the upland areas adjacent to the escarpment. These units may represent zones of increased weathering susceptibility, which could influence slope stability, especially in areas subject to cut-and-fill operations along the road corridor. The overall geotechnical setting of the project area suggests a competent but variable substrate, with zones of highly durable bedrock interspersed with weathered metamorphic material. These conditions have important implications for excavation, drainage design, and material sourcing for construction. Quarrying of suitable rock from nearby exposures of granite or gneiss may offer opportunities for local material use, subject to environmental permitting.

5.1.3 Soils

The project area for the Chingo–Makanjira Road, including the selected bridge rehabilitation sites, traverses diverse soil landscapes influenced by the geological and topographic variability of the lower lakeshore and escarpment zone of Mangochi District. The dominant soils within the project's catchment boundary are Lixisols and Cambisols on the Malawian side, and chromic ferralic or paraferralic soils derived from crystalline rocks on the Mozambican side, as shown in Figure 5-2.

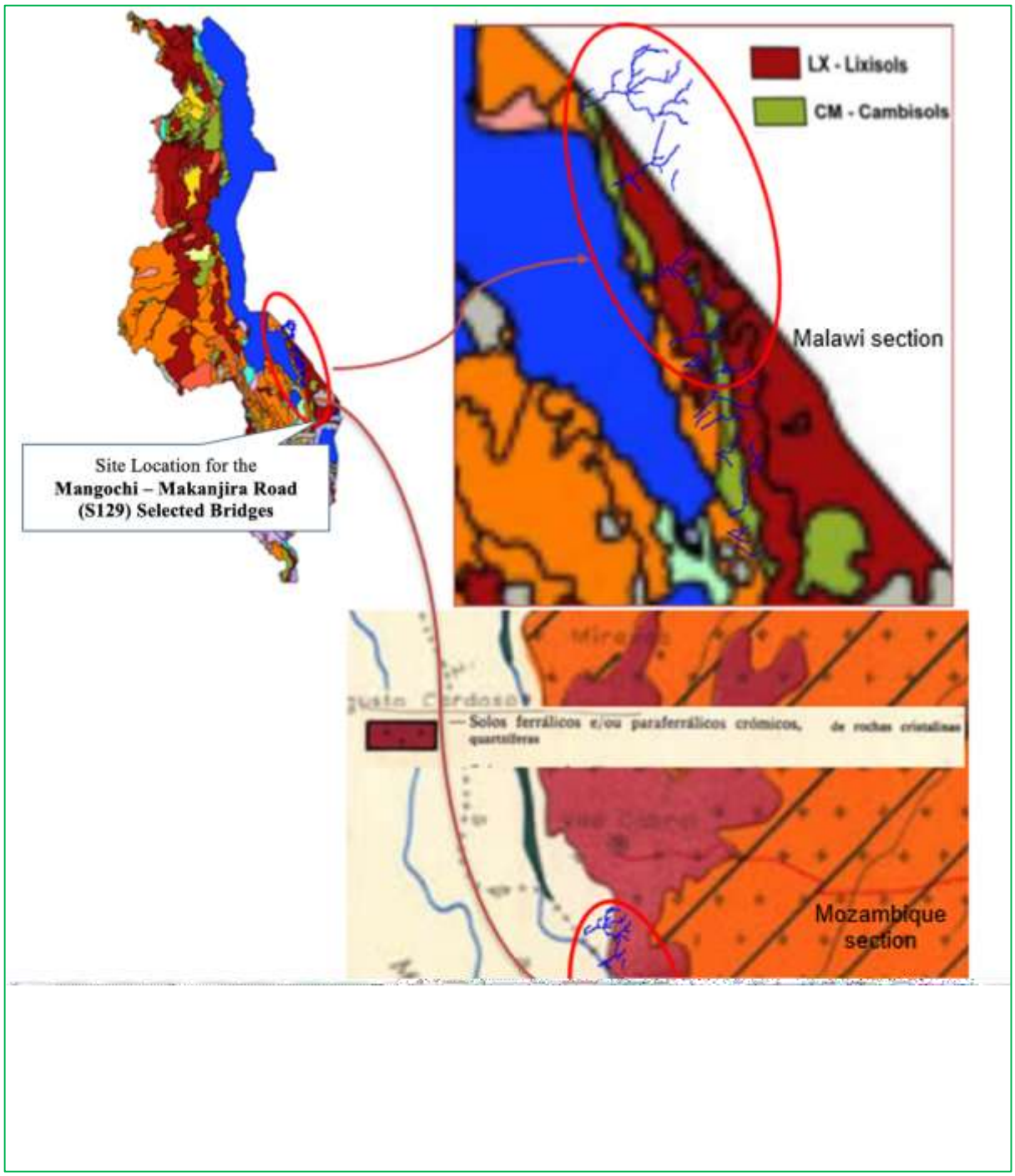

Figure 5-2: Soil Types in Project Area

Lixisols, which cover the majority of the Malawian section, are moderately leached soils typically found in gently undulating to rolling terrain. They are characterised by a high base saturation and a clay-enriched subsoil horizon, which influences moderate infiltration capacity and water-holding potential. These soils generally fall under Hydrologic Soil Group B, indicating moderately low runoff potential due to moderate infiltration rates. Cambisols, also observed in limited pockets particularly near transitional slopes, are young soils with weakly developed horizons. Both soil types support woodland and seasonal cultivation but are susceptible to erosion when exposed, especially near road embankments and bridge construction areas.

In the Mozambique section of the shared drainage basin, soil mapping indicates the prevalence of chromic ferralic and paraferralic soils derived from crystalline and quartzitic parent material. These soils are moderately weathered, often red to reddish-brown, and also exhibit moderate infiltration rates. The shared catchment between Malawi and Mozambique, particularly where river headwaters originate in Mozambique, underscores the importance of coordinated soil and land management to mitigate sediment transport and erosion risks. Soil infiltration capacity across the basin affects the volume and rate of surface runoff, which can impact the stability of drainage structures and slope gradients along the road alignment.

Understanding the soil hydrology is essential for informing bridge foundation design, slope stabilisation, drainage planning, and erosion control measures. The moderate infiltration rates of the dominant soil types suggest the potential for moderate surface runoff during intense rainfall events, particularly in areas where vegetation cover is removed or compacted by construction equipment. According to the Soil Conservation Service (SCS) classification, the soil hydrologic groups relevant to this project area are summarised as Group B: Moderately low runoff potential – includes Lixisols, Cambisols, and chromic ferralic/paraferralic soils observed across the basin.

5.1.4 Climate and Weather Patterns

Based on the Mangochi District Socio Economic Profile (2017-2022), Mangochi District experiences a warm tropical climate with mean annual temperatures ranging from 18 to 32 degrees. In exceptional instances, temperatures go as high as 40 degrees Celsius. The lowest temperatures are experienced in June and July while the highest temperatures are registered during the months of October and November.

The climatic zones are distinguishable in Mangochi where the eastern highlands covering the entire Namwera, and the project site, experience cooler temperatures and receive more rains. On the other hand, the Coastal plains, from the foot of Namizimu Highland Forest Reserve, Chilipa area and the Bwanje receive less rainfall but experience high temperatures. The dry season in Mangochi extends from May to October.

The hot season lasts for 2.2 months, from 28 September to 2 December, with an average daily high temperature above 32°C. The hottest month of the year in Mangochi falls in November, with an average high of 33°C and low of 25°C. The cool season lasts for 2.4 months, from 28

May to 10 August, with an average daily high temperature below 27°C. The coldest month of the year in Mangochi falls in July, with an average low of 18°C and high of 26°C.

The wetter season lasts 4.0 months, from 26 November to 25 March, with a greater than 39% chance of a given day being a wet day. The month with the most wet days in Mangochi is January, with an average of 23.5 days with at least 1 millimeter of precipitation. The drier season lasts 8.0 months, from March 25 to November 26. The month with the fewest wet days in Mangochi is July, with an average of 0.4 days with at least 1 millimeter of precipitation. Between the driest and wettest months, the difference in precipitation is 321 mm, while the average temperatures vary during the year by 7.4 °C. The month with the highest relative humidity is January with 85.22 %, while the month with the lowest relative humidity is October with 49.20 %.

5.1.5 Hydrology and Water Resources

This section describes surface and groundwater resources along the Project Road corridor. It draws heavily from the Final Hydrology, Hydraulics and Structural Design Report (Kandoli - AESL JV, 2024), which included detailed flood modelling, hydrological analysis, and catchment assessments for all 12 bridge sites.

5.1.5.1 Rivers, Streams, and Wetlands Crossed by the Road

The Chingo-Makanjira road alignment crosses several seasonal and perennial rivers and streams, including Tavila, Kalanje, Lungwena, Mbwazi, Lutende, Lilembwe, Unga, Lugola, and Lilole rivers. These are part of small-to-medium catchments draining towards Lake Malawi. The rivers vary in width and flow regime, with many showing highly seasonal patterns and being prone to erosion during peak rainfall. The riverbanks near crossing points are typically vegetated but exhibit gully erosion, siltation, and structural degradation at older culverts and embankments. Wetlands and floodplains, particularly along the Unga and Lungwena Rivers, play vital roles in groundwater recharge and flood buffering, and must be conserved to maintain hydrological connectivity. The catchment characteristics for each bridge crossing are summarised in Table 5-1. This information was essential for flood modelling and hydrological design.

Table 5-1: Catchment Characteristics for Bridge Sites along the Road Corridor

Bridge Name	Catchment Area (km^2)	Main Channel Length (km)	Main Channel Slope (%)	Overall Land Gradient (%)
Chikosere	6.1	4.2	1.6	4.5
Kalanje	4.5	2.9	2.3	5.1
Lilembwe	18.3	6.8	1.8	4.3
Lilore	4.9	3.4	2.1	5.4
Litufu	6.2	2.3	1.7	4.7
Lugola	12.6	5.7	2.2	4.8
Lungwena	27.7	9.4	1.4	4.1
Lusalumwe	58.4	11.2	1.1	3.9
Lutende	6.2	2.8	2.6	5
Mbwazi	11.4	6.2	1.9	4.6

Bridge Name	Catchment Area (km^2)	Main Channel Length (km)	Main Channel Slope (%)	Overall Land Gradient (%)
Nkuli	3.3	2.5	3.2	5.5
Unga	125.6	16.4	1.3	3.7

5.1.5.2 Surface and Groundwater Availability

Surface water availability in the area is closely tied to seasonal rainfall patterns. Rivers generally flow from November to March, but most streams dry up between May and October, particularly in upland areas. Some perennial flow is maintained in lower catchments such as the Unga and Lungwena Rivers, depending on rainfall intensity and groundwater discharge. The communities adjacent to the road corridor primarily depend on groundwater for domestic water supply, abstracted via shallow wells and boreholes. While detailed hydrogeological investigations were not part of this ESIA, the Hydrology Report indicates that the water table is accessible in valley areas and fractured zones associated with gneissic and charnockitic bedrock. However, these groundwater sources are vulnerable to contamination from poor waste management and poor siting, surface erosion, and accidental fuel spills during road construction if not properly mitigated.

5.1.5.3 Flood-Prone Areas and Flood Modelling

Flood vulnerability was comprehensively assessed using the NRCS/SCS Curve Number Method, Snyder's Unit Hydrograph Method, and Regional Flood Frequency Analysis (TP12), as documented in the Final Hydrology Report. These methods were used to model peak discharges, flow velocities, flood widths, and recurrence intervals under both current and projected climatic scenarios. These findings are consolidated in Table 5-2, which provides the design discharge (Q100), estimated channel width, Manning's coefficients, and freeboard allowances for each bridge site.

Table 5-2: Peak Flood Discharge, Channel Widths, and Design Parameters

Bridge Name	Q100 Design Discharge (m^3/s)	Channel Width (m)	Freeboard Provided (m)	Manning's n
Chikosere	45	12	1.2	0.035
Kalanje	38	10	1.1	0.035
Lilembwe	102	18	1.5	0.035
Lilore	40	11	1	0.035
Litufu	43	12	1.1	0.035
Lugola	85	17	1.4	0.035
Lungwena	210	25	2	0.035
Lusalumwe	250	30	2.1	0.035
Lutende	42	11	1.1	0.035
Mbwazi	78	16	1.3	0.035
Nkuli	35	9	1	0.035
Unga	410	36	2.5	0.035

Key findings from the flood analysis include:

- Unga, Lungwena, and Lilole Rivers exhibited the highest peak flows and the widest inundation zones, requiring substantial upgrades in bridge freeboard and drainage capacity.
- Multiple sites previously experienced bridge or culvert failure during Cyclone Freddy (2023), demonstrating that pre-existing structures were undersized or poorly maintained.
- Design discharges for most bridges were recalculated for the 100-year return period under future climate projections, showing up to 40% increases in peak flow rates.
- The drainage catchments for the bridge sites range from 3.3 km² to 125.6 km², with steep slopes and high runoff coefficients, particularly in areas with degraded vegetation.

Flood risk areas were identified along low-lying stretches and at poorly drained sections of the road. These include the approach roads to Lungwena and Lugola Bridges, where ponding, backwater effects, and overtopping are common during peak storms. The findings from the Final Hydrology Report provide critical insights that have direct implications for the planning, design, and environmental management of the Chingo-Makanjira road works:

- Bridge and culvert designs must integrate climate-resilient features, including higher freeboards, improved scour protection, and oversized drainage structures.
- Floodplain connectivity should be maintained by avoiding embankment blockage and incorporating multi-cell culverts or elevated spans in critical locations.
- Construction activities must be scheduled during the dry season (May to October) to reduce exposure to storm-related delays and safety hazards.
- Groundwater protection measures should include buffer zones around wells, fuel handling protocols, and borrow pit rehabilitation plans to prevent aquifer contamination.
- An adaptive monitoring system should be in place to track post-construction hydrological performance and trigger maintenance or retrofitting where necessary.

5.1.6 Land Use and Tenure

The area surrounding the twelve selected bridge sites is dominated by rural land uses, particularly smallholder agriculture, which remains the principal economic activity. Based on land cover data collected within a 500-metre radius of each bridge, agricultural land use (including both cultivated fields and bare land under preparation) accounts for the majority of land coverage, with proportions ranging from 61% to over 91%, depending on the location (Table 5-3). Sites such as Nkuti (91.9%), Unga (91.7%), and Bwanje (90.7%) recorded the highest shares of agricultural land use. Settlements and built-up areas are present in small proportions across all bridge sites, with the highest concentrations observed at Kalanje Bridge (13.2%) and Likhonyo Bridge (11.8%). These typically consist of dispersed rural homesteads and trading centre developments. Vegetation cover and forested areas are minimal or nearly absent at most sites, indicating significant anthropogenic conversion of natural landscapes.

The land tenure system in the project area is predominantly customary, under the administration of Traditional Authorities. Most of the agricultural and settlement land is held communally without formal title, although isolated instances of public tenure may be present

near trading centres or public facilities. Private tenure is limited, largely due to the informal nature of landholding in rural Mangochi District.

Table 5-3: Summary of Land Use Cover within 500m radius of each Bridge Site

Bridge Name	Agriculture (Field + Bare Land) %	Settlements & Built-Up %	Vegetation %	Total Area (ha)
Chisoka Bridge	84.20%	4.30%	11.50%	78.5
Kalanje Bridge	76.20%	13.20%	10.60%	78.8
Likwenu Bridge	87.50%	5.00%	7.50%	78.2
Liwafu Bridge	76.60%	10.10%	13.30%	78.2
Lirundu Bridge	74.70%	16.70%	8.60%	78.3
Lugola Bridge	61.30%	8.50%	30.20%	78.3
Chibwana Bridge	79.50%	15.50%	5.00%	78.2
Bilalunkhwe Bridge	63.50%	33.20%	3.30%	78.2
Bwanje Bridge	90.70%	8.40%	0.90%	78.3
Nkuti Bridge	91.90%	7.30%	0.80%	78.2
Unga Bridge	91.70%	6.70%	1.60%	78.3

5.2 Biological Environment

5.2.1 Methodology of the Field Survey

To comprehensively understand the floral characteristics along the Road corridor and proposed bridge sites, a detailed methodology combining desk-based review and field-based techniques was adopted in line with ESS6 on Biodiversity Conservation and Sustainable Management of Living Natural Resources.

5.2.1.1 Desktop Review

An initial literature review was conducted to understand the ecological context and identify species of potential conservation concern. This included references to the IUCN Red List, National Herbarium plant inventories, the Botanical Research and Herbarium Management System (BRAHMS), the Global Biodiversity Information Facility (GBIF), and citizen science platforms such as iNaturalist. The review provided a baseline understanding of endemic, threatened, and invasive alien plant species in the area.

5.2.1.2 Rapid Reconnaissance Survey

A Rapid Botanical Survey (RBS) was implemented during the October 2023 field visits to assess site-specific vegetation types. The RBS helped determine species composition, density, and habitat variability across the 12 proposed bridge sites. This exercise also assisted in determining the number and distribution of sampling plots.

5.2.1.3 Sampling Design

Vegetation sampling employed 20 m × 20 m quadrats (400 m²), systematically distributed every 2 km along both sides of the road. A total of 3 concentric subplots were established per sampling point:

- 2 m radius for regenerants and saplings,
- 6 m radius for intermediate-sized trees,

- 20 m radius for mature trees.

Each subplot represented a stratum based on tree size and density to ensure comprehensive stratified sampling.

5.2.1.4 Data Collection and Identification

Plant species within each quadrat, ranging from herbs and grasses to climbers and trees, were identified and recorded. Field guides, botanical keys, and online platforms were used for immediate identification, while unidentified specimens were collected and pressed for herbarium confirmation at the National Herbarium and Botanic Gardens (NHBG) in Zomba.
GPS coordinates were recorded at each sample plot. Additional variables included species frequency, growth stage (e.g., flowering, fruiting), evidence of anthropogenic disturbance, and ecological function.

5.2.1.5 Tree Measurement

Tree height and diameter at breast height (DBH) were measured using a Haglöf Vertex5 and diameter tape, respectively. These metrics helped assess vegetation structure and biomass estimates, which are vital for evaluating carbon stocks and potential GHG implications from vegetation loss during construction. Trees were classified into:

- Regenerants/saplings: DBH ≤ 5 cm,
- Juvenile/adults: DBH > 5 cm.
- Community Participation

Local informants and Forestry Department staff participated in the flora assessment, providing traditional knowledge on the uses and local names of species, especially medicinal and economically important plants.

5.2.1.6 Mapping of Sample Points

Coordinates for each bridge site were used to ensure spatial coverage. Annexe 4 provides a summary of the GPS locations for each vegetation assessment point. These geo-referenced locations serve as baselines for future monitoring of vegetation loss and rehabilitation success.

5.2.1 Terrestrial Flora

5.2.1.1 Vegetation Types

The project area supports five primary vegetation types: woodlands, shrublands, grasslands, riparian zones, and cultivated/agroforestry mosaics, reflecting a heterogeneous landscape shaped by both natural and anthropogenic factors. These vegetation systems were recorded around the 12 bridge sites and the adjacent road corridor, with site-specific variations influenced by topography, hydrology, land use, and community practices. The diversity of vegetation types underscores the ecological importance of the area and the need to integrate vegetation conservation into project planning.

5.2.1.1.1 Woodland Vegetation

Woodlands in the project area are characterised by tall, scattered trees forming a discontinuous canopy. These ecosystems are important carbon sinks and biodiversity hotspots and support a wide range of forest products for local livelihoods. Commonly recorded species include

- *Eucalyptus camaldulensis* (Lusalumwe river): Widely planted for timber and poles, though exotic and water-demanding.
- *Faidherbia albida* (Nkuli, Kalanje, Lusalumwe): A nitrogen-fixing species valued for agroforestry and canoe making.
- *Khaya anthotheca* (Lusalumwe): An endangered species listed on the IUCN Red List, known for high-quality timber.

These trees are not only ecologically important but also contribute to subsistence and income-generating activities. However, unsustainable harvesting poses a threat to woodland integrity.

5.2.1.1.2 Shrubland Vegetation

Shrublands dominate in degraded or transitional areas, particularly around bridge shoulders and near villages. They consist of multi-stemmed woody species and serve as sources of firewood, fencing, and traditional medicine. Notable species include:

- *Croton megalobotrys* (Lusalumwe, Kalanje): Used for poles and firewood.
- *Markhamia obtusifolia* (Lugola, Lilore): Commonly used for building material and fodder.
- *Albizia amara* (Lusalumwe): Provides firewood and hoe handles.

These shrubs also play an important role in erosion control on embankments and disturbed slopes, making their conservation integral to the project's resilience.

5.2.1.1.3 Grassland Vegetation

Open grasslands were recorded in several bridge areas, especially in flat terrain and cleared plots used for grazing. These habitats support herbaceous biodiversity and are critical for livestock, fire control, and soil stability. Key species include:

- *Brachiaria brizantha* (Lusalumwe): Used for thatching and erosion control.
- *Pennisetum spp.* (Chikosele): Fodder grass supporting the local livestock economy.

Grasslands are sensitive to overgrazing and soil disturbance during construction. Buffer zones and restoration activities will be required post-construction.

5.2.1.1.4 Riparian Vegetation

Riparian zones along rivers and streams host vegetation that stabilises banks, improves water quality, and supports aquatic biodiversity. They are highly sensitive to disturbance. Key species include *Philenoptera violacea* (at Litufu River, Mbwadzi Bridge) that a multi-use tree used for firewood and erosion control. These ecosystems are critical habitats for amphibians and birds and must be protected through minimal intervention approaches during bridge construction.

5.2.1.1.5. Ornamental and Fruit Trees

Scattered fruit and ornamental trees were noted near settlements and trading centres. These serve both ecological and livelihood functions:

- *Mangifera indica* (Nkuli, Lutende, Lilore): Source of fruit and shade.
- *Adansonia digitata* (Lusalumwe, Lilore): Baobab, used for food, medicinal, and cultural purposes.
- *Delonix regia* (Lilore, Lutende): An exotic ornamental tree valued for shade and aesthetics.

While these are often planted and not naturally occurring, they are culturally significant and should be preserved where possible.

5.2.1.2 Diversity of Plant Flora Recorded

The diversity of flora across the Road Project area reflects a complex mosaic of ecological interactions and land-use influences that underpin local livelihoods and ecosystem resilience. During the flora assessment, a total of 73 species representing various vegetation strata, trees, shrubs, herbs, grasses, and climbers were identified across the twelve bridge locations (Annex 4; A4.1). This floristic diversity indicates a relatively intact and functioning ecological system that, while impacted by anthropogenic pressures, continues to support important ecosystem services such as soil stabilisation, microclimate regulation, fuelwood supply, and food provision.

The dominant plant families observed in the area include Fabaceae, Combretaceae, Euphorbiaceae, and Poaceae, each of which contributes significantly to the structure and function of local ecosystems. For example, members of the Fabaceae family such as *Faidherbia albida* and *Albizia amara* are known for their nitrogen-fixing abilities, which enrich soil fertility and improve conditions for agroforestry. These species were commonly recorded near agricultural fields and homestead boundaries, reflecting the strong link between local biodiversity and subsistence farming practices. Sites such as Lusalumwe, Litufu, and Lutende Bridge were noted for their relatively high floristic richness, which is attributable to their location near riparian corridors and uncultivated woodlands. In contrast, more disturbed areas near trading centres or heavily settled regions, such as Lungwena and Kalanje Bridge, showed lower diversity and a greater prevalence of exotic or invasive species such as *Eucalyptus camaldulensis*. This pattern of floristic variation is consistent with global observations that edge habitats and human-altered landscapes often exhibit reduced species diversity and altered species composition. Importantly, the study documented the presence of rare and conservation-sensitive species. *Khaya anthotheca*, classified as endangered by the IUCN, was identified in the vicinity of Lusalumwe Bridge and represents a significant conservation priority due to its vulnerability to logging and habitat loss. Similarly, *Pericopsis angolensis*, another rare and ecologically valuable species, was recorded near the Litufu Bridge area. These species serve important ecological roles, such as habitat provision and seed dispersal, and carry high socioeconomic value as sources of timber and traditional medicine.

Documenting such species richness and ecological value reaffirms the importance of integrating biodiversity considerations into the project's design and implementation. It also underscores the need to ensure that any unavoidable vegetation clearance is compensated through restoration and enrichment planting using native species, and that sensitive areas are demarcated and protected from construction-induced degradation.

5.2.1.3 Species with Conservation Concern

In line with World Bank ESS6 definitions, an assessment of critical habitats was undertaken to determine whether the presence of species of conservation concern within the project footprint qualifies the area as a critical habitat. Critical habitats are defined as areas with high biodiversity value, including habitats of significant importance to critically endangered and/or endangered species, endemic and restricted-range species, migratory or congregatory species, or areas supporting globally significant concentrations of biodiversity. Based on the recorded species, their conservation status, distribution, and ecological function, certain locations within the project's direct impact zone, such as riparian corridors near Lusalumwe Bridge, meet criteria for critical habitat due to the occurrence of nationally and globally threatened species, and the ecological functions these areas perform. Project works in such areas will be guided by ESS6 requirements for avoidance, mitigation, and offsetting to ensure no net loss of biodiversity.

The vegetation assessment revealed the presence of several plant species of conservation concern. These species were identified based on field observations and further validated using reputable conservation databases such as the IUCN Red List, the Botanical Research and Herbarium Management System (BRAHMS), and the National Herbarium and Botanic Gardens of Malawi (Annex 4; A4.1). Identifying rare, vulnerable, and endangered flora within the project footprint significantly impacts biodiversity management and conservation planning during project implementation. One of the most notable species recorded is *Khaya anthotheca*, a valuable hardwood tree classified as endangered on the IUCN Red List. This species was encountered in the Lusalumwe Bridge area and is recognised for its high-quality timber used in construction and furniture-making. Due to overexploitation, habitat loss, and its slow regeneration rate, *Khaya anthotheca* is at risk of local extinction if not properly conserved. Its occurrence within the project's direct impact zone necessitates strict measures to prevent unnecessary felling, and where avoidance is not feasible, compensatory planting must be considered.

Another species of significant ecological importance is *Faidherbia albida*, which, while not currently classified as endangered, is regarded as rare and ecologically sensitive in Malawi. This nitrogen-fixing tree was recorded at multiple bridge sites, including Nkuli, Kalanje, and Lusalumwe. It plays a pivotal role in agroforestry systems due to its unique reverse phenology, shedding leaves during the rainy season, which benefits crop growth beneath its canopy. Additionally, it provides high-value fodder for livestock, making it both an ecological and socio-economic asset. Given its scattered distribution and the ecosystem services it offers,

Faidherbia albida requires monitoring and targeted conservation interventions throughout the construction phase. The presence of *Pericopsis angolensis*, identified near the Litufu River, also raises concern. This species, known locally for its hardwood properties, is listed as endangered on the IUCN Red List and is also recognised as nationally threatened in Malawi due to widespread harvesting and habitat degradation. Its slow growth rate further complicates natural regeneration, making it vulnerable to irreversible decline in areas experiencing intensive land use change. The inclusion of this species in the project area highlights the urgent need for habitat preservation and, where applicable, exclusion zones to protect its existing stands.

In addition to the species mentioned above, the survey recorded other flora with limited distributions or localised rarity, including *Albizia amara* and *Trichilia emetica*. While not formally listed as endangered, these species face increasing pressure from fuelwood collection and land conversion. Their identification as locally rare indicates that even seemingly abundant plant species can become threatened in specific regions if not managed sustainably. The documentation of these species with conservation concern underscores the critical importance of integrating biodiversity safeguards into project planning. The proposed bridge rehabilitation works must therefore incorporate site-specific vegetation management plans to avoid unnecessary destruction of key species, ensure appropriate transplantation or relocation measures where feasible, and engage local communities in restoration and conservation initiatives. Doing so will contribute to the project's compliance with ESS6, which mandates the protection of natural habitats and the avoidance of net biodiversity loss.

5.2.1.4 Uses and Benefits of Flora

The flora within the project area offers a wide range of ecological, economic, and cultural benefits to the local communities and the broader ecosystem. During the field survey, it was evident that the vegetation comprises both indigenous and exotic species, many of which are utilised daily by surrounding communities for household needs, income generation, traditional medicine, and ecosystem services. Understanding these uses is critical for informing appropriate environmental and social management strategies that minimise project-related impacts on community wellbeing and biodiversity integrity.

Timber and fuelwood represent some of the most direct uses of flora in the project area. Tree species such as *Eucalyptus camaldulensis*, *Senna siamea*, and *Khaya anthotheca* are extensively harvested for poles, construction timber, and firewood. These species are highly valued not only for their structural properties but also for their ease of growth and high biomass yield. Communities depend on them for building homes, making furniture, and meeting daily cooking and heating needs. While *Eucalyptus camaldulensis* is commonly planted and considered fast-growing, *Khaya anthotheca*, which is endangered, offers more durable timber and therefore commands higher economic value, making its sustainable management a priority concern.

Several species found in the project area are known for their medicinal value, which forms a vital part of local healthcare systems. For instance, *Trichilia emetica* and *Ricinus communis* are used in the preparation of herbal remedies to treat various ailments, including fevers, stomach disorders, and skin infections. These species are typically harvested in the wild, and their continued availability is essential for supporting community health, particularly in areas where access to formal medical services is limited. The survey confirmed that many households regularly rely on such plants, highlighting the need to safeguard access to these resources throughout and after construction.

In terms of food and nutritional security, fruit-bearing trees such as *Mangifera indica* (mango), *Ziziphus mauritiana*(masau), and *Adansonia digitata* (baobab) play a key role. These species not only provide important sources of vitamins and minerals but also support household income through small-scale fruit sales, especially during the dry season when other food sources are limited. Baobab fruits, in particular, are also used in the preparation of nutritious porridge and drinks, while their leaves are used as a leafy vegetable in traditional diets. The presence of these species near several bridge locations further reinforces their significance as locally available and culturally important food sources.

Beyond direct uses, the flora in the project area also delivers critical ecosystem services. Woodland and riparian species help regulate microclimates, maintain soil stability, and reduce erosion, particularly on steep slopes and along riverbanks. Shrubland and grassland species support livestock grazing and thatch production, which are fundamental to rural livelihoods. Insect-pollinated trees such as *Mangifera indica* also play an indirect role in enhancing agricultural productivity, while trees like *Faidherbia albida* contribute to soil enrichment through nitrogen fixation, improving crop yields under agroforestry systems.

5.2.1.6 Implications for the Project

The ecological richness of the flora along corridor calls for deliberate mitigation and management strategies. Given the presence of endangered and rare species such as *Khaya anthotheca* and *Perocopsis angolensis*, construction activities should avoid zones where these species are found or incorporate translocation and replanting protocols. Vegetation clearance should be minimised, and compensatory tree planting should prioritise indigenous species, particularly those offering ecosystem services. The project must also ensure that communities dependent on flora for livelihoods are not adversely affected. Engagement of local stakeholders in reforestation and restoration efforts is recommended, particularly to promote sustainable harvesting and biodiversity stewardship. Environmental monitoring indicators should include vegetation regeneration rates and the survival of transplanted or compensatory species to track long-term impact.

5.2.2 Terrestrial Fauna

5.2.2.1 Methodology of the Faunal Survey

The faunal assessment was undertaken in July 2024, covering areas within and adjacent to the defined area of influence of the road and bridge rehabilitation works. The objective of the survey was to document terrestrial and semi-aquatic fauna across key taxonomic groups, including mammals, reptiles, amphibians, insects, and avifauna, with a focus on identifying species composition, habitat associations, conservation status, and potential project-related risks. The study adopted a mixed-method approach integrating systematic and non-systematic sampling techniques to ensure comprehensiveness. The systematic component involved habitat-stratified sampling, where representative sites were selected across major vegetation communities identified along the road corridor and bridge sites. Survey teams employed transect walks and active searches at each site, adhering to standardised field protocols for wildlife observation and documentation. Table 5-4 provides points within the project area where data was collected. Data collected included georeferenced site coordinates, photographic records, habitat characteristics, vegetation structure, and evidence of human disturbance. These variables provided context for understanding the relationship between faunal presence and ecological conditions. In parallel, non-systematic or opportunistic surveys were undertaken to complement the structured observations. These included incidental sightings, auditory detections, and secondary signs such as faeces, tracks, burrows, nests, and feeding remains. Observations were recorded during daily reconnaissance, travel between sites, and informal interactions with local residents and field guides. This inclusive method allowed for the detection of species that may be cryptic, transient, or active outside of formal survey hours.

Table 5-4: The GPS coordinates of the survey sites for reference

Name of Bridge	Point A	Point B	Point C	Point D
Chikosere	S 13°44’42.56016" E 35°42'42.9888"	S 13°44’42.57384" E 35°4’24.63024"	S 13°44’45.72636" E 35°4’26.63904"	S 13°44’45.74148" E 35°4’26.83956"
Kalanje	S 14°13’25.13088" E 35°15’21.54348"	S 14°15’26.93736" E 35°15’22.14252"	S 14°15’27.95724" E 35°15’21.06432"	S 14°15’25.19172" E 35°14’20.14956"
Lilembwe	S 14°3’49.36716" E 35°11’36.90024"	S 14°3’49.29876" E 35°11’37.69368"	S 14°3’53.51112" E 35°11’37.22316"	S 14°3’53.19144" E 35°11’38.23548"
Lilore	S 13°42’19.8342" E 35°3’1.52928"	S 13°42’20.72304" E 35°2’56.99616"	S 13°42’19.6938" E 35°3’1.494"	S 13°42’19.18476" E 35°2’58.87032"
Litufu	S 13°54’8.26272" E 35°7’26.64552"	S 13°54’10.59984" E 35°7’28.8858"	S 13°54’10.92204" E 35°7’28.7272"	
Lugola	S 13°57’34.34184" E 35°8’23.07156"	S 13°57’34.34436" E 35°18’22.49844"	S 13°57’38.44944" E 35°8’26.68344"	S 13°57’37.61332" E 35°8’25.54908"
Lusalumwe	S 14°24’9.62748" E 35°18’45.10188"	S 14°24’5.4666" E 35°18’52.91988"	S 14°24’5.15088" E 35°18’44.6904"	S 14°24’5.53716" E 35°18’44.78724"
Lungwena	S 14°14’55.238" E 35°15’37.228"	S 14°15’1.07208" E 35°15’12.19932"	S 14°15’4.09356" E 35°15’16.18308"	S 14°15’4.0939" E 35°15’16.183"
Lutende	S 14°6’44.69904" E 35°12’20.1906"	S 14°6’45.59652" E 35°12’19.17036"	S 14°6’45.69228" E 35°12’19.21068"	S 14°6’48.2168" E 35°12’21.7674"
Mbwazi	S 14°9’11.54628" E 35°13’48.65592"	S 14°9’11.546" E 35°14’48.657"	S 14°9’9.81648" E 35°13’46.12368"	S 14°6’48.21768" E 35°12’21.7674"

Name of Bridge	Point A	Point B	Point C	Point D
Nkuli	S 14°18’25.43724" E 35°17’10.38876"	S 14°18’25.39764" E 35°17’11.48208"	S 14°18’25.29072" E 35°17’11.25708"	S 14°18’21.67272" E 35°17’12.14376"
Unga	S 13°59’94.3896" E 35°9’28.7838"	S 13°59’54.303" E 35°9’26.98632"	S 13°59’58.2036" E 35°9’28.58832"	S 13°59’58.33032" E 35°9’30.03732"

5.2.2.2 Species Distribution and Faunal Richness

The baseline survey recorded diverse faunal species distributed across the twelve designated bridge sites (Annex 4). Species composition included 17 mammal species, 14 reptile species, 2 amphibian species, 47 bird species, and 52 insect taxa. This diversity underscores the project area's ecological heterogeneity, including riparian zones, miombo woodlands, grassland patches, and anthropogenically altered landscapes. Table 5-5 presents a summary of species richness per site. The analysis of species distribution revealed notable biodiversity hotspots, particularly around Chikosere and Unga Bridges for mammals, Mbwazi Bridge for reptiles, Lilore Bridge for amphibians, Lugola and Mbwazi for avifauna, and Lusalumwe Bridge for insect diversity. These sites represent ecologically sensitive areas that warrant heightened conservation attention during project planning and implementation.

Table 5-5: Summary of findings for each location

Name of Bridge	No. of Mammals	No. of Reptiles	No. of Amphibians	No. of Insects	No. of Birds
Chikosere	7	9	1	9	12
Kalanje	0	0	0	1	6
Lilembwe	3	3	0	8	11
Lilore	0	4	2	7	18
Litufu	0	1	0	1	8
Lugola	4	3	0	4	23
Lungwena	1	3	0	9	7
Lusalumwe	3	5	1	13	15
Lutende	1	4	0	5	15
Mbwazi	6	10	0	1	23
Nkuli	0	3	0	9	10
Unga	7	8	0	6	21

5.2.2.3 Mammals

A total of 17 mammal species were recorded (Annex 4; A4.2), representing 12 families across the orders Rodentia, Carnivora, Primates, Macroscelidea, and Eulipotyphla. Commonly encountered species included the Vervet Monkey (*Cercopithecus aethiops*), Yellow Baboon (*Papio cynocephalus*), and Side-striped Jackal (*Lupulella adusta*). Smaller mammals such as the Fat Mouse (*Steatomys pratensis*) and Gambian Giant Pouched Rat (*Cricetomys gambianus*) were prevalent in shrubby habitats with minimal disturbance. Importantly, all recorded mammal species were classified as “Least Concern” under the IUCN Red List. However, the ecological roles of these species, as seed dispersers, predators, and ecosystem engineers,

highlight their importance in maintaining ecological function. Sites such as Chikosere and Unga recorded the highest mammal species richness (Figure 5-3). These areas exhibit relatively intact microhabitats with dense vegetation and water sources, conditions favourable for medium to large mammals. Construction-related impacts, such as habitat fragmentation and night-time disturbances, may disproportionately affect nocturnal and territorial species, including the African Wild Cat (*Felis lybica*) and the Spotted Hyena (*Crocuta crocuta*).

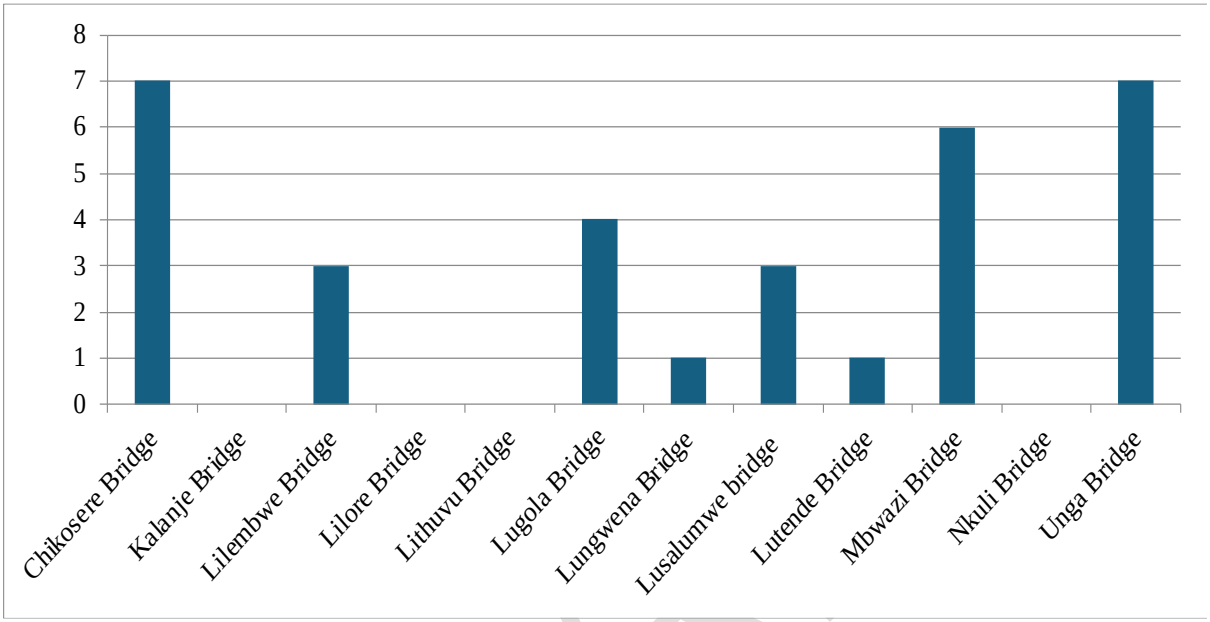

Figure 5-3: Analysis of the mammal species richness

5.2.2.4 Reptiles

The reptile survey recorded 14 species from 9 families, with representatives from the Squamata order dominating the findings (Annex 4; A4.3). Key species included the Mozambique Spitting Cobra (*Naja mossambica*), Puff Adder (*Bitis arietans*), and Water Monitor (*Varanus niloticus*). While all species were assessed as Least Concern by the IUCN, some, such as the Black Mamba (*Dendroaspis polylepis*), pose safety risks and may trigger conflict if encountered by construction workers. Mbwazi Bridge stood out as a reptile-rich zone (Figure 5-4), with a mix of arboreal and terrestrial species suggesting diverse habitat structure. Given the potential for encounters with venomous snakes, training programmes for site workers on species identification, safe handling protocols, and first aid will be essential. Additionally, buffer zones and signage will be used to prevent encroachment into high-density reptile areas during construction.

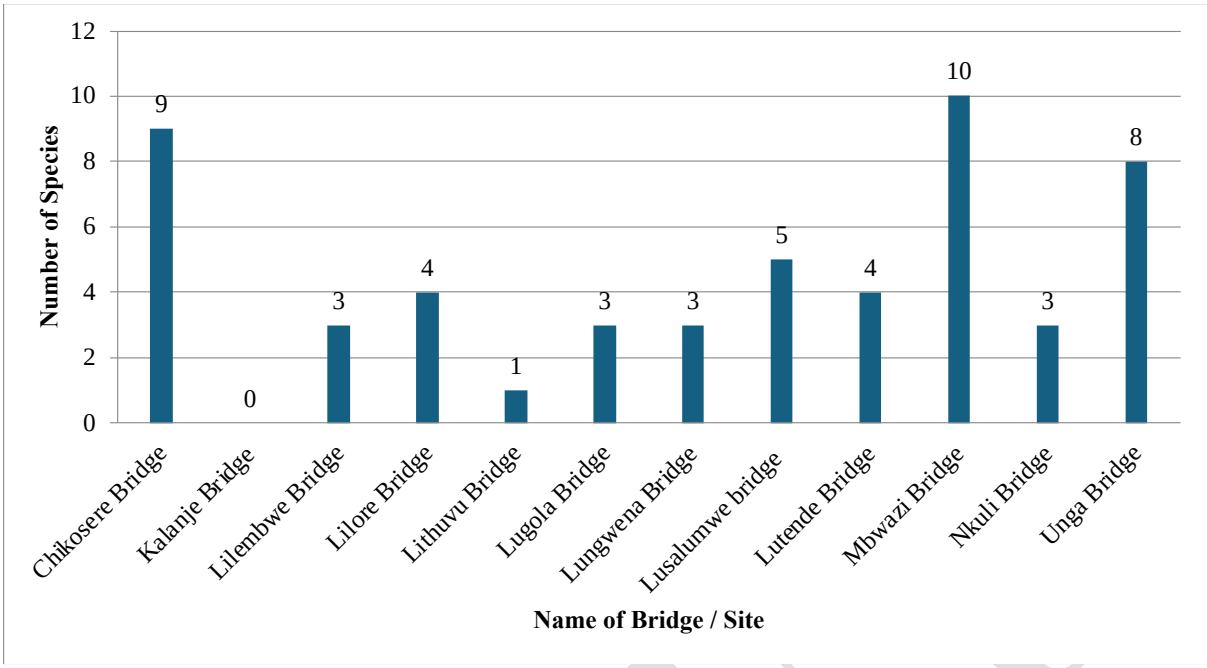

Figure 5-4: Analysis of the reptile species richness

5.2.2.5 Amphibians

Amphibian diversity was low, with only two species recorded (Annex 4; A4.6): the Anchieta Rigged Frog (*Ptychadena anchieta*) and the Guttural Toad (*Sclerophrys gutturalis*). Both species are common across sub-Saharan Africa and are currently not threatened. Their detection around Lilore Bridge (Figure 5-5), an area with high moisture content and seasonal pools, reinforces the association of amphibians with hydrologically sensitive habitats. Amphibians serve as indicators of ecosystem health and are vulnerable to pollutants, sedimentation, and altered hydrological regimes. The ESIA recommends protecting seasonal wetlands, ensuring proper drainage design, and restricting the use of harmful chemicals near amphibian habitats. Post-construction habitat restoration should consider the creation of small artificial ponds or wetland features to compensate for any habitat loss.

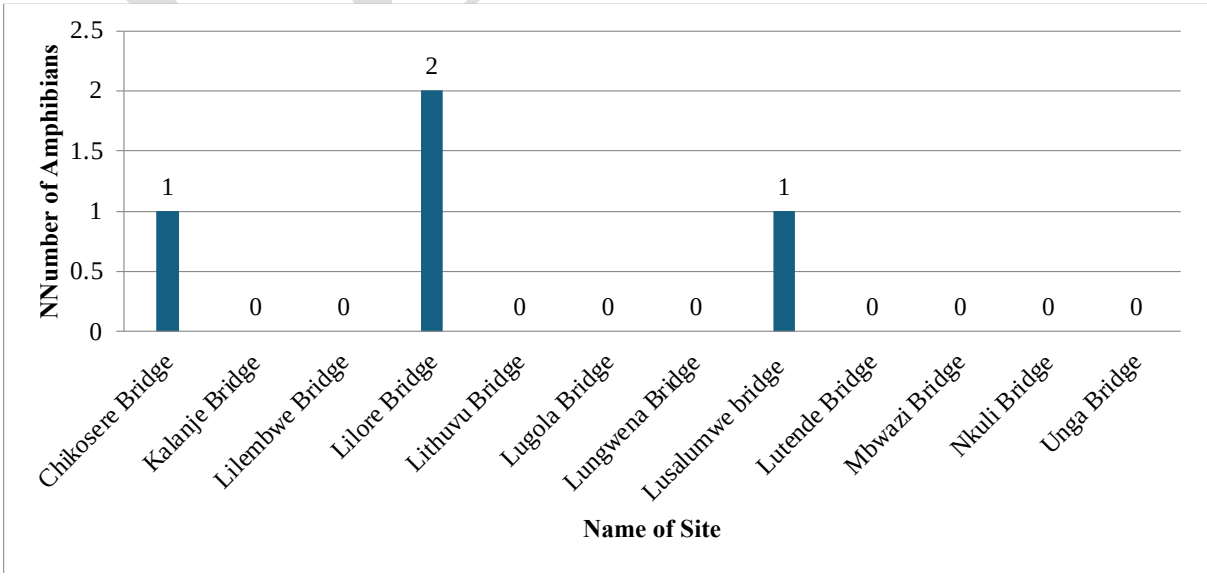

Figure 5-5: Analysis of the amphibian species richness

5.2.2.6 Avifauna

Bird species were the most diverse group, with 47 species representing 26 families (Annex 4; A4.5). These included raptors (e.g., Little Sparrowhawk *Accipiter minullus*), granivores (e.g., Red-billed Firefinch *Lagonosticta senegala*), nectarivores (e.g., Collared Sunbird *Anthreptes collaris*), and wetland-associated species such as the Hamerkop (*Scopus umbretta*). Lugola and Mbwazi Bridges hosted the highest avian diversity (Figure 5-6), likely due to the availability of heterogeneous habitats, including riparian forests, grasslands, and cultivated fields. No species of global conservation concern were recorded, although local nesting sites, such as those of weavers and hornbills, are of ecological importance and must be protected. During the breeding season, construction schedules should be adjusted to avoid nest disturbance, particularly in areas where large or colonial nesting birds are known to breed. In the post-construction phase, revegetation using native shrubs and trees that attract birds should be promoted to restore habitat quality.

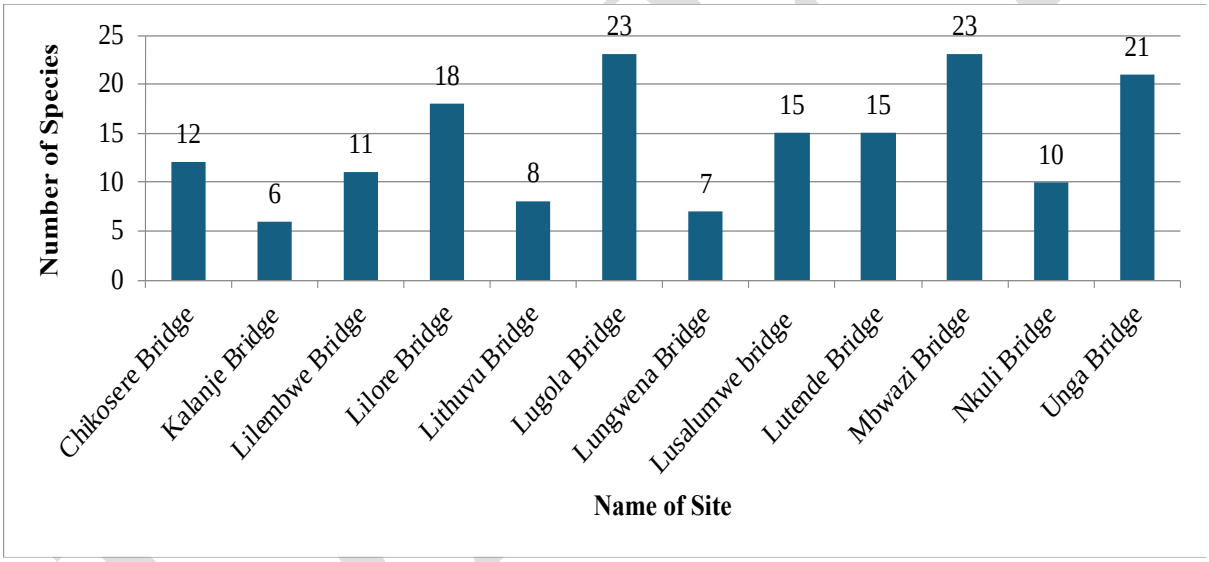

Figure 5-6: Analysis of the avifauna species richness

5.2.2.7 Insects

Insect surveys identified 52 species from 20 families (Annex 4; A4.4), encompassing ecologically significant groups such as pollinators (e.g., *Apis mellifera*, *Xylocopa caffra*), decomposers (e.g., blowflies), and predators (e.g., antlions, spider wasps). Insects were most abundant around Lusalumwe Bridge (Figure 5-7), a location characterised by mixed floral diversity and relatively low disturbance. Although all insect species observed were considered Least Concern, their functional importance in ecosystem processes cannot be overstated. Pollinators in particular are critical for maintaining the productivity of both natural and cultivated vegetation. Measures to protect insect habitats include minimising pesticide use, preserving native flowering plants, and ensuring riparian buffers remain intact. Post-construction landscaping should prioritise insect-friendly plant species, and environmental

awareness programmes for site workers should promote appreciation of insects as ecological allies rather than pests.

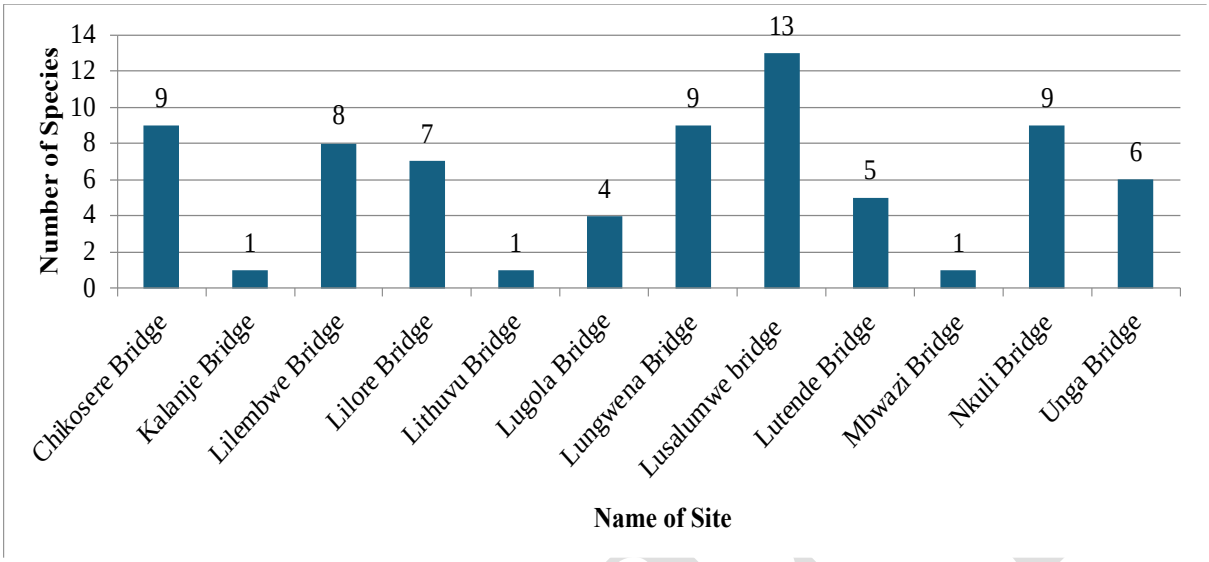

Figure 5-7: Analysis of the insect species richness

5.2.3 Data Gaps and Future Studies

While the baseline biodiversity and ecological assessments provided a strong understanding of terrestrial vegetation, amphibians, and general habitat conditions within the project's area of influence, certain information gaps remain. These gaps are primarily linked to time constraints during the ESIA preparation phase, which limited the scope and duration of fieldwork. As a result, some components of the aquatic and terrestrial ecology require further study to ensure full compliance with World Bank ESS6 and to inform adaptive management during project implementation.

One key gap relates to the absence of a dedicated fish biodiversity survey in rivers and streams intersecting the project alignment, particularly those that drain into Lake Malawi. Given the ecological importance of Lake Malawi as a UNESCO World Heritage Site and the potential connectivity of these watercourses, understanding the diversity, conservation status, and habitat requirements of fish species is critical for impact avoidance and mitigation. Similarly, amphibian and aquatic macroinvertebrate assessments were conducted during a single season, limiting the ability to capture seasonal variation in species diversity and abundance. In addition, while the botanical survey identified several species of conservation concern within bridge footprints, time limitations prevented a comprehensive inventory of locally rare flora in adjacent riparian and terrestrial habitats. This could mean that some sensitive species remain undocumented. Furthermore, detailed hydrological flow data for smaller tributaries were not collected during the ESIA, which could influence both the final bridge design and sediment management measures. To address these gaps, targeted follow-up studies have been recommended for implementation during the pre-construction and early construction phases. The recommended follow-up actions are summarised in Table 5-6.

Table 5-6: Flora and Fauna Data Gaps and Future Studies

Data Gap / Limitation	Reason for Gap	Recommended Future Study / Action	Timing for Completion	Responsibility
Absence of fish biodiversity survey in aquatic habitats linked to project sites (including rivers discharging into Lake Malawi)	Limited time available for field surveys during ESIA preparation phase	Undertake dedicated fish biodiversity survey to identify species present, assess conservation status, and map critical habitats. Integrate findings into C-ESMP.	Before commencement of in-stream works	Contractor with oversight from Supervising Engineer
Limited seasonal variation data for amphibians and aquatic macroinvertebrates	Fieldwork conducted during a single season	Conduct follow-up surveys in contrasting seasons to capture seasonal variation in species diversity and abundance	During first year of construction phase	Contractor's Environmental Team
Incomplete inventory of locally rare flora outside immediate bridge footprints	Time constraints during baseline botanical survey	Undertake supplementary vegetation survey in adjacent riparian and terrestrial habitats to identify and protect additional species of conservation concern	Pre-construction	Contractor with guidance from an Independent Ecologist
Limited hydrological flow data for smaller tributaries	No continuous monitoring stations in place	Install temporary monitoring stations or undertake manual flow measurements to inform bridge design and sediment control measures	Prior to finalisation of detailed construction plans	Contractor and Design Engineer

5.3 Socio-Economic Environment

5.3.1 Demographic Characteristics

The project area spans several rural communities located near the 12 proposed bridge sites within Mangochi District. These communities are distributed across TAs including Namavi, Makanjira, Chowe, and Chapola. The settlements within these TAs are characterised by moderate to high population densities typical of rural southern lakeshore Malawi. Population figures compiled during the baseline survey indicate that the total population across the bridge sites exceeds 110,000 people. The largest settlement is Chikosere with 27,600 residents, while the smallest is Lungwena with 2,760 residents. Across all sites, the population exhibits a consistent gender balance, with females slightly outnumbering males in each location. Table 5-7 presents the disaggregated population data by site and sex.

The demographic structure of the project area is youthful. Community profiles gathered through consultations and secondary data confirm that a significant proportion of residents are under 30 years of age, reflecting national demographic trends. Household structures are typically extended, and in many areas, matrilineal systems influence land access and inheritance patterns. The population distribution around bridge sites is primarily rural and dispersed, with some households clustered along road corridors. Settlement patterns are influenced by access to arable land, proximity to water sources, and availability of social services such as schools and health centres. Most communities are accessible by feeder roads that connect to the Chingo-Makanjira Road.

In terms of gender dynamics, the data indicates a higher number of females than males in all the surveyed sites. This reflects broader demographic trends in Malawi, where women comprise most of the population due to factors such as male labour migration. Female-headed households are present across the project area, though the proportion varies between sites.

Table 5-7: Population Distribution by Site and Gender

Name of Site	Total Population	Male	Female
Chikosere	27,600	13,373	14,227
Kalanje	4,319	2,093	2,226
Lilembwe	6,900	3,343	3,557
Lilore	3,391	1,643	1,748
Litufu	6,300	3,053	3,247
Lungwena	2,760	1,337	1,423
Lusalumwe	4,393	2,129	2,264
Lutende	23,000	11,144	11,856
Mbwazi	5,580	2,704	2,876
Nkuli	4,761	2,307	2,454
Unga	13,800	6,687	7,113

5.3.2 Education

The project area traverses areas, where access to education is an essential factor influencing local development, youth empowerment, and social well-being. However, the area still faces

challenges associated with education infrastructure, literacy levels, and equitable access, particularly for girls and children from low-income households. According to NSO (2020), Mangochi District reports a literacy rate of 46.3 percent among persons aged five years and above, significantly lower than the national average of 65.4 percent. Male literacy stands at 48.5 percent, while female literacy lags behind at 44.4 percent. These figures reflect disparities in access to and retention in education, often attributed to poverty, child marriages, cultural attitudes, and limited school infrastructure.

At the community level, the road project passes through settlements that are served by a range of primary and secondary schools. Table 5-8 summarises the location and proximity of these schools to the bridge sites. For instance, primary schools such as St. Joseph (2.5 km from Lutende) and Mwanjati (0.5 km from Mbwazi) are in close proximity to construction sites and may be affected by increased traffic, noise, and dust during the construction phase. Similarly, secondary schools such as Malindi Secondary and Lungwena Secondary lie near Kalanje and Lungwena sites respectively, indicating that schoolchildren may interact frequently with the road corridor during construction and operation phases. Despite the presence of these institutions, schools in the area continue to face quality constraints. During stakeholder consultations, community members expressed concerns over insufficient classrooms, shortages of teaching and learning materials, and long travel distances to reach secondary schools. In particular, female learners are disproportionately affected, often dropping out due to early marriage or responsibilities at home.

Table 5-8: Educational Facilities in Project-Affected Communities

Name of Site	Primary Schools (Names & Proximity)	Secondary Schools (Names & Proximity)
Chikosere	Chimbiya	Lungwena Secondary; Malindi
Kalanje	Mtengeza (2 km); Lungwena (1.5 km)	Lungwena Secondary; Malindi
Lilembwe	Lilembwe (0.5 km)	
Lilore	Mpiripiri (1 km)	Mlambe Secondary (2.5 km)
Litufu	Lupetere (1.5 km)	Chiwinga CDSS (2.5 km)
Lungwena		Malindi (4 km)
Lusalumwe	Chimbende (2 km)	Malindi (3 km)
Lutende	St. Joseph (2.5 km); Koche (3 km)	St. Joseph CDSS (0.5 km)
Mbwazi	Mwanjati (0.5 km); Mikombe (3 km)	
Nkuli	Makumba (1.5 km)	St. Michael (3 km)
Unga	Unga; Lugola (7 km)	Lugola Secondary School (6 km)

5.3.3 Health and Sanitation

Health and sanitation conditions in the project area were assessed based on community consultations and health facility mapping across affected sites. The area is served by a mix of public and Christian Health Association of Malawi (CHAM)-operated health centres. Health services are delivered at the Primary level, through health centres and posts, and at Secondary level, via the Mangochi District Hospital, located in Mangochi Boma, which acts as a referral centre. The health facilities serving the project sites fall under the Makanjira and Mangochi Boma Zones, two of the five health administration areas in Mangochi District. At the site level, access to health care varies by proximity to health centres, with distances ranging from less

than 2 km to more than 5 km in some communities. Table 5-9 summarises the key health facilities and commonly reported diseases in each locality.

Table 5-9: Site-Specific Health Facilities and Common Diseases

Site	Health Facility	Common Diseases
Chikosere	Mpiripiri Health Centre (5 km)	Malaria, Cholera, HIV/AIDS, TB (recent increase)
Kalanje	Lungwena Health Centre	Malaria, Cholera
Lilembwe	Kadango Health Centre	Malaria, Diarrhoea, HIV/AIDS
Lilore	Makanjira Health Centre	Malaria, Flu, Coughs, Diarrhoea, High Blood Pressure, TB, Stroke
Litufu	Lugola Health Centre (4 km)	Malaria, Diarrhoea
Lugola	Lugola Health Centre (1.5 km)	Malaria, Diarrhoea
Lungwena	Lungwena Health Centre (1.5 km)	Malaria, Diarrhoea, HIV/AIDS
Lusalumwe	Malindi Health Centre (6 km)	Malaria, Diarrhoea, HIV/AIDS

The most commonly reported diseases across the project area include malaria, cholera, diarrhoea, and HIV/AIDS, which are typical of lakeshore communities with limited access to improved water and sanitation infrastructure. Tuberculosis and non-communicable diseases such as high blood pressure and stroke were also noted, particularly in Lilore. Where health data was not available at site level, district-level health statistics were used to provide broader context. For example, Mangochi District has a 9% prevalence of chronic illnesses, with HIV/AIDS accounting for 40.4% of these cases, followed by asthma, epilepsy, and mental illness (NSO, 2020). This background is important for understanding overall disease burden and planning relevant public health interventions during construction and operation phases.

The COVID-19 pandemic also affected the district, with Mangochi recording one of the highest confirmed case rates in the country. As of August 2021, 1,541 confirmed cases were reported in the district, representing 2.9% of national cases. The district had a relatively high recovery rate (75%) and a low case fatality ratio (2%) compared to national averages (PHIM, 2021). Though COVID-19 cases have since declined, its legacy underscores the need for integrating occupational and public health preparedness in infrastructure projects.

5.3.4 Economic Activities and Livelihoods

The project area spans several rural and peri-urban communities whose livelihoods are predominantly dependent on agriculture, fishing, casual labour (ganyu), small-scale businesses, and salaried employment. As presented in Table 5-10, farming and fishing remain the principal sources of income, particularly in lakeshore communities such as Unga, Nkuli, Lungwena, and Lilore, where fishing also serves as the main form of casual labour. Casual labour in these areas is largely seasonal, tied to both fishing seasons and agricultural cycles. In upland communities such as Chikosere, Kalanje, Lilembwe, Lugola, Lutende, and Lusalumwe, livelihoods are diversified to include farming, petty trading, artisanal crafts (tailoring, welding, carpentry), brickmaking, and informal employment in construction and services. Locations like Lugola and Nkuli also report small-scale gold mining, which is increasingly attracting youth due to limited formal employment opportunities.

Despite the relatively diverse income strategies, many households remain vulnerable due to low productivity, erratic market access, and seasonal income fluctuations. Women and youth are often engaged in informal trading and service work, with limited access to capital and formal credit. Access to financial services such as banks and microfinance institutions is mostly concentrated in Mangochi Town, making formal financial inclusion in these communities relatively low. The main trading and economic hubs that serve the project area include Chingo, Malindi, Makanjira, and Lungwena, where informal markets, retail shops, produce vendors, and small enterprises such as barbershops, garages, tailoring shops, and rest houses provide services and limited wage employment.

Table 5-10: Main Economic Activities by Site

Name of Site	Main Income Sources
Chikosere	Farming, fishing, casual labour, and small-scale businesses
Kalanje	Farming, casual work, and fishing
Lilembwe	Farming and small-scale businesses
Lilore	Fishing (main ganyu), farming, small-scale businesses, and skill-based trades (e.g., tailoring, welding, hairdressing)
Litufu	Fishing (main ganyu), crop and livestock farming
Lugola	Farming, small-scale businesses, casual work, gold mining, and salaried jobs
Lungwena	Fishing (main ganyu), farming, business, salaried work, and casual work
Lusalumwe	Brick making, fishing, farming, and skill-based trades (e.g., carpentry, tailoring, and mechanics)
Lutende	Farming, business, salaried work, and casual work
Mbwazi	Fishing (main ganyu), farming, small-scale businesses, and skill-based trades (e.g., tailoring, welding)
Nkuli	Fishing (main ganyu), farming, small-scale businesses, and gold mining
Unga	Fishing (main ganyu), farming, small-scale businesses, livestock rearing, and casual work

5.3.5 Agriculture and Food Security

Agriculture is the primary livelihood activity across the project sites. The area supports both subsistence and small-scale commercial farming, with communities growing a range of crops for household consumption and sale. The key crops include maize, cassava, pigeon peas, groundnuts, rice, sweet potatoes, tomatoes, onions, beans, and leafy green vegetables. Table 5-11 presents a site-specific summary of crops grown and livestock kept in each community.

Table 5-11: Crops and Livestock in the Project Area

Name of Site	Crops Grown	Livestock Kept
Chikosere	Tomatoes, onions, leafy greens, maize, cassava, groundnuts, pigeon peas	Cows, ducks, chickens, goats, sheep
Kalanje	Maize and rice	–
Lilembwe	Maize and pigeon peas	–

Name of Site	Crops Grown	Livestock Kept
Lilore	Cabbage, tomatoes, maize, groundnuts, sweet potatoes, sugarcane, bananas, mango, papaya	Sheep, goats, chickens, ducks
Litufu	Maize, sorghum	Goats, cattle, chickens, sheep
Lugola	Maize, beans, groundnuts	Cows, chickens, ducks
Lungwena	Maize, sweet potatoes, rice, cassava	–
Lusalumwe	Maize, tomato, mpome	–
Lutende	Maize, rice, tomatoes	–
Mbwazi	Maize, sweet potatoes, cassava, vegetables (mpiru, tanaposi), tomato soya, pigeon peas	Goats, chickens, sheep, ducks, guinea fowl, pigeons
Nkuli	Maize, sweet potatoes, cassava, pigeon peas	Goats, chickens, cattle
Unga	Maize, rice, sugarcane, sweet potatoes, cowpeas (Kholowe)	Goats, cattle

Site visits and consultations revealed that agricultural activities vary by location depending on local soil characteristics, access to water, and proximity to markets. For instance, vegetable production is common in Mbwazi and Lilore due to better soil moisture, while sugarcane and cowpeas are more prevalent in Unga. Maize and cassava are staple crops grown throughout the corridor. Crop production, however, is increasingly vulnerable to climatic variability, including droughts and flooding that have affected yields and food security. Livestock production is also widely practised across the project area. Households keep goats, chickens, cattle, ducks, and sheep, with species varying by site. Goats and chickens are the most common due to their low maintenance and compatibility with the local diet. In Mbwazi and Lilore, households also rear ducks, guinea fowl, and pigeons. Pigs are rare, reflecting the dominant Islamic cultural norms across Mangochi District. To supplement rainfed agriculture, limited irrigation is practiced in sites like Lungwena and Lugola using treadle pumps, watering cans, or small-scale motorized systems. While district-level data show that over 2,000 hectares have been developed under irrigation (MDC, 2017), this is included here to provide broader context and highlight the potential for scaling up irrigation within the project area.

5.3.6 Transportation and Mobility

Transportation in the project area is characterised by a combination of non-motorised and motorised transport modes, which reflect the rural and semi-rural dynamics of Mangochi District. As shown in Table 5-12, the most common modes of transport across the project sites include bicycles, motorcycles, pick-up vehicles, and in some lakeshore communities, unregistered boats and walking. Bicycles and motorcycles are the dominant forms of transport due to their affordability and adaptability to poor road conditions, particularly in hard-to-reach areas like Litufu, Lilore, and Lilembwe.

Table 5-12: Common Transport Modes in Project Sites

Name of Site	Common Transport Modes
Chikosere	Motorbikes, bicycles, cars, and boats
Kalanje	Bicycle, pick-ups, motorcycle, boats
Lilembwe	Motor vehicle, motorcycle, bicycle

Name of Site	Common Transport Modes
Lilore	Bicycle, pick-ups, motorcycle, and boats
Litufu	Motorcycles and bicycles
Lugola	Motor vehicles, motorbikes, and bicycle
Lungwena	Motorcycle, motor vehicle, and bicycle
Lusalumwe	Bicycle, motorcycle, and pick-ups
Lutende	Motorcycles, bicycles, and motor vehicles
Mbwazi	Bicycle, motorcycle, and pick-ups
Nkuli	Bicycle, motorcycle, and pick-ups
Unga	Road: Motor vehicles, motorcycles, bicycles, and walking
	Water: Private and unregistered boats

Sites closer to the lake such as Unga, Kalanje, and Chikosere also rely heavily on boats for both passenger and cargo transport, especially during the rainy season when road access becomes difficult. In contrast, sites like Lungwena and Lugola have relatively better connectivity and access to motor vehicles, enhancing year-round mobility.

The Chingo-Makanjira Road, which forms the core alignment of this project, is one of the three secondary roads in Mangochi District. Unlike the M3 and M10 roads, which are fully bituminised, the Chingo-Makanjira is only bituminised for 38.5 km out of a total 106 km, leaving significant sections vulnerable to erosion and flooding. These unsealed stretches become impassable during the rainy season, disrupting transport services and isolating communities. This severely affects access to markets, health centres, and schools. The proposed rehabilitation of the Chingo-Makanjira Road and bridges is therefore expected to drastically improve local mobility, reduce travel times, and enhance economic and social service delivery. The current transportation scenario highlights the urgent need for climate-resilient road infrastructure, especially in project areas where transport is a critical enabler of livelihoods and emergency response.

5.3.7 Commerce and Industry

Commercial and industrial activities within the project area are primarily informal and community-based, reflecting the rural character of much of the Road corridor. Across the project sites, small-scale commerce such as vending, produce selling, and hawking constitutes the predominant source of household income. Petty trading in groceries, clothing, farm produce, and fish is common in trading centres such as Chikosere, Lugola, Lungwena, and Lilore. These activities often operate from roadside markets or informal stalls clustered around health centres, schools, and road junctions. In more developed centres such as Malindi, Makanjira, Namalaka, and Chimbende, commercial enterprises are relatively diversified. These areas host butcheries, tailors, saloons, battery charging kiosks, fish mongers, restaurants, rest houses, and retail shops. Additionally, agro-dealer shops, maize mills, and mobile money booths are scattered throughout the corridor and serve as economic lifelines for the rural population. A few rest houses and lodges also cater to travellers and government extension staff.

In terms of light industry, there are informal garages and workshops dealing in carpentry, tailoring, bicycle and motorcycle repairs, and welding. These are typically family-run or youth-led enterprises located at trading centres or near key road intersections. Formal industry is largely absent, although sand mining and gold panning were noted in areas such as Lugola and Nkuli during community consultations. Access to financial services remains a constraint for many businesses in the corridor. Most project-affected persons (PAPs) rely on Mangochi Town for banking services, where commercial banks such as National Bank of Malawi, Standard Bank, FDH Bank, MyBucks, and New Finance Bank operate. Microfinance institutions also support savings and loans in rural areas through village banks (VSLAs) and informal lending groups. Overall, the local economy is heavily dependent on transport connectivity. The current poor state of the Chingo-Makanjira Road limits the frequency of supply trips and increases the cost of goods, undermining business viability. Therefore, the proposed road and bridge rehabilitation is expected to boost commercial activity by improving access to markets, enabling efficient delivery of goods, and reducing transport-related losses, particularly for traders dealing in perishable produce and fish.

5.3.9 Religion and Community Cohesion

The project area, like the rest of Mangochi District, is characterised by a multi-ethnic and religiously diverse population, which plays a vital role in shaping community structures, social values, and service provision. According to community consultations and demographic data, the Yao ethnic group constitutes the majority of the population in the project sites, representing approximately 72.3 percent. Other ethnic groups found in the area include the Lomwe (9.5%), Chewa (8.0%), Ngoni (4.2%), and Nyanja (3.1%), with the remaining 2.8 percent comprising various minority groups. Despite the ethnic diversity, a strong sense of community cohesion is maintained through shared cultural norms, intermarriages, and common social obligations such as funerals, weddings, initiation ceremonies, and communal farming practices. The Yao language is widely spoken, but Chichewa serves as the common national language, facilitating communication across ethnic lines. English is mainly used in formal institutions such as schools, health centres, and administrative offices.

Religious life is deeply embedded in the social fabric of the project communities. Islam is the predominant religion, practiced by an estimated 72.7 percent of the population. This is followed by Christianity at 25.2 percent, which includes denominations such as Roman Catholic (5.4%), Church of Central Africa Presbyterian (3.2%), Seventh Day Adventist/Baptist/Apostolic churches (3.2%), Anglican (3.2%), Pentecostal (2.1%), and other Christian groups (8.1%). A small proportion of the population adheres to other religions (1.8%), traditional beliefs (0.1%), or identify as non-religious (0.3%) (NSO, 2018). Religious institutions are highly influential in the project area and contribute significantly to the provision of education, health, and social welfare services. Mosques, churches, madrassas, and mission-run schools and clinics serve as critical anchors for both spiritual guidance and social development. Religious leaders often play an essential role in mobilising community support, resolving conflicts, and reinforcing moral behaviour, particularly among youth.

Community cohesion in the project area is generally strong, facilitated by traditional leadership structures and community-based organisations. Village Development Committees (VDCs), Area Development Committees (ADCs), and faith-based groups collaborate on development issues, enhancing collective resilience. However, periodic tensions may arise over land disputes, political differences, or access to natural resources, which are typically resolved through local conflict-resolution mechanisms led by traditional authorities and religious leaders. The inclusive and cooperative nature of the social environment in the project area provides a favourable context for stakeholder engagement and community participation during project implementation.

5.3.10 Security and Social Risks

Security within the project area is primarily under the jurisdiction of the Malawi Police Service (MPS), which plays a central role in ensuring public safety and protecting property. The area falls under the oversight of the Mangochi Police Station, with operational support from satellite police formations at Makanjira, Chiphole, Malindi, and Lungwena. These police formations are strategically positioned to respond to incidents along the road corridor and within surrounding communities. The local police formations are tasked with maintaining law and order, conducting patrols, investigating crimes, and offering general community support. However, like many rural policing structures in Malawi, these units often operate with limited resources, including personnel, transportation, and communication tools, which can constrain rapid response to security incidents in remote sections of the project area.

Community policing structures are well established in the project sites and play a pivotal role in crime prevention and conflict resolution. Through the Malawi Police Service's Community Policing Scheme, Community Policing Forums (CPFs) have been formed in most of the villages and trading centres near the project alignment. These forums facilitate a strong partnership between community members and the police, aimed at enhancing vigilance and reducing petty crimes, domestic violence, theft, and gender-based violence (GBV). During consultations, community members acknowledged the effectiveness of CPFs and local neighbourhood watch groups in addressing social conflicts, protecting public infrastructure, and discouraging antisocial behaviour among youth. Nevertheless, emerging social risks remain, particularly during major construction activities. These may include increased risks of theft, social conflict between outsiders and host communities, child protection issues, and heightened vulnerability of women and girls to sexual exploitation and abuse, especially where there is an influx of workers and increased income inequality.

While the police and CPF structures provide a foundation for maintaining order, the planned project works will require enhanced coordination between the contractor, local leaders, the police, and the District Social Welfare Office to monitor and manage social risks effectively. This will be particularly critical during peak construction periods when labour-related tensions, traffic incidents, and land-based disputes may become more pronounced. Field observations noted that there are no designated accident blackspots near the bridge sites. All the bridge locations have straight approach alignments, which generally enhance visibility and reduce

accident risk. Nevertheless, standard construction-period traffic management measures will still be applied to maintain safety for road users and workers.

5.3.11 Cultural and Historical Heritage

The project area traverses a culturally rich corridor of Mangochi District, inhabited by communities with longstanding traditions and religious practices. The predominant cultural group in the project area is the Yao, whose influence is seen in language, customs, and Islamic practices. Religious and cultural structures such as mosques and graveyards are key features of the cultural landscape and are widespread across the TAs of Namavi, Makanjira, Chowe, and Chapola. The location map (Figure 5-8) identifies several mosques near the project road, particularly around settlements such as Lungwena, Lugola, Kalanje, and Lusalumwe. These structures are frequently used and play an important role in religious observance, community cohesion, and identity. Although these mosques are within the broader area of influence, none are located within the immediate construction footprint or right of way. Additionally, graveyards are present in proximity to the road alignment but remain outside the direct impact zone. These are considered highly sensitive cultural assets, and community consultations have emphasized their importance for heritage preservation. Careful siting of detours, material storage areas, and construction camps will be essential to avoid disturbances.

No formal historical monuments or protected heritage sites have been recorded within the direct influence of the road works, but intangible heritage practices, such as initiation ceremonies and traditional leadership roles, are deeply woven into the local social fabric. Such activities are seasonal and are observed with respect by local communities. Given the proximity of the project area to Lake Malawi, which is designated as a UNESCO World Heritage Site due to its exceptional biodiversity and cultural value, particular attention will be given to ensuring that construction activities do not adversely affect the lake's environmental or cultural attributes. As part of World Bank ESS8 (Cultural Heritage), continuous community engagement will ensure that cultural assets and sensitivities are respected during implementation. A Chance Finds Procedure will be incorporated into the ESMP to address any unexpected discoveries of archaeological or cultural significance.

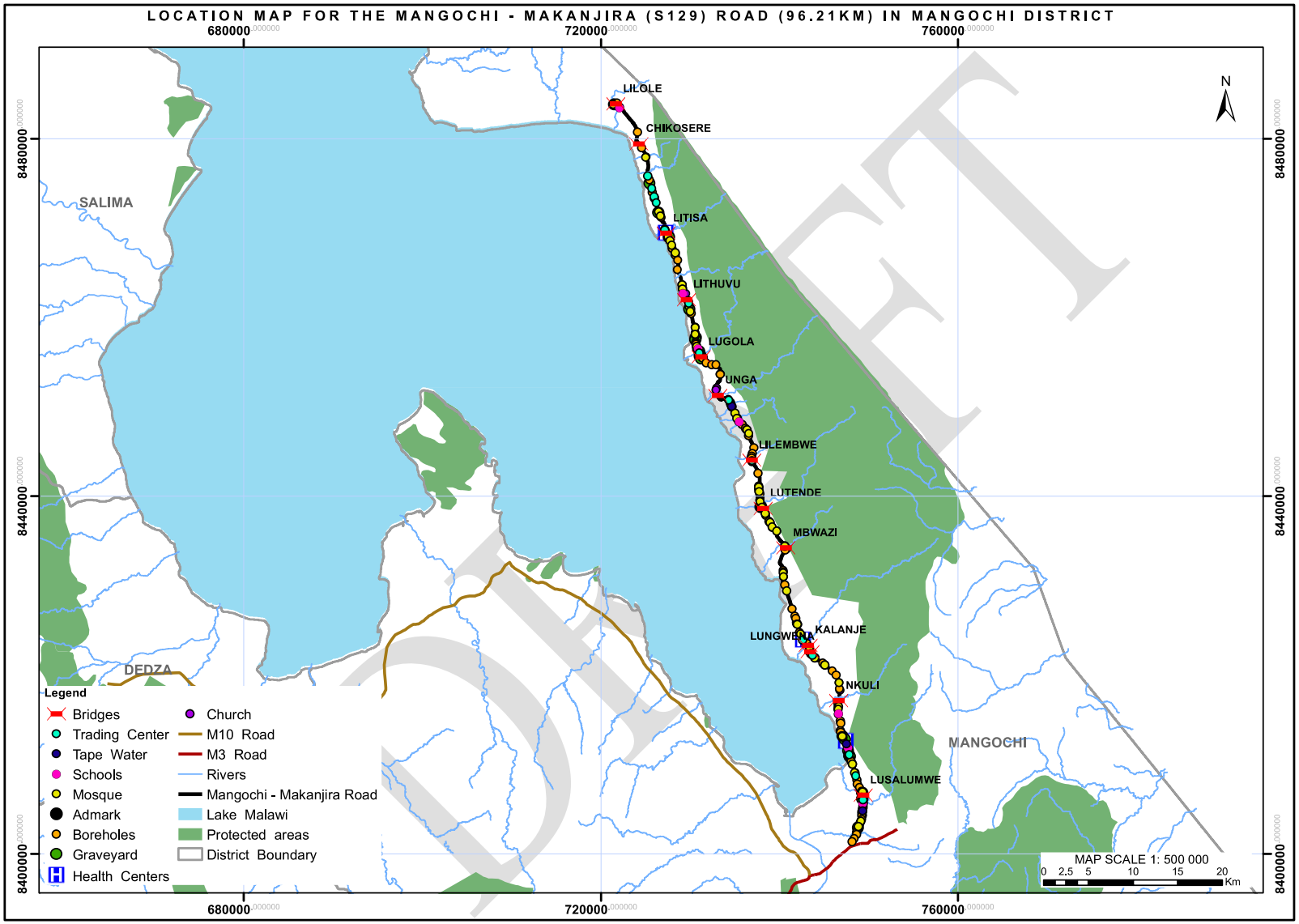

Figure 5-8: Map of Cultural and Religious Features

Chapter Six: Identification and Analysis of Environmental and Social Impacts

Predicts and assesses the project's likely positive and negative environmental and social (E&S) impacts, in quantitative terms to the extent possible. It should include E&S impacts at various phases of the project, including cumulative E&S impacts. Identifies mitigation measures and any residual negative E&S impacts that cannot be mitigated. Explores opportunities for environmental enhancement. Identifies and estimates the extent and quality of available data, key data gaps, and uncertainties associated with predictions, and specifies topics that do not require further attention.

6.1 Assessment of E&S Impacts and Mitigation Measures

This section presents the methodology used to identify, evaluate, and rank the potential environmental and social impacts associated with the construction and rehabilitation of the 12 selected bridges along the Road. The assessment considers E&S impacts across all project phases, (planning, construction, and operation) and includes direct, indirect, and cumulative effects. A structured scoring system based on defined criteria is used to determine the significance of each E&S E&S impact. This enables the identification of appropriate mitigation measures and evaluation of residual E&S impacts that may persist after mitigation, in line with the mitigation hierarchy.

6.1.1 Assessment of E&S Impacts and Mitigation

The assessment of E&S impacts and mitigation evaluates the likely extent and significance of the potential E&S impacts on identified receptors and resources against defined assessment criteria, to develop and describe measures that will be taken to avoid, minimise or compensate for any adverse environmental impacts, to enhance positive E&S impacts, and to report the significance of residual E&S impacts that occur following mitigation. The key objectives of the risk assessment methodology are to identify any additional potential environmental issues and associated E&S impacts likely to arise from the proposed project, and to propose a significance ranking. Issues / aspects will be reviewed and ranked against a series of significance criteria to identify and record interactions between activities and aspects, and resources and receptors to provide a detailed discussion of E&S impacts. The assessment considers direct, indirect, secondary as well as cumulative E&S impacts. A standard risk assessment methodology is used for the ranking of the identified environmental impacts pre- and post-mitigation (i.e. residual E&S impact). The significance of environmental aspects is determined and ranked by considering the criteria presented in Table 6-1.

Table 6-1: E&S 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

CRITERIA	SCORE 1	SCORE 2	SCORE 3	SCORE 4	SCORE 5
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
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**	**Low**	**Moderate**	**High**	**Very High**
Environmental Significance Rating (Positive (+))	**Very low**	**Low**	**Moderate**	**High**	**Very High**

6.1.2 E&S Impact Mitigation

The E&S impact significance without mitigation measures will be assessed with the design controls in place. E&S impacts without mitigation measures in place are not representative of the proposed development's actual extent of E&S impact and are included to facilitate understanding of how and why mitigation measures were identified. The residual E&S impact is what remains following the application of mitigation and management measures and is thus the final level of E&S impact associated with the development. Residual E&S impacts also serve as the focus of management and monitoring activities during Project implementation to verify that actual E&S impacts are the same as those predicted in this report. The mitigation measures chosen are based on the mitigation sequence/hierarchy which allows for consideration of five (5) different levels, which include avoid/prevent, minimise, rehabilitate/restore, offset and no-go in that order. The mitigation sequence/hierarchy is shown in Figure 6-1.

The idea is that when project E&S impacts are considered, the first option should be to avoid or prevent the E&S impacts from occurring in the first place if possible, however, this is not always feasible. If this is not attainable, the E&S impacts can be allowed, however they must be minimised as far as possible by considering reducing the footprint of the development for example so that little damage is encountered. If E&S impacts are unavoidable, the next goal is to rehabilitate or restore the areas E&S impacted back to their original form after project

completion. Offsets are then considered if all the other measures described above fail to remedy high/significant residual negative E&S impacts. If no offsets can be achieved on a potential E&S impact, which results in full destruction of any ecosystem for example, the no-go option is considered so that another activity or location is considered in place of the original plan.

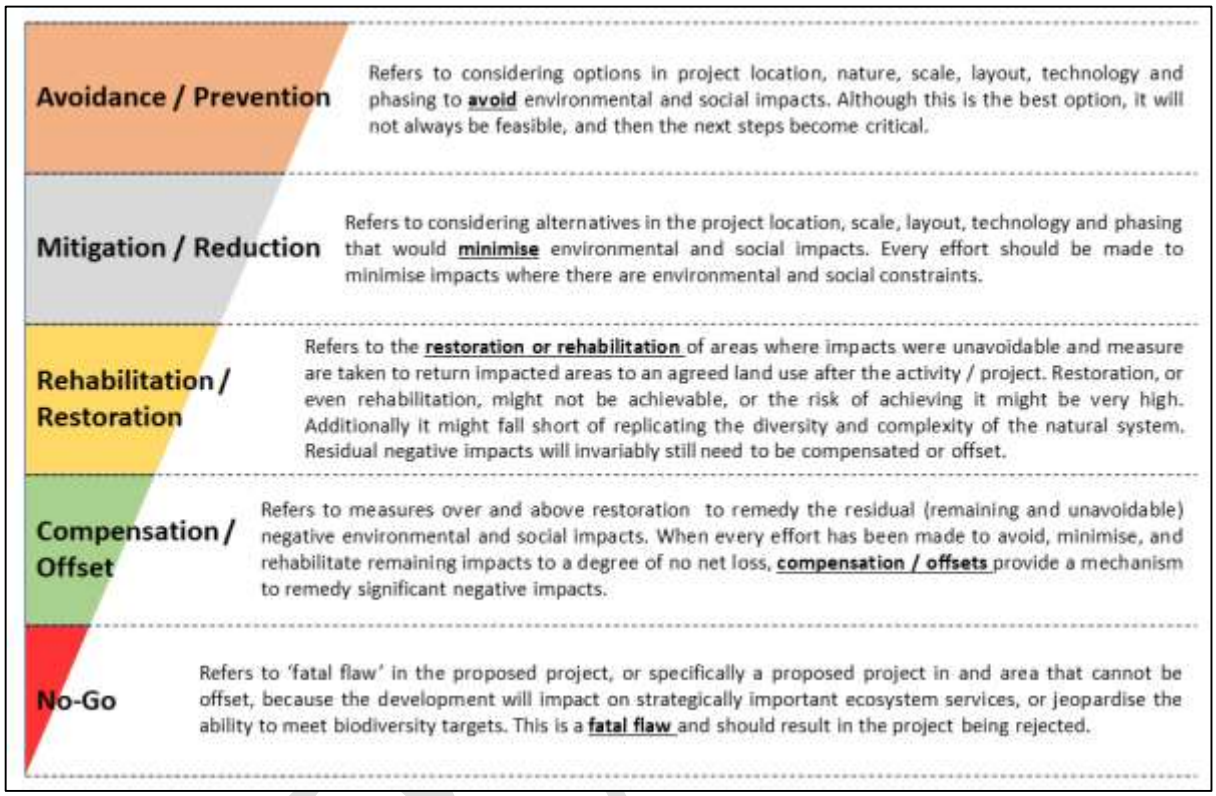

Figure 6-1: Mitigation Sequence/Hierarchy

6.2 Evaluation of Identified E&S Impacts

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

6.2.1 Construction Phase Positive E&S Impacts

6.2.1.1 Creation of Local Employment

The construction and rehabilitation of the 12 bridges along the Road is expected to generate significant short-term employment, with up to 300 workers engaged during peak construction periods. This workforce will include approximately 50 skilled workers, 200 unskilled workers, and 50 supervisory and management staff, in line with the project's workforce plan (Section 2.4.1). The engagement of this labour force presents a major opportunity for local economic upliftment, especially in the rural and peri-urban communities traversed by the road corridor. Unskilled and semi-skilled workers will be primarily drawn from local areas under Traditional

Authorities Namavi, Makanjira and Chowe, with the project targeting at least 70% local employment. Recruitment will be conducted in coordination with community leaders and district authorities to ensure transparency and equitable access. At least 40% of the total workforce will be women, with deliberate inclusion in roles such as road safety management, site cleaning, catering, administration, environmental monitoring, and community liaison. Communities in the project area predominantly rely on fishing, small-scale agriculture, casual labour (locally called ganyu), and petty trading. Baseline data (Section 5.3.4) shows that bridge and road construction labour opportunities will provide a vital income stream, particularly during the off-seasons for agriculture and fishing. In communities like Lungwena, Unga, Lilore, and Nkuli, where fishing is seasonal, and in upland areas like Lugola, Chikosere, and Kalanje, where youth engage in casual work and small-scale mining, this project will offer a safer and more predictable source of employment.

Table 6-2 presents the E&S impact assessment for employment creation during the construction phase, comparing pre- and post-enhancement scenarios. It highlights the shift from a moderate to a high positive E&S impact following the implementation of labour-related enhancement measures, based on standardised scoring across magnitude, extent, reversibility, duration, and probability criteria.

Table 6-2: Creation of Employment Impact Evaluation

Impact	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	Significance
Before Enhancement	4 (High)	2 (Local)	3 (Recoverable)	2 (Short-term)	3 (Probable)	**Moderate (39)**
After Enhancement	4 (High)	3 (Regional)	5 (Reversible)	4 (Long-term)	5 (Definite)	**High (80)**

Enhancement Measures:

i. Publicise employment opportunities and prioritise local recruitment through TAs Namavi, Makanjira, Chowe, and Chapola to maximise economic inclusion.
ii. Implement inclusive recruitment procedures to achieve at least 40% female participation across all roles, including semi-skilled and support positions, as verified through monthly workforce gender composition reports.
iii. Implement the project's Labour Management Plan, including procedures for recruitment, grievance redress, workplace conduct, and worker accommodation.
iv. Provide job-specific and OHS training for all workers, with extra support for unskilled and first-time workers.
v. Prepare a worker accommodation plan for non-local workers to ensure compliance with health, safety, and dignity standards.
vi. Pay equal wages for equal work, regardless of gender or origin, and ensure compliance with national minimum wage laws.
vii. Establish a worker grievance redress mechanism that is accessible, anonymous, and responsive.
viii. Enforce a code of conduct covering respectful behaviour, anti-harassment, community relations, and prohibition of child/forced labour.

ix. Monitor labour compliance through regular audits and submit monthly labour reports, including gender-disaggregated workforce data and labour incident tracking.
x. Facilitate skill development through on-the-job training, creating a local pool of semi-skilled workers for future maintenance or development activities.

6.2.1.2 Creation of New Opportunities for Local Business

The construction of the 12 climate-resilient bridges is expected to stimulate local economic development through enhanced procurement and supply chain participation. The appointed contractor(s), registered with the National Construction Industry Council (NCIC), will be encouraged to subcontract components of the works to local firms and service providers. This is aligned with the project's commitment to inclusive growth and local content utilisation under the RCRP-2 and World Bank ESF standards. Project activities that are likely to generate local business opportunities include:

- Supply of construction materials such as aggregates, sand, and cement;
- Provision of food and groceries to worker camps;
- Haulage and transport services;
- Fuel and equipment maintenance;
- Waste management, sanitation, and auxiliary services for construction camps.

Table 6-3 summarises the impact assessment for local business opportunities, showing a shift from moderate to high significance with enhancement measures such as local procurement and timely payments. With enhancement measures, the significance of this impact will increase from moderate to high.

Table 6-3: Creation of New Businesses Impact Evaluation

Impact	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	Significance
Before Enhancement	3 (Medium)	3 (Local)	3 (Recoverable)	2 (Short-term)	3 (Probable)	**Moderate (33)**
After Enhancement	4 (High)	4 (Regional)	5 (Reversible)	4 (Long-term)	4 (Highly Probable)	**High (68)**

Enhancement Measures:

i. Require the contractor to conduct a local supply chain review, identifying businesses in Mangochi District capable of supplying goods and services that are in line with World Bank procurement standards.
ii. Develop and implement a local procurement plan to prioritise purchasing materials such as cement, aggregates, and groceries from licensed vendors operating within Mangochi and neighbouring districts.
iii. All materials must be sourced from MRA-registered suppliers. Where local suppliers for essential inputs like sand or gravel are unavailable, the contractor shall obtain written clearance from the Mangochi District Council.
iv. Enforce timely payment schedules to small businesses, with contractually defined payment terms to ensure cash flow stability.

v. Monitor local procurement and service engagement through quarterly reports, disaggregated by business type and geographical origin, to assess and maximise the project's local economic footprint.

6.2.1.3 Skills Transfer

The implementation of the bridge rehabilitation works presents an opportunity to enhance the skills and capacities of the local workforce, particularly unskilled and semi-skilled individuals recruited from the Traditional Authorities of Namavi, Makanjira and Chowe. Through daily involvement in construction tasks such as earthworks, concrete mixing, steel fixing, drainage installation, and safety monitoring, these workers will gain transferrable skills that can enhance future employability. Given the employment of 200 unskilled personnel and 50 skilled artisans and technicians, there is significant potential for peer learning and on-the-job training. Without deliberate interventions, the skills transfer impact may remain low. However, structured support through mentorship and training will elevate the long-term benefits for local workers. Table 6-4 presents the impact assessment on skill transfer, demonstrating improvement from low to moderate significance with structured on-the-job training and mentoring.

Table 6-4: Skill Transfer Impact Evaluation

Impact	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	Significance
Before Enhancement	2 (Low)	2 (Local)	1 (Limited)	2 (Short-term)	3 (Probable)	**Low (21)**
After Enhancement	4 (High)	3 (Regional)	3 (Moderate)	4 (Long-term)	4 (Highly Probable)	**Moderate (56)**

Enhancement Measures:

i. Pair all unskilled workers, particularly women and youth, with skilled artisans for on-the-job mentorship and learning.
ii. Formalise induction training, toolbox talks, and structured skill development modules under the Labour Management Plan (Annex 5).
iii. Provide equal access to training for both male and female workers, promoting inclusive workforce development.
iv. Involve technical colleges or vocational training institutions to certify basic construction skills, enabling long-term employability.
v. Collaborate with local leaders and VDCs to promote awareness of the skill-building aspects of the project among youth and underrepresented groups.

6.2.2 Construction Phase Negative E&S Impacts

6.2.2.1 Physical and Economic Displacement

The construction and rehabilitation of 12 bridges along the Chingo-Makanjira Road will require the acquisition of land and the removal of structures located within the designated road reserve and approach roads (200 metres on either side of each bridge). These interventions will result in physical and economic displacement of Project-Affected Persons (PAPs), with

impacts on housing, businesses, and associated livelihoods. According to the Resettlement Action Plan (RAP, 2025) and verified census data, the project will affect at least 208 PAPs across several villages (Table 6-5), with varying levels of vulnerability. The highest numbers of affected persons are recorded in Lilembwe (38 PAPs), and Lutende (30 PAPs). Structures to be affected include residential houses, business premises, auxiliary structures, and incomplete buildings, many of which are in areas like Nkuli, Lungwena, Lilembwe, and Lutende.

Table 6-5: Summary of PAP Information

SN	Section	No. of PAPs, Female	No. of PAPs, Male	No. of PAPs, Other	Total No. of PAPs
1	Lusalumwe	13	4	0	17
2	Nkuli	10	3	0	13
3	Kalanje	3	5	0	8
4	Lungwena	3	5	1	9
5	Mbwazi	10	3	0	13
6	Lutende	15	13	2	30
7	Lilembwe	18	19	1	38
8	Unga	7	3	0	10
9	Lugola	10	7	0	17
10	Lithuvu	13	3	0	16
11	Chikosere	10	10	1	21
12	Lilole	10	6	0	16
	Total	**122**	**81**	**5**	**208**

The total number of affected structures identified in the project's displacement inventory includes:

- Residential and mixed-use structures (e.g., homes with business functions),
- Commercial units (e.g., shops, stalls),
- Temporary or incomplete buildings, and
- Community and auxiliary structures.

Table 6-6 summarises the anticipated significance of displacement impacts before and after mitigation. With proper implementation of the RAP and its associated Livelihood Restoration Plan (LRP), including full compensation, timely relocation support, and vulnerability allowances, the impact can be reduced from high to low significance.

Table 6-6: Physical and Economic Displacement Impact Evaluation

Impact	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	Significance
Before Mitigation	5 (Very High)	2 (Localised)	3 (Recoverable)	5 (Permanent)	5 (Definite)	**High (75)**
After Mitigation	2 (Low)	2 (Localised)	1 (Reversible)	5 (Permanent)	3 (Probable)	**Low (21)**

Mitigation Measures:

i. Implement all compensation and relocation support prior to commencement of construction, in strict compliance with the RAP and World Bank ESS5.
ii. Provide direct cash payments or in-kind compensation to PAPs for structures, trees, and crops, in line with the entitlements matrix defined in the RAP, ensuring transparency, fairness, and timely delivery in accordance with the preferences of PAPs.
iii. Complete all agreed compensation payments, including shifting and disturbance allowances, before initiating physical relocation, with verification by the RAP Implementation Committee.
iv. Maintain an active Grievance Redress Mechanism (GRM) throughout the resettlement process to resolve disputes promptly and fairly.
v. Provide additional support to vulnerable households, including elderly-headed households, female-headed households, and those with limited income streams.
vi. Monitor resettlement outcomes through post-displacement audits and feedback from affected communities to verify that livelihoods are restored or improved.

6.2.2.2 Disruption of Access to Properties and Social Services

The construction activities are expected to occur largely within the existing road reserve. However, the project may still lead to temporary disruptions in access to private properties and essential social services during the construction phase, particularly due to temporary road closures, detours, movement of heavy machinery, and camp establishment. Access to homes, farmlands, markets, and local businesses situated near construction sites may be obstructed or delayed, especially where alternative access routes are unavailable. As noted in the baseline assessment (Section 5.3.4), many communities in the project area, such as Lilembwe, Lungwena, Lutende, and Unga, depend on informal trade and small-scale enterprises, many of which operate adjacent to the road corridor.

In addition to economic access, critical services such as schools and health centres may also experience accessibility challenges. The majority of residents depend on public health facilities, which are already strained in terms of staff and resources (see Section 5.3.3). Construction-related obstructions, dust, and noise may deter caregivers from accessing antenatal, child health, and outpatient services. Similarly, children's ability to walk to school may be impeded, especially in areas with limited transport alternatives or poorly demarcated detour routes. Moreover, the establishment of construction camps may include the sinking of high-yield boreholes to meet water demand. If not properly sited or managed, this could affect the groundwater table and disrupt community water supply sources, many of which rely on shallow wells and boreholes. Table 6-7 summarises the significance of the disruption of access to services and properties. Without mitigation, the impact is high, especially for vulnerable groups. With targeted and timely mitigation, the impact can be reduced to low significance.

Table 6-7: Disruption of Access to Properties and Social Services Impact Evaluation

Impact	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Probability of Occurrence	Significance

Before Mitigation	5 (Very High)	3 (Local to Regional)	3 (Recoverable)	3 (Medium-term)	5 (Definite)	**High (70)**
After Mitigation	2 (Low)	2 (Localised)	1 (Reversible)	2 (Short-term)	3 (Probable)	**Low (21)**

Mitigation Measures:

i. Develop and implement a Traffic and Access Management Plan in line with Annex 5, including safe pedestrian crossings, detour signage, and access restoration timelines.
ii. Publicly communicate construction schedules in advance to allow households, traders, and institutions to plan for any temporary disruptions.
iii. Engage community leaders and social service providers to ensure that access to health centres, schools, and religious facilities remains unobstructed throughout the construction period.
iv. Establish temporary trading sites in consultation with local market committees to support the continuity of business for roadside vendors, particularly women. The affected women must be compensated and included in the LRP.
v. Restore all disrupted access paths post-construction and provides alternative routes during construction, approved by the District Council and Roads Authority.
vi. Establish a GRM specifically for service disruption complaints and respond within 5 working days.

6.2.2.3 Risks of Human Trafficking and Labour Exploitation

The Project passes through a corridor that borders Mozambique and includes communities where illegal gold mining, informal trade, and casual labour are prevalent. These factors, coupled with poverty, low educational attainment, and limited enforcement of labour standards, heighten the risk of trafficking in persons (TIP) and labour exploitation, particularly of youth and women. The movement of non-local workers and establishment of work camps near informal settlements and trading centres may increase the potential for:

- Misleading or unregulated recruitment;
- Use of child or forced labour in camp support services;
- Sexual exploitation of minors;
- Informal cross-border recruitment and smuggling;
- Exploitation of undocumented or seasonal workers.

These risks are amplified in areas like Lugola, Nkuli, and Unga, where mining and informal trade attract young labourers from surrounding areas. While the project does not involve international contractors, poor oversight of subcontractors and informal suppliers could facilitate such abuses if not proactively managed. Table 6-8 highlights the significance of TIP risks in the project context. While the pre-mitigation risk is high due to location and socio-economic dynamics, robust mitigation reduces the residual risk to low.

Table 6-8: Impact Assessment on Risks of Human Trafficking and Exploitation

Impact	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Probability of Occurrence	Significance
Before Mitigation	5 (Very High)	3 (Local–Cross-Border)	3 (Recoverable)	3 (Medium-term)	5 (Definite)	**High (70)**
After Mitigation	2 (Low)	1 (Site-specific)	1 (Reversible)	1 (Immediate)	3 (Probable)	**Low (18)**

Mitigation Measures:

i. All workers must be engaged through transparent, direct hiring processes, with contracts provided in the local language.
ii. Recruiters and contractors must be vetted and prohibited from charging recruitment fees.
iii. All staff must sign a Code of Conduct that explicitly prohibits harassment, exploitation, and unethical recruitment.
iv. Establish anonymous and confidential GRM procedures accessible to workers, with regular toolbox talks on workers' rights.
v. Monitor contractors' compliance with labour laws, especially around working hours, leave, and pay, as outlined in the LMP.
vi. Facilitate random site inspections by labour inspectors and social welfare officers at least once per month during peak construction, and address any compliance issues within 14 days of inspection reports.

6.2.2.4 Gender-Based Violence and Sexual Exploitation and Abuse (GBV/SEA)

The presence of male-dominated construction teams, combined with socio-economic vulnerabilities and poor access to protection services, increases the risk of GBV and SEA in the project area. Women and girls involved in informal trade in roadside centres such as Malindi, Lungwena, and Lutende may be exposed to coercive or transactional sex, harassment, and sexual abuse. Some construction sites are also located in close proximity to schools, which may heighten the risk of SEA for school-aged girls, particularly during travel to and from school. Cultural norms and low reporting rates can obscure the full extent of these risks. Table 6-9 reflects the high risk of GBV and SEA if mitigation is not in place. Through awareness, enforcement, and confidential reporting mechanisms, the project can reduce the risk to a low level.

Table 6-9: Impact Assessment on GBV and SEA Risks

Impact	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Probability of Occurrence	Significance
Before Mitigation	5 (Very High)	3 (Local)	3 (Recoverable)	4 (Long-term)	5 (Definite)	**High (75)**
After Mitigation	2 (Low)	1 (Site-specific)	2 (Reversible)	2 (Short-term)	3 (Probable)	**Low (21)**

Mitigation Measures:

i. Implement a robust Code of Conduct (CoC) for all workers and supervisors, clearly outlining unacceptable behaviour and consequences.

ii. Include GBV/SEA/SH clauses in contractor agreements, requiring proactive training and enforcement.
iii. Conduct mandatory, ongoing GBV/SEA/SH awareness training for all staff and service providers.
iv. Establish a confidential, survivor-centred GRM, with referral pathways to District Social Welfare and local support services.
v. Locate campsites away from sensitive community areas and ensure proper lighting, surveillance, and access control.
vi. Engage a qualified GBV Service Provider within three months of project start to train workers, establish referral pathways, and monitor GBV risk mitigation measures throughout implementation.

6.2.2.5 Discriminatory Working Conditions

Despite the project's commitment to inclusive hiring and the Malawi Gender Policy, there remains a risk of discrimination against women, persons with disabilities, and youth in recruitment, task allocation, and treatment at work sites. Women may face exclusion from skilled roles or unequal pay, while marginalised workers may not benefit from training opportunities or fair grievance redress. Table 6-10 shows that while the risk of discrimination is moderate without mitigation, it can be significantly reduced with proactive implementation of gender-inclusive and fair labour practices.

Table 6-10: Impact Assessment on Discriminatory Working Conditions

Impact	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Probability of Occurrence	Significance
Before Mitigation	4 (High)	2 (Localised)	2 (Moderate)	3 (Medium-term)	4 (Highly Probable)	**Moderate (44)**
After Mitigation	2 (Low)	1 (Site-specific)	2 (Reversible)	2 (Short-term)	3 (Probable)	**Low (21)**

Mitigation Measures:

i. Prioritise employment opportunities for women and individuals with disabilities, ensuring inclusivity and diversity in the workforce.
ii. Offer flexible working hours to accommodate the childcare needs of breastfeeding women, thereby supporting their participation in the workforce.
iii. 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.
iv. Actively encourage the recruitment of female workers for roles equivalent to those of male workers and guarantee equal pay for equal work, regardless of gender.
v. 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.
vi. Strategically locate campsites away from villages to limit the interaction between workers and the community, reducing the potential for harassment and other negative

impacts.

vii. Provide regular awareness sessions on workers' rights, including non-discrimination, freedom from harassment, and grievance redress procedures.

viii. Implement and rigorously monitor a Workers Grievance Redress Mechanism (WGRM) with clear and accessible channels for reporting and investigating incidents of workplace harassment, ensuring that complaints are handled promptly and fairly.

6.2.2.6 Social Disruption and Risk of Conflicts between Workers and Local Communities

The construction of the 12 selected bridges will require the mobilisation of contractors and up to 300 workers, including non-local personnel. The establishment of construction and labour camps, combined with the presence of large work crews near rural communities, carries a risk of social disruption, including tensions or conflicts between project workers and community members. The baseline assessment indicates that the local population engages in subsistence farming, fishing, and small-scale business. Influxes of non-local workers could lead to:

- Competition over limited goods and services (e.g. food, water, housing);
- Disrespect of local cultural norms and traditions;
- Disputes arising from perceived inequality in employment opportunities;
- Unauthorised access to community or sacred spaces;
- Interaction between unsupervised workers and vulnerable groups (e.g. children or women traders);
- Theft or petty crime in areas with poor security.

If not proactively managed, these risks could compromise community support for the project, reduce worker safety, and contribute to reputational damage or delays. Table 5-12Table 6-11 presents the risk of social disruption and conflict resulting from worker-community interactions. Without mitigation, the impact is high due to the likely presence of non-local workers in sensitive community areas. Through proper camp management, cultural orientation, and community liaison, the residual risk can be significantly reduced.

Table 6-11: Risk of Conflicts between Workers and Local Communities

Impact	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Probability of Occurrence	Significance
Before Mitigation	4 (High)	3 (Local)	3 (Recoverable)	3 (Medium-term)	5 (Definite)	**High (65)**
After Mitigation	2 (Low)	1 (Site-specific)	2 (Reversible)	2 (Short-term)	3 (Probable)	**Low (21)**

Mitigation Measures:

i. Establish contractor labour camps before mobilising non-local workers, ensuring proper accommodation, sanitation, and separation from settlements.

ii. Locate camps at least 500 metres from homes, schools, water bodies, and sensitive sites, and consult communities on siting to avoid conflict.

iii. Provide mandatory induction and cultural sensitisation to all workers on local customs, conflict avoidance, and codes of conduct.

iv. Keep comprehensive labour records, including proof of age, identity, and place of origin, to ensure traceability and accountability.
v. The Contracor will designate a Community Liaison Officer (CLO) to manage interactions with local leaders, facilitate two-way communication, and address concerns early.
vi. Clearly demarcate and secure work areas with signage and fencing to prevent unauthorised entry, especially by children and livestock.
vii. Implement visitor registration and site access controls at all construction sites and camps.
viii. Provide on-site canteens and shops within camps to reduce reliance on local markets and prevent pressure on village resources.
ix. Prioritise hiring of local unskilled labour (target 70%) to promote shared benefits and improve social integration.
x. Accommodate non-local workers in dedicated contractor-managed camps, avoiding housing allowances that may inflate local rent or displace residents.
xi. Apply camp management and worker conduct guidelines consistent with Annex 5, ensuring all camp siting and operations meet GIIP and WB ESS2/ESS4 requirements.
xii. Conduct monthly community engagement meetings to identify and address any rising grievances related to workers or construction activities.

6.2.2.7 Exposure of Workers to Occupational Health and Safety Hazards

The construction of bridges and approach roads will expose workers to a range of Occupational Health and Safety (OHS) risks, particularly given the project's reliance on both skilled and unskilled labour. The use of elevated scaffolding, heavy machinery (cranes, concrete mixers, excavators), power tools, and activities in confined or waterlogged spaces significantly increases the likelihood of accidents or injuries. Specific risks include:

- Falls from heights during bridge deck and formwork installation;
- Falling objects from scaffolds or crane loads;
- Machinery-related injuries, including crushing, lacerations, or amputations;
- Road traffic incidents due to shared workspaces with moving vehicles;
- Heat stress, dehydration, and fatigue, particularly during the dry season;
- Respiratory hazards from dust, fumes, or cement particles;
- Hearing damage due to high noise levels at construction sites;
- Musculoskeletal injuries from repetitive or heavy lifting tasks.

Given the presence of first-time and low-skilled workers from surrounding TAs (e.g. Namavi, Makanjira, Chowe, and Chapola), many of whom lack prior exposure to structured safety protocols, the probability of injury is high without mitigation. In line with the hierarchy of controls, the project will prioritise eliminating hazards where possible, substituting safer methods or equipment, applying engineering controls (e.g., guardrails, barriers), followed by administrative controls (e.g., work rotation, safety training), and finally the use of PPE as the last line of defence. Table 6-12 shows that without mitigation, the risk to worker health and

safety is high due to hazardous construction activities. Through structured training, proper PPE, medical services, and supervision, the risk is reduced significantly.

Table 6-12: Impact Assessment on Worker Health and Safety Risks

Impact	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Probability of Occurrence	Significance
Before Mitigation	5 (Very High)	3 (Project-wide)	3 (Recoverable)	3 (Medium-term)	5 (Definite)	**High (70)**
After Mitigation	2 (Low)	2 (Site-specific)	2 (Reversible)	2 (Short-term)	3 (Probable)	**Low (24)**

Mitigation Measures:

i. Develop and implement a Occupational Health and Safety (OHS) covering hazard identification, emergency preparedness, safe equipment use, and risk communication.
ii. Provide task-specific training and induction to all workers, including toolbox talks, hazard awareness, and rights under the Occupational Safety, Health and Welfare Act (1997) of Malawi and ESS2.
iii. Supply certified PPE (helmets, gloves, harnesses, reflective vests) free of charge and enforce its use through supervision and spot checks.
iv. Station qualified medical personnel and first aiders at all sites; maintain stocked first aid kits and referral arrangements with nearby clinics.
v. Conduct heat stress management through shaded rest areas, hydration schedules, and flexible working hours.
vi. Install and inspect certified scaffolding and fall protection systems for all work conducted at a height of 1.8 m or more at all bridge sites before commencement of deck construction, and conduct weekly safety audits to verify structural integrity and usage compliance.
vii. Implement and monitor incident reporting and corrective action procedures, with weekly OHS compliance reporting.
viii. Include OHS measures in all subcontractor contracts and carry out regular site audits.

6.2.2.8 Exposure of Nearby Communities to Construction-Related Hazards

Construction activities in settlements near bridges, especially in areas such as Lungwena, Nkuli, and Lilembwe, may expose residents, including children, traders, and farmers, to physical hazards. These include:

- Accidental entry into hazardous work zones by children, livestock, or vendors;
- Increased traffic from haul trucks and construction vehicles on shared community roads;
- Dust, vibration, and noise pollution, affecting sensitive receptors such as schools and health centres;
- Open trenches or water diversion channels, posing drowning or injury risks;
- Spills of hazardous materials (e.g. fuel or cement), contaminating soil or water near homes.

Table 6-13 presents the potential for construction-related harm to community members. With effective mitigation, including signage, fencing, access control, and community communication, the risks can be reduced to low.

Table 6-13: Impact Assessment on Community Health and Safety Risks

Impact	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Probability of Occurrence	Significance
Before Mitigation	4 (High)	3 (Local–Corridor)	3 (Recoverable)	3 (Medium-term)	4 (Highly Probable)	**Moderate (52)**
After Mitigation	2 (Low)	2 (Site-specific)	2 (Reversible)	2 (Short-term)	3 (Probable)	**Low (21)**

Mitigation Measures:

i. Install temporary fencing, signage, and flagmen around active construction zones.
ii. Provide public awareness campaigns before major construction activities, in collaboration with local leaders and radio stations.
iii. Establish and implement traffic management plans, including speed control, bypass roads, and reflective signs.
iv. Appoint a Community Liaison Officer (CLO) to coordinate emergency responses, support in the management of CHS risks, and address public complaints.
v. Provide safe pedestrian crossings and dedicated footpaths where construction interfaces with populated areas.
vi. Store fuels and hazardous materials in secured, bunded areas, away from homes, boreholes, and streams.
vii. Immediately restore or fence off all open pits, borrow areas, or culverts once inactive or completed.
viii. Implement progressive rehabilitation of borrow sites during construction, restoring each site within two weeks of material extraction completion to minimise the risk of leaving open pits at project closure.
ix. Monitor ambient air quality, dust, and noise levels and apply controls such as water spraying, silencers, and restricted working hours near schools and health centres.

6.2.2.9 Loss of Trees for Economic Livelihood and Biomass for Energy

Bridge construction and associated activities will require vegetation clearance within the 36 m-wide road reserve and around bridge approach roads, borrow pits, and temporary campsites. According to the Resettlement Action Plan (RAP), a total of 2,398 trees are at risk of removal, including:

- 1,677 indigenous trees, many of which provide timber, medicinal, or ecological value;
- 517 exotic trees, including *Eucalyptus* and *Senna siamea*, typically planted for poles or shade;
- 204 fruit trees, which are economically and nutritionally critical to local households.

The fruit tree inventory, based on numbers from the RAP, identifies the following as the most commonly affected species: *Mangifera indica* (Mango) as the most dominant, *Ziziphus mauritiana* (Masau), *Adansonia digitata* (Baobab), *Musa spp.* (Banana), *Citrus spp.* (Orange), *Carica papaya* (Pawpaw). These trees are not only sources of seasonal income and dietary supplements but also serve cultural and shade functions near homes, schools, and markets. Their removal could lead to:

- Short-term loss of household food and income;
- Increased pressure on remaining forest resources, particularly for firewood;
- Vulnerability of endangered or rare species such as *Khaya anthotheca* or *Pericopsis angolensis* found in riparian or wooded sites like Lusalumwe and Litufu;
- Long-term degradation of slope stability and microclimate regulation, particularly where large trees are removed near rivers or embankments.

Table 6-14 reflects the moderate pre-mitigation impact from tree loss along the corridor. With well-managed replanting and fuelwood substitution, the long-term residual impact is very low.

Table 6-14: Impact Assessment on Loss of Trees for Livelihood and Biomass Energy

Impact	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Probability of Occurrence	Significance
Before Mitigation	3 (Medium)	3 (Corridor-wide)	3 (Recoverable)	3 (Medium-term)	4 (Highly Probable)	**Moderate (48)**
After Mitigation	1 (Low)	1 (Site-specific)	1 (Reversible)	2 (Short-term)	2 (Unlikely)	**Very Low (10)**

Mitigation Measures:

i. Conduct pre-construction tree tagging and valuation at each site, guided by the RAP inventory, distinguishing indigenous, exotic, and fruit trees. RAP will include a livelihood restoration program to address loss of income.

ii. Integrate a Tree Removal and Replanting Schedule into the ESMP, with species-specific restoration requirements:
   a. Replant a minimum of ten saplings per tree removed;
   b. Prioritise native species offering shade, erosion control, or agroforestry benefits (*Faidherbia albida*, *Albizia amara*, *Trichilia emetica*);
   c. Use fruit tree nurseries (e.g. mango, baobab, masau) near affected homes to restore lost economic value.

iii. Engage community members, especially women and youth groups, in nursery establishment, planting, and maintenance, promoting ownership and income diversification.

iv. Conduct all tree felling under the supervision of qualified environmental personnel, marking and protecting endangered or culturally important species (e.g., *Khaya anthotheca*, Baobab) prior to clearance.

v. Prohibit sourcing firewood and charcoal from unlicensed vendors within the contractor's camp; require formal procurement of cooking fuel for worker camps.

vi. Install LPG stoves or solar cookers in all contractor camps to eliminate worker-driven

firewood demand.

vii. Provide packed meals or catered food to reduce pressure on the surrounding woodlands for cooking needs.

viii. Conduct quarterly tree survival audits, with replanting obligations of a ratio of 1:5 in place if survival rates fall below 80% within the first year.

ix. Publicly share progress on replanting efforts during stakeholder meetings, demonstrating commitment to natural resource sustainability.

6.2.2.10 Disturbance and Displacement of Terrestrial Fauna

The construction and rehabilitation of the bridges will cause varying degrees of habitat disturbance and displacement of mammals, reptiles, amphibians, birds, and insects documented in the baseline faunal survey (Section 5.2.2). Based on survey results, the bridge sites traverse ecologically diverse areas, including riparian zones, miombo woodlands, grasslands, and cultivated mosaics that support key species of ecological and socio-economic relevance.

While no species of global conservation concern were recorded, many faunal groups perform critical ecosystem functions, such as seed dispersal, pollination, pest control, and water quality regulation. Sites such as Unga, Chikosere, Mbwazi, Lugola, and Lusalumwe exhibited notably high faunal richness and should be considered sensitive ecological zones. Potential project-related impacts include:

- Habitat degradation and fragmentation due to vegetation clearing, soil compaction, and changes in microclimate;
- Noise and vibration disturbances from heavy machinery, especially disruptive to nocturnal mammals and nesting birds;
- Mortality or injury from construction vehicles, trenching, or clearing operations;
- Disruption of foraging or breeding behaviours in amphibians and birds due to altered hydrology, increased human presence, or habitat removal;
- Loss of insect habitat through removal of flowering plants and the potential use of pesticides;
- Human–wildlife conflict, particularly with venomous reptiles (e.g., Puff Adder, Black Mamba) that may wander into work sites or camps.

These impacts are particularly relevant at bridge sites adjacent to riverbanks and forested zones, where small mammals, reptiles, birds, and amphibians tend to concentrate.

Table 6-15: Impact Assessment on Disturbance and Displacement of Terrestrial Fauna

Impact	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Probability of Occurrence	Significance
Before Mitigation	4 (High)	3 (Corridor-wide)	3 (Recoverable)	3 (Medium-term)	4 (Highly Probable)	**Moderate (52)**
After Mitigation	2 (Low)	2 (Site-specific)	2 (Reversible)	2 (Short-term)	3 (Probable)	**Low (24)**

Mitigation Measures:

i. Restrict vegetation clearance to designated work zones. Avoid disturbing intact habitats at biodiversity hotspots like Unga, Chikosere, and Mbwazi.
ii. Conduct pre-clearance faunal surveys to identify active nests, burrows, or breeding sites. Temporarily halt work where nesting or breeding activity is observed.
iii. Use manual clearing methods in sensitive areas (riparian zones, thickets, wetlands) to reduce habitat destruction and wildlife injury.
iv. Train construction workers in wildlife awareness, including safe handling of reptiles, identification of venomous species, and procedures for relocating non-dangerous animals.
v. Install informational signage and buffer zones around high-density fauna areas (e.g., herpetofauna zones near Mbwazi or amphibian zones at Lilore) to prevent encroachment.
vi. Prohibit the use of pesticides or herbicides near bridge sites, especially where amphibians or pollinators are present.
vii. Avoid construction near known bird nesting periods (e.g. for weavers or hornbills) and relocate active nests under expert supervision if unavoidable.
viii. Design post-construction vegetation restoration to include native, insect-friendly shrubs and grasses that attract pollinators and ground-dwelling species.
ix. Use low-noise equipment and limit activities during early morning or night hours, when faunal activity is highest.
x. Maintain riparian buffers and shade vegetation to protect amphibians, reptiles, and aquatic-dependent species from exposure and desiccation.
xi. Prohibit hunting, capture, or killing of any wildlife by workers, and include this in the Code of Conduct.
xii. Implement a Wildlife Encounter Protocol, requiring reporting and safe relocation (where appropriate) of fauna found within construction areas.
xiii. Develop an Aquatic Biodiversity Management Plan to help avoid or minimise direct disturbance to aquatic life.

6.2.2.11 Disruption of River Hydrology and Floodplain Function

The construction of 12 bridges across rivers and streams has the potential to alter natural river flow regimes, including reducing or interrupting environmental flows (e-flows) that sustain downstream ecosystems and livelihoods, obstruct drainage channels, and degrade floodplain functionality. These impacts may result from poorly managed construction activities such as diversion of river channels, infilling of embankments, sediment release, and obstruction of seasonal flows during culvert or abutment installation. According to the Final Hydrology, Hydraulics and Structural Design Report (see Section 5.1.5; Kandoli - AESL JV (2024), rivers such as Unga, Lungwena, Lilembwe, and Lugola have high flood discharge rates and wide inundation zones that are sensitive to changes in flow paths and channel morphology. Failure to maintain adequate e-flows and floodplain connectivity at these sites could cause severe ecological stress to aquatic habitats, reduce fish migration, and impair water availability for downstream users. Improper bridge installation at these sites could lead to:

- Increased flood risk due to restricted water passage or reduced freeboard;ll
- Bank erosion and scouring, especially during the rainy season;
- Disruption of ecological connectivity across floodplains;
- Reduced groundwater recharge if floodwater dispersal is impeded;
- Altered sediment transport, causing siltation or undercutting of riverbanks.

These hydrological and geomorphological impacts are significant not only for the integrity of the infrastructure but also for downstream users who rely on these rivers for domestic water, agriculture, and fishing. Although best practice recommends dry-season construction in riverine areas, the project's compressed timeline requires construction year-round, including during the rainy season. This constraint necessitates a stronger focus on real-time environmental flow monitoring, water management, storm preparation, and engineered flood resilience measures at each site. Environmental flow thresholds (to be determined in consultation with the Supervising Engineer and Environmental Safeguards Specialist) shall be always maintained to ensure compliance with World Bank ESS5 and ESS6 requirements. In addition, flooding events may lead to the mobilisation and spread of hazardous materials, increased sediment and pollutant runoff into adjacent water bodies, and pose significant safety risks to workers due to fast-flowing water, unstable ground conditions, and potential isolation of work sites. Table 6-16 evaluates the disruption to river systems and adjacent floodplains caused by bridge construction. With appropriate hydrological design and good construction practices, the risk level can be reduced from moderate to low.

Table 6-16: Impact on Disruption of River Hydrology and Floodplain Function

Impact	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Probability of Occurrence	Significance
Before Mitigation	4 (High)	3 (Corridor-wide)	3 (Recoverable)	3 (Medium-term)	4 (Highly Probable)	**Moderate (52)**
After Mitigation	2 (Low)	2 (Site-specific)	2 (Reversible)	2 (Short-term)	3 (Probable)	**Low (24)**

Mitigation Measures:

i. Design and implement stormwater diversion and control structures (e.g. temporary channels, biodegradable/non-polyethylene sandbags, flow control culverts) to manage flow during active construction, especially at sites with high Q100 values, while always maintaining minimum environmental flow thresholds.
ii. Use precast bridge components and modular installation techniques to minimise in-stream works during peak rainfall periods and reduce duration of e-flow disruption.
iii. Deploy on-site rapid response teams and mobile pumps to manage floodwaters and remove sediment from work zones during storms.
iv. Install permanent scour protection (e.g. riprap, gabions) at abutments and piers prior to full flow season to prevent erosion.
v. Maintain floodplain connectivity by avoiding embankment blockage and using multi-cell culverts or raised decks in flat catchments.
vi. Apply erosion control measures, such as coir logs, geotextiles, silt fencing, and

sediment basins, immediately after land clearing.

vii. Avoid fuel storage and concrete mixing platforms within 100 metres of any river or stream to protect water quality and groundwater recharge zones.

viii. Restore and stabilise disturbed banks with bioengineering techniques (vetiver grass, native shrubs) post-construction.

ix. For sites requiring cofferdams, use non-polluting fill materials such as biodegradable/non-polyethylene sandbags, sheet piles, or clean rock, to maintain continuous e-flows downstream during construction.

x. Monitor construction in real time using daily site logs, drone imagery, river gauge data, and flow meters to verify compliance with agreed e-flow thresholds.

xi. Maintain buffer zones around known floodplains and high-flow areas, as identified in the Hydrology Report, and restrict heavy machinery operations during peak flow days.

xii. Maintain environmental flows (e-flows) for all river bodies crossed by the project, thereby safeguarding downstream ecosystems and livelihoods.

6.2.2.12 Land Degradation (Soil and Water)

Several activities during the road construction phase will increase soil erosion and contribute to the siltation of surface water bodies and the wetlands. 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. The project will also require gravel material and rock aggregates. 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 because the project area has wetlands and other rivers. The impact, if left uncontrolled, would alter the ecological system of these habitats.

Table 6-17: Impact Assessment on Soil Erosion and Siltation

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:

i. 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 5.
ii. 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.
iii. 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.
iv. Install erosion and run-off control barriers along excavation and embankment areas, using silt fences or check dams to manage soil movement.
v. Redistribute collected soil to the areas most affected by construction activities to aid in site rehabilitation and prevent long-term soil degradation.
vi. Restrict the movement of heavy machinery to designated areas to minimise soil compaction and avoid damage to privately owned land.
vii. Minimise vegetation clearance and follow an approved method statement to protect the local environment and reduce the risk of soil erosion.
viii. Continuously monitor embankments during construction for signs of erosion, and take immediate action to address any issues.
ix. 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.
x. Construct designated, signposted wash bays at each campsite, ensuring they are fully contained and regularly maintained, with treated water released to natural water bodies.
xi. Rehabilitate compacted sites by ripping, levelling, and re-vegetating disturbed areas, restoring them to a stable and sustainable condition.
xii. 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.
xiii. Follow specific guidelines when collecting borrow soil, ensuring that:
    - The soil is sourced from nearby locations to minimise transportation impacts.
    - The soil is not sourced from riverbeds, flood-prone areas, protected sites, or agricultural land, nor from sites near urban, touristic, or culturally sensitive areas.

6.2.2.13 Water Quality Degradation

The 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 the quality of water in nearby wetlands and other water bodies. Water contamination might harm the people in the project area, and the impact probability is high. The baseline study found that the majority of people source drinking water from boreholes, while others source their drinking water from

surface water bodies. Some reasons for sourcing water from the rivers were that the distance to the nearest water points (boreholes) was far, with a range of up to 4 kilometres.

Table 6-18: 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:

i. Prohibit the placement of temporary facilities (such as construction campsites, storage areas, and fuel storage) within 50 metres of wells and boreholes. Additionally, ban the fuelling, washing, or maintenance of machinery near drains or watercourses to prevent contamination.
ii. Develop and implement a comprehensive Waste Management Plan, as guided by Annex 5, to manage all waste generated during construction. This plan should cover waste identification, classification, and proper disposal methods.
iii. 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.
iv. Properly store all waste produced during construction, according to its type and local regulations, to prevent runoff or spills from reaching water bodies.
v. Provide sheltered storage facilities for hazardous substances, equipped with safety and spill control measures, to prevent contamination.
vi. Store used oils, lubricants, fuels, paints, glues, resins, and other hazardous substances in sealed containers for proper disposal to avoid environmental contamination.
vii. Promptly clean up all chemical spills using appropriate absorbent materials and ensure proper disposal of the collected materials.
viii. 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.
ix. Develop and implement a stormwater and water management plan, following the guidance provided in Annex 5, to manage water runoff effectively.
x. Restrict vegetation clearance, excavations, and soil compaction to approved sites only to minimise the impact on surrounding environments.
xi. Obtain all necessary permits for water abstraction and comply with all relevant regulatory standards to ensure sustainable water use.

6.2.2.14 Accidents and incidents 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 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. 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 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 : Impact Assessment on 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	3	**Moderate (36)**
After Mitigation	1	1	3	2	2	**Very Low (14)**

Mitigation measures:

i. Develop and implement a traffic management plan, as guided by Annex 5, to manage traffic disruptions and enhance safety.
ii. Develop and implement a Community Health and Safety Plan (CHSP) to protect communities from traffic-related hazards and ensure safe interaction between the public and project activities.
iii. Prepare and operationalise an Emergency Preparedness and Response Plan (EPRP) that includes protocols for responding to flooding, traffic accidents, and other emergencies likely to occur during heavy rains and high river flows.
iv. Secure all active work areas through hoarding or fencing to prevent unauthorised entry and reduce the risk of accidents involving community members.
v. Enforce compliance with safety and signalling standards on public roads, prioritising the safety of the local population and minimising disruptions to their daily activities.
vi. 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.
vii. Install barriers, such as guardrails and fencing, to prevent unauthorised pedestrian and livestock access to the roadway, except at designated crossing points.
viii. Secure and signal (with barriers, and warning signs) any houses located close to the construction sites that are not subject to resettlement, to prevent accidental structural damage and to ensure the safety of occupants and passers-by.
ix. Conduct regular road safety awareness and sensitisation programmes targeting pedestrians, motorcycle operators, and small vehicle drivers.

x. Install speed calming structures at strategic locations, including trading centres, villages, schools, hospitals, and public service areas, to reduce vehicle speeds and enhance safety.
xi. 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.
xii. Prepare an emergency preparedness and response plan, as guided by Annex 5, in coordination with the local community and emergency responders, to provide timely first aid and hazardous materials response in the event of accidents.
xiii. Interactions involving pedestrians and construction vehicles should be minimized;
xiv. Operators and drivers should have required licenses to operate and drive.
xv. Use of speed control devices on trucks;
xvi. Regular maintenance of vehicles and use of manufacturer approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure.

6.2.2.15 Spread of Sexually Transmitted Infections and other 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, Sexually Transmitted Infections can increase. Additionally, there are Sexually Transmitted Infections (STIs) that occurs when men who live in the village with their families start working on the project and spend their pay packet on sex workers or extra marital 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. There is a strong link between the spread of HIV and other STDs, as co-infection is common and the presence of one infection increases susceptibility to acquiring or transmitting others due to compromised immune systems and overlapping transmission routes. The project is expected to induce workers from other parts of Malawi, which will increase the risk of the spread of HIV and AIDS, and other STDs. The average prevalence of HIV and AIDS in the project area is 4%.

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 6-19) 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 6-19: 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:

i. Develop an HIV and AIDS prevention and management plan, following the guidance provided in Annex 5, to address the risks associated with STIs and HIV/AIDS.
ii. Prioritise the recruitment of local workers to reduce the influx of non-local workers and increase income for local families.
iii. 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.
iv. Distribute condoms regularly, at strategically identified points within worker camps and in surrounding communities along the project corridor, particularly in high-interaction, to minimise the risk of spreading STIs, and HIV and AIDS.
v. Establish a campsite clinic and arrange with local health service provider to offer regular Voluntary Counselling and Testing (VCT) services.
vi. 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.
vii. Eliminate pools of stagnant water created by construction activities to control mosquito proliferation and prevent insect-borne diseases such as malaria.

6.2.2.16 Temporary 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. Air quality degradation from particulate matter depends on introducing and emitting contaminant compounds into the air and meteorological factors determining its local dispersion, and the wind is a key aspect. The unfavourable periods (where conditions promote more significant dust emissions and local dispersion) coincide with dryer weather and higher wind intensity. The worst scenario in terms of dust emissions is generally the months of July to December (high temperatures, wind intensity and low precipitation) for a wind direction of east/northeast.

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 6-20), especially because the project will involve earthworks that will generate dust 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 6-20: Impact Assessment on 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:

i. Acquire and deploy equipment to monitor air quality throughout the construction phase to track pollutant levels and ensure compliance with air quality standards.
ii. Regularly sprinkle water during the construction phase, particularly during dry and windy periods, to suppress dust and mitigate its dispersion into the surrounding environment.
iii. 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.
iv. 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.
v. Use drop-height regulation equipment when unloading powdery materials to maintain the lowest possible drop-height, reducing dust emissions during these operations.
vi. Implement measures to reduce greenhouse gas (GHG) emissions and provide additional strategies for enhancing carbon sinks to offset emissions generated by construction activities.
vii. 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.
viii. 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.
ix. 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.

6.2.2.17 Temporary Elevation 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 machineries 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 6-21); 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 6-21: Impact Assessment on Noise Nuisance and Vibration

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:

i. 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.
ii. 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.
iii. Develop and implement a Noise and Vibration Control Management Plan, following the guidelines in Annex 5, to mitigate noise impacts throughout the construction process.
iv. 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.
v. Provide appropriate personal protective equipment (PPE), such as earplugs, earmuffs, or ear defenders, to workers exposed to high noise levels to protect their hearing.

6.2.2.19 Risk of Disturbance to Cultural and Historical Heritage

The project corridor passes through culturally significant areas inhabited predominantly by the Yao people. The presence of mosques, graveyards, and intangible heritage practices, such as initiation ceremonies, burial rituals, and leadership traditions, demands a culturally sensitive approach during construction planning and execution.

Although no known physical cultural resources lie directly within the road reserve or bridge footprints, there are:

- Mosques are located close to the alignment in areas such as Lungwena, Lugola, Kalanje, and Lusalumwe, which are frequently used for prayer and religious gatherings.
- Graveyards near the alignment, which are highly sensitive and deeply valued by local communities;

- Seasonal cultural practices that are not spatially fixed but are central to social identity, such as initiation ceremonies, which may be disturbed by construction activities if they occur nearby.

Risks include:

- Noise and dust emissions affecting nearby religious structures during prayer hours;
- Unintentional encroachment onto graveyards or sacred community sites when setting up detours, borrow pits, or worker camps;
- Disruption of cultural or religious gatherings, especially if construction coincides with key community events;
- Chance discoveries of burial remains or artefacts during earthworks, which could delay work and provoke strong community reactions if not managed sensitively.

Table 6-22 indicates that although direct impacts on cultural heritage are unlikely, there is a moderate risk of indirect or accidental disturbance, which can be mitigated through proactive planning and a strong Chance Finds Procedure.

Table 6-22: Impact Assessment on Disturbance to Cultural and Historical Heritage

Impact	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Probability of Occurrence	Significance
Before Mitigation	3 (Medium)	3 (Corridor-wide)	3 (Recoverable)	2 (Short-term)	4 (Highly Probable)	**Moderate (44)**
After Mitigation	1 (Low)	1 (Site-specific)	2 (Reversible)	2 (Short-term)	2 (Unlikely)	**Very Low (10)**

Mitigation Measures:

i. Map and clearly mark all cultural sites of concern (mosques, graveyards, ceremonial areas) on construction planning maps using GPS coordinates validated with local leaders.
ii. Ensure all detours, material storage, borrow pits, and worker camps are sited away from mosques and graveyards, with buffer zones of at least 100 metres where feasible.
iii. Conduct pre-construction cultural briefings with Traditional Authorities, village leaders, and religious elders to identify any intangible cultural practices or upcoming ceremonies.
iv. Schedule construction activities to avoid disruption during key local events such as Friday prayers, funerals, and initiation seasons.
v. Install signage and fencing around nearby graveyards or sacred spaces to avoid accidental encroachment.
vi. Integrate a Chance Finds Procedure into the ESMP that:
    a. Suspends work immediately upon discovery of cultural artefacts or burial remains;
    b. Notifies relevant authorities (e.g. Department of Antiquities, District Council);
    c. Halt works immediately upon discovery of cultural heritage items, record the find, and engage a qualified heritage specialist for assessment and clearance before resuming activities.

vii. Include cultural sensitivity and ESS8 awareness in worker Codes of Conduct and toolbox talks to avoid disrespectful behaviour.
viii. Maintain a cultural grievance redress channel, accessible to local communities for reporting concerns related to heritage or traditions.
ix. Document all community engagement meetings on cultural heritage and publicly disclose mitigation actions to build trust and transparency.

6.2.2.20

6.2.3 Identified Positive E&S Impacts During Operation Phase.

6.2.3.1 Enhanced Connectivity to Urban Areas

The rehabilitation and construction of climate-resilient bridges will significantly improve year-round accessibility between previously isolated rural communities and key service centres, such as Malindi and Makanjira. This improved connectivity will reduce travel time and transport costs for agricultural produce, improve access to markets, schools, and healthcare services, and enable timely emergency response. The project will improve continuity across rivers that were frequently impassable during the rainy season, particularly at sites such as Lungwena, Unga, and Lugola. These areas had historically suffered isolation due to bridge collapses or flood washouts, as experienced during Cyclone Freddy in 2023. Improved access is expected to stimulate local economic activity, especially in fishing and agriculture, and enhance mobility for vulnerable groups including women and children. The impact is highly significant even before enhancement measures (Table 6-23), and with sustained maintenance and safety, the long-term benefits will be transformative.

Table 6-23: Impact Assessment on Enhanced Connectivity to Urban Areas

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:

i. Implement a routine bridge and approach road maintenance program, with drainage inspections and prompt repairs.
ii. Install road signage, guardrails, and pedestrian shoulders for safety at all bridge sites.
iii. Promote road safety awareness through community-based campaigns.
iv. Maintain all-weather access to bridge approaches and connecting roads through routine grading, drainage maintenance, and prompt repair of damaged sections to facilitate uninterrupted public transport services.

6.2.3.2 Improved Access to Social Services

Improved road connectivity and restored bridge crossings will enhance community access to education, healthcare, and administrative services. Previously, damaged or impassable river crossings, particularly during the rainy season, limited travel to schools, hospitals, and trading centres. This disproportionately affected children, pregnant women, the elderly, and people with disabilities. Rehabilitated bridges will improve the regularity and safety of public transport, enabling more reliable access to essential services.

Key benefits include:

- Reduced travel time to health centres during emergencies (especially near Lungwena and Unga).
- Improved school attendance in wet seasons due to safer crossings at sites like Lutende and Lilore.
- Enhanced delivery of extension services (e.g. agriculture, public health) by government officers.

Table 6-24: Impact Assessment on Improved Access to Social Services

Assessment Stage	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	Significance
Before Enhancement	4	3	5	3	4	**High (60)**
After Enhancement	5	4	5	4	5	**Very High (90)**

Enhancement Measures:

i. Coordinate with District Health and Education Offices to assess anticipated service demand and implement staffing, supply, and outreach adjustments in affected communities within three (3) months of restored access.
ii. Improve road signage and pedestrian safety infrastructure (e.g. footbridges, crossings) near schools and health centres.
iii. Facilitate mobile health outreach programs through improved access to remote communities.
iv. Include disability-friendly design elements such as ramps at crossing points and adequate pedestrian space near trading centres and schools.

6.2.3.3 Strengthening of Local Trade and Small Enterprises

With the road and bridge improvements, local markets in places like Chingosere, Lilembwe, and Malindi will become more accessible. Improved transportation reduces spoilage and increases market volumes for agricultural and fishery products. Local businesses (e.g., groceries, rest houses, carpentry, tailoring, etc.) are expected to benefit from:

- Increased customer movement;
- Faster access to supplies and wholesalers;
- Better pricing and bargaining power.

Women and youth engaged in informal trade will especially benefit from the improved environment for business growth and micro-enterprise diversification.

Table 6-25: Impact Assessment on Strengthening of Local Trade and Small Enterprises

Assessment Stage	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	Significance
Before Enhancement	4	3	5	3	4	**High (60)**
After Enhancement	5	4	5	4	5	**Very High (90)**

Enhancement Measures:

- Promote inclusion of women and youth through targeted sensitisation and access to microfinance and entrepreneurship support services.

i. Provide safe offloading zones and lay-bys at key trading centres to reduce congestion and enhance commercial mobility.

ii. Encourage multi-stakeholder road corridor planning, involving traders, transporters, and local councils to maximise economic potential.

6.2.3.4 Increased Disaster Resilience and Climate Adaptation

The project includes climate-resilient design features, such as:

- Elevated bridge structures;
- Wider waterways and improved freeboards;
- Robust drainage and erosion controls.

These features will reduce future flood damage risks, especially in the wake of Tropical Cyclone Freddy (2023), which destroyed or severely damaged several original structures. By reducing infrastructure vulnerability, the project enhances community disaster preparedness and helps safeguard lives, livelihoods, and critical mobility routes during extreme weather events.

Table 6-26: Impact Assessment on Increased Disaster Resilience and Climate Adaptation

Assessment Stage	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	Significance
Before Enhancement	4	3	5	3	4	**High (60)**
After Enhancement	5	4	5	4	5	**Very High (90)**

Enhancement Measures:

i. Conduct quarterly maintenance of drainage systems, including desilting and vegetation clearance, with mandatory completion of works at least one month before the rainy season.

ii. Promote community awareness on flood-resilient infrastructure, and involve communities in monitoring and reporting drainage blockages.

iii. Integrate climate risk indicators into the road authority's asset management and maintenance tracking system.

iv. Establish early warning signage and flood markers at bridges with high historical flood levels (e.g., Unga, Lungwena) for improved public safety.

6.2.4 Identified Negative E&S Impacts During Operation Phase.

Although the Project will deliver significant socio-economic benefits through improved accessibility and disaster resilience, several residual environmental and social risks may emerge during the operation phase. These negative impacts are largely related to increased traffic volumes, emissions, and land use change and will require long-term monitoring and enforcement by the Roads Authority and relevant stakeholders.

6.2.4.1 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 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 6-27: Impact Assessment on Air Pollution and Climate Change-Related Impacts

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:

i. Implement tree planting programs within the road reserve (10 m spacing) to act as carbon sinks and dust buffers.
ii. Promote community greening initiatives along the corridor in partnership with local authorities.
iii. Enforce annual vehicle fitness inspections to control tailpipe emissions.
iv. Encourage modal shift through improved public transport systems to reduce the number of individual vehicles.

6.2.4.2 Increased risk of traffic-related accidents

Improved road surface and speed-friendly alignment may lead to speeding and road safety hazards, particularly in densely populated settlements. Vulnerable groups such as school children, elderly pedestrians, and cyclists are at elevated risk near bridges, trading centres, and markets. The impact is likely to occur within the first months of operation as users adjust to new traffic patterns.

Table 6-28: 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:

i. Install speed control measures (bumps, rumble strips) on bridge approaches.
ii. Provide clear and visible signage at all bridge sites and pedestrian crossings.
iii. Conduct community road safety sensitisation, particularly targeting school children and cyclists.
iv. Design and maintain shoulders and pathways for pedestrian and non-motorised road users.
v. Monitor accidents data on specific bridges / sections.

6.2.4.3 Noise Pollution and Excessive Vibrations

The study anticipates that there would be noise during the operation stage of the project due to the high speed and raving of motor vehicles along the road since its design speed is 80-100km/hr.

Table 6-29: Impact Assessment on Noise Pollution and Excessive Vibrations

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:

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

6.2.4.4 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 such as Lungwena and Lugola. These effects can compromise road safety and reduce the lifespan of the infrastructure.

Table 6-30: 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)**

Mitigation Measures:

i. Establish a routine road and drainage maintenance programme post-construction.
ii. Train district council staff and communities on identifying and reporting blocked drains or culverts.
iii. Include budget provisions for emergency de-silting and maintenance.
iv. Clear roadside vegetation at least twice per year to prevent blockage of outlets and culverts, with clearance records submitted to the supervising engineer.

6.2.4.5 Proliferation of Informal Roadside Trading at Bridge Approaches

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 6-31: 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:

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

6.2.4.6 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 6-32: 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:

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

6.2.2.7 Increased Theft and Crime

The operation of the rehabilitated bridges and associated road sections is expected to improve connectivity, traffic flow, and economic activity in the project area. However, improved access can also increase the risk of theft and crime, both against road users and nearby communities. During the operational phase, criminal activities may target vulnerable road users, public infrastructure (e.g., guardrails, signposts, lighting, and drainage covers), and goods in transit. The risk may be higher in remote sections of the road where natural surveillance is limited, particularly at night or during low-traffic periods. There is also potential for opportunistic theft from slow-moving or stationary vehicles at bridge approaches. These activities could compromise road safety, disrupt transport operations, and erode community trust in the project.

Table 6-33: Impact Assessment on Increased Theft and Crime

Impact	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Occurrence Probability	Significance
Before Mitigation	3	3	3	4	4	**Moderate (52)**
After Mitigation	2	2	2	3	2	**Low (18)**

Mitigation Measures:

i. Collaborate with local law enforcement and community policing units to establish regular patrols along the road corridor and at bridge approaches.
ii. Install and maintain security features such as lighting at strategic points, tamper-resistant fixtures, and anti-theft road furniture.
iii. Promote community awareness and reporting mechanisms to encourage local participation in protecting public infrastructure.
iv. Include security considerations in road operation and maintenance contracts, with specific provisions for infrastructure protection.

Chapter Seven: Environmental and Social Management and Monitoring Plans

This chapter outlines the Environmental and Social Management and Monitoring Plan (ESMMP) for the Project. It operationalises the ESIA findings by presenting practical and costed measures to manage identified environmental and social risks and impacts. The chapter provides a tabulated Environmental and Social Management Plan (ESMP), detailing mitigation actions across project phases. It also includes a monitoring plan that defines indicators, frequency, and responsible institutions for tracking compliance and effectiveness. While specific sub-plans will be developed by the contractor, this chapter provides standard frameworks to guide their preparation and integration into the Contractor's ESMP (C-ESMP).

7.1 Objectives of the ESMMP

The main objective of the ESMMP is to provide a practical framework for the effective management of identified environmental and social risks and impacts throughout the project lifecycle. Specifically, the ESMMP aims to:

i. Implement all mitigation and enhancement measures outlined in the ESIA and ESMP, and maintain compliance records for monitoring by the Roads Authority and MEPA;
ii. Promote the integration of environmental and social safeguards into project planning, procurement, construction, and operation activities;
iii. Assign clear responsibilities for the implementation of mitigation measures to relevant parties, particularly the Contractor;
iv. Support informed decision-making through timely monitoring of key environmental and social indicators; and
v. Guide the Contractor in developing site-specific sub-plans in line with the frameworks provided in the project's Environmental and Social Management Framework (ESMF).

7.2 Environmental and Social Management Plan (ESMP)

This section presents the ESMP in Table 7-1, in compliance with MEPA guidelines. The ESMP consolidates the mitigation and enhancement measures proposed in the ESIA into a structured and actionable format that facilitates effective implementation and supervision. The measures cover both generic environmental and social risks commonly associated with road and bridge construction, as well as site-specific issues identified at the 12 bridge locations. Each mitigation measure is linked to the specific E&S impact it addresses and is accompanied by implementation details, including timing, location, and the responsible institution. The ESMP distinguishes clearly between construction and operational phase activities. All proposed measures are budgeted and aligned with project implementation timelines. The tabulated ESMP also includes references to relevant sub-plans that are required to be developed during project implementation.

Table 7-1: Environmental and Social Management Plan

Impact Code	Environmental & Social Impact	Enhancement / Mitigation Measures	Schedule of Implementation	Implementation Institution	Implementation Cost (USD)
6.2.1	**Construction Phase Positive Impacts**				
6.2.1.1	Creation of Local Employment	Publicise employment opportunities and prioritise local recruitment through TAs Namavi, Makanjira, Chowe, and Chapola to maximise economic inclusion.	Throughout the construction phase	Construction Contractor in collaboration with District Labour Office	10,000.00
		Implement inclusive recruitment procedures to achieve at least 40% female participation across all roles, including semi-skilled and support positions, as verified through monthly workforce gender composition reports.			
		Implement the project's Labour Management Plan, including procedures for recruitment, grievance redress, workplace conduct, and worker accommodation.			
		provide job-specific and OHS training for all workers, with extra support for unskilled and first-time workers.			
		Prepare a worker accommodation plan for non-local workers to ensure compliance with health, safety, and dignity standards.			
		Pay equal wages for equal work, regardless of gender or origin, and ensure compliance with national minimum wage laws.			
		Establish a worker grievance redress mechanism that is accessible, anonymous, and responsive.			
		Enforce a code of conduct covering respectful behaviour, anti-harassment, community relations, and prohibition of child/forced labour.			
		Monitor labour compliance through regular audits and submit monthly labour reports, including gender-disaggregated workforce data and labour incident tracking.			
		Facilitate skill development through on-the-job training, creating a local pool of semi-skilled workers for future maintenance or development activities.			
6.2.1.2		Require the contractor to conduct a local supply chain review, identifying businesses in Mangochi District capable of supplying		Construction Contractor	25,0000.00

Impact Code	Environmental & Social Impact	Enhancement / Mitigation Measures	Schedule of Implementation	Implementation Institution	Implementation Cost (USD)
	Creation of New Opportunities for Local Business	goods and services that are in line with World Bank procurement standards.	Prior to and during construction		
		Develop and implement a local procurement plan to prioritise purchasing materials such as cement, aggregates, and groceries from licensed vendors operating within Mangochi and neighbouring districts.			
		All materials must be sourced from MRA-registered suppliers. Where local suppliers for essential inputs like sand or gravel are unavailable, the contractor shall obtain written clearance from the Mangochi District Council.			
		Enforce timely payment schedules to small businesses, with contractually defined payment terms to ensure cash flow stability.			
		Monitor local procurement and services engagement through quarterly reports, disaggregated by business type and geographical origin, to assess and maximise the project's local economic footprint.			
6.2.1.3	Skills Transfer	Pair all unskilled workers, particularly women and youth, are paired with skilled artisans for on-the-job mentorship and learning.	Throughout the construction phase	Construction contractor supported by local vocational institutions	25,000.00
		Formalise induction training, toolbox talks, and structured skill development modules under the Labour Management Plan (Annex 5).			
		provide equal access to training for both male and female workers, promoting inclusive workforce development.			
		Involve technical colleges or vocational training institutions to certify basic construction skills, enabling long-term employability.			
		Collaborate with local leaders and VDCs to promote awareness of the skill-building aspects of the project among youth and underrepresented groups.			
6.2.2	**Construction Phase Negative Impacts**				
6.2.2.1	Physical and Economic Displacement	Implement all compensation and relocation support prior to commencement of construction, in strict compliance with the RAP and World Bank ESS5.	Pre-construction and early construction	Roads Authority (lead) with support from	300,000.00

Impact Code	Environmental & Social Impact	Enhancement / Mitigation Measures	Schedule of Implementation	Implementation Institution	Implementation Cost (USD)
		provide direct cash or in-kind compensation to PAPs for structures, trees, and crops, in line with the entitlements matrix defined in the RAP, ensuring transparency, fairness, and timely delivery in accordance with the preferences of PAPs.		Mangochi District Lands Office,	
		Complete all agreed compensation payments, including shifting and disturbance allowances, before initiating physical relocation, with verification by the RAP Implementation Committee.			
		Maintain an active Grievance Redress Mechanism (GRM) throughout the resettlement process to resolve disputes promptly and fairly.			
		provide additional support to vulnerable households, including elderly-headed households, female-headed households, and those with limited income streams.			
		Monitor resettlement outcomes through post-displacement audits and feedback from affected communities to verify that livelihoods are restored or improved.			
6.2.2.2	Disruption of Access to Properties and Social Services	Develop and implement a Traffic and Access Management Plan in line with Annex 5, including safe pedestrian crossings, detour signage, and access restoration timelines.	Pre-construction and throughout construction	Construction Contractor (lead), supported by Supervising Engineer and Mangochi District Council	45,000.00
		Publicly communicate construction schedules in advance to allow households, traders, and institutions to plan for any temporary disruptions.			
		Engage community leaders and social services providers to ensure that access to health centres, schools, and religious facilities remains unobstructed throughout the construction period.			
		Establish temporary trading sites in consultation with local market committees to support the continuity of business for roadside vendors, particularly women.			
		Restore all disrupted access paths post-construction and provides alternative routes during construction, approved by the District Council and Roads Authority.			

Impact Code	Environmental & Social Impact	Enhancement / Mitigation Measures	Schedule of Implementation	Implementation Institution	Implementation Cost (USD)
		Establish a GRM specifically for services disruption complaints and respond within 5 working days.			
6.2.2.3	Risks of Human Trafficking and Labour Exploitation	All workers must be engaged through transparent, direct hiring processes, with contracts provided in the local language.	Throughout construction	Construction Contractor (lead), supported by Ministry of Labour and Malawi Police Service	20,000.00
		Recruiters and contractors must be vetted and prohibited from charging recruitment fees.			
		All staff must sign a Code of Conduct that explicitly prohibits harassment, exploitation, and unethical recruitment.			
		Establish anonymous and confidential GRM procedures accessible to workers, with regular toolbox talks on workers' rights.			
		Monitor contractors' compliance with labour laws, especially around working hours, leave, and pay, as outlined in the LMP.			
		Facilitate random site inspections by labour inspectors and social welfare officers at least once per month during peak construction, and address any compliance issues within 14 days of inspection reports.			
6.2.2.4	Gender-Based Violence and Sexual Exploitation and Abuse (GBV/SEA)	Implement a robust Code of Conduct (CoC) for all workers and supervisors, clearly outlining unacceptable behaviour and consequences.	Pre-construction and throughout construction	Construction Contractor	45,000.00
		Include GBV/SEA/SH clauses in contractor agreements, requiring proactive training and enforcement.			
		Conduct mandatory, ongoing GBV/SEA/SH awareness training for all staff and services providers.			
		Establish a confidential, survivor-centred GRM, with referral pathways to District Social Welfare and local support services.			
		Locate campsites away from sensitive community areas and ensure proper lighting, surveillance, and access control.			
		Engage a qualified GBV Service Provider within three months of project start to train workers, establish referral pathways, and monitor GBV risk mitigation measures throughout implementation.			

Impact Code	Environmental & Social Impact	Enhancement / Mitigation Measures	Schedule of Implementation	Implementation Institution	Implementation Cost (USD)
6.2.2.5	Discriminatory Working Conditions	Prioritise employment opportunities for women and individuals with disabilities, ensuring inclusivity and diversity in the workforce.	Throughout construction	Construction Contractor	24,000.00
		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.			
		Actively 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 WGRM with clear and accessible channels for reporting and investigating incidents of workplace harassment, ensuring that complaints are handled promptly and fairly.			
6.2.2.6	Social Disruption and Risk of Conflicts between Workers and Local Communities	Establish contractor labour camps before mobilising non-local workers, ensuring proper accommodation, sanitation, and separation from settlements.	Pre-construction and throughout construction	Construction Contractor	48,000.00
		Locate camps at least 500 metres from homes, schools, water bodies, and sensitive sites, and consult communities on siting to avoid conflict.			
		provide mandatory induction and cultural sensitisation to all workers on local customs, conflict avoidance, and codes of conduct.			

Impact Code	Environmental & Social Impact	Enhancement / Mitigation Measures	Schedule of Implementation	Implementation Institution	Implementation Cost (USD)
		Keep comprehensive labour records, including proof of age, identity, and place of origin, to ensure traceability and accountability.			
		Designate a Community Liaison Officer to manage interactions with local leaders, facilitate two-way communication, and address concerns early.			
		Clearly demarcate and secure work areas with signage and fencing to prevent unauthorised entry, especially by children and livestock.			
		Implement visitor registration and site access controls at all construction sites and camps.			
		provide on-site canteens and shops within camps to reduce reliance on local markets and prevent pressure on village resources.			
		Prioritise hiring of local unskilled labour (target 70%) to promote shared benefits and improve social integration.			
		Accommodate non-local workers in dedicated contractor-managed camps, avoiding housing allowances that may inflate local rent or displace residents.			
		Apply camp management and worker conduct guidelines consistent with Annex 5, ensuring all camp siting and operations meet GP and WB ESS2/ESS4 requirements.			
		Conduct monthly community engagement meetings to identify and address any rising grievances related to workers or construction activities.			
6.2.2.7	Exposure of Workers to Occupational Health and Safety Hazards	Develop and implement a OHS Plan covering hazard identification, emergency preparedness, safe equipment use, and risk communication.	Throughout construction	Construction Contractor	100,000.00
		provide task-specific training and induction to all workers, including toolbox talks, hazard awareness, and rights under Malawi's OHS law and ESS2.			
		Supply certified PPE (helmets, gloves, harnesses, reflective vests) free of charge and enforce its use through supervision and spot checks.			

Impact Code	Environmental & Social Impact	Enhancement / Mitigation Measures	Schedule of Implementation	Implementation Institution	Implementation Cost (USD)
		Station qualified medical personnel and first aiders at all sites; maintain stocked first aid kits and referral arrangements with nearby clinics.			
		Conduct heat stress management through shaded rest areas, hydration schedules, and flexible working hours.			
		Install and inspect certified scaffolding and fall protection systems at all bridge sites before commencement of deck construction, and conduct weekly safety audits to verify structural integrity and usage compliance.			
		Implement and monitor incident reporting and corrective action procedures, with weekly OHS compliance reporting.			
		Include OHS measures in all subcontractor contracts and carry out regular site audits.			
6.2.2.8	Exposure of Nearby Communities to Construction-Related Hazards	Install temporary fencing, signage, and flagmen around active construction zones near settlements or trading centres.	Throughout construction	Construction Contractor	60,000.00
		provide public awareness campaigns before major construction activities, in collaboration with local leaders and radio stations.			
		Establish and implement traffic management plans, including speed control, bypass roads, and reflective signs.			
		Appoint a Community Liaison Officer to coordinate emergency responses, support in the management of CHS risks, and address public complaints.			
		Provide safe pedestrian crossings and dedicated footpaths where construction interfaces with populated areas.			
		Store fuels and hazardous materials in secured, bunded areas, away from homes, boreholes, and streams.			
		Immediately restore or fence off all open pits, borrow areas, or culverts once inactive or completed.			
		Implement progressive rehabilitation of borrow sites during construction, restoring each site within two weeks of material extraction completion to minimise the risk of leaving open pits at project closure.			

Impact Code	Environmental & Social Impact	Enhancement / Mitigation Measures	Schedule of Implementation	Implementation Institution	Implementation Cost (USD)
		Monitor ambient air quality, dust, and noise levels and apply controls such as water spraying, silencers, and restricted working hours near schools and health centres.			
6.2.2.9	Loss of Trees for Economic Livelihood and Biomass for Energy	Conduct pre-construction tree tagging and valuation at each site, guided by the RAP inventory, distinguishing indigenous, exotic, and fruit trees. RAP will include a livelihood restoration program to address loss of income.	Pre-construction and during clearing	Construction Contractor	35,000.00
		Integrate a Tree Removal and Replanting Schedule into the ESMP, with species-specific restoration requirements: a) Replant a minimum of ten saplings per tree removed; b) Prioritise native species offering shade, erosion control, or agroforestry benefits (*Faidherbia albida*, *Albizia amara*, *Trichilia emetica*); c) c. Use fruit tree nurseries (e.g. mango, baobab, masau) near affected homes to restore lost economic value.			
		Engage community members, especially women and youth groups, in nursery establishment, planting, and maintenance, promoting ownership and income diversification.			
		Conduct all tree felling under the supervision of qualified environmental personnel, marking and protecting endangered or culturally important species (e.g., *Khaya anthotheca*, Baobab) prior to clearance.			
		Prohibit sourcing firewood and charcoal from unlicensed vendors within the contractor's camp; require formal procurement of cooking fuel for worker camps.			
		Install LPG stoves or solar cookers in all contractor camps to eliminate worker-driven firewood demand.			
		provide packed meals or catered food to reduce pressure on the surrounding woodlands for cooking needs.			

Impact Code	Environmental & Social Impact	Enhancement / Mitigation Measures	Schedule of Implementation	Implementation Institution	Implementation Cost (USD)
		Conduct quarterly tree survival audits, with replanting obligations of a ratio of 1:5 in place if survival rates fall below 80% within the first year.			
		Publicly share progress on replanting efforts during stakeholder meetings, demonstrating commitment to natural resource sustainability.			
6.2.2.10	Disturbance and Displacement of Terrestrial Fauna	Restrict vegetation clearance to designated work zones. Avoid disturbing intact habitats at biodiversity hotspots like Unga, Chikosere, and Mbwazi.	Pre-construction and during clearing	Construction Contractor	35,000.00
		conduct pre-clearance faunal surveys to identify active nests, burrows, or breeding sites. Temporarily halt work where nesting or breeding activity is observed.			
		Use manual clearing methods in sensitive areas (riparian zones, thickets, wetlands) to reduce habitat destruction and wildlife injury.			
		Train construction workers in wildlife awareness, including safe handling of reptiles, identification of venomous species, and procedures for relocating non-dangerous animals.			
		Install informational signage and buffer zones around high-density fauna areas (e.g., herpetofauna zones near Mbwazi or amphibian zones at Lilore) to prevent encroachment.			
		Prohibit the use of pesticides or herbicides near bridge sites, especially where amphibians or pollinators are present.			
		Avoid construction near known bird nesting periods (e.g. for weavers or hornbills) and relocate active nests under expert supervision if unavoidable.			
		Design post-construction vegetation restoration to include native, insect-friendly shrubs and grasses that attract pollinators and ground-dwelling species.			
		Use low-noise equipment and limit activities during early morning or night hours, when faunal activity is highest.			

Impact Code	Environmental & Social Impact	Enhancement / Mitigation Measures	Schedule of Implementation	Implementation Institution	Implementation Cost (USD)
		Maintain riparian buffers and shade vegetation to protect amphibians, reptiles, and aquatic-dependent species from exposure and desiccation.			
		Prohibit hunting, capture, or killing of any wildlife by workers, and include this in the Code of Conduct.			
		Implement a Wildlife Encounter Protocol, requiring reporting and safe relocation (where appropriate) of fauna found within construction areas.			
		Develop an Aquatic Biodiversity Management Plan to help avoid or minimise direct disturbance to aquatic life.			
6.2.2.11	Disruption of River Hydrology and Floodplain Function	Design and implement stormwater diversion and control structures (e.g. temporary channels, biodegradable/non-polyethylene sandbags, flow control culverts) to manage flow during active construction, especially at sites with high Q100 values, while always maintaining minimum environmental flow thresholds.	Pre-construction and throughout construction	Construction Contractor	120,000.00
		Use precast bridge components and modular installation techniques to minimise in-stream works during peak rainfall periods and reduce duration of e-flow disruption.			
		Deploy on-site rapid response teams and mobile pumps to manage floodwaters and remove sediment from work zones during storms.			
		Install permanent scour protection (e.g. riprap, gabions) at abutments and piers prior to full flow season to prevent erosion.			
		Maintain floodplain connectivity by avoiding embankment blockage and using multi-cell culverts or raised decks in flat catchments.			
		Apply erosion control measures, immediately after land clearing.			
		Avoid fuel storage and concrete mixing platforms within 100 metres of any river or stream to protect water quality and groundwater recharge zones.			
		Restore and stabilise disturbed banks with bioengineering techniques (vetiver grass, native shrubs) post-construction.			

Impact Code	Environmental & Social Impact	Enhancement / Mitigation Measures	Schedule of Implementation	Implementation Institution	Implementation Cost (USD)
		For sites requiring cofferdams, use non-polluting fill materials such as biodegradable/non-polyethylene sandbags, sheet piles, or clean rock, to maintain continuous e-flows downstream during construction.			
		Monitor construction in real time using daily site logs, drone imagery, and river gauge data, and flow meters to verify compliance with agreed e-flow thresholds.			
		xii. Maintain environmental flows (e-flows) for all river bodies crossed by the project, thereby safeguarding downstream ecosystems and livelihoods.			
		Maintain buffer zones around known floodplains and high-flow areas, as identified in the Hydrology Report, and restrict heavy machinery operations during peak flow days.			
6.2.2.12	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 5.	Throughout construction	Construction Contractor	64,000.00
		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.			
		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.			

Impact Code	Environmental & Social Impact	Enhancement / Mitigation Measures	Schedule of Implementation	Implementation Institution	Implementation Cost (USD)
		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 borrow soil, ensuring that: • The soil is sourced from nearby locations to minimise transportation impacts. • The soil is not sourced from riverbeds, flood-prone areas, protected sites, or agricultural land, nor from sites near urban, touristic, or culturally sensitive areas.			

Impact Code	Environmental & Social Impact	Enhancement / Mitigation Measures	Schedule of Implementation	Implementation Institution	Implementation Cost (USD)
6.2.2.13	Water Quality Degradation	Prohibit the placement of temporary facilities (such as construction campsites, storage areas, and fuel storage) within 50 metres of wells and boreholes. Additionally, ban the fuelling, washing, or maintenance of machinery near drains or watercourses to prevent contamination.	Pre-construction and throughout construction	Construction Contractor	30,000.00
		Develop and implement a comprehensive Waste Management Plan, as guided by Annex 5, 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.			
		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.			
		Develop and implement a stormwater and water management plan, following the guidance provided in Annex 5, to manage water runoff effectively.			
		Restrict vegetation clearance, excavations, and soil compaction to approved sites only to minimise the impact on surrounding environments.			

Impact Code	Environmental & Social Impact	Enhancement / Mitigation Measures	Schedule of Implementation	Implementation Institution	Implementation Cost (USD)
		Obtain all necessary permits for water abstraction and comply with all relevant regulatory standards to ensure sustainable water use.			
6.2.2.14	Accidents and incidents 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.	Throughout construction	Construction Contractor	45,000.00
		Develop and implement a Community Health and Safety Plan (CHSP) to protect communities from traffic-related hazards and ensure safe interaction between the public and project activities.			
		Prepare and operationalise an Emergency Preparedness and Response Plan (EPRP) that includes protocols for responding to flooding, traffic accidents, and other emergencies likely to occur during heavy rains and high river flows.			
		Secure all active work areas through hoarding or fencing to prevent unauthorised entry and reduce the risk of accidents involving community members.			
		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 (with barriers, and warning signs) any houses located close to the construction sites that are not subject to resettlement, to prevent accidental structural damage and to ensure the safety of occupants and passers-by.			
		Conduct regular road safety awareness and sensitisation programmes targeting pedestrians, motorcycle operators, and small vehicle drivers.			

Impact Code	Environmental & Social Impact	Enhancement / Mitigation Measures	Schedule of Implementation	Implementation Institution	Implementation Cost (USD)
		Install speed calming structures at strategic locations, including trading centres, villages, schools, hospitals, and public services 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.			
		Prepare an emergency preparedness and response plan, as guided by Annex 5, in coordination with the local community and emergency responders, to provide timely first aid and hazardous materials response in the event of accidents.			
6.2.2.15	Spread of Sexually Transmitted Infections and other Communicable Diseases	Develop an HIV and AIDS prevention and management plan, following the guidance provided in Annex 5, to address the risks associated with STIs and HIV/AIDS.	Throughout construction	Construction Contractor	40,000.00
		Prioritise the recruitment of 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.			
		Establish a campsite clinic and arrange with local health services provider 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.			
6.2.2.16	Temporary 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.	Throughout construction	Construction Contractor	35,000.00

Impact Code	Environmental & Social Impact	Enhancement / Mitigation Measures	Schedule of Implementation	Implementation Institution	Implementation Cost (USD)
		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.			
		Implement measures to reduce greenhouse gas (GHG) emissions and provide additional strategies for enhancing carbon sinks to offset emissions generated by construction activities.			
		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.			
6.2.2.17	Temporary Elevation of Noise Levels	Restrict construction activities to daytime hours (07:00 – 17:00) when working near populated areas and apply the same restriction to mong heavy construction vehicles and machinery. If construction must extend beyond these hours, inform local authorities and the affected population in advance.	Throughout construction	Construction Contractor	35,000.00
		Conduct regular maintenance of machinery, equipment, and vehicles to minimise noise levels, ensuring that all machinery			

Impact Code	Environmental & Social Impact	Enhancement / Mitigation Measures	Schedule of Implementation	Implementation Institution	Implementation Cost (USD)
		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 5, to mitigate noise impacts throughout the construction process.			
		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.			
6.2.2.18	Risk of Disturbance to Cultural and Historical Heritage	Map and clearly mark all cultural sites of concern (mosques, graveyards, ceremonial areas) on construction planning maps using GPS coordinates validated with local leaders.	Throughout construction	Construction Contractor	25,000.00
		Site all detours, material storage, borrow pits, and worker camps are sited away from mosques and graveyards, with buffer zones of at least 100 metres where feasible.			
		Conduct pre-construction cultural briefings with Traditional Authorities, village leaders, and religious elders to identify any intangible cultural practices or upcoming ceremonies.			
		Schedule construction activities to avoid disruption during key local events such as Friday prayers, funerals, and initiation seasons.			
		Install signage and fencing around nearby graveyards or sacred spaces to avoid accidental encroachment.			
		Integrate a Chance Finds Procedure into the ESMP that:			
		a. Suspends work immediately upon discovery of cultural artefacts or burial remains;			
		b. Notifies relevant authorities (e.g. Department of Antiquities, District Council);			
		c. Halt works immediately upon discovery of cultural heritage items, record the find, and engage a qualified heritage specialist for assessment and clearance before resuming activities.			

Impact Code	Environmental & Social Impact	Enhancement / Mitigation Measures	Schedule of Implementation	Implementation Institution	Implementation Cost (USD)
		Include cultural sensitivity and ESS8 awareness in worker Codes of Conduct and toolbox talks to avoid disrespectful behaviour.			
		Maintain a cultural grievance redress channel, accessible to local communities for reporting concerns related to heritage or traditions.			
		Document all community engagement meetings on cultural heritage and publicly disclose mitigation actions to build trust and transparency.			
6.2.3	**Identified Positive Impacts During Operation Phase.**				
6.2.3.1	Enhanced Connectivity to Urban Areas	Implement a routine bridge and approach road maintenance program, with drainage inspections and prompt repairs.	During operation and maintenance phases	Roads Authority	
		Install road signage, guardrails, and pedestrian shoulders for safety at all bridge sites.			
		Promote road safety awareness through community-based campaigns.			
		Maintain all-weather access to bridge approaches and connecting roads through routine grading, drainage maintenance, and prompt repair of damaged sections to facilitate uninterrupted public transport services.			
6.2.3.2	Improved Access to Social Services	Coordinate with District Health and Education Offices to assess anticipated service demand and implement staffing, supply, and outreach adjustments in affected communities within three (3) months of restored access.	During operation	Roads Authority	
		Improve road signage and pedestrian safety infrastructure (e.g. footbridges, crossings) near schools and health centres.			
		Facilitate mobile health outreach programs through improved access to remote communities.			
		Include disability-friendly design elements such as ramps at crossing points and adequate pedestrian space near trading centres and schools.			
6.2.3.3	Strengthening of Local Trade and Small Enterprises	Promote inclusion of women and youth through targeted sensitisation and access to microfinance and entrepreneurship support services.	During operation	Mangochi District Council	

Impact Code	Environmental & Social Impact	Enhancement / Mitigation Measures	Schedule of Implementation	Implementation Institution	Implementation Cost (USD)
		provide safe offloading zones and lay-bys at key trading centres to reduce congestion and enhance commercial mobility.			
		Encourage multi-stakeholder road corridor planning, involving traders, transporters, and local councils to maximise economic potential.			
6.2.3.4	Increased Disaster Resilience and Climate Adaptation	Conduct quarterly maintenance of drainage systems, including desilting and vegetation clearance, with mandatory completion of works at least one month before the rainy season.	During operation and road maintenance	Roads Authority	
		Promote community awareness on flood-resilient infrastructure, and involve communities in monitoring and reporting drainage blockages.			
		Integrate climate risk indicators into the road authority's asset management and maintenance tracking system.			
		Establish early warning signage and flood markers at bridges with high historical flood levels (e.g., Unga, Lungwena) for improved public safety.			
6.2.4	**Identified Negative Impacts During Operation Phase.**				
6.2.4.1	Air Pollution	Implement tree planting programs within the road reserve (10 m spacing) to act as carbon sinks and dust buffers.	During operation and periodic reviews		
		Promote community greening initiatives along the corridor in partnership with local authorities.			
		Enforce annual vehicle fitness inspections to control tailpipe emissions.			
		Encourage modal shift through improved public transport systems to reduce the number of individual vehicles.			
6.2.4.2	Increased risk of traffic-related accidents	Install speed control measures (bumps, rumble strips) on bridge approaches.	During operation and continuous traffic monitoring	Roads Authority	10,000.00 per year
		Provide clear and visible signage at all bridge sites and pedestrian crossings.			
		Conduct community road safety sensitisation, particularly targeting school children and cyclists.			
		Design and maintain shoulders and pathways for pedestrian and non-motorised road users.			

Impact Code	Environmental & Social Impact	Enhancement / Mitigation Measures	Schedule of Implementation	Implementation Institution	Implementation Cost (USD)
6.2.4.3	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.	During operation	Roads Authority	6,000.00 per year
		Install speed control measures such as bumps and rumble strips in the villages and towns where the road traverses.			
		Install no hooting signs in sensitive areas such as near hospitals, schools, churches, mosques etc.			
6.2.4.4	Inadequate Stormwater Drainage and Flooding of Road Shoulders	Establish a routine road and drainage maintenance programme post-construction.	During rainy seasons and maintenance	Mangochi District Council	6,000.00 per year
		Train district council staff and communities on identifying and reporting blocked drains or culverts.			
		Include budget provisions for emergency de-silting and maintenance.			
		Clear roadside vegetation at least twice per year to prevent blockage of outlets and culverts, with clearance records submitted to the supervising engineer.			
6.2.4.5	Proliferation of Informal Roadside Trading at Bridge Approaches	Work with local councils to designate and plan formal market spaces near bridge approaches.	During rainy seasons and inspections	Mangochi District Council	
		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.			
6.2.4.6	Risk of Illegal Settlements Along the Road Reserve	Enforce strict compliance with the 36m road reserve boundary in partnership with local authorities.	Continuous monitoring and periodic review	Roads Authority	12,000.00 per year
		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.			

Impact Code	Environmental & Social Impact	Enhancement / Mitigation Measures	Schedule of Implementation	Implementation Institution	Implementation Cost (USD)
		Develop a grievance mechanism for handling disputes over land use or forced relocations.			

7.3 Frameworks for Thematic Sub-Plans

The Contractor shall prepare and implement a Contractor's Environmental and Social Management Plan (C-ESMP) before the start of any physical works. The C-ESMP will serve as the Contractor's principal instrument for managing environmental, social, health, and safety (ESHS) risks during the project. It must be aligned with this ESIA, and the Environmental and Social Management Framework (ESMF) for the RCRP-II project. The C-ESMP shall be submitted to the Supervising Engineer and the Roads Authority for review and approval prior to mobilisation. The C-ESMP must include the following thematic sub-plans, which provide detailed operational procedures for managing specific environmental and social risks. All sub-plans shall be prepared using the detailed frameworks provided in Annex 5 of this report. Once finalised, they shall be submitted to the Supervising Engineer and the Roads Authority for review and approval prior to site mobilisation. The implementation of each sub-plan shall be monitored throughout the contract and evaluated during site inspections, audits, and compliance reporting.

7.3.1 Labour Management Plan (LMP)

The Labour Management Plan shall detail how the Contractor will manage all project workers in accordance with the requirements of World Bank ESS2. The plan must include procedures for the recruitment and selection of workers, clearly defining terms and conditions of employment, hours of work, remuneration, and entitlements. The LMP shall outline procedures to prevent child labour and forced labour, and measures to ensure non-discrimination and equal opportunity, including employment opportunities for women and persons with disabilities. The Contractor shall establish a functional grievance redress mechanism (GRM) for workers, with confidential and timely resolution procedures. The plan must also address contractor responsibilities for managing sub-contractors and service providers.

7.3.2 Occupational Health and Safety (OHS) Plan

The OHS Plan must define the Contractor's strategy to ensure the safety and health of workers during all phases of construction. The plan should begin with a comprehensive site-specific risk assessment that identifies potential hazards such as working at heights, excavation, equipment use, exposure to dust and noise, and confined spaces. The risk assessment should also have risks defined and the risk ratings of the hazards identified. Based on the risk assessment, the plan shall specify preventive measures including mandatory use of personal protective equipment (PPE), site safety signage, tool box talks, safety drills, emergency contacts, and incident reporting protocols. The OHS Plan must comply with Malawi's Occupational Safety, Health and Welfare Act (1997) and reflect best practice guidance from the World Bank Group's EHS Guidelines.

7.3.3 Waste Management Plan (WMP)

This plan shall outline procedures for handling, storing, transporting, and disposing of all solid, liquid, and hazardous wastes generated during construction. The Contractor must classify waste types (e.g., domestic, construction debris, packaging, oils, and chemicals) and define management procedures for each category. The plan shall include provisions for safe storage

on-site, designated disposal locations, partnerships with licensed waste handlers (where required), and measures to prevent littering, illegal dumping, or groundwater contamination. Opportunities for reuse and recycling of materials shall also be identified. All waste management practices must align with national regulations and the World Bank Group EHS Guidelines.

7.3.4 GBV/SEA Action Plan

The Gender-Based Violence and Sexual Exploitation and Abuse (GBV/SEA) Action Plan must define proactive measures to prevent and respond to risks of gender-based violence and sexual harassment associated with the presence of a migrant workforce and local power imbalances. The Contractor shall enforce a Code of Conduct (CoC) for all workers, with specific clauses prohibiting SEA/SH and outlining disciplinary procedures. This action plan must align with the project GBV/SEA/SH action plan and will work in conjunction with the GBV Service Provider in the implementation of activities. Workers must receive induction and regular refresher training on GBV risks and appropriate behaviour. The plan must include clear internal reporting mechanisms, survivor-centred response protocols, and linkages to local GBV service providers. Coordination with community structures and awareness campaigns targeting project-affected persons are essential.

7.3.5 Traffic and Road Safety Management Plan

The Traffic Management Plan shall identify measures to minimise traffic disruptions and reduce risks to workers, pedestrians, school children, and road users during bridge construction and haulage activities. The plan must define access routes, delivery schedules, speed limits, and flagging operations. Contractors shall install warning signs, barriers, and traffic cones near active work zones, and coordinate with local authorities to ensure alternative access routes where needed. The plan must include procedures for vehicle maintenance, driver conduct, and community sensitisation on traffic safety risks. Locations near schools, clinics, or trading centres must receive special attention.

7.3.6 Chance Finds Procedure

The Contractor shall prepare a procedure to be followed in the event that cultural artefacts, graves, fossils, or other heritage items are unexpectedly discovered during excavation or construction. All activities must immediately stop upon discovery. The procedure must include steps for protecting the find, notifying the Supervising Engineer and the Department of Antiquities, and awaiting instructions before resuming works. Staff must receive awareness training on recognising potential chance finds and the importance of cultural heritage protection.

7.3.7 Emergency Preparedness and Response Plan

This plan shall define protocols for responding to project-related emergencies such as fire outbreaks, hazardous spills, worker injuries, or severe weather events. The Contractor must identify likely emergency scenarios and outline roles, responsibilities, evacuation routes, assembly points, and communication procedures. Emergency drills must be conducted at regular intervals. The plan must include contact information for local hospitals, fire services,

and district authorities. Emergency preparedness procedures must be clearly communicated to all workers and subcontractors.

7.3.8 Community Health and Safety Plan (CHSP)

The CHSP shall define measures to protect nearby communities from construction-related risks such as dust, noise, traffic accidents, communicable diseases (e.g. HIV/AIDS and COVID-19), and unauthorised access to hazardous areas. The Contractor must ensure perimeter fencing of construction sites, provide clear signage, and implement dust suppression and noise control measures. Outreach campaigns must be conducted to raise awareness about health risks and safety precautions. The plan shall also identify how local grievances will be received and addressed at site level and will also tackle the Emergency Preparedness and Response Plan.

7.3.9 Site Restoration and Demobilisation Plan

This plan shall detail how the Contractor will demobilise at the end of the construction phase and restore all disturbed areas. The plan must include removal of temporary structures and equipment, proper disposal of waste and materials, re-vegetation or soil stabilisation of exposed areas, and grading of land to ensure safety and drainage. The goal is to leave the site in a safe, clean, and environmentally stable condition. Final inspection and approval by the Supervising Engineer shall be required.

7.3.10 Environmental Incident and Non-Compliance Reporting Procedure

The Contractor shall establish a procedure for identifying, documenting, and responding to environmental and social incidents or non-compliance with ESMP measures. The system must include immediate notification to the Supervising Engineer, root cause analysis, corrective action planning, and follow-up. A standardised incident report form and logbook must be maintained on-site. Serious incidents must be reported to the Roads Authority and relevant government departments within 24 hours.

7.3.11 Stakeholder Engagement and Communication Plan

Although the project-wide Stakeholder Engagement Plan (SEP) provides overall guidance, the Contractor must develop a site-specific plan for communicating with affected communities. This plan must include appointment of a Community Liaison Officer (CLO) by the contractor, community noticeboards, grievance intake channels, and a schedule of regular meetings with local leaders and residents. Particular emphasis shall be placed on engagement with vulnerable groups, timely sharing of construction schedules, and feedback mechanisms for concerns raised.

7.4 Environmental and Social Monitoring Plan

Monitoring will involve routine checks on the progress of implementation and the resultant effects on the environment as the Project proceeds. These will 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, organisations responsible for carrying out the monitoring, and those receiving the reports. The environmental and social monitoring plan provides for monitoring to check the implementation of the enhancement and mitigation measures proposed in the ESMP. The monitoring plan gives monitoring indicators, frequency of monitoring and the stakeholders responsible for monitoring.

7.4.1 Internal Project Monitoring and Reporting

The contractor will have to conduct monitoring of its own and its sub-contractor's activities on a daily, weekly and regular basis. The contractor will prepare regular reports (monthly, quarterly, and annual) on environmental, social, health and safety performance that are submitted to the supervisory engineer, and Roads Authority. The report will provide the information and data required to determine compliance with legal and contractual requirements. Roads Authority will submit periodic reports on environmental and social sustainability to MEPA and other regulatory authorities using the contractors' reports.

7.4.2 External Monitoring

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

i. MEPA for surveillance on the impacts management and compliance of projects.
ii. Ministry of Labour will be involved in the surveillance of public and occupational health 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. Mangochi District Councils to be involved in handling public concerns, especially where there are social conflicts.
iv. National Water Resources Authority for monitoring water abstraction and pollution.

7.4.3 Independent Audits

External experts may be called upon to undertake limited monitoring activities for the Contractor and the Consultant on pre-agreed terms. The areas requiring this initiative will include environment quality sampling and measurements (biodiversity, water, air, soil, and noise), etc. The external experts will be engaged on a need basis but within the project implementation structures.

Table 7-2: Monitoring Plan

Impact Code	Identified Impact	Enhancement / Mitigation Measures	Monitoring Indicator	Monitoring Frequency	Monitoring Institution	Monitoring Cost (USD)
6.2.1	**Construction Phase Positive Impacts**					
6.2.1.1	Creation of Local Employment	Publicise employment opportunities and prioritise local recruitment through TAs Namavi, Makanjira, Chowe, and Chapola to maximise economic inclusion.	% of workers from TAs Makanjira, Chowe, Namabvi	Monthly during construction phase	Supervising Engineer; PCU (Environment and Social Experts); District Labour Office	14,000.00
		Implement inclusive recruitment procedures to achieve at least 40% female participation across all roles, including semi-skilled and support positions, as verified through monthly workforce gender composition reports.	% of female workers hired (semi-skilled and support roles)			
		Implement the project's Labour Management Plan, including procedures for recruitment, grievance redress, workplace conduct, and worker accommodation.	Existence and application of LMP			
		Provide job-specific and OHS training for all workers, with extra support for unskilled and first-time workers.	% of workers trained; feedback on training			
		Prepare a worker accommodation plan for non-local workers to ensure compliance with health, safety, and dignity standards.	Availability and standard compliance of accommodation plan			
		Pay equal wages for equal work, regardless of gender or origin, and ensure compliance with national minimum wage laws.	% compliance with minimum wage law; wage parity by gender			
		Establish a worker grievance redress mechanism that is accessible, anonymous, and responsive.	No. of grievances received/resolved within specified time			
		Enforce a code of conduct covering respectful behaviour, anti-harassment, community relations, and prohibition of child/forced labour.	No. of violations of code of conduct reported and resolved within specified time			
		Monitor labour compliance through regular audits and submit monthly labour reports,	Monthly labour audit reports submitted			

Impact Code	Identified Impact	Enhancement / Mitigation Measures	Monitoring Indicator	Monitoring Frequency	Monitoring Institution	Monitoring Cost (USD)
		including gender-disaggregated workforce data and labour incident tracking.				
		Facilitate skill development through on-the-job training, creating a local pool of semi-skilled workers for future maintenance or development activities.	No. of workers trained on job			
6.2.1.2	Creation of New Opportunities for Local Business	Require the contractor to conduct a local supply chain review, identifying businesses in Mangochi District capable of supplying goods and services that are in line with World Bank procurement standards.	Number of local suppliers reviewed and listed	Monthly during construction phase	Supervising Engineer; PCU (Environment and Social Experts); District Labour Office; District Trade Office	20,000.00
		Develop and implement a local procurement plan to prioritise purchasing materials such as cement, aggregates, and groceries from licensed vendors operating within Mangochi and neighbouring districts.	% of contracts awarded to local businesses			
		All materials must be sourced from MRA-registered suppliers. Where local suppliers for essential inputs like sand or gravel are unavailable, the contractor shall obtain written clearance from the Mangochi District Council.	% of materials from MRA vendors or with District Council clearance			
		Enforce timely payment schedules to small businesses, with contractually defined payment terms to ensure cash flow stability.	% of contracts with timely payment			
		Monitor local procurement and services engagement through quarterly reports, disaggregated by business type and geographical origin, to assess and maximise the project's local economic footprint.	% of procurement from Mangochi District			
6.2.1.3	Skills Transfer	Pair all unskilled workers, particularly women and youth, are paired with skilled artisans for on-the-job mentorship and learning.	% of unskilled workers assigned mentors	Monthly during	Supervising Engineer; PCU	Cost included under 6.2.1.1

Impact Code	Identified Impact	Enhancement / Mitigation Measures	Monitoring Indicator	Monitoring Frequency	Monitoring Institution	Monitoring Cost (USD)
		Formalise induction training, toolbox talks, and structured skill development modules under the Labour Management Plan (Annex 5).	Number of formal induction sessions and toolbox talks held	construction phase	(Environment and Social Experts); District Labour Office	
		provide equal access to training for both male and female workers, promoting inclusive workforce development.	% of male/female trained			
		Involve technical colleges or vocational training institutions to certify basic construction skills, enabling long-term employability.	Number of trainees certified by reputable/recognised institution			
		Collaborate with local leaders and VDCs to promote awareness of the skill-building aspects of the project among youth and underrepresented groups.	No. of VDC meetings on skills			
6.2.2	**Construction Phase Negative Impacts**					
6.2.2.1	Physical and Economic Displacement	Implement all compensation and relocation support prior to commencement of construction, in strict compliance with the RAP and World Bank ESS5.	% of PAPs compensated before construction starts	Monthly for entire construction phase	Supervising Engineer; PCU (Environment and Social Experts); District Lands Office	50,000.00
		Provide direct cash or in-kind compensation to PAPs for structures, trees, and crops, in line with the entitlements matrix defined in the RAP, ensuring transparency, fairness, and timely delivery in accordance with the preferences of PAPs.	% of payments disbursed to PAPs by category (land, crops, structures)			
		Complete all agreed compensation payments, including shifting and disturbance allowances, before initiating physical relocation, with verification by the RAP Implementation Committee.	% of relocations with disturbance allowances paid before move			
		Maintain an active Grievance Redress Mechanism (GRM) throughout the	Number of grievances logged/resolved during resettlement			

Impact Code	Identified Impact	Enhancement / Mitigation Measures	Monitoring Indicator	Monitoring Frequency	Monitoring Institution	Monitoring Cost (USD)
		resettlement process to resolve disputes promptly and fairly.				
		provide additional support to vulnerable households, including elderly-headed households, female-headed households, and those with limited income streams.	No. of vulnerable PAPs receiving targeted support			
		Monitor resettlement outcomes through post-displacement audits and feedback from affected communities to verify that livelihoods are restored or improved.	Post-displacement audit results showing % livelihood restoration			
6.2.2.2	Disruption of Access to Properties and Social Services	Develop and implement a Traffic and Access Management Plan in line with Annex 5, including safe pedestrian crossings, detour signage, and access restoration timelines.	Traffic and Access Management Plan approved and implemented	Monthly throughout construction phase	Supervising Engineer; PCU (Environment and Social Experts); District Lands Office	Cost included under 6.2.2.1
		Publicly communicate construction schedules in advance to allow households, traders, and institutions to plan for any temporary disruptions.	No. of public announcements or notices issued in advance			
		Engage community leaders and social services providers to ensure that access to health centres, schools, and religious facilities remains unobstructed throughout the construction period.	Evidence of access maintained (photos, logs) to key services			
		Restore all disrupted access paths post-construction and provides alternative routes during construction, approved by the District Council and Roads Authority.	No. of access routes restored			
		Establish a GRM specifically for services disruption complaints and respond within 5 working days.	No. of GRM cases related to service disruption resolved within 5 days			
6.2.2.3	Risks of Human Trafficking	All workers must be engaged through transparent, direct hiring processes, with contracts provided in the local language.	% of workers with signed contracts in local language	Quarterly throughout	Supervising Engineer; PCU	Cost included under 6.2.1.1

Impact Code	Identified Impact	Enhancement / Mitigation Measures	Monitoring Indicator	Monitoring Frequency	Monitoring Institution	Monitoring Cost (USD)
	and Labour Exploitation	Recruiters and contractors must be vetted and prohibited from charging recruitment fees.	% of recruiters vetted	construction phase	(Environment and Social Experts); Ministry of Labour	
		All staff must sign a Code of Conduct that explicitly prohibits harassment, exploitation, and unethical recruitment.	% of workers signing Code of Conduct			
		Establish anonymous and confidential GRM procedures accessible to workers, with regular toolbox talks on workers' rights.	No. of toolbox talks held; % worker access to GRM			
		Monitor contractors' compliance with labour laws, especially around working hours, leave, and pay, as outlined in the LMP.	% compliance with working hours, leave, and pay standards			
		Facilitate random site inspections by labour inspectors and social welfare officers at least once per month during peak construction, and address any compliance issues within 14 days of inspection reports.	No. of random inspections conducted			
6.2.2.4	Gender-Based Violence and Sexual Exploitation and Abuse (GBV/SEA)	Implement a robust Code of Conduct (CoC) for all workers and supervisors, clearly outlining unacceptable behaviour and consequences.	% of workers signing CoC	Quarterly throughout construction phase	Supervising Engineer; PCU (Environment and Social Experts); Ministry of Labour	45,000.00
		Include GBV/SEA/SH clauses in contractor agreements, requiring proactive training and enforcement.	% of contracts with GBV/SEA clauses enforced			
		Conduct mandatory, ongoing GBV/SEA/SH awareness training for all staff and services providers.	No. of awareness sessions held			
		Establish a confidential, survivor-centred GRM, with referral pathways to District Social Welfare and local support services.	GRM functionality			
		Locate campsites away from sensitive community areas and ensure proper lighting, surveillance, and access control.	No. of campsites with security and lighting measures			

Impact Code	Identified Impact	Enhancement / Mitigation Measures	Monitoring Indicator	Monitoring Frequency	Monitoring Institution	Monitoring Cost (USD)
		Engage Community Policing Forums to monitor and address GBV-related risks during implementation.	Community Policing Forum reports on GBV risk monitoring			
6.2.2.5	Discriminatory Working Conditions	Prioritise employment opportunities for women and individuals with disabilities, ensuring inclusivity and diversity in the workforce.	% of employees who are women or have disabilities	Monthly throughout construction phase	Supervising Engineer; PCU (Environment and Social Experts); Ministry of Labour	12,000.00
		Offer flexible working hours to accommodate the childcare needs of breastfeeding women, thereby supporting their participation in the workforce.	% of women on flexible schedules due to childcare			
		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 analysis records for female candidates			
		Actively encourage the recruitment of female workers for roles equivalent to those of male workers and guarantee equal pay for equal work, regardless of gender.	% of female workers in skilled roles and wage parity reports			
		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.	Availability of amenities and logs of use			
		Strategically locate campsites away from villages to limit the interaction between workers and the community, reducing the potential for harassment and other negative impacts.	Distance of camps from village; observation reports			
		Implement and rigorously monitor a WGRM with clear and accessible channels for reporting and investigating incidents of	GRM usage stats and resolution time for harassment complaints			

Impact Code	Identified Impact	Enhancement / Mitigation Measures	Monitoring Indicator	Monitoring Frequency	Monitoring Institution	Monitoring Cost (USD)
		workplace harassment, ensuring that complaints are handled promptly and fairly.				
6.2.2.6	Social Disruption and Risk of Conflicts between Workers and Local Communities	Establish contractor labour camps before mobilising non-local workers, ensuring proper accommodation, sanitation, and separation from settlements.	Existence of camps prior to mobilisation	Monthly throughout construction phase	Supervising Engineer; PCU (Environment and Social Experts)	12,000.00
		Locate camps at least 500 metres from homes, schools, water bodies, and sensitive sites, and consult communities on siting to avoid conflict.	Camp distances from sensitive sites			
		provide mandatory induction and cultural sensitisation to all workers on local customs, conflict avoidance, and codes of conduct.	Induction training attendance and topics covered			
		Keep comprehensive labour records, including proof of age, identity, and place of origin, to ensure traceability and accountability.	Labour records showing ID, age, and origin			
		Designate a Community Liaison Officer to manage interactions with local leaders, facilitate two-way communication, and address concerns early.	Records of community meetings			
		Clearly demarcate and secure work areas with signage and fencing to prevent unauthorised entry, especially by children and livestock.	Photos of fencing and signage			
		Implement visitor registration and site access controls at all construction sites and camps.	Access logbooks for sites and camps			
		provide on-site canteens and shops within camps to reduce reliance on local markets and prevent pressure on village resources.	Stock and sales logs for camp shops/canteens			
		Prioritise hiring of local unskilled labour (target 70%) to promote shared benefits and improve social integration.	% of unskilled labour hired locally			

Impact Code	Identified Impact	Enhancement / Mitigation Measures	Monitoring Indicator	Monitoring Frequency	Monitoring Institution	Monitoring Cost (USD)
		Accommodate non-local workers in dedicated contractor-managed camps, avoiding housing allowances that may inflate local rent or displace residents.	Accommodation logs and avoidance of rent allowances			
		Apply camp management and worker conduct guidelines consistent with Annex 5, ensuring all camp siting and operations meet GP and WB ESS2/ESS4 requirements.	Compliance reports on Annex 5 and WB ESS standards			
		Conduct monthly community engagement meetings to identify and address any rising grievances related to workers or construction activities.	Community meeting minutes and grievance logs			
6.2.2.7	Exposure of Workers to Occupational Health and Safety Hazards	Develop and implement a OHS Plan covering hazard identification, emergency preparedness, safe equipment use, and risk communication.	OHSP developed and implemented; site-specific risk logs	Monthly throughout construction phase	Supervising Engineer; PCU (Environment and Social Experts); District Labour Office	Cost included under 6.2.1.1
		provide task-specific training and induction to all workers, including toolbox talks, hazard awareness, and rights under Malawi's OHS law and ESS2.	No. of toolbox talks			
		Supply certified PPE (helmets, gloves, harnesses, reflective vests) free of charge and enforce its use through supervision and spot checks.	% of workers using PPE			
		Station qualified medical personnel and first aiders at all sites; maintain stocked first aid kits and referral arrangements with nearby clinics.	No. of clinics/staff on-site			
		Conduct heat stress management through shaded rest areas, hydration schedules, and flexible working hours.	No. of shaded areas			
		Install and inspect certified scaffolding and fall protection systems at all bridge sites before commencement of deck construction,	Inspection records for scaffolding and protection systems			

Impact Code	Identified Impact	Enhancement / Mitigation Measures	Monitoring Indicator	Monitoring Frequency	Monitoring Institution	Monitoring Cost (USD)
		and conduct weekly safety audits to verify structural integrity and usage compliance.				
		Implement and monitor incident reporting and corrective action procedures, with weekly OHS compliance reporting.	Weekly incident and corrective action logs			
		Include OHS measures in all subcontractor contracts and carry out regular site audits.	% subcontractors audited for OHS compliance			
6.2.2.8	Exposure of Nearby Communities to Construction-Related Hazards	Install temporary fencing, signage, and flagmen around active construction zones near settlements or trading centres.	Fencing/signage installed	Monthly throughout construction phase	Supervising Engineer; PCU (Environment and Social Experts); District Labour Office	Cost included under 6.2.1.1
		provide public awareness campaigns before major construction activities, in collaboration with local leaders and radio stations.	No. of campaigns			
		Establish traffic management plans, including speed control, bypass roads, and reflective signs.	Traffic control points installed and active			
		Appoint a Community Liaison Officer to coordinate emergency responses and address public complaints.	community feedback reports			
		Provide safe pedestrian crossings and dedicated footpaths where construction interfaces with populated areas.	No. of pedestrian crossings in use			
		Store fuels and hazardous materials in secured, bunded areas, away from homes, boreholes, and streams.	Storage inspection logs; bunding photos			
		Immediately restore or fence off all open pits, borrow areas, or culverts once inactive or completed.	Completion photos of closed pits/borrow areas			
		Implement progressive rehabilitation of borrow sites during construction, restoring each site within two weeks of material extraction completion to minimise the risk of leaving open pits at project closure.				

Impact Code	Identified Impact	Enhancement / Mitigation Measures	Monitoring Indicator	Monitoring Frequency	Monitoring Institution	Monitoring Cost (USD)
		Monitor ambient air quality, dust, and noise levels and apply controls such as water spraying, silencers, and restricted working hours near schools and health centres.	Dust and Noise levels within allowable threshold			
6.2.2.9	Loss of Trees for Economic Livelihood and Biomass for Energy	Conduct pre-construction tree tagging and valuation at each site, guided by the RAP inventory, distinguishing indigenous, exotic, and fruit trees. RAP will include a livelihood restoration program to address loss of income.	Number of trees cut by species; Number of trees planted; Number of trees replanted	Quarterly throughout construction phase	Supervising Engineer; PCU (Environment and Social Experts); District Forest Office	12,000.00
		Integrate a Tree Removal and Replanting Schedule into the ESMP, with species-specific restoration requirements:				
		Engage community members, especially women and youth groups, in nursery establishment, planting, and maintenance, promoting ownership and income diversification.				
		Install LPG stoves or solar cookers in all contractor camps to eliminate worker-driven firewood demand.				
		Conduct quarterly tree survival audits, with replanting obligations of a ratio of 1:5 in place if survival rates fall below 80% within the first year.				
		Publicly share progress on replanting efforts during stakeholder meetings, demonstrating commitment to natural resource sustainability.				
6.2.2.10	Disturbance and Displacement of Terrestrial Fauna	Restrict vegetation clearance to designated work zones. Avoid disturbing intact habitats at biodiversity hotspots like Unga, Chikosere, and Mbwazi.	Area of vegetation cleared	Quarterly throughout construction phase	Supervising Engineer; PCU (Environment and Social Experts);	Cost included under 6.2.2.9
		Conduct pre-clearance faunal surveys to identify active nests, burrows, or breeding				

Impact Code	Identified Impact	Enhancement / Mitigation Measures	Monitoring Indicator	Monitoring Frequency	Monitoring Institution	Monitoring Cost (USD)
		sites. Temporarily halt work where nesting or breeding activity is observed.			District Forest Office	
		Use manual clearing methods in sensitive areas (riparian zones, thickets, wetlands) to reduce habitat destruction and wildlife injury.				
		Train construction workers in wildlife awareness, including safe handling of reptiles, identification of venomous species, and procedures for relocating non-dangerous animals.				
		Install informational signage and buffer zones around high-density fauna areas (e.g., herpetofauna zones near Mbwazi or amphibian zones at Lilore) to prevent encroachment.				
		Prohibit the use of pesticides or herbicides near bridge sites, especially where amphibians or pollinators are present.				
		Avoid construction near known bird nesting periods (e.g. for weavers or hornbills) and relocate active nests under expert supervision if unavoidable.				
		Design post-construction vegetation restoration to include native, insect-friendly shrubs and grasses that attract pollinators and ground-dwelling species.				
		Use low-noise equipment and limit activities during early morning or night hours, when faunal activity is highest.				
		Maintain riparian buffers and shade vegetation to protect amphibians, reptiles, and aquatic-dependent species from exposure and desiccation.				

Impact Code	Identified Impact	Enhancement / Mitigation Measures	Monitoring Indicator	Monitoring Frequency	Monitoring Institution	Monitoring Cost (USD)
		Prohibit hunting, capture, or killing of any wildlife by workers, and include this in the Code of Conduct.				
		Develop an Aquatic Biodiversity Management Plan to help avoid or minimise direct disturbance to aquatic life.				
		Implement a Wildlife Encounter Protocol, requiring reporting and safe relocation (where appropriate) of fauna found within construction areas.				
6.2.2.11	Disruption of River Hydrology and Floodplain Function	Design and implement stormwater diversion and control structures (e.g. temporary channels, biodegradable sandbags, flow control culverts) to manage flow during active construction, especially at sites with high Q100 values, while always maintaining minimum environmental flow thresholds.	% of sites with functional stormwater diversion structures installed before construction	Monthly throughout construction phase	Supervising Engineer; PCU (Environment and Social Experts)	18,000.00
		Use precast bridge components and modular installation techniques to minimise in-stream works during peak rainfall periods and reduce duration of e-flow disruption.	No. of in-stream activities conducted using precast techniques			
		Deploy on-site rapid response teams and mobile pumps to manage floodwaters and remove sediment from work zones during storms.	No. of rapid response deployments during flood events			
		Install permanent scour protection (e.g. riprap, gabions) at abutments and piers prior to full flow season to prevent erosion.	% of abutments/pier sites with installed scour protection pre-flow season			
		Maintain floodplain connectivity by avoiding embankment blockage and using multi-cell culverts or raised decks in flat catchments.	% of floodplain crossings using raised decks or multi-cell culverts			
		Apply erosion control measures, immediately after land clearing.	No. of erosion control installations after land clearing events			

Impact Code	Identified Impact	Enhancement / Mitigation Measures	Monitoring Indicator	Monitoring Frequency	Monitoring Institution	Monitoring Cost (USD)
		Avoid fuel storage and concrete mixing platforms within 100 metres of any river or stream to protect water quality and groundwater recharge zones.	% of sites with no fuel storage within 100m of water bodies			
		Restore and stabilise disturbed banks with bioengineering techniques (vetiver grass, native shrubs) post-construction.	Length of riverbanks stabilised using bioengineering methods			
		For sites requiring cofferdams, use non-polluting fill materials such as biodegradable/non-polyethylene sandbags, sheet piles, or clean rock, to maintain continuous e-flows downstream during construction.				
		Monitor construction in real time using daily site logs, drone imagery, and river gauge data, and flow meters to verify compliance with agreed e-flow thresholds.	Availability of daily logs, drone data, and river gauge records for active sites			
		xii. Maintain environmental flows (e-flows) for all river bodies crossed by the project, thereby safeguarding downstream ecosystems and livelihoods.				
		Maintain buffer zones around known floodplains and high-flow areas, as identified in the Hydrology Report, and restrict heavy machinery operations during peak flow days.	% of high-flow zones with enforced machinery restrictions			
6.2.2.12	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 5.	% of excavated areas where topsoil was safely stored and protected	Monthly throughout construction phase	Supervising Engineer; PCU (Environment and Social Experts)	12,000.00
		Implement and adhere to mitigation and enhancement measures outlined in the ESMP and further specified in the C-ESMP,	Water quality monitoring results (upstream, abstraction point,			

Impact Code	Identified Impact	Enhancement / Mitigation Measures	Monitoring Indicator	Monitoring Frequency	Monitoring Institution	Monitoring Cost (USD)
		particularly regarding the management of batch plants, bulk material storage, quarries, borrow sites, and equipment maintenance areas.	downstream) within limits for turbidity, pH, conductivity, dissolved oxygen, faecal coliforms, and oil/grease			
		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.	Quarterly laboratory water quality testing reports showing compliance with national standards			
		Restrict the movement of heavy machinery to designated areas to minimise soil compaction and avoid damage to privately owned land.	% of liquid and solid hazardous waste stored, labelled, and disposed of through licensed operators			
6.2.2.13	Water Quality Degradation	Prohibit the placement of temporary facilities (such as construction campsites, storage areas, and fuel storage) within 50 metres of wells and boreholes. Additionally, ban the fuelling, washing, or maintenance of machinery near drains or watercourses to prevent contamination.	Water quality parameters (pH, Turbidity Dissolved Oxygen, BOD, Faecal Coliforms / E. coli) are within allowable limits	Monthly throughout construction phase	Supervising Engineer; PCU (Environment and Social Experts); Independent Laboratory	30,000.00
		Develop and implement a comprehensive Waste Management Plan, as guided by Annex 5, to manage all waste generated during construction. This plan should cover waste identification, classification, and proper disposal methods.				

Impact Code	Identified Impact	Enhancement / Mitigation Measures	Monitoring Indicator	Monitoring Frequency	Monitoring Institution	Monitoring Cost (USD)
		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.				
		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.				
		Develop and implement a stormwater and water management plan, following the guidance provided in Annex 5, to manage water runoff effectively.				
		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				

Impact Code	Identified Impact	Enhancement / Mitigation Measures	Monitoring Indicator	Monitoring Frequency	Monitoring Institution	Monitoring Cost (USD)
		regulatory standards to ensure sustainable water use.				
6.2.2.14	Accidents and incidents 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.	Number of traffic-related accidents reported monthly (including gender-disaggregated injury data); Presence and visibility of traffic signs, barriers, and speed calming structures; % of construction sites with functioning traffic management plans.	Monthly throughout construction phase	Supervising Engineer; PCU (Environment and Social Experts); Independent Laboratory	Cost included under 6.2.2.8
		Develop and implement a Community Health and Safety Plan (CHSP) to protect communities from traffic-related hazards and ensure safe interaction between the public and project activities.				
		Prepare and operationalise an Emergency Preparedness and Response Plan (EPRP) that includes protocols for responding to flooding, traffic accidents, and other emergencies likely to occur during heavy rains and high river flows.				
		Secure all active work areas through hoarding or fencing to prevent unauthorised entry and reduce the risk of accidents involving community members.				
		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.				

Impact Code	Identified Impact	Enhancement / Mitigation Measures	Monitoring Indicator	Monitoring Frequency	Monitoring Institution	Monitoring Cost (USD)
		Secure and signal (with barriers, and warning signs) any houses located close to the construction sites that are not subject to resettlement, to prevent accidental structural damage and to ensure the safety of occupants and passers-by.				
		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 services 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.				
		Prepare an emergency preparedness and response plan, as guided by Annex 5, in coordination with the local community and emergency responders, to provide timely first aid and hazardous materials response in the event of accidents.				
6.2.2.15	Spread of Sexually Transmitted Infections and other Communicable Diseases	Develop an HIV and AIDS prevention and management plan, following the guidance provided in Annex 5, to address the risks associated with STIs and HIV/AIDS.	umber of HIV/STI sensitisation meetings/toolbox talks held per quarter (attendance disaggregated by gender); No. of local and non-local workers accessing Voluntary	Quarterly throughout construction phase	Supervising Engineer; PCU (Environment and Social Experts)	Cost included under 6.2.2.8
		Prioritise the recruitment of 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				

Impact Code	Identified Impact	Enhancement / Mitigation Measures	Monitoring Indicator	Monitoring Frequency	Monitoring Institution	Monitoring Cost (USD)
		educate them on disease transmission, prevention and treatment, in line with Malawi's HIV and AIDS prevention programme.	Counselling and Testing (VCT) services; Number of cases of STIs or malaria reported by health service providers linked to the project.			
		Distribute condoms regularly to minimise the risk of spreading STIs, and HIV and AIDS.				
		Establish a campsite clinic and arrange with local health services provider 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.				
6.2.2.16	Temporary 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.	PM2.5 and PM10 concentrations at sensitive receptors (e.g. schools, homes) remain within national limits; % of construction vehicles and material transport trucks with covered loads; Number of dust complaints logged in GRM and resolved within 5 working days.	Monthly throughout construction phase	Supervising Engineer; PCU (Environment and Social Experts); Independent Laboratory	Cost included under 6.2.2.13
		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				

Impact Code	Identified Impact	Enhancement / Mitigation Measures	Monitoring Indicator	Monitoring Frequency	Monitoring Institution	Monitoring Cost (USD)
		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 to offset emissions generated by construction activities.				
		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.				
6.2.2.17	Temporary Elevation of Noise Levels	Restrict construction activities to daytime hours (07:00 – 17:00) when working near populated areas and apply the same restriction to mong heavy construction vehicles and machinery. If construction must extend beyond these hours, inform local authorities and the affected population in advance.	dB(A) levels recorded at sensitive receptors remain below legal thresholds; Number of working hours extended beyond 17:00 with documented community approval; Number of noise-related	Monthly throughout construction phase	Supervising Engineer; PCU (Environment and Social Experts)	6,000.00
		Conduct regular maintenance of machinery, equipment, and vehicles to minimise noise				

Impact Code	Identified Impact	Enhancement / Mitigation Measures	Monitoring Indicator	Monitoring Frequency	Monitoring Institution	Monitoring Cost (USD)
		levels, ensuring that all machinery adheres to a set maintenance schedule as specified by the contractor.	complaints received and addressed via GRM.			
		Develop and implement a Noise and vibration Control Management Plan, following the guidelines in Annex 5, to mitigate noise impacts throughout the construction process.				
		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.				
6.2.2.18	Risk of Disturbance to Cultural and Historical Heritage	Map and clearly mark all cultural sites of concern (mosques, graveyards, ceremonial areas) on construction planning maps using GPS coordinates validated with local leaders.	% of identified cultural sites with GPS-tagged boundary demarcations and fencing; Number of Chance Finds Protocol activations and incident reports submitted.	Monthly throughout construction phase	Supervising Engineer; PCU (Environment and Social Experts)	Cost included under 6.2.2.8
		Ensure all detours, material storage, borrow pits, and worker camps are sited away from mosques and graveyards, with buffer zones of at least 100 metres where feasible.				
		Conduct pre-construction cultural briefings with Traditional Authorities, village leaders, and religious elders to identify any intangible cultural practices or upcoming ceremonies.				
		Schedule construction activities to avoid disruption during key local events such as Friday prayers, funerals, and initiation seasons.				

Impact Code	Identified Impact	Enhancement / Mitigation Measures	Monitoring Indicator	Monitoring Frequency	Monitoring Institution	Monitoring Cost (USD)
		Install signage and fencing around nearby graveyards or sacred spaces to avoid accidental encroachment.				

Chapter Eight: Institutional Arrangements, Capacity Assessment and Capacity Building Program

This chapter describes the institutional framework and capacity required to implement, supervise, and monitor the Environmental and Social Management and Monitoring Plan (ESMMP). It outlines the roles and responsibilities of implementing parties at national, district, and project levels, including contractors, the Roads Authority, and local government. The chapter presents an assessment of existing capacity to manage environmental and social risks and identifies key gaps in staffing, technical skills, and coordination. Based on this, a targeted capacity-building program is proposed to strengthen environmental and social management systems. Measures include staff training, provision of tools, and support for the establishment or expansion of implementing units, in line with the project's ESMF and World Bank ESF requirements.

8.1 Implementation Arrangement

The successful implementation of this ESIA report depends on a well-coordinated institutional framework that integrates national, district, and project-level actors.

8.1.1 Lead Implementing Agency: Roads Authority (RA)

The Roads Authority, as the Project Proponent, will be responsible for overall environmental and social performance, including compliance with the EMA (2017) AND World Bank's Environmental and Social Standards. In line with the RCRP II ESMF provisions, the RA will establish a dedicated project desk staffed with the following:

- Project Coordinator;
- Environmental Safeguards Specialist;
- Health and Safety Specialist; and
- Social Safeguards Expert.

These personnel will be responsible for overseeing the execution of the ESMMP, coordinating with the Supervision Consultant, and supporting the Contractor to ensure timely and effective implementation of environmental and social mitigation measures. The RA will also be the focal point for reporting to the Project Coordination Unit (PCU) under the Ministry of Finance and Economic Affairs and for preparing quarterly E&S reports to the World Bank.

8.1.2 Supervision Consultant

The Supervision Consultant will play a key role in monitoring field-level implementation of the ESIA. Under the leadership of the Resident Engineer, the supervision team will include a qualified Health and Safety Specialist, Environmental Specialist and a Social Safeguards Specialist. Consistent with ESMF requirements, their responsibilities will include:

- Preparing a monitoring checklist aligned with the ESMMP and tailored to the physical layout of each bridge site;
- Developing a structured monitoring programme that targets construction activities, material sources, sensitive habitats, and community interfaces;

- Convening monthly site meetings involving the Contractor, RA, local authorities, and other stakeholders;
- Preparing monthly environmental and social monitoring reports and submitting them to the RA;
- Verifying Contractor compliance with the C-ESMP, and issuing corrective instructions for any observed non-compliance;
- Supporting environmental incident investigations and reporting, as guided by the ESMF's Incident and Accident Reporting Protocol.
- The Supervision Consultant is also required to ensure that environmental and social provisions are integrated into construction schedules, designs, and payment certifications.

8.1.3 Construction Contractor

The Contractor has primary responsibility for implementing day-to-day mitigation and monitoring measures during construction. In accordance with the Projects ESMF (Contractor Management Procedures), the Contractor shall:

- Mobilise in-house staff that will include as environmental officer, social and gender inclusion officer and the Health and Safety Officer, with experience in ESMP implementation and environmental monitoring C-ESMP based on project realities, which must be submitted to the Resident Engineer for approval before commencement of works;
- Integrate mitigation actions into daily construction planning, including erosion control, material site management, traffic safety, noise suppression, and pollution prevention;
- Procure appropriate environmental monitoring equipment (e.g., for dust, noise, and water quality), or subcontract competent service providers for such services;
- Maintain updated records of non-compliance observations, accidents/incidents, grievances, and corrective actions;
- Submit monthly C-ESMP implementation reports to the Resident Engineer and participate in site inspections and audits.

The Contractor is contractually obligated to adhere to the mitigation hierarchy (avoid, minimise, mitigate, compensate) and ensure that no activity proceeds without prior environmental clearance or permits as required. For all associated facilities not assessed in this ESIA (e.g. borrow pits, access roads, quarries, labour camps, material laydown areas, asphalt plants, etc.) and whose exact locations or footprints are not yet determined, the Project Implementing Unit shall ensure that standalone ESIAs or Environmental and Social Management Plans (ESMPs), are prepared as required by the MEPA and in line with the World Bank's ESF. Where specified in the works contract, the Contractor shall engage qualified experts to develop these instruments, subject to review and approval by the Project Implementing Unit and the relevant authorities before commencement of associated works.

8.1.4 District Authorities and Local Structures

The Mangochi District Council will play a vital support role, particularly through the District Environmental Sub-Committee (DESC). Their responsibilities include:

- Participating in monthly coordination meetings;
- Supporting community-level awareness and feedback collection through Area and Village Development Committees (ADCs and VDCs);
- Monitoring implementation of community-sensitive measures, including grievance redress, public health, and resettlement follow-ups;
- Advising on local environmental and cultural sensitivities, particularly during excavation, vegetation clearance, and material sourcing.

8.1.5 Project Coordination and Reporting Structure

The proposed institutional model ensures a clear chain of accountability, structured monitoring, and timely corrective action. The reporting hierarchy aligns with the ESMF institutional framework and is structured as follows:

- Contractor reports monthly to the Supervising Engineer through the Safeguards Officer;
- Resident Engineer consolidates reports and forwards to the RA Project Desk, flagging any serious incidents for immediate attention;
- RA Project Desk compiles quarterly Environmental and Social Progress Reports for submission to the PCU at the Ministry of Finance and Economic Affairs;
- The PCU, in turn, submits consolidated project-level reporting to the World Bank, in accordance with the Environmental and Social Commitment Plan.

8.2 Capacity Assessment of Key Institutions

The effective implementation of the Environmental and Social Management and Monitoring Plan (ESMMP) depends on the institutional and operational capacity of key stakeholders mentioned in section 8.1. The capacity assessment aimed at identifying capacity gaps that, if left unaddressed, may result in weak enforcement of mitigation measures on-site, and failure to comply with national environmental regulations and World Bank ESS obligations. The capacity gaps identified for each stakeholder are presented in Table 8.1.

Table 8-1: Summary of Institutional Capacity

Institution	Strengths	Key Gaps Identified
Roads Authority (RA)	• Experienced in delivering road infrastructure projects. • Established Environmental Desk within the Planning Directorate. • Has oversight mechanisms for contractor compliance	• Limited number of dedicated safeguards staff for field monitoring • Inadequate logistical support for monitoring missions (e.g., lack of dedicated vehicles, fuel, field allowances, or field kits). • Limited integration of gender and social inclusion into site-level supervision
Supervision Consultant	• Has qualified Resident Engineer and access to	• Delayed mobilisation of Environmental and Social

Institution	Strengths	Key Gaps Identified
	technical experts. • Familiar with construction supervision protocols and World Bank documentation requirements	Experts, often after construction activities have begun • Limited site-level integration of stakeholder feedback and grievance tracking into technical reports
Construction Contractor	• Contractually obligated to implement the C-ESMP- Expected to recruit an in-house Safeguards Officer during mobilisation	• Delayed recruitment and underqualification of safeguards personnel • Lack of awareness and practical knowledge of E&S safeguards, especially ESS1 (assessment and management of risks), ESS2 (labour), and ESS4 (community health and safety) • Inadequate internal monitoring tools and poor documentation of non-compliance, grievances, and near-miss incidents
Mangochi District Council	• Functional District Environmental Sub-Committee (DESC) • Involvement of sector departments such as Forestry, Health, and Lands • Experience with past infrastructure and development projects	• No budget allocation for monitoring of E&S safeguards. • Limited capacity for environmental inspections, incident reporting, and site audits- Gaps in training on World Bank ESF, particularly on stakeholder engagement, GBV/SEA response, and environmental incident management
Village-Level Structures (VDCs/ADCs)	• Trusted community platforms- In-depth understanding of local issues and sensitive areas (e.g., burial sites, traditional forests)	• Not formally integrated into the monitoring or grievance redress system. • Lack of training on environmental protection, social accountability, and construction-related risks

8.3 Capacity Building Program

Effective implementation of this ESIA requires that these identified key institutions, particularly the RA, Supervision Consultant, Construction Contractor, and District Authorities, have the necessary human resources, technical knowledge, and tools. Given the need to build capacity amongst stakeholders proposed measures are shown in Table 8-2. The capacity-building program is designed to:

- Address institutional gaps identified in the capacity assessment;
- Fulfil specific staffing and training obligations outlined in the ESCP;
- Ensure that all implementing actors are adequately equipped to meet environmental and social compliance requirements throughout the project lifecycle;
- Strengthen long-term institutional systems for safeguards management beyond this project.

Table 8-2 Key Capacity Building Measures

Thematic Area	Target Audience	Training Focus	Frequency/Timing
Environmental and Social Risk Management under WB ESF and EMA (2017)	RA PIU, management of Supervision Consultant and Contractors, DESC	Overview of the ESF, ESS1–10, ESMF procedures, screening, ESMP implementation, monitoring, reporting	Within the first month of mobilisation; refresher annually
Occupational Health and Safety (OHS)	Contractor Safeguards Team, Supervising Engineers, RA OHS Officer, District Labour Office	OHS procedures, incident reporting, emergency response, Job Hazard Analysis (JHA), PPE use	Prior to construction; ongoing toolbox talks
SEA/SH Prevention and Response	All site-based workers, Supervisors, VDCs, GBV Focal Points	Code of Conduct, survivor-centred GBV handling, referral pathways, SEA/SH Action Plan enforcement	At mobilisation; quarterly refreshers
Grievance Redress Mechanism (GRM)	Community and District GRM Committees, RA Safeguards Desk, Supervising Engineer and Contractor.	GRM intake, recording and referral procedures, linking with SEA/SH protocols	Prior to construction; every 6 months
Environmental Monitoring Techniques	Contractor Safeguards Officers, Supervision Consultant, RA Safeguards Staff	Monitoring of air, water, noise, soil; use of checklists and reporting templates	Within 1 month of mobilisation
Resettlement and Land-Related Compliance	RA PIU, District Lands Officers, Consultants	RPF and RAP implementation, compensation protocols, land tenure sensitivity, vulnerable groups	As needed before and during RAP rollout
Community Health and Safety	Contractor, RA PIU, Supervisors, District	Managing communicable disease risks, site safety, public	Prior to construction; every 6 months

Thematic Area	Target Audience	Training Focus	Frequency/Timing
	Health Office, Community Facilitators	awareness, emergency preparedness	
Cultural Heritage and Chance Finds	Contractor Supervisors, EDO, Department of Antiquities, Site Workers	Chance finds procedure, buffer zone protection, community notification protocols	Once before excavation starts

8.4 ESMP Estimated Budget

Table 8-3 provides a budget to support the capacity building program.

Table 8-3: Summary of Capacity Building Program Budget

SN	Thematic Area	Potential Cost (USD)
1	Environmental and Social Risk Management under WB ESF and EMA (2017)	30,000.00
2	Occupational Health and Safety (OHS)	40,000.00
3	SEA/SH Prevention and Response	25,000.00
4	Grievance Redress Mechanism (GRM)	25,000.00
5	Environmental Monitoring Techniques	10,000.00
6	Resettlement and Land-Related Compliance	25,000.00
7	Community Health and Safety	15,000.00
8	Cultural Heritage and Chance Finds	12,000.00
	Total Budget	**182,000.00**

Chapter Nine: Conclusion and Recommendations

9.1 Conclusion

The 12 bridges to be rehabilitated along the Chingo-Mkanjira Road project have undergone a thorough Environmental and Social Impact Assessment (ESIA) in alignment with the Environment Management Act (2017), and World Bank ESF. The assessment has identified both significant positive outcomes and potential risks associated with the project. The most notable benefit is the enhanced connectivity it will provide to rural communities in the project area, and fostering economic development. The project is also expected to create up to 300 jobs, prioritizing local employment to reduce unemployment and increase income levels within the project area.

However, the project also poses significant risks, including the displacement of communities, potential impacts on agricultural activities, and disruptions to essential services. To mitigate these, the project must implement a Resettlement Action Plan (RAP) to ensure fair compensation and adequate resettlement of affected persons. Additional concerns include the risk of Trafficking in Persons (TIP) and Gender-Based Violence (GBV), particularly due to the influx of workers. To address these, the Project must prepare and implement Labour Management Plan (LMP) and a Grievance Redress Mechanism (GRM), the guidance for preparation of which has been provided.

The ESIA also highlights the importance of managing occupational health and safety risks, water quality, and maintaining stakeholder engagement. An ESMP has been developed that outlines the specific actions required to mitigate these impacts, along with a monitoring plan to ensure ongoing compliance and effectiveness. These plans include specific measures such as water spraying to control dust, proper storage of hazardous substances to protect water resources, and regular monitoring to ensure compliance with environmental standards. In addition, the Project must develop and implement detailed Health and Safety Management Plan (HSMP), Waste Management Plan, and continuously engage stakeholders in the management of these risks and impacts. The project has considered various alternatives and conducted a thorough analysis of residual impacts, determining that with the proposed mitigation measures, the residual impacts are manageable and within acceptable limits.

In conclusion, the proposed project is deemed environmentally and socially viable, with significant benefits outweighing the risks when managed effectively. It is recommended that the project be approved, contingent upon the successful implementation of the ESMPs, continuous stakeholder engagement, and strict adherence to national legislation and international standards. The responsible parties, including the project developer, contractors, and relevant government agencies, must ensure that all mitigation measures are executed diligently to safeguard environmental and social well-being throughout the project lifecycle.

9.2 Recommendations

To enhance overall sustainability of the proposed development, the developer must:

- Implement all mitigation measures outlined in the ESMP.
- Prepare and implement a RAP and ensure fair compensation and adequate resettlement for all affected persons before construction begins. Regularly monitor and evaluate the RLRP's effectiveness to promptly address any emerging issues.
- Develop and enforce a comprehensive Labour Management Plan (LMP) through strict recruitment protocols, worker code of conduct, and regular TIP and GBV awareness training. Establish a robust Grievance Redress Mechanism (GRM) specifically designed to handle TIP and GBV-related incidents.
- Establish and execute an Occupational Health and Safety (OHS) Plan incorporating regular safety audits, accident prevention strategies, and ensure emergency preparedness. Provide ongoing safety training and ensure all necessary safety equipment is available on-site.
- Implement and monitor environmental protection plans including the Waste Management Plan ensuring regular dust control, and proper handling of hazardous waste. Regularly monitor water quality to prevent contamination from construction activities.
- Maintain continuous stakeholder engagement and communication. This includes regular updates to stakeholders on project progress, construction schedules, and potential disruptions. Actively involve local communities in decision-making processes to ensure their concerns are addressed.
- Establish a robust monitoring and evaluation framework to tack the implementation of the ESMP and other mitigation measures. Regularly assess and adjust these measures to ensure compliance with national and international environmental and social standards.
- Develop and implement a traffic management plan to minimize construction-related disruptions and enhance road safety by implementing pedestrian safety measures and conducting road safety awareness campaigns targeting vulnerable road users.
- Adopt an adaptive management approach aimed at reviewing and updating the ESMP based on monitoring results and stakeholder feedback.
- Secure essential permits and approvals from relevant authorities to ensure project compliance. Additional to the ESIA Certificate from MEPA, obtain approvals for waste disposal and sand mining from the Mangochi District Council, with waste disposal also requiring MEPA's approval. Mining approvals for quarry, gravel, and sand must be obtained from the Department of Mines as per the Mines and Minerals Act, 2018. The project also requires a Workplace Registration Certificate from the Ministry of Labour under the Occupational Safety, Health, and Welfare Act, 1997, and water abstraction approval from the National Water Resources Authority under the Water Resources Act, 2013.

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- National Statistical Office (2022). Malawi Demographic and Health Survey 2022. Zomba, Malawi.

Annex 1: Terms of Reference

Our Reference No: MEPA / 34/ 02/01 /
Your Reference No: .....
Communications should be addressed to:
The Director General

Malawi Environment Protection Authority
P/ Bag 317
Lilongwe 3
Tel: +265 986 184 292/ 882 425 163
Email: information@mepa.mw
Website: www.mepa.mw

Protecting the environment, Protecting life

18th June 2025

The Chief Executive Officer
Roads Authority
Private Bag B346
Lilongwe 3

Dear Sir,

TERMS OF REFERENCE FOR ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE CONSTRUCTION OF TWELVE SELECTED BRIDGES ON CHINGO-MAKANJIRA ROAD (S 129) IN MANGOCHI DISTRICT

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 AUTHORITY

Juwo Sibale, PhD
FOR: DIRECTOR GENERAL

Attd: Terms of Reference for ESIA

TERMS OF REFERENCE FOR ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE CONSTRUCTION OF TWELVE SELECTED BRIDGES ON CHINGO-MAKANJIRA ROAD (S 129) IN MANGOCHI DISTRICT

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).

2. Provide a google satellite image and 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.

3. Describe main activities to be undertaken in the construction of the bridges. Identify the main construction and operation activities of the project including access roads, source of raw materials (quarries and borrow pits for gravel), storm water drainage, diversions, 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 estimated quantity of wastes (both solid and liquid) that will be generated; circularity to waste management i.e. state the means of reducing waste to a minimum by reusing and recycling the wastes, facilities for appropriate disposal of waste that cannot be reused or recycle and estimated costs for the activities.

4. Describe project alternatives especially those which are significantly different from an environment perspective (e.g. location alternatives affecting different ecosystems or construction technology, materials, designs etc.)

5. 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 including climate projections and drainage system (water courses);
   - **Biological Resources**: scope of vegetative resources of the project area including riparian vegetation, extent of terrestrial and aquatic fauna;

- **Climate change**: current climate conditions and trends as well as future climate projections
- **Socio-economic conditions**: demographic trend within and around the project area, main land uses, including current use of the proposed project site, the distance from the nearest settlements/ houses, agriculture and marketing, business activities, basic infrastructure and health situation including description of HIV and AIDS prevalence rates; and gender issues in terms of effects of gender inequalities on the environment and how environment issues affects women, youth and other vulnerable gender categories as well as access to and control over productive resources, decision making, access to information, literacy levels and gender division of labour and;
- **Physical cultural resource:** list the physical cultural resources existing in the project area by type

6. 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, Agriculture Policy, Forestry Act, Water Resources Act, National Water Policy, National Environment Policy, Malawi National Land Policy, Monuments and Relics Act, Public Roads Act, Public Health Act, Occupational Safety, Health and Welfare Act, Malawi Development and Growth Strategy, MBS standards 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

7. Identify, assess and analyze environmental, social and climate change impacts associated with the proposed activities at and around the site, focusing on both the positive and negative impacts. In the analysis distinguish between significant positive and negative impacts, direct and indirect impacts, immediate and long terms impacts, reversible and irreversible and cumulative impacts. Identify and compare alternative scenarios to recommend realistic proposals for design considerations. The impacts should include:
    - **Project location** (e.g. impact on flora and fauna, loss of grazing pastures and other economic activities, impact on cultural site, impact on youth, women and other vulnerable gender categories/ groups);
    - **Project design** (e.g. drainage problem and other physical structures)
    - **Construction works** (e.g. soil erosion, disposal of construction spoils, air quality, water quality, social inclusion, youth, gender, child labour, construction material, physical cultural resources); and
    - **Project operation** (e.g. impacts on soil, risk of water pollution, solid and liquid waste impact (conflict of natural resources use) phases of the project through its projected life.

8. Propose measures to eliminate, reduce or mitigate the identified negative environmental and social impacts and measures to enhance the positive effects. Propose an Environmental and Social Management Plan (ESMP) by which all of the measures prescribed in above, will be carried out. Review capacities of institutions to implement recommended measure and identify support to strengthen capacity needs (human resources, training, technical assistance etc.). In addition, indicate the budget for the recommended mitigation measures, specifications of who will be responsible for these measures and the schedule when these measures would be implemented during will take place during planning, construction, operation and decommissioning of the project. The ESMP should be in a tabular form. The plan should be developed in a participatory manner with the potential beneficiaries.

9. Propose an Environmental and Social Monitoring Plan by which all mitigation measures recommended in Environmental and Social 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 compliance. It should also include measures to ensure meaningful and inclusive community participation in the monitoring

10. Undertake stakeholder consultation to ensure key interested and affected parties are involved in the Environmental and Social Assessment process. Ensure that social inclusion is key in the consultation with the youth, women, and other vulnerable groups. Incorporate their views in the report and indicate a record of consultations in the appendices part of the report. Disintegrate the list of people consulted by gender

11. The preparation, presentation and structure of the ESIA 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.

12. Ensure that the District Commissioner and Environment District Officer (EDO) for Mangochi District Council are adequately consulted on the proposed project

13. 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.

14. Attach the TORs and letter accompanying the TORs in the appendices part of the report

15. Provide the names of the ESIA Team and their respective fields and attach them as annex of the ESIA report. The team should be composed of:

- Civil Engineer
- Environmental Expert
- Social Expert
- Water Expert

16. Printing of ESIA report using Times New Roman, font size 12.

Annex 2: Stakeholder Engagement Report during Preparation of ESIA

This report documents the stakeholder engagement process undertaken between March and June 2025 during the preparation of the ESIA and the RAP for the Project. This report provides an overview of the consultation objectives, methods applied, stakeholders consulted, and the key issues raised by different stakeholder groups. The report also explains how the findings from these consultations were considered in the ESIA and associated project design decisions, including the RAP and the Environmental and Social Management Plan (ESMP). Stakeholder engagement is a critical component of project preparation under both national environmental regulatory frameworks and the World Bank's ESF, specifically ESS10 on Stakeholder Engagement and Information Disclosure.

Given that the Road traverses rural and ecologically sensitive areas and will directly affect communities residing near the 12 selected bridge sites, it was critical to ensure that engagement was inclusive, culturally appropriate, and accessible to all groups, including women, youth, the elderly, persons with disabilities, and other vulnerable categories. Consultations, therefore, involved multiple levels of engagement, district-level meetings with government officials and technical departments, as well as community-level FGDs and KIIs with local leaders and directly affected persons.

The information presented in this report is intended to support the ESIA's goal of promoting environmentally and socially responsible decision-making and to fulfil disclosure requirements under both the Malawi Environment Management Act (2017) and the World Bank ESF. Furthermore, this report contributes to enhancing project transparency, social accountability, and community ownership by documenting the nature and outcomes of consultations held before project appraisal.

A2.1 Objectives of the Report

The primary objective of conducting stakeholder consultations was to ensure that the environmental and social dimensions of the project accurately reflect the views, concerns, and suggestions of affected communities and other relevant stakeholders. The consultations were essential for identifying context-specific risks, shaping appropriate mitigation measures, and securing social licence for the project, particularly in light of the sensitivities around land acquisition, ecosystem disruption, and access to economic and social services along the bridge sites. The specific objectives of this report are to:

- Inform communities along the road corridor about the planned rehabilitation of 12 damaged bridges and associated road works.
- Allow residents, local leaders, and affected persons to raise concerns regarding loss of land, crop damage, and access challenges during construction.
- Capture local knowledge and preferences to guide the alignment of bridge approaches, especially in flood-prone or ecologically sensitive areas.
- Incorporate views on compensation expectations, labour opportunities, and community safety into the RAP and ESMP.

- Identify site-specific concerns of vulnerable groups such as female-headed households, elderly persons, and youth.
- Document how stakeholder feedback influenced the design of mitigation measures and project implementation strategies/
- Demonstrate compliance with the stakeholder engagement requirements of Malawi's Environment Management Act (2017) and the World Bank's ESS10.

A2.2 Methodology

The stakeholder engagement process was designed to ensure inclusive and culturally appropriate consultations with both directly affected communities and relevant institutional stakeholders. The approach was participatory and community-centred, ensuring that the voices of women, youth, the elderly, and other vulnerable groups were meaningfully heard.

A2.2.1 Planning and Preparation

Prior to field consultations, the project team carried out a preparatory phase that involved identifying key stakeholders at both district and community levels. This included stakeholders living within the 500-metre radius of each bridge site as well as institutional actors with mandates related to land, environment, and community development. Coordination at the district level was led through collaboration with the Environmental District Office and the District Community Development Office. These departments played a key role in mobilising technical officers, convening the District Environment Sub-Committee (DESC), and advising on culturally sensitive entry points into the community. At the community level, mobilisation efforts were coordinated through GVHs and their respective VDC chairpersons.

To support clear and visual communication with communities, large-format A3 paper printouts of the proposed bridge designs and map overlays were used. These maps depicted bridge locations, approach road limits, land demarcations, and sensitive environmental features. The visual aids helped communities better understand the nature, footprint, and implications of the project works. The team also developed structured discussion guides, consultation logs, attendance registers, and consent protocols for use during all engagements.

A2.2.2 Consultation Techniques Used

A variety of engagement methods were employed to gather feedback across the project area.

A2.2.2.1 District-Level Consultations

On 27 March 2025, a formal consultation meeting was held at the Mangochi District Council with members of the DESC. Participants included technical officers from the Departments of Lands, Forestry, Agriculture, Water, Health, Community Development, and Gender, among others. The purpose of the meeting was to present the bridge designs, discuss anticipated environmental and social risks, and validate the stakeholder engagement strategy. From 28 March to 5 April 2025, follow-up key informant interviews were conducted with selected district officers to obtain department-specific insights, especially regarding land issues, environmental permits, gender inclusion, and service delivery coordination.

A2.2.2.2 Community-Level FGDs

Between 31 March and 12 April 2025, a total of 33 FGDs were conducted in villages surrounding the twelve bridge sites. Each site had three separate sessions: one with men, one with women, and one with youth or local leadership groups. The FGDs allowed community members to discuss the project in a familiar setting and express their views in a language and format they were comfortable with. In total, 265 people participated in the FGDs, comprising 100 adult males, 75 adult females, 84 local chiefs and 55 youths. These figures are consistent with Table 1-4 presented in Chapter 1 of the ESIA report.

Topics covered during the FGDs included concerns about compensation for land and crops, possible displacement, environmental changes, safety during construction, access to employment, and the need for clear communication throughout project implementation. Participants also raised suggestions for minimising disruptions during the construction period and ensuring women and youth were included in project benefits.

A2.2.2.3 Key Informant Interviews (KIIs)

Semi-structured interviews were held with GVHs, religious leaders, and government extension workers. These interviews provided deeper insight into community structures, governance dynamics, informal communication networks, and local concerns that may not be captured in group settings. Religious leaders provided culturally rooted perspectives on community values, while extension workers contributed their understanding of seasonal livelihood patterns, mobility trends, and community vulnerabilities.

A2.2.2.4 Household-Level Interactions

Households located near the proposed bridge footprints and approach roads were visited as part of the RAP process. During these one-on-one interactions, household heads provided information on asset ownership, land boundaries, and personal or family vulnerabilities. These visits also helped clarify earlier FGD feedback and verify the presence of elderly, disabled, or female-headed households who may require targeted support.

A2.2.2.5 Inclusion of Vulnerable Groups

Specific measures were implemented to ensure inclusive participation of vulnerable and marginalised groups throughout the consultation process. These included:

- Sessions were held in the mornings from 09:00 to 11:30hrs and in the afternoons from 13:30 to 16:00hrs, avoiding hours of peak household or farming activity.
- All FGDs and community meetings were held in known public spaces such as village meeting grounds, churches, or under shade trees regularly used by communities for VDC meetings.
- Conducting separate sessions for men, women, and youth to ensure participants could speak freely.
- Encouraging VDCs to personally identify households or individuals considered vulnerable (e.g., widows, elderly persons, people with disabilities) so they could be included either in group sessions or follow-up household visits.

- Translating all technical content into Chichewa to enhance comprehension and engagement, especially for women and elderly participants.

A2.3 Stakeholder Identification

Stakeholder identification was conducted as a foundational step in the preparation of the ESIA and RAP to ensure that all individuals, groups, and institutions who may be affected by or have an interest in the Project were appropriately consulted. The identification process was guided by the Stakeholder Engagement Plan (SEP) developed under the RCRP-2. It involved mapping both affected and interested stakeholders using spatial proximity, institutional relevance, livelihood dependence, and vulnerability considerations. The process also drew upon local knowledge from District Council officers, Traditional Authorities, and Village Development Committees. Table below presents the identified and consulted stakeholders.

Stakeholder Identification Matrix

Stakeholder Group	Sub-Group / Category	Description / Relevance to Project
Affected Stakeholders	Local residents near 12 bridge sites	May experience construction-related impacts such as noise, dust, vibration, and restricted access
	Project-Affected Persons (PAPs)	Have land, crops, or structures affected by 200 m approach roads; subject to compensation/resettlement
	Women and female-headed households	May face greater livelihood impacts, caregiving burdens, or exclusion from decision-making
	Youth and children	Use road corridors for school access, bicycle transport, and social activities
	Elderly persons and persons with disabilities	Face mobility challenges and may be more vulnerable to disruptions during construction
	Local farmers and vendors	Depend on riverbanks, road access, or nearby land for income and food production
Other Interested Parties	Traditional Authorities (TAs), GVHs, VDCs	Mobilise communities, oversee local land matters, support grievance redress
	Mangochi District Council and DESC members	Provide sector-specific oversight (lands, water, forestry, gender, health, environment, social issues)
	Religious leaders	Influence local opinion, promote peaceful engagement and equity
	Government extension workers	Provide local knowledge on land use, farming, social welfare, and natural resources
	NGOs and CBOs	Support development, gender inclusion, health, livelihoods, and environment
	Regulatory and implementing institutions (RA, MEPA, ministries)	Oversight of planning, permitting, safeguards compliance, and implementation
Vulnerable and Marginalised Groups	Female-headed households	Often lack secure tenure, support, and voice in decision-making
	Persons with disabilities	May be excluded from public meetings or face difficulty accessing project benefits
	Elderly-headed households	May require special assistance for relocation or consultation
	Extremely poor households	At risk of exclusion from compensation processes or livelihood restoration
	Youth-headed or unemployed youth	May lack opportunities but expect local employment and inclusion

A2.4 Summary of Consultation Activities

Consultations were conducted at both district and community levels to gather views from stakeholders on the potential impacts of the project. These engagements took place between March and June 2025 and targeted directly affected persons, local leaders, service providers, and technical departments.

A combination of Focus Group Discussions (FGDs), key informant interviews, and institutional meetings was used. At the community level, a total of 33 FGDs were conducted across the 12 bridge sites, involving 265 participants disaggregated by gender and role (men, women, chiefs, youth leaders). District-level consultations involved members of the District Environment Sub-Committee (DESC) and relevant sector officers.

Key Themes from Community-Level Consultations

Category	Key Issues Raised by Communities	Common Recommendations from Participants
Employment	Strong expectation that local people will be prioritised for unskilled labour. Concerns that external workers will take jobs meant for local youth and adults.	Contractors should recruit from within the surrounding communities and provide equal opportunities for both men and women. Skilled youths should be considered where applicable.
Compensation	Uncertainty about compensation boundaries. PAPs reported inconsistent messages on compensation for crops, trees, and bare land. Some feared exclusion from RAP lists.	Clarify compensation boundaries, involve local leaders in verification, and ensure timely and transparent payments. Compensation should cover land, crops, and structures.
Access and Mobility	Fear of restricted movement during construction, especially across river crossings and to health centres, markets, or schools.	Ensure alternative footbridges or crossings are provided. Work should be phased to avoid complete disruption. Communities should be notified of construction schedules.
Safety and Health	Concerns about accidents involving children, increased dust, and potential spread of diseases (HIV/AIDS, STIs) due to influx of workers.	Raise awareness on construction site safety. Fence off dangerous work areas. Implement health campaigns on HIV/AIDS and STIs in coordination with health and social welfare offices.
Gender Issues	Women highlighted exclusion from decision-making and job opportunities. Concerns were raised about the safety of women near work camps and risk of GBV.	Ensure women participate in decision-making. Prioritise female-headed households for support and labour inclusion. Sensitise workers and communities on gender-based violence.
Environmental Concerns	Concerns over tree cutting, river pollution from machinery, oil spills, and erosion of riverbanks.	Use best practices in erosion control, avoid excessive vegetation clearance, and provide tree replacement or restoration programmes post-construction.
Business and Livelihoods	Fear that road and bridge works will disrupt farming, sand mining, or informal trade.	Avoid construction during peak farming seasons. Allow continued access to key economic zones. Provide fair compensation for temporary business loss.

In addition to common themes, several site-specific issues emerged, reflecting localised conditions, land uses, and stakeholder expectations. Below is a summary of key points raised at selected bridge sites:

- **Lulwe:** Community welcomed the project but requested clarification on approach road limits to avoid affecting farmlands unnecessarily. Called for prioritisation of local youth in hiring.
- **Lutende:** Raised concerns over delayed compensation and inconsistent information. Emphasised the need for regular updates on the project timeline.
- **Mitawa:** Discussions focused on the need for transparent relocation processes and local involvement in resettlement decisions. Community worried about losing access to land and water.
- **Lulumba & Malui:** Communities feared increased exposure to diseases due to migrant workers. Youth leaders called for protection of local jobs and implementation of social safeguards.
- **Chimbende, Kaloya, and Kwitanda:** Participants stressed the need for footbridges during construction to avoid isolation. Traders requested that road diversions not affect market access.
- **Lilore:** Community requested culverts and proper drainage in addition to bridge works to reduce flood risks during heavy rains.

District technical officers and DESC members raised the sector-specific concerns and guidance that are provided in Table below.

Department	Key Concerns / Inputs	Recommendations
Environmental Affairs	Dust, water pollution, oil spills, and degradation of riverbanks	Use sediment controls, regular water quality monitoring, and riverbank protection measures
Social Welfare & Gender	Potential GBV, child marriage, and exclusion of women from project benefits	Implement GBV action plans; sensitise workers and communities; promote equitable employment
Community Development	Importance of involving local structures in decision-making	Strengthen role of VDCs and GVHs in verifying PAPs and selecting community liaison representatives
Forestry	Risks of deforestation and unsustainable land use	Integrate reforestation plans; support community-led tree planting
Disaster Risk Management	Need for flood-resilient infrastructure due to past damage from Cyclone Freddy	Use climate-resilient bridge designs; ensure strong foundations and elevated structures
Labour and Planning	Occupational safety, job quality, and the need for on-site supervision	Enforce OHS measures; recruit locally; provide on-site orientation and clear signage for workers and visitors

A2.5 How Stakeholder Views Were Addressed

Stakeholder input collected during the preparation of the ESIA and RAP was instrumental in informing project design, shaping mitigation measures, and developing sub-management plans. The feedback provided by affected communities and district stakeholders was carefully reviewed, categorised, and integrated into the ESIA, RAP, and associated instruments such as the Labour Management Procedures (LMP), Environmental and Social Management Plan (ESMP), and Grievance Redress Mechanism (GRM). The table below summarises key issues raised during consultations and the corresponding project responses. Overall, stakeholder contributions have strengthened the project by enhancing its social acceptability, reducing

potential conflict, and ensuring that risks are proactively managed through inclusive, responsive, and transparent processes.

Stakeholder Concern	Project Response / Integration Measure	Reference in ESIA
Risk of exclusion from compensation and confusion about boundaries	The Roads Authority and RAP team initiated a verification process involving District Lands Office and GVHs to harmonise boundary demarcations and ensure fair identification of PAPs. Clear communication on land take limits (200 m total for bridge approaches) was provided.	ESIA Section 1.9.2.1
Demand for local employment opportunities	The Labour Management Procedures require contractors to prioritise local workers (both skilled and unskilled), including youth and women. Gender targets have been included in the ESMP, and provisions were made to prevent labour importation where local capacity exists.	ESIA Section 2.6; LMP Annex in RAP
Concerns over relocation and temporary displacement	PAPs requiring relocation are covered under the RAP. Transitional support and livelihood restoration measures have been designed in consultation with affected households. Vulnerable PAPs will receive additional assistance.	RAP Sections 5.1 & 6.3
Lack of clarity on construction schedule and its impact on access	The ESMP requires the contractor to provide advance notice before construction begins, with work phased to maintain access to schools, markets, and health centres. Temporary crossings or culverts will be installed where needed.	ESIA Section 2.3.2; ESMP Annex 5
Safety risks to children, elderly, and road users during construction	Safety measures have been embedded into the Traffic and Road Safety Management Plan, including signage, fencing of hazardous zones, speed control near villages, and child protection awareness for workers and communities.	ESMP – Traffic Safety Management Plan (Annex 7)
Fears of gender-based violence and spread of HIV/STIs	A standalone GBV Action Plan and community health awareness component are included in the ESMP. Sensitisation campaigns and coordination with the District Social Welfare Office will be implemented. A code of conduct for workers will be enforced.	ESIA Section 6.4; GBV Action Plan (Annex 6)
Environmental concerns including vegetation clearance and river pollution	The ESMP integrates erosion control measures, waste management protocols, and reforestation plans. Contractors are required to minimise vegetation clearance and protect riparian buffers.	ESIA Section 7.1.1; ESMP (Annex 5)
Exclusion of vulnerable groups in decision-making	Consultations were disaggregated to capture the views of vulnerable groups, including female-headed households, elderly persons, and persons with disabilities. The GRM and stakeholder engagement process were designed to remain inclusive during implementation.	ESIA Section 1.9.2.1; GRM Annex 4
Demand for associated facilities like culverts or drainage improvements	Feedback led to inclusion of drainage enhancements, culverts, and site-specific stormwater controls in the engineering design and ESMP.	ESIA Section 2.2.1; ESMP Annex 5

A2.6 Conclusion

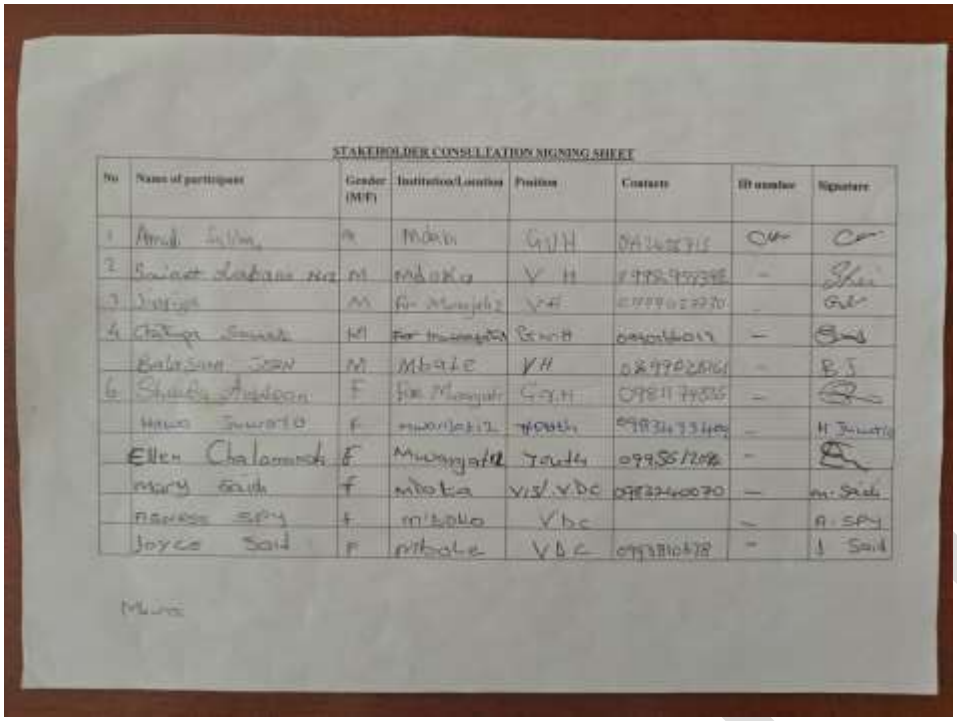
The stakeholder engagement process conducted for the Project was essential in ensuring that the perspectives, knowledge, and concerns of affected communities and other stakeholders were captured and meaningfully integrated into the design and planning of the project.

Consultations were held at both community and district levels, employing participatory and inclusive approaches to reach a wide range of stakeholders, including vulnerable and marginalised groups. The issues raised by stakeholders, ranging from land access, compensation, employment, health and safety, to environmental concerns, have been carefully reviewed and addressed through project design modifications, mitigation measures in the Environmental and Social Management Plan (ESMP), and commitments outlined in the Resettlement Action Plan (RAP). Sub-management plans such as the Labour Management Procedures (LMP), Grievance Redress Mechanism (GRM), and GBV Action Plan were also informed by these consultations. Stakeholder engagement will continue throughout the construction and operational phases of the project to ensure that concerns are addressed promptly and that the community remains actively involved in monitoring, grievance resolution, and benefit-sharing processes.

Annex 3: Evidence of Stakeholder Engagement

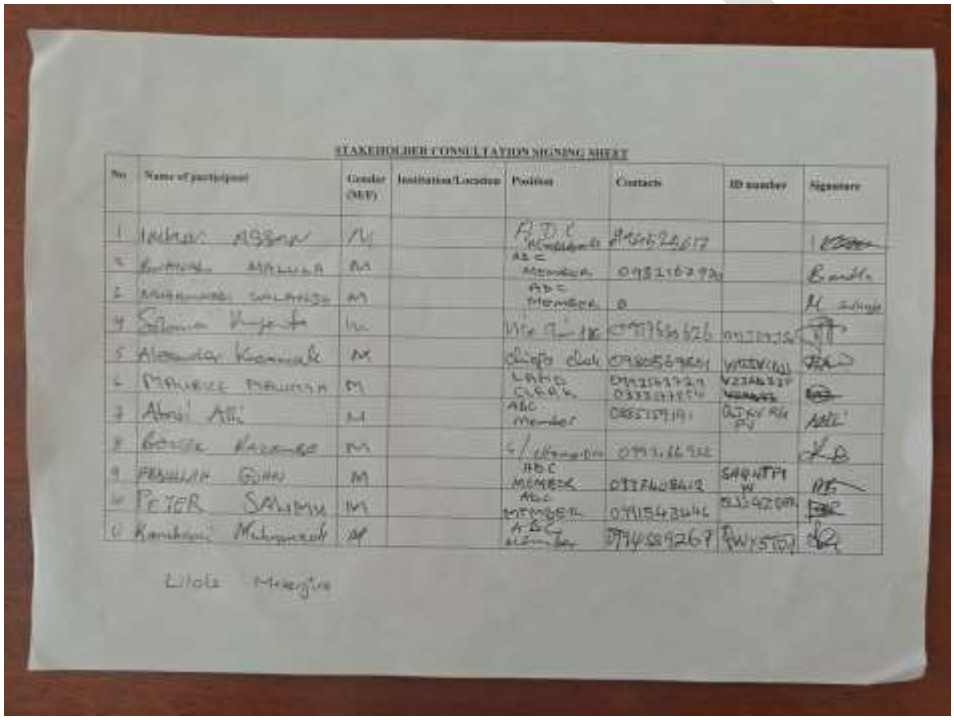
A3.1 DESC Meeting Signatures

A3.2 Community Stakeholders Signatures



STAKEHOLDER CONSULTATION SIGNING SHEET

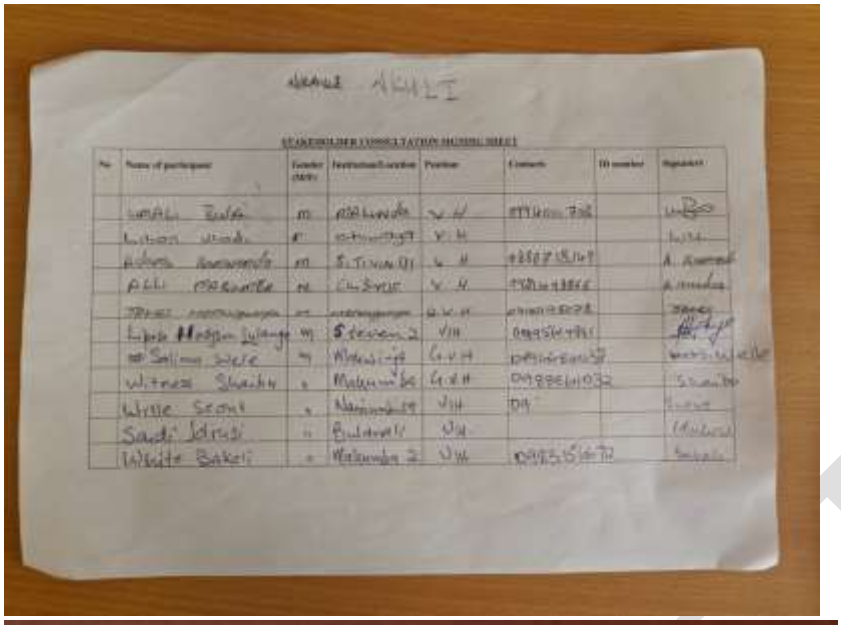
No	Name of participant	Gender (M/F)	Institution/Location	Position	Contacts	ID number	Signature
1	[illegible]	M	Mbale	GVH	[illegible]	[illegible]	[illegible]
2	[illegible]	M	Mbale	V H	[illegible]	-	[illegible]
3	[illegible]	M	Bu-Mwiji	V-H	[illegible]	-	[illegible]
4	[illegible]	M	[illegible]	G.V.H	[illegible]	-	[illegible]
	[illegible]	M	Mbale	VH	[illegible]	-	[illegible]
6	[illegible]	F	Bu Mwiji	G.V.H	[illegible]	-	[illegible]
	[illegible]	F	[illegible]	[illegible]	[illegible]	-	[illegible]
	Ellen Chalomark	F	Mwiji	Youth	0995[illegible]	-	[illegible]
	Mary [illegible]	F	Mbale	V/S/VDC	[illegible]	-	[illegible]
	[illegible]	F	M'bale	VDC		-	[illegible]
	Joyce Said	F	Mbale	VDC	[illegible]	-	[illegible]



STAKEHOLDER CONSULTATION SIGNING SHEET

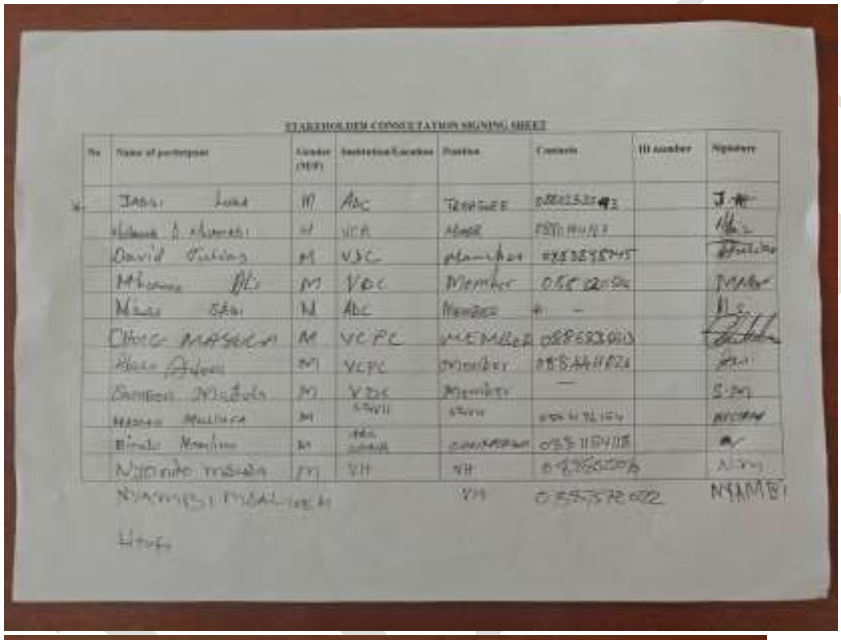
No	Name of participant	Gender (M/F)	Institution/Location	Position	Contacts	ID number	Signature
1	[illegible]	M		A.D.C Member	[illegible]		[illegible]
2	[illegible]	M		ADC Member	0[illegible]		[illegible]
3	[illegible]	M		ADC Member	0		[illegible]
4	[illegible]	M		Wife 1st	[illegible]	[illegible]	[illegible]
5	[illegible]	M		Chief's clerk	[illegible]	[illegible]	[illegible]
6	[illegible]	M		LAND CLERK	[illegible]	[illegible]	[illegible]
7	[illegible]	M		ADC Member	[illegible]	[illegible]	[illegible]
8	[illegible]	M		C/Woman	[illegible]		[illegible]
9	[illegible]	M		ADC MEMBER	[illegible]	[illegible]	[illegible]
10	[illegible]	M		ADC MEMBER	[illegible]	[illegible]	[illegible]
11	[illegible]	M		ADC	[illegible]	[illegible]	[illegible]

[illegible]



STAKEHOLDER CONSULTATION SIGNING SHEET

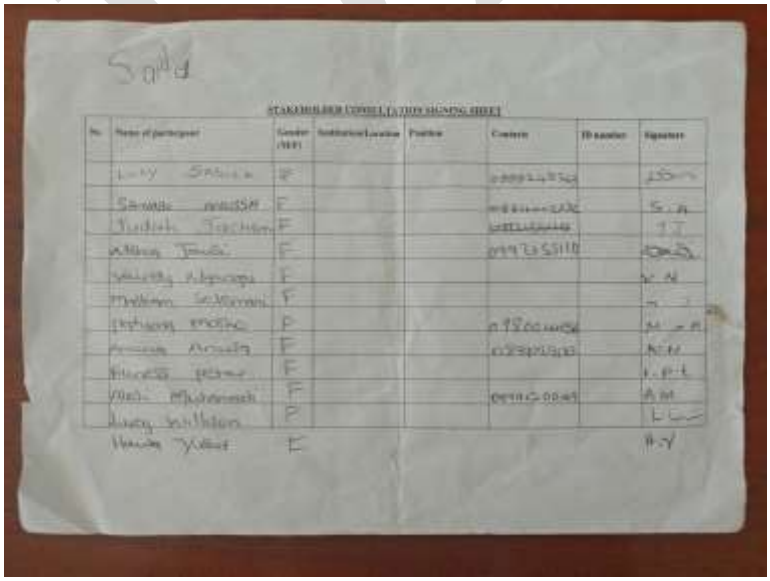
No	Name of participant	Gender (M/F)	Institution/Location	Position	Contacts	ID number	Signature
	UMAR Bala	M	ABAlanda	V.H	0711600 738		
	Lilian Wade	F	Ombaya	V. H			
	Abdul Ramadhan	M	S. Tiwa Q1	V. H	+255715		
	ALI Mohamed	M	Ch Sayid	V. H	0784		
	Lipoli Hodgson Lwanga	M	Steven 2	V/H	0995		
	Salma were	F	Mbwa'ifa	C.V.H	0		
	Witness Shaikh	F	Makumba	C.V.H	0788		
	Wise Seoni	F	Nambole	V/H	0		
	Saadi Idrisi	M	Bukoto II	V/H			
	Wakiite Bakiri	F	Nakawa 2	V/H	0775		



STAKEHOLDER CONSULTATION SIGNING SHEET

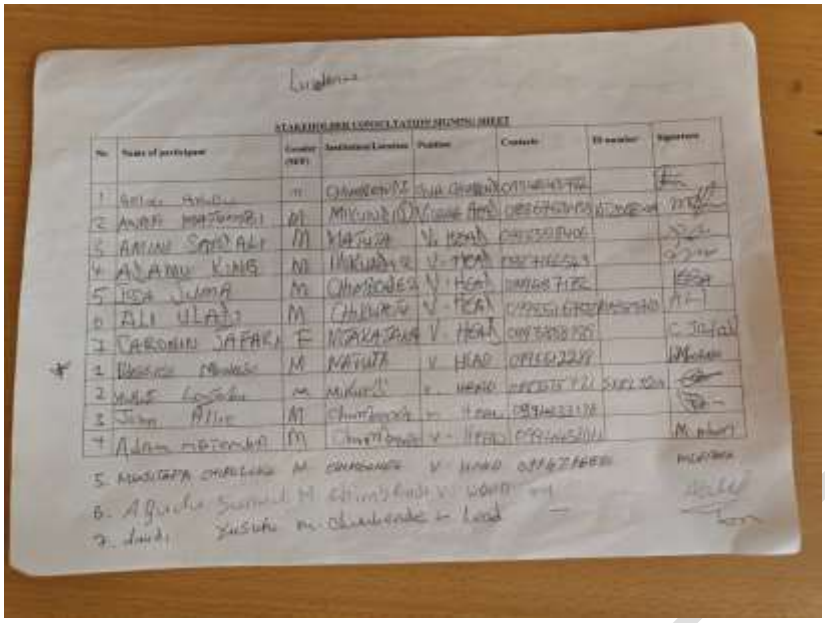
No	Name of participant	Gender (M/F)	Institution/Location	Position	Contacts	ID number	Signature
	JABAI Luka	M	ABC	TREASURE	0		
	Hamza A Ahmadi	M	VCA	ADMIN	0		
	David Ouma	M	VSC	member	+25		
	Mbowa Ali	M	VDC	Member	0		
	Mizzi Sali	M	ABC	Member	0		
	CHRIS MASEKA	M	VCPC	MEMBER	0		
	Alex Ajoni	M	VCPC	Member	0		
	Samson Mutebi	M	VDC	Member			
	Hamza Mulindwa	M	[illegible]	[illegible]	0		
	Bindu Nsalim	M	[illegible]	CHAIRMAN	0		
	Nyonyo Nsiima	F	VH	VH	0		
	Nyamugisi Mbalwetu			V/H	0		NSIMBI

Hon.



STAKEHOLDER CONSULTATION SIGNING SHEET

No.	Name of participant	Gender (M/F)	Institution/Location	Position	Contacts	ID number	Signature
	Lucy Sabiiti	F			0		
	Sarah Nassali	F			0		
	Judith Tushemereirwe	F			0		
	Mbabazi Jane	F			0		
	Velicity Akpogo	F					
	Mariam Sekimpi	F					
	Esther Mpabulo	F			0		
	Proscovia Nanteza	F			0		
	Rhoda Peace	F					
	Mrs. Mukasa	F			0		
	Lucy Nabbosa	F					
	Hawa Nakat	F					



STAKEHOLDER CONSULTATION SIGNING SHEET

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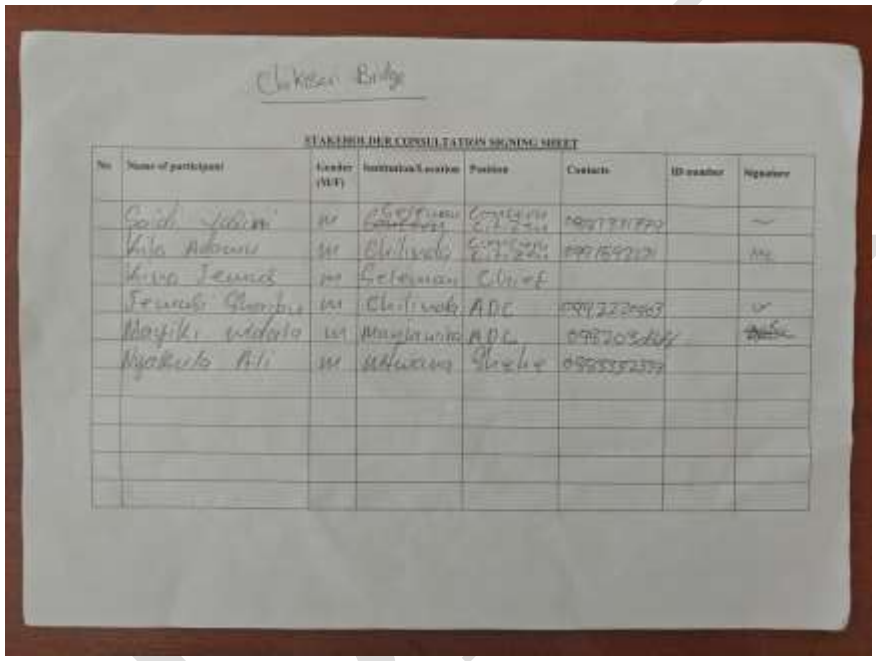

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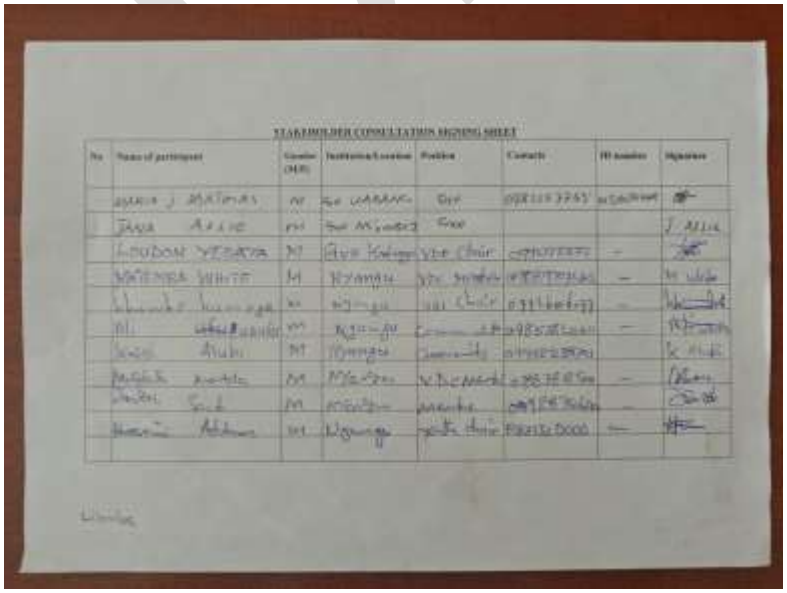

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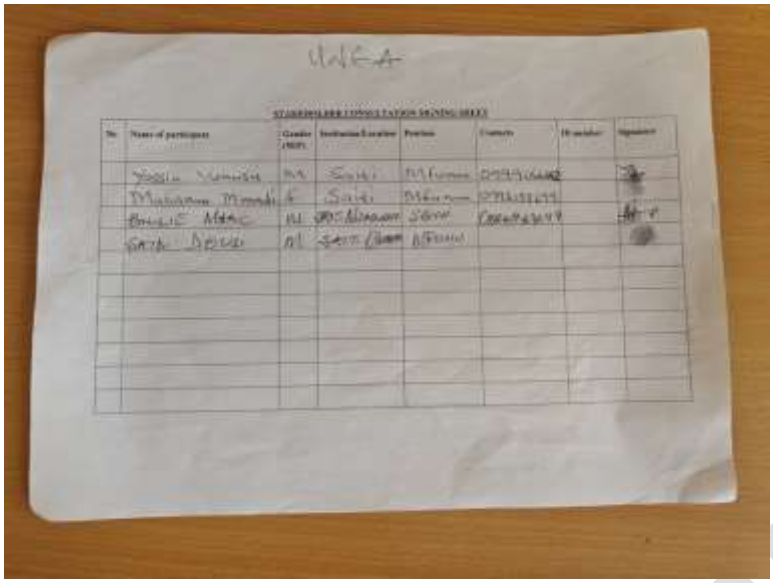
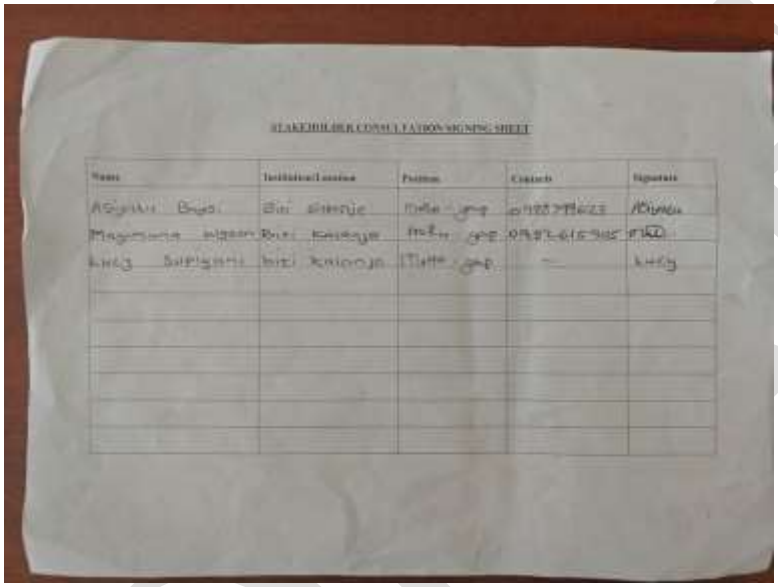


UNEA

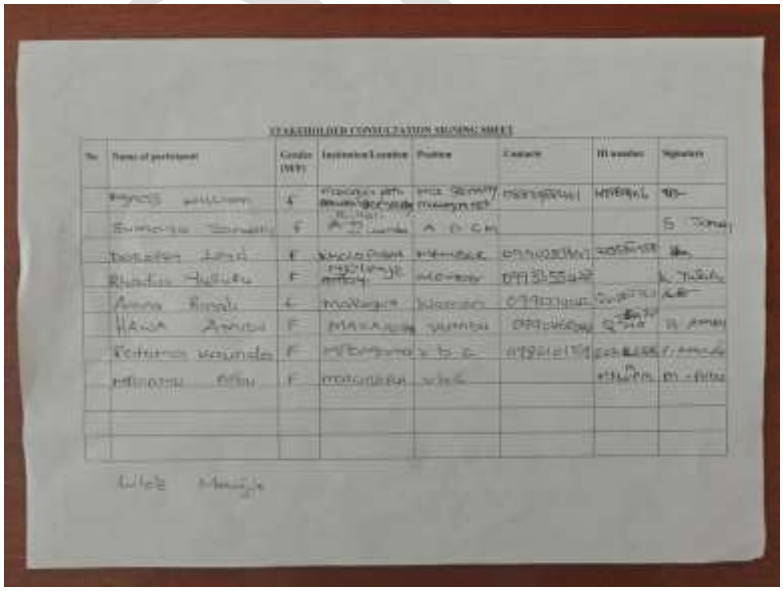
STAKEHOLDER CONSULTATION SIGNING SHEET

No	Name of participant	Gender (M/F)	Institution/Location	Position	Contacts	ID number	Signature
	Yassin Yunus	M	Soroti	Mwuma	0779704482		
	Mawanda Mmadi	M	Soroti	Mwuma	0776331279		
	Angie Mac	M	[illegible]	Sdw	0784763479		
	Sara Dewi	M	[illegible]	Afwuu			



STAKEHOLDER CONSULTATION SIGNING SHEET

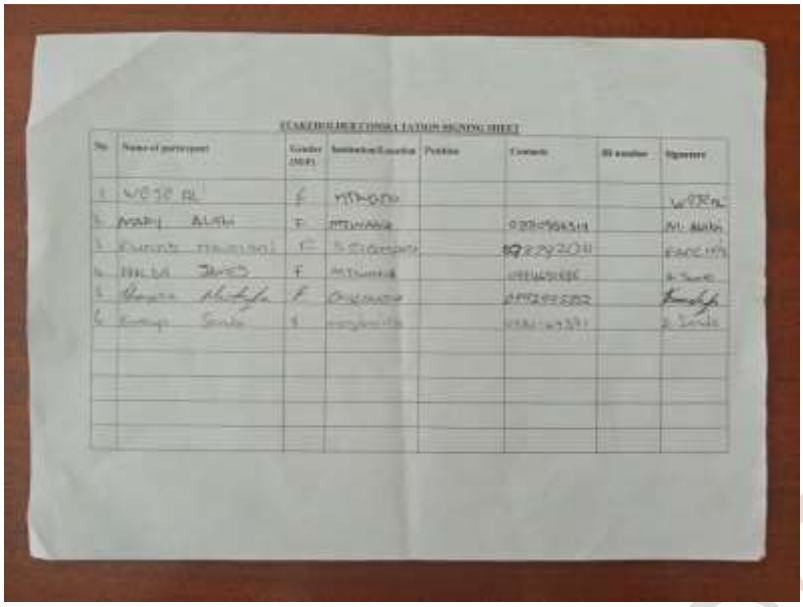
Name	Institution/Location	Position	Contacts	Signature
Agiru Bua	Bii Kamuje	Male gap	0788778622	Abuwa
Magoma Nigam	Bii Kamuje	Male gap	0787616965	Nigam
Lucy Sufigmi	Bii Kamuje	Male gap	—	Lucy



STAKEHOLDER CONSULTATION SIGNING SHEET

No	Name of participant	Gender (M/F)	Institution/Location	Position	Contacts	ID number	Signature
	Bigirs William	M	[illegible]	[illegible]	[illegible]	[illegible]	
	Sumaya Sowali	F	[illegible]	A D C M			
	Bekalen Lizi	F	[illegible]	Member	0776083847	[illegible]	
	Rhoda Tulutu	F	[illegible]	Member	0783555432		
	Anna Rosa	F	[illegible]	[illegible]	0776[illegible]		
	Hawa Annu	F	[illegible]	[illegible]	0776[illegible]		
	Kotuma Maunda	F	[illegible]	[illegible]	0782[illegible]		
	Mbinamu Mbu	F	[illegible]	[illegible]		[illegible]	

Wide Mwuja



STAKEHOLDER CONSULTATION SIGNING SHEET

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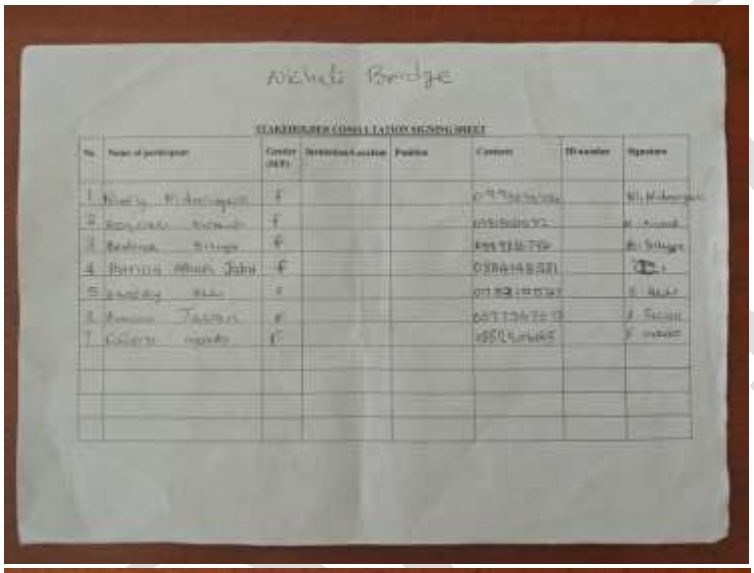

Nichole Bridge

STAKEHOLDER CONSULTATION SIGNING SHEET

No	Name of participant	Gender (M/F)	Institution/Location	Position	Contacts	ID number	Signature
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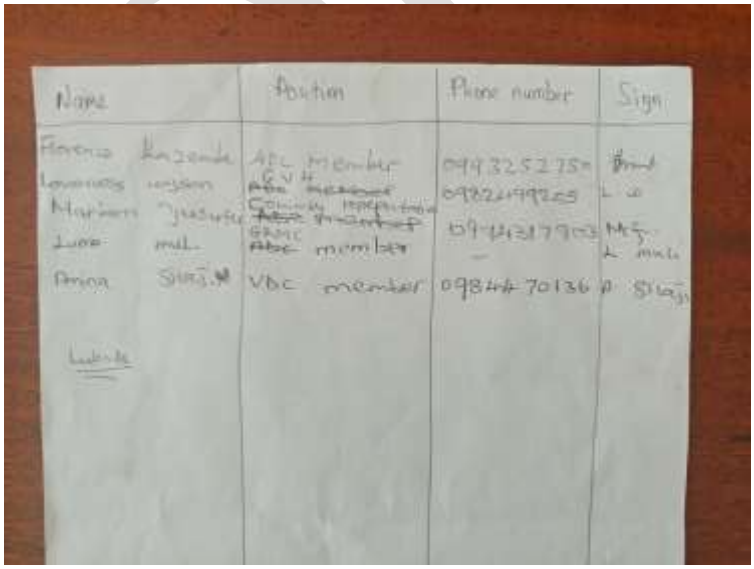
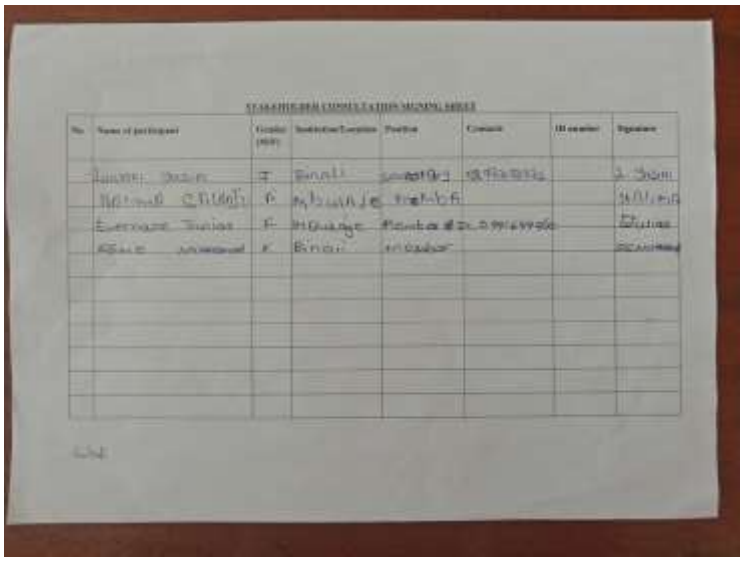


Name	Position	Phone number	Sign
Florence Kazembe	APC member	0993252754	
Lovemore Mwalwa	~~APC member~~ G V H	0992249955	
Mariam Yusuf	~~APC member~~ Comm. representative	0994317703	
Lucy mil.	~~APC~~ GENDC member		
Amos Simon	VDC member	0984470136	

Lubrik



STAKEHOLDER CONSULTATION SIGNING SHEET

No	Name of participant	Gender (M/F)	Institution/Location	Position	Contacts	ID number	Signature

STAKEHOLDER CONSULTATION SIGNING SHEET

No	Name of participant	Gender (M/F)	Institution/Location	Position	Contacts	ID number	Signature
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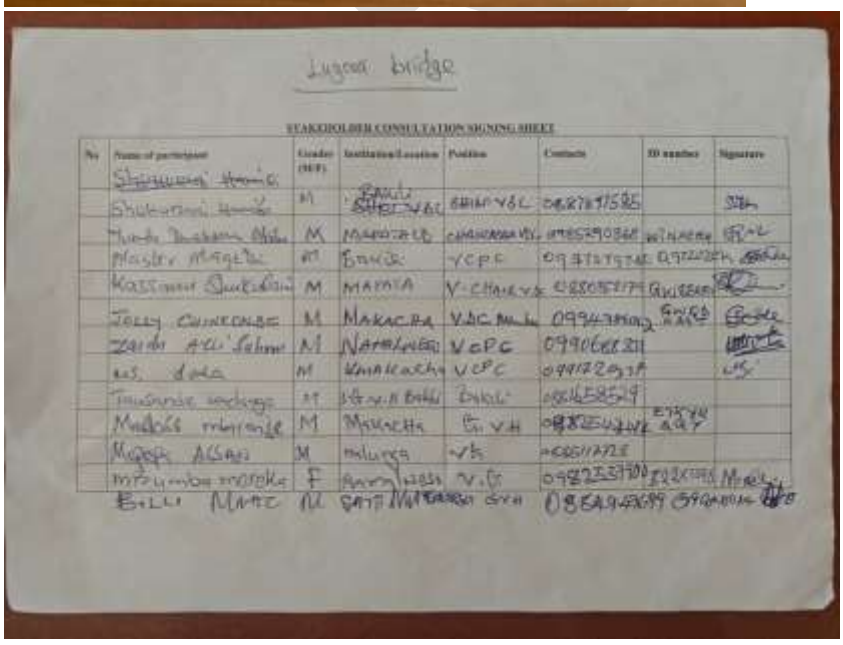


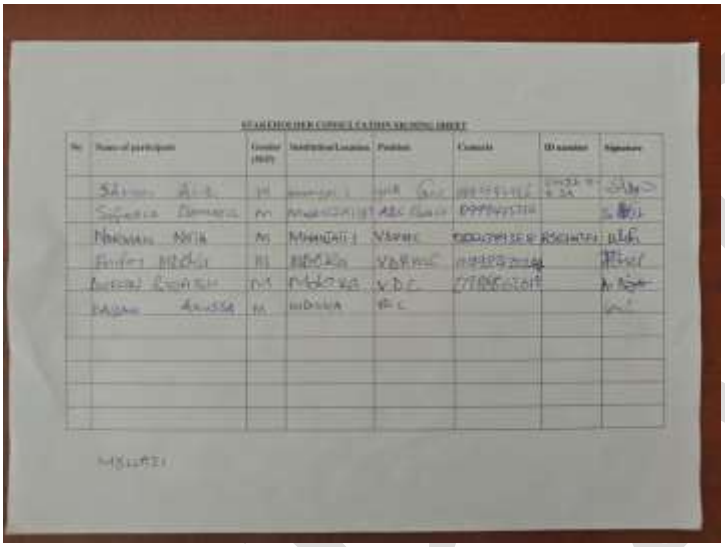
Lugoba bridge

STAKEHOLDER CONSULTATION SIGNING SHEET

No	Name of participant	Gender (M/F)	Institution/Location	Position	Contacts	ID number	Signature

STAKEHOLDER CONSULTATION MEETING SHEET

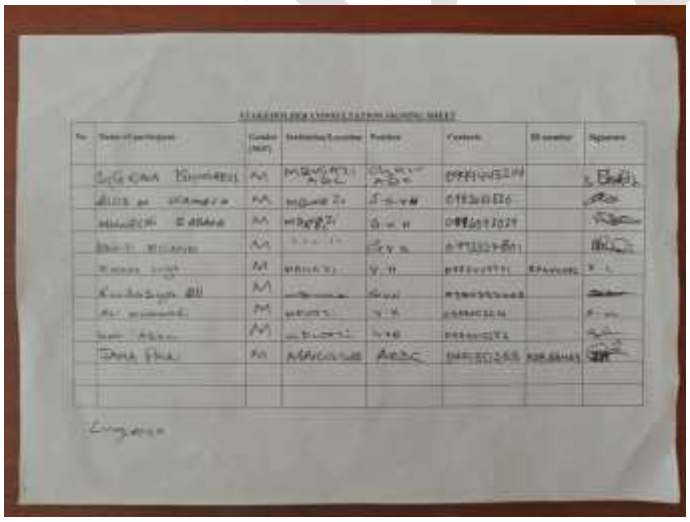
Name	Institution/Location	Position	Contacts	Signature



STAKEHOLDER CONSULTATION MEETING SHEET

No	Name of participants	Gender (M/F)	Institution/Location	Position	Contacts	ID number	Signature

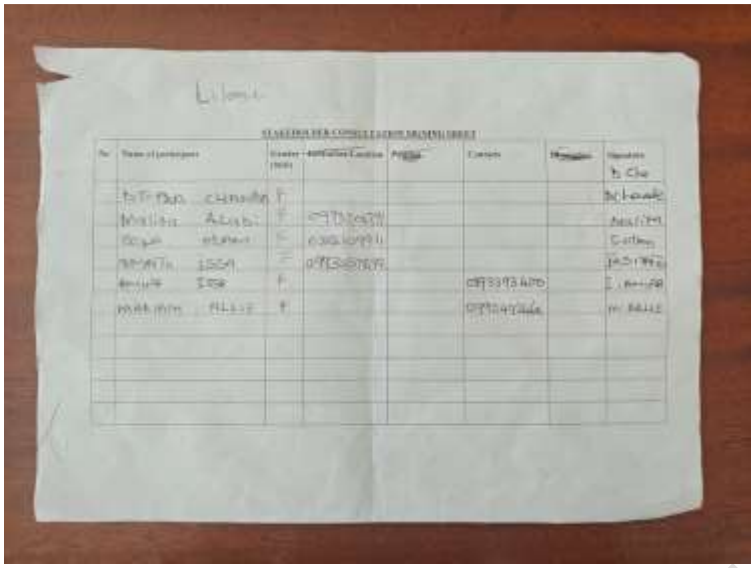
MSUATI

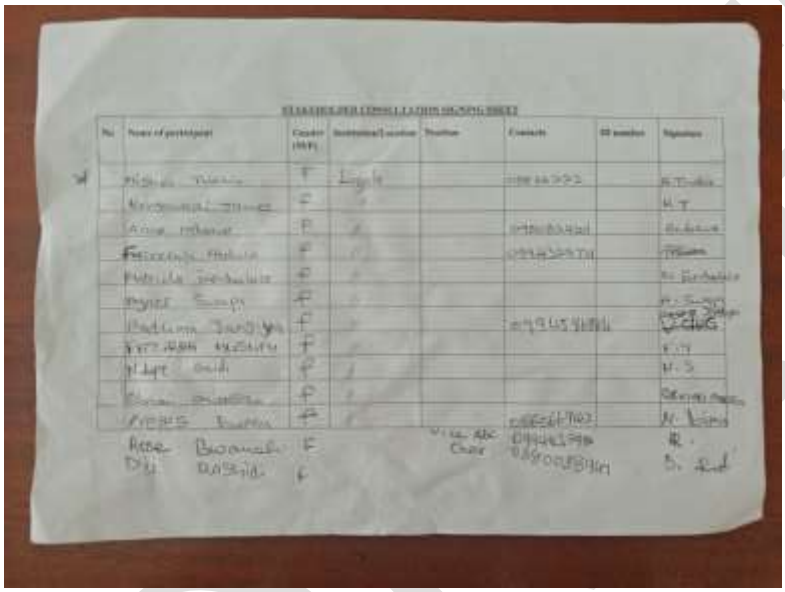


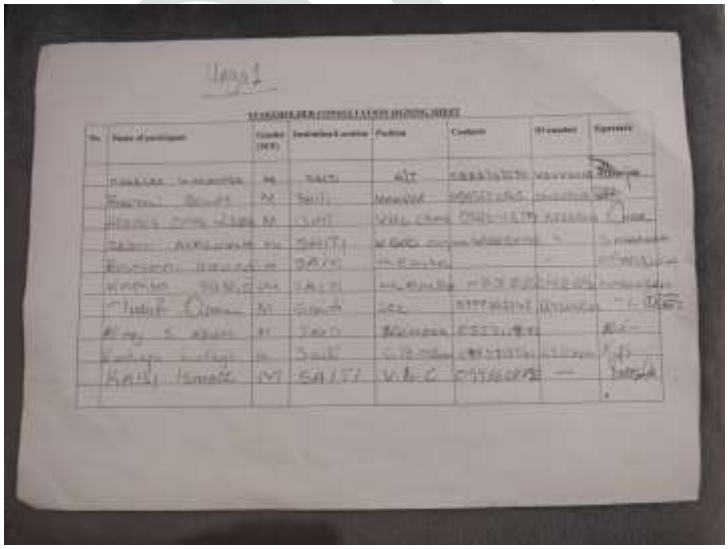
STAKEHOLDER CONSULTATION MEETING SHEET

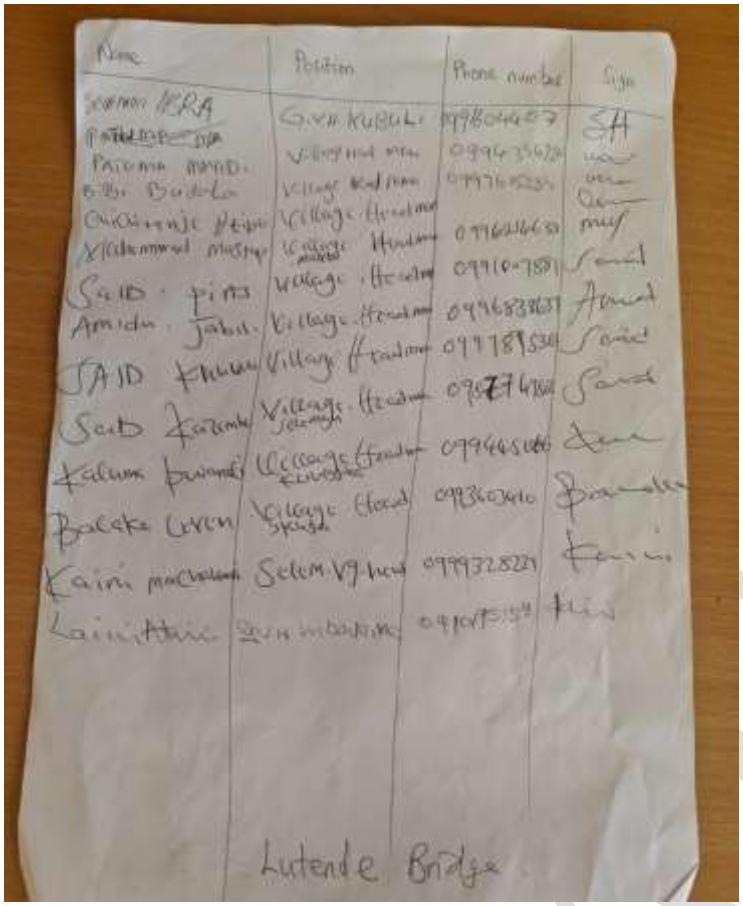
No	Name of participants	Gender (M/F)	Institution/Location	Position	Contacts	ID number	Signature

Lungalo



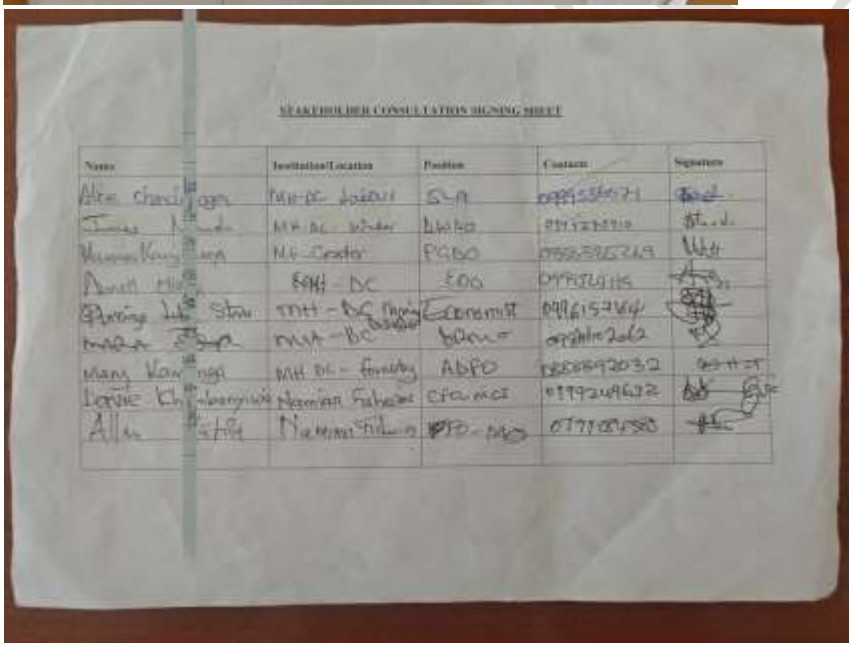






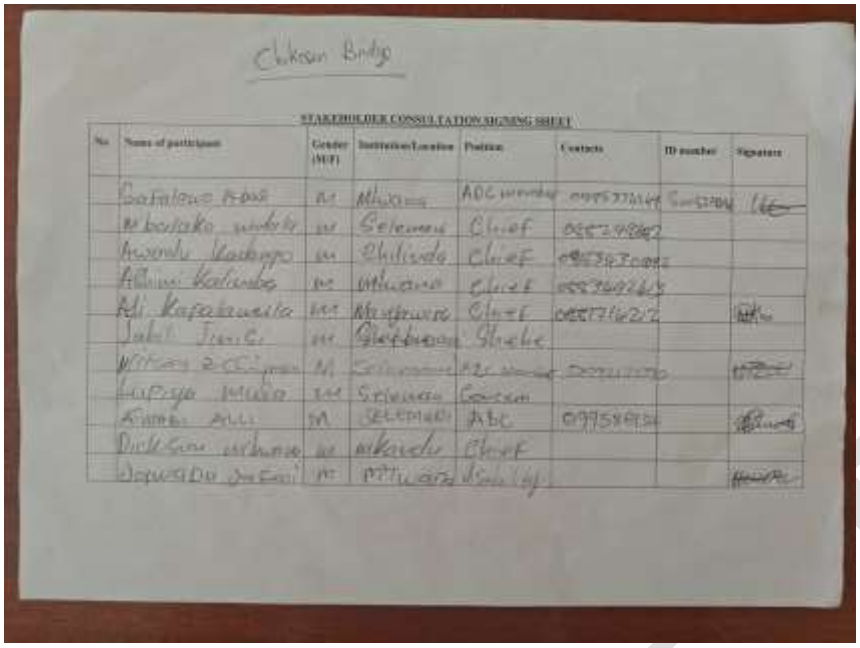
Name	Position	Phone number	Sign

Lutende Bridge



STAKEHOLDER CONSULTATION SIGNING SHEET

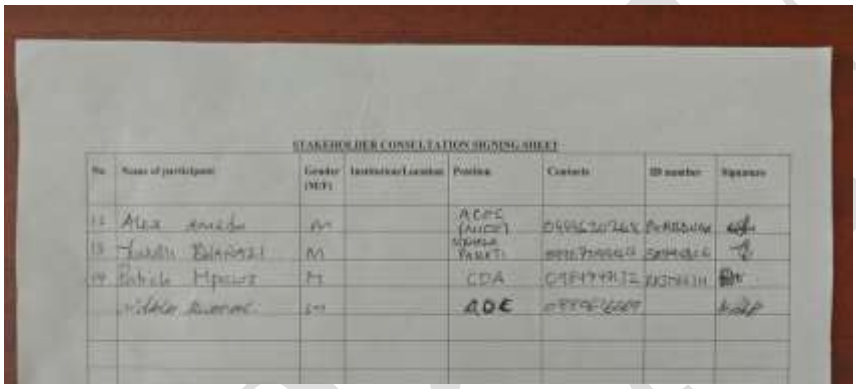
Name	Institution/Location	Position	Contacts	Signature



Chikwa Bridge

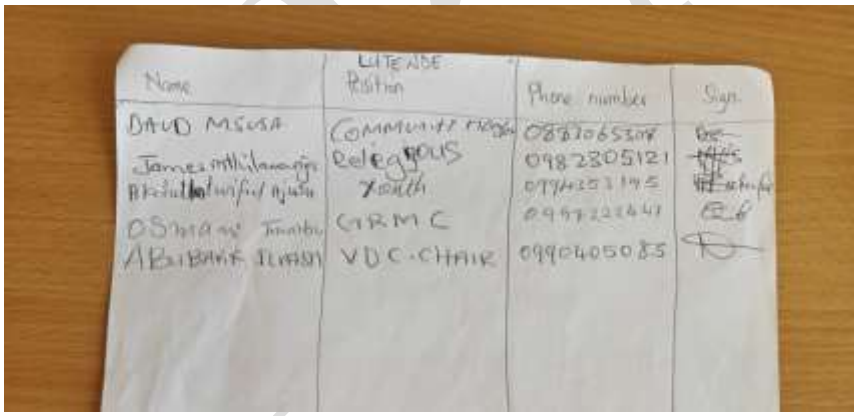
STAKEHOLDER CONSULTATION SIGNING SHEET

No	Name of participant	Gender (M/F)	Institution/Location	Position	Contacts	ID number	Signature
	Gabalowe Rose	M	Mkhoma	ADC member	0995771449	[illegible]	
	Mbalaka wabele	M	Selemani	Chief	0887249862		
	Mwendu Kadenge	M	Chilinde	Chief	0883810082		
	Alfonso Kalumba	M	Mkhoma	Chief	0887697263		
	Rt Kazembeza	M	Mkhumula	Chief	0887716227		
	Jakes Jones	M	Blantyre	Shehe			
	William Chipeta	M	Salima	ADC Member	0888[illegible]70		
	Lupiya Musa	M	Salima	Canon			
	Kamba Ali	M	Selemani	ADC	0995849[illegible]4		
	Dickson Mkhoma	M	Mkhoma	Chief			
	Joseph Dokosi	M	Mthwalo	Village			

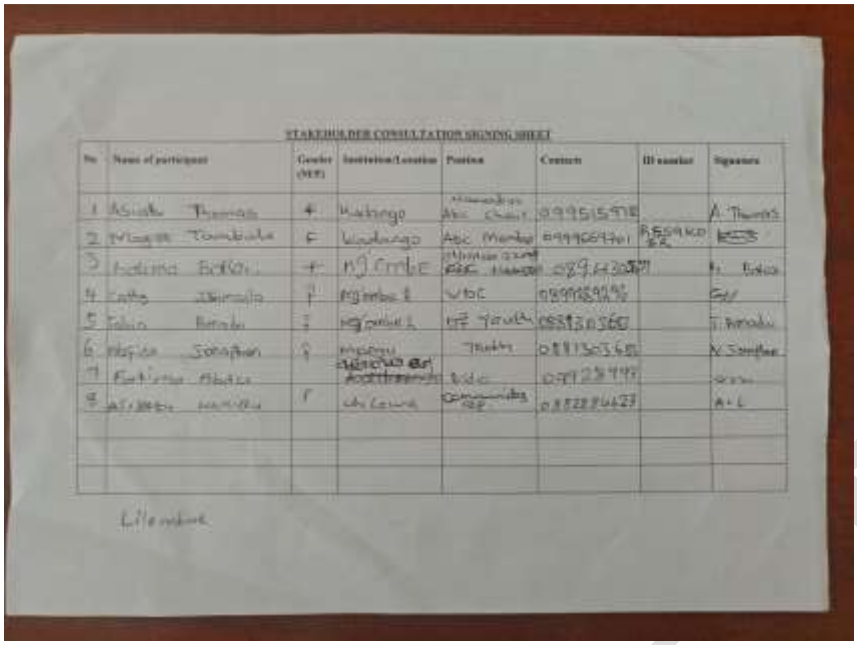


STAKEHOLDER CONSULTATION SIGNING SHEET

No	Name of participant	Gender (M/F)	Institution/Location	Position	Contacts	ID number	Signature
12	Alex Amidu	M		ADC Member	0995620748	[illegible]	
13	Yusuf Banda	M		Village Head	[illegible]	[illegible]	
14	Patrick Mpasu	M		CDA	0884[illegible]	[illegible]	
	[illegible]	M		ADC	[illegible]		



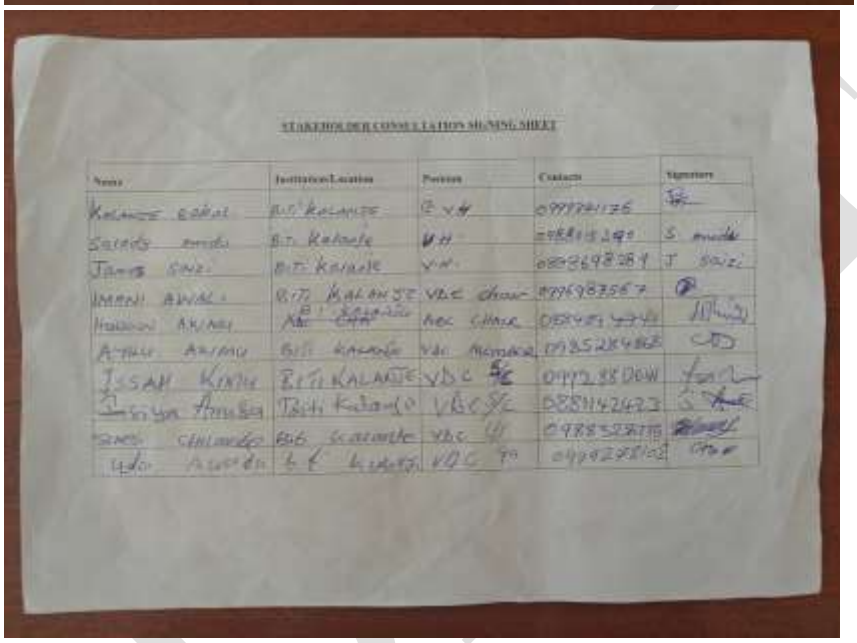
Name	LUTEADE Position	Phone number	Sign.
DAUD MSUSA	COMMUNITY [illegible]	0881065308	
James Mhilawanga	Religious	0982305121	
[illegible]	Youth	0994[illegible]195	
OSMAN Tembo	CARMC	0997221641	
ABUBAKR ILYASU	VDC-CHAIR	0990405085	



STAKEHOLDER CONSULTATION SIGNING SHEET

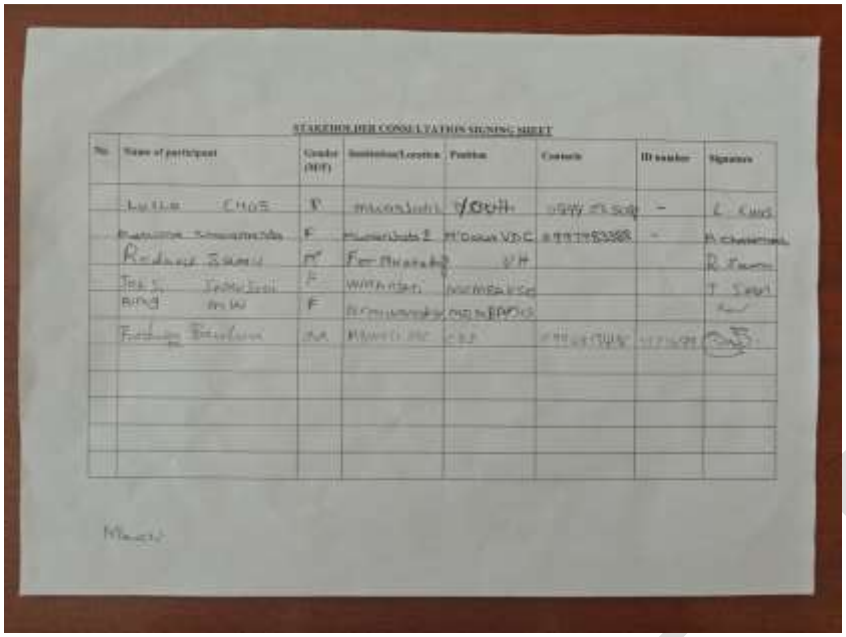
No	Name of participant	Gender (M/F)	Institution/Location	Position	Contacts	ID number	Signature
1	Asiimwe Thomas	M	Kabingo	Member ABC Chair	0995159[illegible]		A. Thomas
2	Mugisa Tumbwine	M	Kabingo	ABC Member	0999069761	[illegible]	
3	Nakima Esther	F	Mbarara	[illegible]	0894430[illegible]		N. Esther
4	Kathy Ibrahim	F	Mbarara	VTOC	0[illegible]		
5	Tabu Benabu	F	Mbarara	Mbarara Youth	0[illegible]		T. Benabu
6	Nafida Sanyahan	F	Mbarara	Youth	0[illegible]		N. Sanyahan
7	Katirina Abaka	F	[illegible]	[illegible]	0[illegible]		[illegible]
8	[illegible]	F	[illegible]	[illegible]	0[illegible]		A. L

Lile mukwe



STAKEHOLDER CONSULTATION SIGNING SHEET

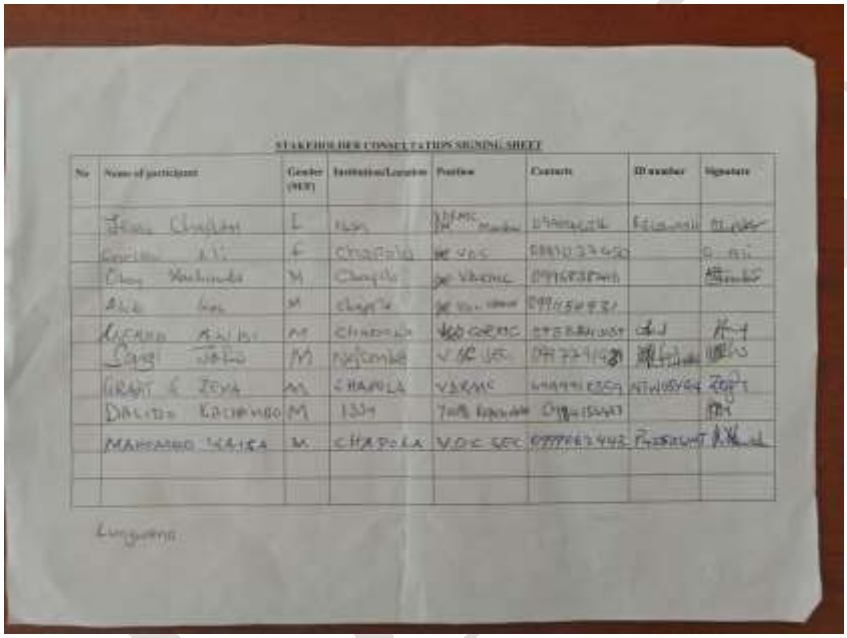
Name	Institution/Location	Position	Contacts	Signature
Kalanje Esther	B.T. Kalanje	C V H	0997241176	
Sarah Amabi	B.T. Kalanje	V H	0[illegible]	S Amabi
James Sanz	B.T. Kalanje	V H	0[illegible]	J Sanz
Imani Awali	B.T. Kalanje	VDC Chair	0996983567	
Hussein Akaki	B.T. Kalanje	Asst Chair	0[illegible]	
Aziku Azimu	B.T. Kalanje	Vdc Member	0[illegible]	
Issah Kinte	B.T. KALANJE	VDC Sec	0[illegible]	
Isiya Amaba	B.T. Kalanje	VDC Sec	0[illegible]	
James Chilando	B.T. Kalanje	VDC	0[illegible]	
[illegible]	[illegible]	VDC	0[illegible]	



STAKEHOLDER CONSULTATION SIGNING SHEET

No	Name of participant	Gender (M/F)	Institution/Location	Position	Contacts	ID number	Signature
	Lucia Chios	F	Mwanchisi	Youth	0977 [illegible]	-	L Chios
	[illegible]	F	Mwanchisi 2	M'Dewa VDC	0977793388	-	[illegible]
	Richard Banda	M	Fwa Mwanchisi	VH			R Banda
	Tess Jonathan	F	Mwanchisi	Member			T Jonathan
	Ruth Mwale	F	[illegible]	[illegible]			[illegible]
	Fredson Banda	M	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

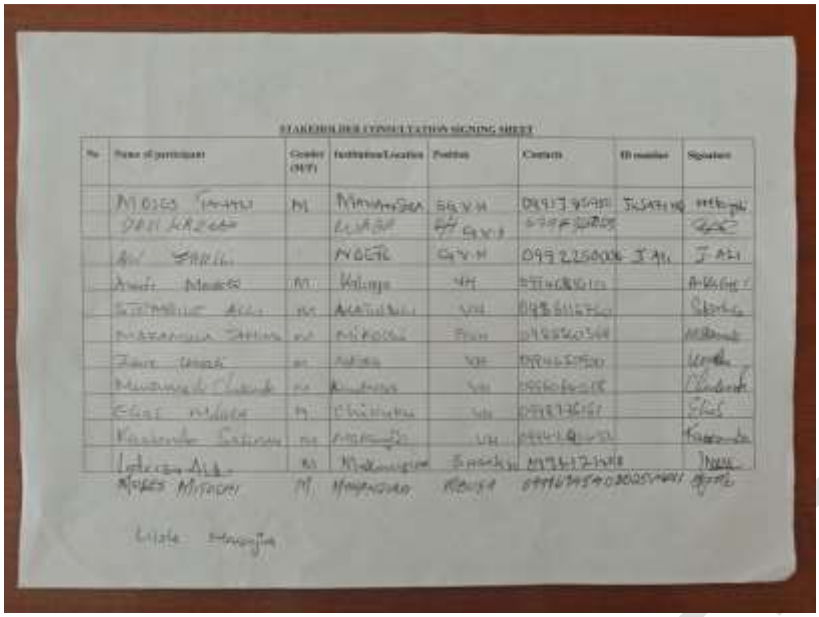
Mwanchisi



STAKEHOLDER CONSULTATIONS SIGNING SHEET

No	Name of participant	Gender (M/F)	Institution/Location	Position	Contacts	ID number	Signature
	Jesse Chisiza	L	Ngoli	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	F	Chapola	[illegible] VDC	[illegible]		[illegible]
	Clay Mahinda	M	Chapola	[illegible]	[illegible]		[illegible]
	Ale [illegible]	M	Chapola	[illegible]	[illegible]		
	Richard Mwale	M	Chapola	[illegible]	[illegible]	[illegible]	[illegible]
	Cosy Jolo	M	Ngoli	[illegible]	[illegible]	[illegible]	[illegible]
	Grant & Zeya	M	Chapola	VSAC	[illegible]	[illegible]	[illegible]
	Dalitso Kachingo	M	1334	[illegible]	[illegible]		[illegible]
	Mahamud Mzaka	M	Chapola	VDC Sec	[illegible]	[illegible]	[illegible]

Lungwena



STAKEHOLDER CONSULTATION SIGNING SHEET

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		M					
		M					
		M					
		M					
		M					
		M					
		M					
		M					

A3.3 Pictures from Selected Stakeholder Meetings

Lugola Mens FGD

Lifulu Site VDC Consultations

Mbwazi VDC Consultations

Lilore Local Chiefs FDG

Lilembwe Females FDG

Annex 4: List of Observed Flora and Fauna Species

A4.1 List of Plant Species Encountered

SPECIES NAME	COUNT	USES	LIFE FORM	IUCN STATUS
LUSALUMWE BRIDGE				
Eucalyptus camaldulensis	26	Poles	Tree	Common
Kirkia acuminata	4	Cannoes	Tree	Common
Senna siamea	11	Poles	Tree	Common
Zizyphus mauritiana	13	Fruits	Tree	Common
Faidherbia albida	14	Cannoes	Tree	Rare
Albizia amara	3	Firewood	Tree	Common
Thevetia peruviana	4	Poles	Tree	Common
Grewia verscolor	1	Fruits	Tree	Common
Khaya anthotheca	6	Timber	Tree	Endangered
Albizia gwechepere	3	Hoe handles	Tree	Common
Croton megalobotrys	10	Poles	Tree	Common
Kirgelia africana	2	Cannoes	Tree	Common
Azadirachta indica	1	Firewood	Tree	Common
Phyllanthus africana	3	Firewood	Tree	Common
Markhamia obtusifolia	6	Poles	Tree	Common
Combretum mossambiscensis	10	Firewood	Tree	Common
Sesbania tetraptula	11	Grain bins	Herb	Common
Trichilia emetica	13	Medicinal	Tree	Rare
Ricinus cummins	1	Medicinal	Tree	Common
Sida acuta	12	Sweeping blooms	Herb	Common
Brachialia brizantha	1	Grass for thatch	Herb	Common
Adansonia digitata	2	Fruits	Tree	Common
Achilanthus aspera	5	Fodder	Herb	Common
NKULI BRIDGE				
Mangifera indica	1	Fruits	Tree	Common
Faidherbia albida	32	Cannoes	Tree	Rare
Kirkia acuminata	4	Cannoes	Tree	Common
Acacia tortilis	2	Poles	Tree	
Kirgelia africana	19	Cannoes	Tree	Common
Adasonia digitata	6	Fruits	Tree	Common
Ricinus cummins	5	Medicinal	Tree	Common
Zizyphus mauritiana	9	Fruits	Tree	Common
Senna spectabilis	3	Ornamental	Tree	Common
Ocimum canum	30%	Medicinal	Herb	Common
Markhamia obtusifolia	3	Tree	Poles	Common
Philenoptera violacea	1	Firewood	Tree	Common
KALANJE BRIDGE				
Faidherbia albida	3	Cannoes	Tree	Rare
Zizyphus mauritiana	1	Tree	Fruits	Common
Acacia xanthophlea	3%	Poles	Tree	Common
Faidherbia albida	16	Cannoes	Tree	Rare
Acacia seberiana	1	Hoe handles	Tree	Common
Leacaniodiscus fraxinifoliuss	3	Fruits	Tree	Common
Croton megalobotrys	10	Poles	Tree	Common

SPECIES NAME	COUNT	USES	LIFE FORM	IUCN STATUS
Zizyphus mauritiana	1	Fruits	Tree	Common
Senna senguena	1	Fruits	Tree	Common
Senna siamea	5	Poles	Tree	Common
Lannea stuhlmannii	1	Fruits	Tree	Common
MBWADZI BRIDGE				
Trichilia emetica	3	Medicinal	Tree	Rare
Philenoptera violacea	3	Firewood	Tree	Common
Vachelea clasicarpa	6	Firewood	Tree	Common
Ricinus cummins	4	Medicinal	Tree	Common
Dalbergia boehmii	11	Currios	Tree	Common
Leacaniodiscus fraxinifoliuss	1	Fruits	Tree	Common
Sclerocarya birrea	1	Fruits	Tree	Common
Zizyphus mauritiana	1	Fruits	Tree	Common
LUTENDE BRIDGE				
Delonix regia	1	Ornamental	Tree	Common
Senna siamea	45	Poles	Tree	Common
Calotropis procera	32	Firewood	Tree	Common
Senna spectabilis	3	Ornamental	Tree	Common
Zizyphus mauritiana	4	Fruits	Tree	Common
Ricinus cummins	10	Medicinal	Tree	Common
Faidherbia albida	9	Cannoes	Tree	Rare
Toona ciliata	4	Timber	Tree	Rare
Kirkia acuminata	25	Cannoes	Tree	Common
Mangifera indica	8	Fruits	Tree	Common
Thevetia peruviana	7	Poles	Tree	Common
Gmelina arborea	1	Timber	Tree	Common
Sterculia africana	3	Ropes	Tree	Common
Calatropis procera	7	Firewood	Tree	Common
Ricinus cummins	8	Medicinal	Tree	Common
Musa paradisiaca	7	Fruits	Tree	Common
Carica papaya	4	Fruits	Tree	Common
Mangifera indica	5	Fruits	Tree	Common
Faidherbia albida	13	Cannoes	Tree	Rare
Sesbania sesbani	7	Grain bins	Herb	Common
Delonix regia	5	Ornamental	Tree	Common
Senna spectabilis	3	Ornamental	Tree	Common
Cajanus cajana	4	Fruits	Shrub	Common
Sclerocarya birrea	2	Fruits	Tree	Common
Ficus stuhlmannii	1	Edible	Tree	Common
Acacia polyacantha	1	Firewood	Tree	Common
Grewia bicolor	2	Fruits	Tree	Common
Senna senguena	6	Fruits	Tree	Common
Stereospermum kunthianum	1	Firewood	Tree	Common
Lannea stuhlmannii	3	Fruits	Tree	Common
Argemone mexicana	20	Ornamental	Herb	Common
Ricinus cummins	24	Medicinal	Tree	Common
Afzelia quanzensis	1	Timber	Tree	Rare
Senna siamea	13	Poles	Tree	Common
Albizia anthelmentica	6	Firewood	Tree	Common

SPECIES NAME	COUNT	USES	LIFE FORM	IUCN STATUS
Adansonia digitata	12	Fruits	Tree	Common
Kirkia acuminata	11	Cannoes	Tree	Common
Zizyphus mauritiana	3	Fruits	Tree	Common
RUGOLA BRIDGE				
Mangifera indica	19	Fruits	Tree	Common
Melia azedarach	14	Timber	Tree	Common
Senna siamea	19	Poles	Tree	Common
Kirkia acuminata	13	Cannoes	Tree	Common
Markhamia obtusifolia	4	Firewood	Poles	Common
Senna spectabilis	9	Ornamental	Tree	Common
LILORE BRIDGE				
Delonix regia	5	Ornamental	Tree	Common
Mangifera indica	17	Fruits	Tree	Common
Adansonia digitata	9	Fruits	Tree	Common
Croton megalobotrys	3	Poles	Tree	Common
Ricinus cummins	20	Medicinal	Tree	Common
Faidherbia albida	8	Cannoes	Tree	Rare
Eucalyptus tereticornis	9	Timber	Tree	Common
Hyphaena petersiana	1	Timber	Tree	Common
Berchemia discolor	1	Fruits	Tree	Common
Trichodesma vernosam	1	Medicinal	Tree	Common
Leucas martinicensis	1	Fodder	Herb	Common
Senna siamea	1	Poles	Tree	Common
Philenoptera violacea	1	Firewood	Tree	Common
Albizia zimmermanii	1	Firewood	Tree	Common
Sclerocarya birrea	1	Fruits	Tree	Common
Markhamia obtusifolia	25	Poles	Tree	Common
Diospyros senensis	12	Fruits	Tree	Common
Cordia abyssinica	4	Medicinal	Tree	Common
Xeroderris stuhlmannii	15	Cannoes	Tree	Rare
CHIKOSELE BRIDGE				
Markhamia obtusifolia	14	Poles	Tree	Common
Faidherbia albida	4	Cannoes	Tree	Rare
Adansonia digitata	3	Fruits	Tree	Common
Senna siamea	15	Poles	Tree	Common
Albizia lebbeck	11	Firewood	Tree	Common
Gmelina arborea	1	Timber	Tree	Common
Zizyphus mauritiana	2	Fruits	Tree	Common
Combretum mossambicensis	1	Firewood	Tree	Common
Pennisetum	40%	Fodder	Grass	Common
Acacia polyacantha	16	Firewood	Tree	Common
Ricinus cummins	8	Medicinal	Tree	Common
Philenoptera violacea	11	Firewood	Tree	Common
Thespesis garckeana	1	Fruits	Tree	Common
LITHUVU BRIDGE				
Grewia bicolor	8	Fruits	Tree	Common
Philenoptera violacea	7	Firewood	Tree	Common
Trichilia emetica	5	Medicinal	Tree	Rare

SPECIES NAME	COUNT	USES	LIFE FORM	IUCN STATUS
Sterculia africana	1	Ropes	Tree	Common
Adansonia digitata	3	Fruits	Tree	Common
Perocorpsis angolensis	4	Currios	Tree	Endangered
Markhamia obtusifolia	11	Poles	Tree	Common

A4.2 Mammal Species Observed

Order	Family Name	Common Name	Scientific Name
Rodentia	Anomaluridae	Red Squirrel	*Paraxerus palliatus*
Rodentia	Anomaluridae	Red Squirrel	*Catopsilia florella*
Rodentia	Anomaluridae	Tree Squirrel	*Paraxerus cepapi*
Carnivora	Canidae	Side-striped Jackal	*Lupulella adusta*
Primates	Cercopithecidae	Vervet Monkey	*Cercopithecus aethiops*
Primates	Cercopithecidae	Yellow Baboon	*Papio cynocephalus*
Rodentia	Cricetomyinae	Pouched Mouse	*Saccostomus capensis*
Carnivora	Felidae	African Wild Cat	*Feris silvestris cafra*
Carnivora	Herpestidae	Slender Mongoose	*Galerella sanguinea*
Carnivora	Hyaenidae	Spotted Hyena	*Crocuta crocuta*
Macroscelidea	Macroscelididae	Peter's Short-Snouted Sengi	*Elephantulus fuscus*
Rodentia	Muridae	Bushveld Gerbil	*Tatera leucogaster*
Rodentia	Muridae	Gambian Giant Pouched Rat	*Cricetomys gambianus*
Rodentia	Muridae	Multimammate Mouse	*Mustomys natalensis*
Rodentia	Nesomyidae	Fat Mouse	*Steatomys pratensis*
Eulipotyphla	Soricidae	Musk Shrew	*Genus Crocidura*
Carnivora	Viverridae	Large Grey Mongoose	*Herpestes ichneumon*

A4.3 Reptile Species Encountered

Order	Family Name	Common Name	Scientific Name
Squamata	Agamidae	Peter's Ground Agama	*Agama armata*
Squamata	Chamaeleonidae	Common Flap-necked Chameleon	*Chamaeleo dilepis-dilepis*
Squamata	Colubridae	Eastern Vine Snake	*Thelotornis mossambicanus*
Squamata	Colubridae	Green Water Snake	*Philothamnus hoplogaster*
Squamata	Colubridae	Spotted Bush Snake	*Philothamnus hoplogaster*
Squamata	Elapidae	Mozambique Spitting Cobra	*Naja mossambicus*
Squamata	Elapidae	Black Mamba	*Dendroaspis polylepis*

Order	Family Name	Common Name	Scientific Name
Squamata	Gekkonidae	Common Dwarf Gecko	*Lygodactylus capensis*
Squamata	Gekkonidae	Flat-headed Tree Gecko	*Hemidactylus platycephalus*
Squamata	Gerrhosauridae	Yellow-throated Plated Lizard	*Gerrhosaurus flavigularis*
Squamata	Lygosomatiinae	Striped Skink	*Trachylepis striata*
Squamata	Lygosomatiinae	Variable Skink	*Trachylepis varia*
Squamata	Varanidae	Water Monitor	*Varanus niloticus*
Squamata	Viperidae	Puff Adder	*Bitis arietans*

A4.4 Insect Species Recorded

Order	Family Name	Common Name	Scientific Name
Orthoptera	Acrididae	Bird Grasshopper	*Acanthacris ruficornis*
Orthoptera	Acrididae	Common Field Grasshopper	*Chorthippus brunneus*
Orthoptera	Acrididae		*Orthoctha*
Odonata	Aeshnidae		*Anax imperator*
Hymenoptera	Apidae	Carpenter Bee	*Xylocopa inconstans*
Hymenoptera	Apidae	Carpenter Bee	*Xylocopa caffra*
Hymenoptera	Apidae	Honey Bee	*Apis mellifera*
Hymenoptera	Braconidae	Parastoid Wasps	
Diptera	Caliphoridae	Blowfly	*Chrysomya chloropyga*
Hymenoptera	Formicidae	African Stink Ant	*Phachycondyla tarsata*
Odonata	Gomphidae	Clubtails Dragonfly	*Ceratogomphus pictus*
Odonata	Libellulidae	Dragonfly	*Orthetrum chrysostigma*
Odonata	Libellulidae	Dragonfly	*Brachythemis leucosticta*
Coleoptera	Meloidae	Blister Beetle	*Mylabris dicincta*
Diptera	Muscidae	Housefly	
Neuroptera	Myrmeleontidae	Antlion	
Lepidoptera	Nymphalidae	Monarch Butterfly	*Danaus chrysippus*
Lepidoptera	Papilionidae	Citrus Swallowtail	*Papilio demodocus*
Lepidoptera	Pieridae	African Migrant	*Catopsilia florella*
Lepidoptera	Pieridae	African Sulphur Butterfly	*Belenois aurota*
Hymenoptera	Pompilidae	Spider Wasp	*Anterhynchium natalense*
Hymenoptera	Sphecidae	Wasp	
Diptera	Tabanidae	Horsefly	
Hymenoptera	Vespidae	Potter Wasp	*Eumenes fraternus*

A4.5 Bird Species Recorded

Order	Family Name	Common Name	Scientific Name
Accipitriformes	Accipitridae	Little Sparrowhawk	*Accipter minullus*
Passeriformes	Acrocephalidae	Common Reed Warbler	*Acrocephulus scirpaceus*
Coraciiformes	Alcedinidae	Pied Kingfisher	*Ceryle rudis*

Order	Family Name	Common Name	Scientific Name
Coraciiformes	Alcedinidae	Woodland Kingfisher	*Halcyon senegalensis*
Bucerotiformes	Bucerotidae	Silvery Cheeked Hornbill	*Bycanistes brevis*
Passeriformes	Cisticolidae	Red-faced Cisticola	*Cisticola erthrops*
Passeriformes	Cisticolidae	Tawny-flanked Prinia	*Prinia subflava*
Passeriformes	Cisticolidae	Wailing Cisticola	*Cisticola lais*
Coliiformes	Coliidae	Speckled Mousebird	*Colius striatus*
Columbiformes	Columbidae	Blue Spotted Wood Dove	*Turtur afer*
Columbiformes	Columbidae	Cape Turtle Dove	*Streptopelia capicola*
Columbiformes	Columbidae	Laughing Dove	*Streptopelia senegalensis*
Columbiformes	Columbidae	Namaqua Dove	*Oena capensis*
Columbiformes	Columbidae	Red-eyed Dove	*Streptopelia semitorquata*
Coraciiformes	Coraciidae	Broad-Billed Roller	*Eurystomus glaucurus*
Cuculiformes	Cuculidae	Klaas's Cuckoo	*Chrysococcyx klaas*
Passeriformes	Dicruridae	Fork-tailed Drongo	*Dicrurus adsimilis*
Passeriformes	Estrildidae	Blue Cordonbleu	*Uraeginthus angolensis*
Passeriformes	Estrildidae	Blue Waxbill	*Uraeginthus angolensis*
Passeriformes	Estrildidae	Bronze Manikin	*Spermestes cucullata*
Passeriformes	Estrildidae	Blue-billed Firefinch	*Lagonisticta lubricata*
Passeriformes	Estrildidae	Common Waxbill	*Estrilda astrild*
Passeriformes	Estrildidae	Red-billed Firefinch	*Lagonosticta senegala*
Passeriformes	Fringillidae	Yellow-fronted Canary	*Serinus mosambicus*
Passeriformes	Hirundinidae	Barn Swallow	*Hirundo rustica*
Passeriformes	Malaconotinidae	Black-backed Puffback	*Dryoscopus cubla*
Passeriformes	Malaconotinidae	Black-crowned Tchagra	*Tchagra senegalensis*
Passeriformes	Malaconotinidae	Brown-headed Tchagra	*Tchagra australis*
Passeriformes	Malaconotinidae	Tropical Boubou	*Laniarius aethiopicus*
Coraciiformes	Meropidae	Little Bee Eater	*Melops pusilus*
Passeriformes	Motacillidae	African Pied Wagtail	*Motacilla anguimp*
Passeriformes	Nectarinidae	Black Sunbird	*Chalcomitra amethystina*
Passeriformes	Nectarinidae	Collared Sunbird	*Anthreptes collaris*
Passeriformes	Passeridae	House Sparrow	*Passer domesticus*
Galliformes	Phasianidae	Red-necked Francolin	*Francolinus afer*
Passeriformes	Ploceidae	African Masked Weaver	*Ploeceus velatus*
Passeriformes	Ploceidae	Red Bishop	*Euplectes orix*
Passeriformes	Ploceidae	Spectacled Weaver	*Ploceus ocularis*
Passeriformes	Ploceidae	Village Weaver	*Ploceus cucullatus*
Passeriformes	Ploceidae	Yellow-rumped Bishop	*Euplectes capensis*
Passeriformes	Pycnonotidae	Black-eyed Bulbul	*Pycnonotus tricolor*
Passeriformes	Pycnonotidae	Terrestrial Brownbul	*Phyllastrephus terrestris*
Pelecaniformes	Scopidae	Hamerkop	*Scopus umbretta*

Order	Family Name	Common Name	Scientific Name
Passeriformes	Sturnidae	Greater Blue-eared Starling	*Lamprotornis chalybaeus*
Passeriformes	Sylviidae	Red-capped Crombec	*Sylvietta ruficapilla*
Passeriformes	Turdidae	Heuglin's Robin	*Cossypha heuglini*
Strigiformes	Viduidae	Village Indigobird	*Vidua chalybeata*

A 4.6: Amphibian Species Encountered

Order	Family Name	Common Name	Scientific Name
Anura	Ptychadinidae	Anchieta Rigged Frog	*Ptychadena anchieta*
Anura	Ptychadinidae	Anchieta Rigged Frog	*Ptychadena anchieta*
Anura	Bufonidae	Guttural Toad	*Bufo gutturalis*
Anura	Bufonidae	Guttural Toad	*Bufo gutturalis*
Anura	Bufonidae	Guttural Toad	*Bufo gutturalis*

Annex 5: Sub- Management Plans Frameworks

A5.1 Labour Management Plan Guideline

This Labour Management Plan (LMP) Guideline provides the framework that the Contractor will use to develop a detailed LMP for the project. The Contractor's LMP must align fully with: The Labor Management Procedures prepared for the Africa Regional Climate Resilience Program (P181308);

- The World Bank's ESS2;
- Relevant Malawi labour legislation, including the Employment Act (2000) and the Occupational Safety, Health and Welfare Act (1997); and
- Applicable ILO conventions ratified by Malawi.

The Contractor's LMP will be submitted for approval to the Supervising Engineer and the Project Implementation Unit prior to the commencement of construction. Once approved, it will apply to all project workers, including those directly employed by the Contractor, subcontractors, and service providers.

A5.1.1 Purpose and Objectives

The LMP is intended to operationalise the commitments in the Project's LMP by:

- Establishing fair, transparent, and lawful labour practices.
- Protecting workers' rights and promoting safe, healthy, and inclusive working conditions.
- Prioritising local recruitment, especially for unskilled and semi-skilled roles, to maximise socio-economic benefits for project-affected communities.
- Ensuring equal opportunity and non-discrimination, with targeted measures to promote the participation of women, youth, and persons with disabilities.
- Prohibiting child labour, forced labour, and any form of coercion.
- Ensuring all workers have written contracts detailing wages, benefits, working hours, leave entitlements, and conditions of employment in compliance with the Project's LMP and ESS2.
- Providing a confidential, accessible, and timely Worker GRM.
- Enforcing effective OHS measures, including provision of PPE, safety training, and hazard control.
- Defining expectations for worker conduct through a Code of Conduct, including prevention of sexual harassment, exploitation, and abuse.

A5.1.2 Framework Requirements

Requirement	Minimum Framework Guidance	Responsibility
Alignment with Project Labor Management Procedures	Ensure the Contractor's Labor Management Procedures reflects and operationalises all commitments in the *Africa Regional Climate Resilience Program (P181308).*	Contractor

Requirement	Minimum Framework Guidance	Responsibility
Fair and Transparent Recruitment	Prioritise local hiring; advertise jobs in local languages and through community channels; ensure merit-based selection.	Contractor
Non-Discrimination & Equal Opportunity	Guarantee equal access for all eligible applicants, with affirmative measures for women, youth, and persons with disabilities.	Contractor
Written Contracts	Provide all workers with contracts compliant with Malawi law, ESS2, and Project LMP commitments, detailing wages, hours, leave, benefits, and termination terms.	Contractor
Prohibition of Child & Forced Labour	Verify worker age (no hazardous work for persons under 18); ensure all work is voluntary.	Contractor
Occupational Health & Safety (OHS)	Develop and implement an OHS Management Plan; provide PPE; train workers in safe practices; register workers for health coverage where applicable.	Contractor
Worker Rights Awareness	Induct and regularly train workers on rights, Code of Conduct, OHS, and GRM.	Contractor
Worker Grievance Redress Mechanism (GRM)	Establish a confidential, accessible GRM with clear timelines and anonymous reporting options.	Contractor
Subcontractor Management	Integrate LMP requirements into all subcontractor agreements; monitor and enforce compliance.	Contractor
Security Personnel Management	Train security staff in appropriate behaviour and non-lethal force; establish clear escalation procedures for involving public security.	Contractor
Monitoring & Reporting	Submit monthly reports on workforce composition, OHS incidents, training sessions, and grievances.	Contractor

A5.1.3 Integration with the ESIA and Project Labor Management Procedures

The Contractor's Labour Management Plan will be an integral component of the C-ESMP. The plan must ensure full alignment with the commitments, mitigation measures, and monitoring requirements outlined in the ESIA, as well as with the Project's Labor Management Procedures. This integration ensures that labour-related commitments established during the environmental and social assessment process are operationalised on site and are consistent with the overarching project-level labour requirements. Compliance with the Labour Management Plan will be monitored by the Supervising Engineer and the PIU throughout the works. Any non-compliance will require immediate corrective action, in accordance with the enforcement provisions of the Environmental and Social Impact Assessment and the Project's Labor Management Procedures, and may include suspension of works until full compliance is achieved.

A5.2 Occupational Health and Safety (OHS)

This annex presents an OHS Framework that provides minimum requirements and guidance for the implementation of project activities. Sub-project-specific measures should be added according to the specific risks and impacts identified. Each subproject will be required to compile a site specific Occupational, Health and Safety Plan. The Contractor is responsible for compiling this plan, and review, compliance and monitoring against this plan will be by the relevant PCU or PIU OHS Safeguard Specialists.

A5.2.1 Rationale and Objective of the OHS Framework

The main objective of this Framework is to provide a healthy and safe working environment. The OHS Framework will guide execution of project operations in a safe manner by clearly setting out procedures for assessing working conditions for different project activities and identifying safety procedures to mitigate the risks, stating out roles and responsibilities of the various project stakeholders which include: the client (contractors, subcontractors), project management, workers, communities, and others. This Framework is designed to define and establish commitment made by the Project to comply with the health and safety requirements of the Malawi's Occupational Safety Health and Welfare Act of 1997 and World Bank Environmental Health and Safety Guidelines.

A5.2.2 Scope and Nature of the Framework

This Framework is applicable to all components of the Project, which has several sub-components with activities related to engineering designs, construction, and rehabilitation works.

A5.2.3 Roles and Responsibilities

The Project PCU will provide consultants, contractors and other workers with the authority to carry out the assigned tasks and holds them accountable for successful and safe completion of those specific tasks. All workers shall be accountable to meet the Project's OH&S goals and objectives. Responsibilities of the key personnel and workers are described below:

Entity	Roles and Responsibilities
PIU	• Ensure that the Contractor carries out the implementation of the OHS Framework. Review and approve OHS mitigation measures for contractors and subcontractors. Approve the staff for the contractor and subcontractors. • Carry out periodic OHS inspections and receive reporting. To be done by qualified/certified OHS personnel • Approve specific tasks with high safety and health risks. • Provide resources for implementing agencies to implement the OHS measures. Adopt and implement the workers' GRM • Responsible for notifying the World Bank or any accidents or incidents on site, compiling Root Cause Analysis and Action Plan, ensuring costs and/or compensation is paid if applicable.

Entity	Roles and Responsibilities
Ministry of Labour	• Carry out joint inspections on OHS • Inspect and issue work place registration licenses. • Carry out accidents investigations
Malawi Environment Protection Authority	• Issuing hazardous waste storage and transportation licenses and permits Carrying out joint inspections on OHS
Directorate of Road Traffic and Safety Services	• Inspect mobile equipment and plants • Carry out road safety trainings to stakeholders
Principal Contractors	• Ensure safe working environment for all workers on the project site and protect the environment and communities from risks and hazards associated with the works. To that end, the principal contractor will undertake the following duties and responsibilities, among others. • Appoint CERTIFIED/QUALIFIED full time OHS Specialist to oversee development and implementation of OHS measures. • Conduct site assessment. Compile OHS plan for the site including site control measures to protect the site, workers on the site, equipment on the site, and the surrounding community from the site and works, including site housekeeping, site rules, standard operating procedures (SOP) for plant and equipment, preparing and use of specific materials or processes, PPE requirements, etc. Applicable to primary work site, campsite, and ancillary sites including borrow pit and quarry, transport routes between sites. • Conduct risk assessment for all tasks and propose measures to eliminate risk and provide PPE and trainings according to results of the risk assessment. • Conduct regular training inform and train workers on risks and hazards associated with the works, including briefing on OHS Plan and relevant SOPs, daily tool box talks. • Provide adequate and appropriate PPE; including specialized PPE for specific tasks Provide safe drinking water and sanitary facilities • Develop and implement an OHS Plan and any supporting plans including, waste management, Traffic Management Plan (which includes pedestrians), Hazardous substances management plan (including transport, handling, storage, disposal and emergency preparedness); • Provide induction and training/safety briefing to all suppliers and visitors to the site, • Provide appropriate and adequate PPE to persons visiting the site.
	• Report all H&S accidents/incidents to Supervising Engineers and Labour Office for independent investigation and initiating compensation process where necessary; Conduct periodic health assessments for workers as required. • Provide rest areas, water break and sheds for workers for shelter during extreme weather conditions

Entity	Roles and Responsibilities
	• Conduct training for workers on how to do a Job Hazard Analysis and prestart inspections for vehicle/plant and equipment operators • OH&S communications will be done in languages that are easily understood by workers. If need be translators should be provided.
Sub- contractors	All subcontractors shall be subjected to and expected to adhere to the requirements of the OHS plan the same way as the Principal Contractor. The OH&S Specialist for the principal contractor shall be responsible for enforcing OHS adherence, conducting inductions and trainings as well as all task assessments for subcontractor's work sites. Subcontractors will: • Ensure its workers are familiar with the OHS requirements sign Code of Conduct Provide information, induction, instruction, training and supervision to ensure that each employee is safe from injury and risk to health. • Provide adequate and appropriate protective equipment. Assist in accident investigations. • Keep and maintain all H&S related records including Job Hazard Analysis and prestart checklists.

A5.2.5 Anticipated OHS Risks

OHS related risks may occur specifically in Component 2 on Infrastructure Investments and Sustainable Asset Management for Climate Resilience. The component includes two sub-components: Sub- component 2.1.: Basin-level Infrastructure Development; and Sub-component 2: District-led Resilience Building. The reconstruction and rehabilitation of critical connectivity (roads, bridges) and critical hydraulic infrastructure, as well as the construction of longer-term flood resilient hydraulic infrastructure (river training, riverbank protection, drainage, dykes, etc…) bears OHS related risks. These include OHS risks from handling equipment, risks related to inadequate PPE, risks related to inadequate understanding of EHS risks and impacts and of mitigation measures, risks from natural hazards during construction, weak regulatory and technical oversight, and capacity, risks from working next to water especially in the wet season, structural safety risks, etc.

Under Component 3, specifically Sub-component 3.1 on Expanding Social Registry in Urban Areas and Piloting Social Protection Public Works, minor OHS risks may occur. The works consist of small pilot interventions to improve the design of the guidelines in 1-2 neighborhoods. This may include labor intensive small public works, such as cleaning drainage systems, fixing access unpaved roads etc). OHS risks include risks from handling equipment, risks from inadequate PPE, and risks related to working next to water especially in the wet season.

A5.2.6 OHS Management Requirements

This section provides guidance on plans and measures that the principal contractors and subcontractors will develop before implementation of the subprojects so that they are able to provide safe and healthy workplaces by mitigating and safeguarding hazards and risks, as well as by proactively improving OHS performance.

A5.2.7 Occupational Health and Safety Management Plan

For all construction projects, the Principal Contractors shall develop an Occupational Health and Safety Management Plan at least 4 weeks prior to commencement of their activities on site, reviewed and cleared by the PCU, no objection by the Bank. The OHS Management Plan shall have sub-plans, which will contribute to the overall implementation of the OHS management plan.

A5.2.7.1 OHS risks and mitigation measures

OHS risk	Mitigation Plan or Measures
General Health impacts of works	**Employee Health Assessment Plan** A contractor has a duty to ensure the health assessment of his or her personnel prior to employment and in the course of project implementation through the entire span of the employee's engagement with the Project at frequent pre- set intervals. The contractor shall therefore, develop a health assessment plan for health assessment of workers. The intervals may vary depending on the site conditions and the health conditions of the employee. A subcontractor shall follow the same procedure before recruiting their workers on their subcontractor role. An independent Health and Safety site safety committee shall be established, which shall have common understanding of safety requirements in accordance with Occupational Heath Safety and Welfare Act 1997. This will enable all participants to recognize their restrictions and site conditions. Health & Safety meetings shall be conducted at least once a week/month, to discuss safety matters, decide safety targets, conduct site safety events for motivating and improving consciousness among all participants, review safety performance and statistics of all participants, evaluate the causes and consequences, study and suggest necessary improvement, highlight high-risk works and co-ordinate necessary measures for improvement.
Traffic Accidents and other traffic related risks	**Traffic Management Plan** Contractors will develop a traffic management plan to ensure smooth flow of traffic and manage the project induced traffic conflicts. This also ensure a safe and standard transportation of workers and material for the project.
Risks related to working next to water,	**Flooding Preparedness and Response Procedure** Develop a Flooding Preparedness and Response Procedure to guide worker safety measures, evacuation routes, and equipment protection during heavy rains and potential flooding events, particularly for sites within river floodplains.

OHS risk	Mitigation Plan or Measures
especially in the wet season	**Storm Water Management Plan** Contractors will be required to develop and implement Storm Water Management Plan. The Plan will outline measures the contractor will follow to avoid pollution, contamination, erosion and flooding by controlling runoff. Stormwater / runoff water Rain runoff water must be appropriately attenuated on site before discharge to the surround environment and community. Erosion project and energy dissipation must be installed as necessary to prevent soil erosion on and off the site. Oil separation from stormwater must be installed, waste, including sediment, must be collected/retained on site. Tools and Equipment Tools and equipment must be fit for purpose. All lifting appliances and lifting gears are to be properly inspected and certified. Guards and electrical trip switches must work effectively and must not be removed or bypassed. All tools shall be of good quality and maintained in a safe working condition. Homemade tools are not permitted. Erecting of Scaffolds shall be inspected and tagged accordingly by competent personnel before use
Health risks through hazardous substances	H**azardous Substances Management Plan** Contractors will be required to submit and implement a Hazardous Substances Management Plan that complies with WB EHS guidelines and local guidelines as well. This plan shall clearly define the mechanisms for managing biological, chemical, and radiological materials and wastes. The Hazardous Substances Management Plan will address methods both to identify materials that need special handling and to prescribe processes to minimize the risk of their unsafe use and/or improper disposal. This plan shall have procedures to govern activities from receipt to disposal of these hazardous agents.

OHS risk	Mitigation Plan or Measures
Health risks for workers and communities through waste	**Waste Management Plan** It shall be a requirement for contractors to develop and implement a site specific waste management plan (WMP). The plan shall address management of all solid and liquid refuse that result from project activities. The WMP will provide guidelines on waste reduction, segregation, collection and disposal practices in accordance with international best practices, to avoid deterioration of the natural environment and negative impacts on the health and safety of workers and the communities in the project areas. The Project is committed to apply the waste hierarchy and will seek to be a zero waste discharge facility. This plan is the primary tool to guide employees towards waste management.
Risks through noise for workers and community members	**Noise Management Measures** Each contractor shall ensure to manage the project induced noise at the worksite and the surrounding community. Excessive exposure to noise can increase the onset of Noise Induced Hearing Loss (NIHL). In this regard, the contractor shall ensure to put noise control measures to ensure the safety and health of workers and the surrounding communities. Some of the noise control measures include, but not limited to the following: • Improve the design of machines (e.g. by supplying them with shock absorbers and anti-vibration mounting, installing protective Plexiglas enclosures, etc.). Where possible, use special covers, silencers and generally materials with strong anti-vibration capacity. • When technically feasible, reduce emission of noise by placing a barrier between the noise source and the employee (e.g. a sound-proof cabin).
	Increase the distance between the noise source and the worker. Provide workers with personal protective devices such as suitable earmuffs and plugs. Use tools and equipment with anti-noise design. Maintain equipment properly since poorly maintained machinery can increase sound emissions. Reduce the speed of cutting, sawing and spinning (Facts) Limit the amount of time an employee spends at a noise source. This can be implemented when workers take it in turns to spend time at very noisy areas. Provide quiet areas where workers can spend time in order to gain relief from hazardous noisy environments. **(**see Table below)

OHS risk	Mitigation Plan or Measures
Health risks related to air quality	**Air Quality Management Measures** Contractors shall ensure to put in site specific air quality measures to manage air pollution induced by the project activities to safeguard the safety and health of workers and the public. The measures shall be submitted to PCU for approval prior to commencement of any activities which may have the potential to pollute air. Major sources of air pollution include: • Storage sites for cement, quarry, sand and gravel • Loose soil due to excavations and vehicular movements In this regard, there is need to locate concrete batch plant away from residential areas and campsite. Storage sites for cement, quarry, sand and gravel should always be covered. This should include the transportation of such materials. Road and weigh bridges construct may cause significant impacts on surrounding communities due to dust release. The contractor should frequently suppress dust through compaction and water spray. Where quarrying activities will be conducted under the project dust emissions are expected from production and processing of quarried materials, transporting, loading, unloading and stockpiling quarried material. Among others, the contractors shall implement the measures listed below; • Where possible Install a wetting system at the quarry production site to keep materials damp, Cover materials by tarpaulin when being hauled by vehicles, • Reduce drop height to a minimum, Limit vehicles speed, • Provide adequate and appropriate PPE to workers/visitors at the site, • prepare risk assessment for all activities happening at the quarry site. For the operation of quarry site and the borrow site the contractor shall prepare specific measures through the Environmental and Social Management Plan. Malawi Environment Protection Authority as well as the Bank shall approve this Plan prior to commencement of works.

OHS risk	Mitigation Plan or Measures
Risks of Accidents	**First Aid** • A fully equipped first aid box is to be available at all project sites, stores and offices with a ratio of 1 box to 30 people. The first aid box shall be easily accessible, and all workers shall be informed of the location. The Site Engineer / Site Supervisor are responsible for maintaining and recording all the usages of the first aid box. The first aid box shall also be easily available at areas where activities of high risk of injury are being undertaken. • Ensure that the worksite has qualified First Aiders who have undergone first Aid Certification training. • All contractors shall provide or ensure that they are provided with such equipment and facilities as are adequate and appropriate in the circumstances for enabling first aid to be rendered to any of their workers / visitors in case of illness, injury or incident at project sites. • A leaflet on first aid / posters should be kept with the first aid box at the stores. The workers are to be briefed regularly about first aid in the 'Toolbox Talks'. • Remote sites shall have written emergency procedures in place for dealing with cases of trauma or serious illness up to the point at which patient care can be transferred to an appropriate medical facility. Procedures shall be pictorial and in English as well as in common local languages. • The contractors, in their site specific OHS plan/Emergency response plan, shall identify and indicate the closest clinic or hospital to the site in case of emergencies and shall have hospital emergency contacts. • Access roads need to be assessed, and alternative routes identified in cases on emergency situations especially for remote sites.

OHS risk	Mitigation Plan or Measures

Safety risks in regards to excavations	**Excavation and Trench Works**
	• All excavations shall be barricaded at all times with solid barriers. Before excavation works, a permit shall be obtained in which it shall detail:
	  o Clearance of existing services
	  o Dimensions of the trench Means of access
	  o Means of prevention of collapse and falling objects where excavated material is to be kept or disposed of Chance find procedures
	• Trenches and excavations shall be inspected regularly to check collapsing or failing.

Risks through handling machinery and equipment	**Machinery Safety** • All drivers and operators of mobile plant (mechanically propelled vehicles) shall be in possession of the appropriate license for the class of vehicles. Site Engineer/supervisor to ensure that all drivers and operators of mobile plant (mechanically propelled vehicles) are certified as competent. • All mobile equipment (mechanically propelled vehicles) shall be inspected by a competent person and certified fit prior to use on site. Equipment considered to be unsafe shall not be allowed access to the site. Operators and drivers should undergo periodic trainings regarding vehicle and machinery operation. • Daily Check of Equipment to be carried out before starting of shift and document prestart inspection using a checklist and reporting of faults/anomalies • All rotating parts of the plant/equipment shall be guarded properly. • In case of any issues with the vehicle/ equipment, the operator must immediately stop the vehicle and report to Site Engineer/ Foreman and get it rectified immediately. • The Operator/ driver must ensure that no one is close to the equipment while operating. • A trained banksman will give signal to the operator when the equipment is being operated. The banksman must always wear Hi-Visibility jacket for easy visibility – all vehicles/plant shall be fitted with reverse beeping alarms. • Prohibit, (through inductions/ Coc/Training), resting under parked heavy machinery, plant and vehicles. Provide rest areas and encourage workers to rest in designated areas/sheds only.

A5.2.7.2 The Occupation Safety and Health Administration Noise Level Standards

The following table provides the standards, exposure times and need for personal protective equipment.

PERMISSIBLE NOISE EXPOSURES (1)	
Duration per day, hours	Sound level Dba Slow response
8	90
6	92
4	95
3	97
2	100
1.5	102
1	105
0.5	110
Less than or equal to 0.25hours or 15 minutes	115

Source: Occupational Safety and Health Administration

The sub-contractors to impress upon them the safety requirement and necessary preparations thereof.

A5.2.8 Reporting Obligations

All workers, supervisors, engineers, managerial team, subcontractors are responsible for the verbal or written reporting of accidents, incidents, near miss, hazards and occupational illness to the concerned site OH&S Manager. Failure to do this may lead to fine or legal action according to the laws. The H&S Reports should be submitted to PCU and to the responsible authorities on weekly and monthly basis.

A5.2.8.1 Monthly OHS Reports to PCU

Principal Contractors shall prepare monthly OHS reports. The monthly reports shall be submitted by close of business of the first week of following month to the PCU. The weekly reports shall comprise of the following information with respect to the reporting timeframe:

a) Originator
b) Name of the project
c) Activities performed
d) Health occurrences
e) Safety occurrences
f) Resulting accidents, incidents or dangerous situations
g) Root cause analysis
h) Investigation results
i) Measures undertaken to address non-compliances including causes of incidents
j) Lessons learned
k) Informed authorities and resulting obligations/conditions
l) Results of workplace inspections
m) Training records

n) OHS related grievances and resolutions Work Place Inspection Reporting
o) The OHS Staff of contractors will be requested to undertake workplace inspections. In case that hazards and risks are identified during work, it is needed that the identified hazard or risk has to be eliminated and without undue delay during the inspection. In case that the problem could not be eliminated, a written report has to be prepared and issued to the OHS Manager highlighting:
p) a description of the problem;
q) the reason why it could not be solved during the workplace inspection;
r) the needed action;
s) the responsible person;
t) the associated hazards and risks;
u) The deadline until the problem must be solved.

The occurrences must be reported in the monthly OH&S Report. Any other reporting requirements with respect to OH&S, e.g. audit reports, weekly and monthly OH&S reports, remain unchanged. The workers/supervisors shall also be trained to conduct and document a Job hazard analysis to be done for each task before starting work. In addition to the site inspections by the OHS staff.

A5.2.9 Incident and Accident Reporting & Investigation

Any accident resulting into damage or loss of property, injury, disability or loss of human life or have possibility of significant environmental impact shall be reported by project manager of that sub-project giving brief details to PCU at earliest possible time and not extending 24 hours from occurrence of the accident. The event summary report of the same shall be submitted to WB within 24 hours of notification, as per the instructions provided in this ESMF.

A5.2.10 OHS Plan

This section provides an outline on how principal contractors and subcontractors will manage health and safety risks during project implementation. It contains an introduction, risk management process, task specific permits, job safety analysis, Safe work instructions, Health and Safety Review program, Health and Safety audits, Health and Safety, inspections, Health and Safety corrective actions and Health and Safety trainings.

In order to ensure the effective implementation of an OHS plan, the risk involved in the operation should be known. In other words, the degree of risk involved in the operation should be analyzed, controlled and properly managed. The contractor with key personnel along with OHS personnel shall carry out risk assessment of all operations. The basic steps are based on Hierarchy of control (HOC) as follows:

- Classify work activities
- Identify hazards
- Assess the risk from each hazard applying the ESMF risk assessment methodology.
- Try to eliminate the Hazard
- Reduce the risk/ exposure by Hierarchy of Control:
- Eliminate

- Reduce / Isolate risk
- Engineering and Administrative controls (Operating procedures)
- Provision of task appropriate PPE
- For activities which fall under High/Very high risk "H" following measures will be taken:
- Consider alternatives that eliminate the risks;
- Decide if the risk is tolerable otherwise, prepare risk control action plan Identify the qualification/capacity level for persons to undertake the activity
- Providing task specific training, Tool Box Talk, Safety Induction and on the job training.
- Monitor and audit the progress of plan and effectiveness
- Review adequacy of action plan and revise if necessary

A5.2.11 Risk Management Process

A5.2.11.1 Job Safety Analysis

The contractor shall undertake job safety analysis (JSA) or Job Hazard Analysis (JHA). A JSA is a procedure which shall help to integrate safety and health principles and practices into a particular job operation. In a JSA, each basic step of the job-related hazards has to be identified and recommendations have to be provided to choose the safest way to do the job. For conducting a JSA, five steps have to be considered as follows:

- selecting the job to be analyzed
- breaking down the job into a sequence of steps
- Identifying the core requirements and competency for doing the job for instance Don't use an illiterate person for a task that requires lots of numbers and counting/reading
- identifying potential hazards
- Determining preventive measures to overcome these hazards.

Each contractor shall submit a JSA procedure for the approval of the Supervising Engineers and PCU prior to commencement of any activity. A contractor's team will be formed comprising of Site Engineer, Site Foremen. The OHS team to prepare the JSA taking into consideration the above points. The JSA will be based on past experience and will be current site specific. Once, the JSA is ready it will be submitted to PCU or supervising engineer for review and approval. The results of the JSA will be shared with all workers and where there is migrant labor, the contractors will provide for a translator to ensure instructions and safety protocols are correctly understood.

A5.2.11.2 Risk Register

The significant risks involved in the installation/ construction and related activities is assessed and registered in the form of qualitative risk assessment. The risk register is a systematic break down of activities, its potential hazards, and the risk involved. Risk rating is identified by multiplying severity by probability of occurrence based on the risk matrix chart and then its control measures. It is always recommended to prioritize those activities which are having high risk. The concept of a risk register recognizes that risk elements arising from proposed or actual activities fall into one of following four categories:

- Risks which are deemed to have a low risk can be proceeded with taking care of all safety measures
- Risks that have a medium risk will proceed with caution & necessary safety measures
- Risks that have a high Risk need to be managed & checked with site engineer & site OH&S officer. If uncontrolled, a risk event at this level may have a significant impact for the actions and tasks at an installation and construction site as a whole. Mitigating actions need to be very reliable and should be approved and monitored by the OHS Officer & Site Engineer. Even with mitigating actions in place, the construction site staff potentially exposed to that risk should be advised of identified or potential risks which have been graded at this level.
- Risks, which have an extreme high risk and therefore the activity, should probably not proceed until Site engineer & OHS Officer take all necessary corrective measures. Identify if there are any controls currently in place to mitigate those risk; If not, develop and document risk mitigation actions. These could include:
  - Planned actions: Reducing the likelihood of a negative risk to occur and/or reduce the seriousness should it occur (What should you do now?)
  - Contingency actions: Planned actions to reduce the immediate seriousness of a negative risk when it does occur. (What should you do when?)
  - Recovery actions: Planned actions taken once a negative risk has occurred to allow you to move on. (What should you do after?)
  - Risk Transfer: Contractor staffs are covered under firms' accidental insurance. The risk is transferred to subcontractors covering all high risk work. For example bush clearing, excavation etc.

A5.2.12 For work to commence the following steps should be taken:

A5.2.12.1 Stage 1 Highlight Potential Hazards:

Worker(s) and the Site construction foreman guided by the OHS Specialist should highlight potential hazards of a task and identify all necessary safety measures. Hazard identification must consider all required electrical and mechanical equipment. Stage 1 has to be done in writing. Work is not permitted to commence until Stage 4.

A5.2.12.2 Stage 2 Application of Permit:

The Site Engineer/ Foreman (Issuing authority) applies for permission to start work on a prescribed form and submit the application to the OHS Specialist only when all requirements and conditions described in the permit to work have been fulfilled. The Site Engineer /Foreman has to indicate in the written permit that risk assessment was conducted. The risk assessment must be attached to the permit to work.

A5.2.12.3 Stage 3 Evaluation of Permit:

The Supervising Consultant will evaluate and verify that all safety conditions specified in the permit to work have been fulfilled and are adequately described. The Supervising Consultant may also recommend additional measures in the permit to work when necessary. Inspection to the location of work where the permit to work has been applied for is to be done, with the

Foreman during this process. Only when all safety requirements and conditions stated in the permit to work are fulfilled, the permitting Supervising Consultant will then endorse the permit to work form and forward to the OHS Specialist.

A5.2.12.4 Stage 4 Approval of Permit:

The Supervising Consultant may approve and issue the permit to work only when it is satisfied that:

- Proper evaluation of risk and hazards for the work concerned has been conducted including competence and skills of the persons to carry out the task should be checked;
- No incompatible work will be carried out in the same time and location of the permit to work, which may pose a risk to the persons at work;
- All reasonably practicable safety measures have been taken and all persons involved in the work have. been informed of the work hazards under the Permit to Work;
- All electrical and mechanical equipment is demonstrable checked and in safe condition. Please note that the permit can be signed by E&S specialists in absence of Project Manager as authorized persons. E&S Specialists must inform the Project Manager before signing the permit. A work permit is valid for a time limit say one working day and for the specified working time. An extension could be provided for additional two hours. In case the tasks could not be finalized within the validity of the permit to work, the permit to work must be renewed before commencement of work on the day the work may continue.

A5.2.13 Safe Work Instructions:

Contractors shall develop site-specific work instructions. Safe work instructions identifying the occupational health and safety issues that may arise from use of the machinery and equipment. The safe work instruction must be based on the OHS Plan. A safe work instruction should identify:

- the risks and hazards associated with the use of a specific tool or piece of equipment;
- the required control measures to be checked to ensure a safe use of a specific tool or piece of equipment;
- the specific training and/or qualification required;
- the personal protective equipment to be worn.

Note that Safe work instructions do not replace the requirement for a risk assessment, Preparation of a workplace procedure, the need of a permit to work or the need for training. They may be used to supplement the process of creating and providing a safe system of work. In the forms of standard operating procedures or standard work method statements for activities to be undertaken. The safe work instructions shall be submitted for approval from the concerned authorities. The approved work instruction must be communicated to each and every member of the working crew for understanding.

A5.2.14 Health & Safety Review Program:

All contractors under shall commit to review their performance in OHS on a timely manner and as and when required basis. The Project believes the review (Check) will play an important

role in continual improvement of any OHS management procedure. Principal Contractor shall implement a Project specific OHS Review Programme for the project. The review program shall include a systematic evaluation of the implemented management system, compliance with this OHS Standards document, and the project OHS Plan and local legislative requirements.

A5.2.15 Health & Safety Audits:

Contractors shall review the OHS management system by undertaking OHS Site Audits on a quarterly basis OR randomly. The audits shall be performed by the Construction Manager, OH&S Manager, and the Supervising Consultant. The audits shall be conducted at the construction sites, material and equipment storage areas, workshop areas and accommodation areas (Worker's camp area), and the adjacent areas affected by the project activity sites, including ancillary sites. These audits shall be recorded and a copy of the audit report shall be attached to the monthly Health & Safety report. Each contractor will develop its own internal as well as external auditing procedure and Project specific Audit Plan.

A5.2.16 Health & Safety Inspections:

Competent Inspection and monitoring is the key to continual improvement when monitoring deviations from the plan and change in the conditions. The inspection will help the contractors to improve their performance by early detection of indicators to major incidents. The PCU shall ensure competent inspection and monitoring on weekly basis of all contractors OHS performance.

A5.2.17 Corrective Action:

After conducting inspections, the following corrective actions should be undertaken. The list of corrective actions must include the following information:

- Identified risks and non-compliances;
- Needed corrective actions;
- Needed personal and material resources;
- Responsible person;
- Date for latest finalization

A5.2.18 Training:

OHS training aims at equipping workers with knowledge and skills on identifying safety, health and environmental hazards as well as determining appropriate control measures. The trainings will be provided in workers' language. Trainings take different forms as indicated below:

A5.2.18.1 Induction Training:

The recruitment and placement processes ensure that all workers and subcontractors have the necessary physical and mental abilities for the job or can acquire these through training and experience. The contractors will ensure that all new workers, labor supply (from approved vendor) and subcontract personnel (approved) shall be given a Health and Safety induction, carried out by OHS Specialists. No personnel/ sub-contractor will be engaged prior to approval. Prior to commencement of work all tradesman shall be given a trade test by a qualified and competent site foreman and/or site engineer.

OHS induction can be defined as the initial training and awareness imparting session to make the personnel aware of the inherent hazards and risks involved in the process and area. Prior to commencing work, the contractor will ensure that all personnel undergo an OHS Induction course which stresses the need for the highest standards of health and safety on the project and conveys the requirement to fulfil the requirement of this OHS Plan. No workers will be allowed to work/visit on site without prior induction.

Below is a list of some of the topics to be covered during worker's induction:

- World Bank and National OHS policy statement
- Brief of safety rules and regulation
- Permit to work systems
- Emergency response procedures, emergency telephones numbers assembly points.
- First aider's telephone numbers, egress routes, first aid fire-fighting procedures.
- Reporting procedure.
- Reporting system for unsafe working conditions and practices
- Proper usage of PPE at site.
- Hand tools and its usages.
- Unauthorized jobs or tasks
- House Keeping and waste identification.
- Warning signs and cautions displayed on site.
- Transport, vehicle and equipment movement. Traffic safety
- Drug and alcohol policy.
- Occupational health and hygiene.
- Accident, incident and Near Miss Reporting procedures
- Heat stress, dehydration and remedies (Heat related abnormalities).
- Explanation of project and employee duties and responsibilities.
- Electrical hazards.
- Protection of environment, pollution to Air, Water and Soil
- Waste handling and disposal procedures.
- Basic site safety rules.
- Recent Similar field incidents.

The contractors will ensure that they have the induction training scheduled for the newly joining workers any day irrespective to pre-planned program. Refresher training will be done on a semi-annual basis or as and when situation demands. Before entering the site, all visitors must undergo OHS induction process. A induction module for visitors will be designed by OHS Specialist for the contractors. The visitors will be provided with an overview of OH&S rules particularly OH&S risks, risky areas, significance of PPE they need to wear before entering the site and emergency protocols. Visitors induction records will be maintained.

A5.2.18.2 Toolbox Talks:

Tool box talk (TBT) is a 5-10 minutes communication between working crews and site supervisor/site engineer related to job specific safety issues, roles responsibilities on daily basis

and as and when required. Contractors will ensure that TBT document is available with safety department. During the meeting the site engineer will always ensure all the work force is aware of their duties, Dos and Don'ts and risk involved. The site engineer/ supervisor shall also monitor/ verify the fitness of the personnel for work. Toolbox talks should consider as well lessons learned from incident and accident investigation, audits, workplace inspections etc. The Site Engineers/ Supervisor shall conduct regular toolbox meeting on different topics by selecting small groups of people (maximum 15).

A5.2.18.3 Needs Based Training:

Needs based trainings look at the knowledge, skills, and abilities of workers to determine what types of training they need to achieve RCRP 2 objectives.

A5.2.18.4 Training Needs Analysis:

Training Needs Analysis (TNA) is the process to discover the training and development needs of people so that they can carry out their job effectively and efficiently, and also to continue to grow and develop their careers. TNA covers a range of approaches. All contractors will carry out a TNA to identify the training needs of the work force as regards OHS.

A5.2.18.5 Training Schedule:

Planned training programs gives the opportunity of continual improvement and re-enforcing the best work practices by reminding the bad practices acquired during the work. All contractors will prepare a training schedule to be in line with TNA to help the personnel gain required level of competency for the time in need.

A5.2.18.6 Personnel Protective Equipment (PPE):

PPEs are the last resort of personnel protection. Contractors shall identify PPEs for the working personnel considering the following: For each hazard identified, select personal protective equipment that will protect the employee by creating a barrier against workplace hazards. Consider the likelihood of an accident and the seriousness of a potential accident. PPE must be selected to protect against any hazard that is present or likely to be present. It is important for department personnel to become familiar with the potential hazards, the type of protective equipment that is available, and the level of protection that is provided by that equipment. The PPE selected must fit the employee it is intended to protect. Make certain that workers have the correct size of protective equipment. Whenever possible, select adjustable personal protective equipment. Workers including subcontractor workers must be trained in the use of their specifically needed appropriate PPE and adhere to No PPE, No work policy.

Employee input in the selection process of PPE is critical. Personal protective equipment that fits properly and is comfortable will more likely be worn by workers. Damaged or defective protective equipment must be taken out of service immediately to be repaired or replaced and workers must be provided with the proper equipment in the interim. Mandatory PPEs requirement at site will be Helmets, Safety Shoes, and Hi- visibility vest before entering to site. Few examples listed below the purpose of using such equipment as: Helmet used to prevent - Objects might fall from above and strike them on the head; might bump the heads against fixed

objects, such as exposed pipes or beams; or there is a possibility of accidental head contact with electrical hazards. Safety Shoes- for example employees who face possible foot or leg injuries from falling or rolling objects or from crushing or penetrating materials, should wear protective footwear. High visibility vests to be used for good visibility specially to attract drivers/operators while operating equipment and vehicle. Task specific PPEs will be used while carrying out specific activities.

A5.2.18.7 OHS PPE

Specific Task	**Task Related PPEs**
Material Handling, Manual work, pulling, Handling hazardous substance, chemical, grinding, welding	Hand gloves suits the work.
Grinding, cutting,	Face shield, gloves while grinding
Working on electrical panels or on live line	Electrical insulated hand gloves and face shield, not steel toe cap boots, rather alloy toe capped boots
Concreting	Gumboots
Noisy Area	Ear plugs / ear muff
Dusty Area	Dust Masks, Safety glasses
Insulator fixing or work on cross arm	Self-Retracting Lanyards
Concrete work, handling chemical, object swinging towards the eyes, protruding object	Eye goggles

A5.2.18.9 Signs, Signals & Barriers:

The Occupational Safety and Health Administration (OSHA) have revised the construction industry safety standards to require that traffic control signs, signals, barricades or devices protect workers. Contractors shall analyze the site requirement for the signs, signals and barriers on daily basis prior to the start of activity. The signs shall be pictorial and in English, common local language and any other language for migrants.

A5.2.19 OHS Procedures

This section outlines specific activities to be implemented by contractors when implementing sub-projects activities under the Project. The contractors will always adhere to the procedures that follows:

A5.2.19.1 Task/Activity Risk Assessment

Contractors shall undertake a risk assessment for all activities and will be assessed to be of a low, medium, high and very high risk. The OHS Specialist shall conduct the risk assessment with the involvement of the foreman, and worker(s) to undertake the activity. A Preliminary Risk Assessment (PRA) of all works will have to be done before the start of works. The PRA

should be done by the engineers, health and safety officer/Specialist site leadership team thus foreman and team leaders. The risk assessment shall be carried out before the execution of the activity and the risk assessment shall be documented. The risk assessment shall be approved by the Manager responsible for the installation or construction site. The risk elements shall be identified from actual activities and associating them in terms of likelihood of occurring and seriousness of impact.

A5.2.19.2 Portable Water Supply

The contractor shall be responsible for supply of potable water for drinking and raw water for washing/toilet facilities, and construction purposes. Drinking water shall meet the drinking water quality standards as specified by Malawi Bureau of Standards.

A5.2.19.3 Workplace Temperature

Exposure to hot or cold working conditions in indoor or outdoor environments can result in temperature stress-related injury or death. Use of personal protective equipment (PPE) to protect against other occupational hazards can accentuate and aggravate heat-related illnesses. Extreme temperatures in permanent work environments should be avoided through implementation of engineering controls and ventilation. Where this is not possible, such as during short-term outdoor work, temperature-related stress management procedures should be implemented which include:

- Monitoring weather forecasts for outdoor work to provide advance warning of extreme weather and scheduling work accordingly
- Adjustment of work and rest periods according to temperature stress management procedures provided by ILO, depending on the temperature and workloads ,
- Provide temporary shelters to protect against the elements during working activities or for use as rest areas
- Use of protective clothing
- Providing easy access to adequate hydration such as drinking water or electrolyte drinks;
- Alcohol tests will be done every morning and workers who test positive will be barred from entering the site

A5.2.19.4 Lone and Isolated Workers

A lone and isolated worker is a worker out of verbal and line of sight communication with a supervisor, other workers, or other persons capable of providing aid and assistance, for continuous periods exceeding 5 minutes. The worker is therefore at increased risk should an accident or injury occur. Where workers may be required to perform work under lone or isolated circumstances, the contractor/client shall develop and implement SOPs to ensure all PPE and safety measures are in place before the worker starts work. The developed SOPs shall establish, at a minimum, verbal contact with the worker at least once every hour, and ensure the worker has a capability for summoning emergency aid. If the worker is potentially exposed to highly toxic or corrosive chemicals, emergency eye-wash and shower facilities should be equipped with audible and visible alarms to summon aid whenever the eye-wash or shower is activated by the worker and without intervention by the worker.

A5.2.19.5 Lavatories

During implementation of all activities the contractor shall provide adequate and appropriate lavatory facilities. The facilities shall be maintained in a clean and orderly condition. The provided lavatory facilities shall meet the number of people expected to work in the facility and allowances made for segregated facilities, or for indicating whether the toilet facility is "In Use" or "Vacant". In cases where both male and females are employed the lavatories will have separate entry for each sex. Toilet facilities shall also be provided with adequate supplies of water and soap.

A5.3 Waste Management Plan Framework

This annex presents a Waste Management framework that provides minimum requirements and guidance for the implementation of project activities. This framework should follow the WB EHS guidelines and local regulations. Sub-project-specific measures should be added according to the specific risks and impacts identified. This Framework provides guidance on the management of the different types of waste that will be generated during the Project implementation. Hazardous waste management is handled in the following annex. Likely non-hazardous wastes under the Project components include sanitary wastes, construction waste, including small amounts of waste plastic containers for oils and lubricants, broken filters and belts, and damaged tires will be generated. Construction and managerial staff will also generate some waste such as paper, bottles, cans, plastics, and food scraps.

The measures presented here will reduce the risk(s) of destroying and/or polluting the environment. They main to prevent any adverse impacts to the local environmental conditions from any construction or rehabilitation activities that generate waste through the implementation of waste management principles and best practice strategies.

A5.3.1 The Objectives are as follows:

- Minimize waste generation in line with the principles of the waste hierarchy: reduce, reuse and recycle.
- Safely dispose of all non-reusable and non-recyclable non-hazardous wastes.
- Comply with relevant regulations and standards.
- Increase the efficiency of the use of raw material.
- Reuse, reduce or recycle material where feasible.
- Promote awareness of and adhere to proper waste management procedures.
- Manage waste as close to the source as practicable.

A5.3.2 Types of Waste and Management

Non-Hazardous Waste is waste that is not toxic but is degradable in the environment – constituted of construction non-hazardous waste and camps/offices non-hazardous waste, including waste waters etc. During the site activities, waste will be generated from sources such as workers' camps and construction and rehabilitation activities.

A5.3.2.1 Waste Management Method Table

Type of Waste	Management Measures
Wood (timber, slash, stumps, etc.)	Reuse, donate, dispose
Treated wood (poles, cross arms	Reuse, donate, dispose
Metals (Ferrous and Non-Ferrous) (but not including drained electrical equipment (transformers, etc.) *refer hazardous substances.*	Reuse, Recycle, dispose.

Type of Waste	Management Measures
Food waste	Composting, dispose
Paper and Cardboard	Recycle
Concrete wastes	Reuse, Dispose in landfill
plastics	Recycle, Reuse, Dispose
Office waste	Recycle, dispose.
Waste from demolition materials	Recycle, dispose
Hazardous waste	Segregate at source, store in secure and clearly labelled containers, and disposal by an approved hazardous waste facility.

A5.3.3 Waste Management Process

A5.3.3.1 Pre and Post Project Waste

Any existing unidentified waste exposed or uncovered on site prior to the initialization of site activities will be brought to the attention of the contractor. All wastes identified pre- project will be clearly documented, and pictorial evidence taken if necessary.

All temporary project infrastructure will be removed after the project activities have been completed. All project rubble and waste generated from the decommissioning of the construction camps, etc. will be sorted into materials that can be reused and waste material for discard. All discarded material will be removed to waste disposal facility. A final site walk through will be undertaken with the client environmental representative to ensure that all rubble/waste has been adequately removed before the site is handed over to the client. A site handover will be done by concerned parties to acknowledge satisfactory waste removal.

A5.3.3.2 Waste Avoidance and Minimization

The opportunity for avoidance and minimization of waste production as described above can be summarized as follows:

- Non-hazardous or low toxicity materials/products will be selected instead of hazardous material/products, whenever feasible;
- Where possible, construction materials will be ordered on a “as needed” basis to prevent over-supply to site;
- As far as possible, it must be ensured that all construction materials are stored and handled correctly to minimize damage to the materials which will render it unusable; and
- Minimization of waste will also include the reduction of waste toxicity. This may be performed by selecting low toxic chemicals used during the Project.

A5.3.3.4 Waste Collection Points

The main waste collection point will be in an easily accessible area within the main camp area or construction site. The waste collection point will be selected, taking into considering the prevailing wind direction, surface runoff patterns, topography and visual context and will as far as possible, cause the minimum of nuisance to adjacent properties. It will be ensured that the waste disposal area will not be located near any drainage areas, wetlands on and near the site.

The selected waste area will comprise of a cordoned-off and contained area. Provisions will be made for the segregation of waste into non-hazardous and hazardous waste. Non-hazardous waste will further be divided into organic and non-organic waste. Organic waste will consist of general domestic food waste. Non-organic waste will consist of glass, plastics and metals.

All waste containers on site (bins, skips, drums, etc.) will be clearly labelled with visible signs to indicate which waste it contains.

A5.3.3.5 Waste Treatment and Disposal

If waste produced cannot be reused or recycled, the waste will be disposed of at a waste disposal facility. Options for disposal of solid organic waste include composting at site. An appropriately sized location will be dug for this purpose and it will be ensured that the facility has sufficient air and will be protected from rodents and other scavengers.
Non organic waste is usually recyclable. Where it is not recyclable or too dirty for recycling, it shall be disposed of at a waste disposal facility.

A5.3.3.6 Waste Disposal Methods

Waste	**Disposal Method**
METALS: Scrap metal, tins, cans, foil	Separate Bin - Metals
Plastic bottles and polythene	Separate Bin – Plastics Empties of water etc.
Cardboard boxes and papers	Separate Bin – Card & Paper
Bottles and Glass	Separate Bin - Glass

A5.3.4 Procedures for Handling and Storage of Waste

A5.3.4.1Waste Handling

All personnel who are involved in the handling of non-hazardous waste will undergo specific training in:

- The procedure to be followed to ensure adequate segregation;
- Waste handling (and PPE requirements) including collection;
- Waste storage; and
- Correct waste disposal procedures.

Waste from litter bins will be collected from site on a weekly basis or as required. Accumulated hazardous waste will be removed from the site daily and will be transported to the main waste collection point.

Waste will be removed from site on a monthly/weekly basis. The frequency of waste collection will be determined based on the rate in which the waste accumulates during the construction activities.

A5.3.4.2 Temporary Waste Storage

All waste produced during the Project activities at site and servicing activities and camps shall be collected using appropriate personnel protective equipment and they shall be sorted out and temporarily stored in special containers at the camp.

The waste storage areas are to be indicated on relevant site procedures and will be located at least 100m from any watercourses. Wastes will be stored in a manner to prevent:

- Accidental spillage or leakage, contamination of soils and groundwater, loss of integrity from accidental collisions or weathering by provision of suitable secondary containment and/or roofing;
- Corrosion or wear of containers both from the weather, by protecting waste storage areas, and from the wastes themselves, by selecting containers suitable for storage of intended waste,
- Theft by people by storing waste within security of camp perimeter; and
- Scavenging by animals by storing putrescible waste in closed bins before composting, The waste storage containers used will be appropriate in terms of volume, composition, shape and opening for the material that is being stored. Only containers in good condition will be utilized. Lids will be securely fastened, or other forms of covering shall be provided. No containers will be used that are susceptible to reaction with the wastes, which may lead to the release of harmful substances. All hazardous wastes will be strictly segregated. Only one category of hazardous waste may be placed in any one container. Solid and liquid wastes will not be mixed, as well as hazardous waste of incompatible nature.

A5.3.5 Construction Site Clean-Up and Disposal of Waste Materials

A5.3.5.1 Site clean-up

The contractor shall always keep the construction area, including storage areas used free from accumulation of waste material or rubbish. The contractor shall obtain a permit or other appropriate documentation approving the disposal methods used. All used fuels, oils, other plant or vehicle fluids, and old tires and tubes shall be collected to a central disposal area daily and disposed of in a manner approved by the Approving Authority (e.g., Local District Council).

Servicing of equipment and vehicles shall whenever possible be carried out at a workshop area. This workshop area shall be equipped with secure storage areas for fuels, oils and other fluids and constructed in such a way as to contain any spillage, which may occur, and similar storage where fluids can be stored securely prior to their disposal. When servicing of plant, equipment and vehicles

is carried out away from the workshop area it shall be done at locations and in such a manner as to avoid spillage and contamination of streams and other drainage courses.
In the event of the contractor's failure to perform the above work, the work may be performed at the expense of the Contractor, and his surety or sureties shall be liable.

A5.3.5.2 Disposal of waste materials

Waste materials, including refuse, garbage, sanitary wastes and oil and other petroleum products, shall be disposed of by the contractor.
Waste materials removed from the construction area shall be dumped at an approved dumpsite.

- Disposal of Material by Burying: Only materials approved by the Local Authority and the Project Engineer may be buried. Burial shall be in pits and the location, size and depth of which shall be approved.
- Disposal of Material by Removal: Material to be disposed of by removal from the construction area(s) shall be removed from the area(s) prior to the completion of the work under these specifications. All materials removal shall be the Contractor's responsibility.
- Disposal by dumping: Materials to be disposed of by dumping shall be hauled to an approved dump site. It shall be the responsibility of the Contractor to make any arrangements of such dumping. Any fees for charges required to be paid for dumping of materials shall be paid by the Contractor.

A5.3.5.3 Water Pollution

The Contractor shall observe the requirements to avoid the pollution of watercourses and ground water. Sanitary facilities for all sites workers convenient to the working sites shall be provided to enable environmentally sensitive disposal of the waste. The storage of fuel and oil for the works operations shall be arranged in working sites, refueling of all plant and equipment and servicing practices shall be arranged to prevent the uncontrolled spilling of any oil-based products.

Mitigation measures shall include drip trays, working on paved surfaces with waste collection arrangements and the provision of oil absorbing material for spills that can be subsequently disposed safely by burning.

A5.3.6 Best Waste Management Practices

These include the following:

- The contractor to obtain permits regarding waste management from relevant authorities.
- The contractor to provide handling containers, storage, signage, transportation, and other items as required to implement waste management procedure during the entire duration of the project.
- The Environmental management personnel to be responsible for matters of managing the environment including being responsible for implementing, monitoring, and reporting status of this procedure and shall be full time on worksites throughout the project.

- All workers, subcontractors, and suppliers to be trained on proper waste management procedures, as appropriate for the work occurring at Project Site(s). Information, Education and Communication (IEC) materials shall be distributed and/or made available to everyone concerned and to all entities when they first begin works.
- To provide specific designated and labeled areas on project site(s) necessary for separating materials that are to be recycled, reused, donated, and sold. Recycling and waste bin areas are to be kept neat, and clean, and clearly marked in order to avoid contamination of materials and.
- Hazardous wastes to be separated, stored, and disposed of according to local regulations and should not be included in management of the other waste streams.

A5.3.7 Consultations with interested stakeholders and link with GRM

The Project has a Stakeholder Engagement Plan which includes those directly involved in waste generation and management. Community members need to have information or resources related to various waste management-related activities such as (e.g. transportation, sanitation, emergency response, environmental health, public health, and business leaders viz a viz potential generators of waste). The communities must have a chance to express their grievances around waste management through the provided Grievance Redress Mechanism (GRM) should that need arise. Each stakeholder's role, in terms of waste management should be clearly spelt out in stakeholder consultation meetings, disclosures and consultative meetings.

The Waste Management measures define ways in which the community should be informed of waste management-related information, including the transportation and management of incident-related wastes in or near the community. The most effective methods of notifying the community about the risks that each waste stream may present to human health and the environment should be clearly spelt out and disseminated at stakeholder engagement opportunities. Communication channels for waste management information should be clearly stipulated be it through the media, community meetings and any other channels that may be identified. If there are possible ways to increase public understanding and acceptance of decontaminated wastes, reused materials and recycled products, let this be known to all stakeholders and members of the community. All relevant personnel involved in waste management operations need to acquire have appropriate training regarding waste handling and management. Use of PPE should always be adhered to in all sub projects.

A5.3.8 Waste Management Plan

A5.3.8.1 Waste Management Matrix

No.	Contractor Measures	Output Indicator	Means of Verification	Time Frame	Responsible Person	Legal Limits / acceptable criteria
1.0	**General Measures**			**Construction phase**		
1.1	Develop & implement staff training program (at induction and through Toolbox Talks)	# of staff trained	Training/toolbox talks/progress reports	Ongoing	Contractor	IFC Performance Standards (2012) 1 & 3, ESS 1 & 3
1.2	Work fronts and office waste handling activities	# of clean sites	Progress reports	Ongoing	Contractor	IFC Performance Standards (2012) 1 & 3, ESS 1 & 3
1.3	Identification and implementation of measures for avoiding or reducing waste generation at work fronts as far as practicable.	Amount/type of waste generated	Waste register/progress reports	Ongoing	Contractor	IFC Performance Standards (2012) 1 & 3, ESS 1 & 3
Waste handling &storage						
1.3	Waste segregation at source: color coding/bin labelling	% of labeled storage containers for different types of waste onsite	Inspection/progress reports	Ongoing	Contractor	MBS waste Handling Standards
1.4	Designation of secure temporary waste storage areas on sites for various waste types: hazardous/general. Provision of proper storage containers, waterproof flooring and signage	# of sites with availability of secure waste storage yards	Inspection/progress reports	Ongoing	Contractor	MBS waste Handling standards

No.	Contractor Measures	Output Indicator	Means of Verification	Time Frame	Responsible Person	Legal Limits / acceptable criteria
Non-Hazardous Waste Transportation and Disposal						
1.5	Collection and transportation of waste without spilling while in transit to a disposal site.	Covered Vehicle with Tarpaulin	Inspection/progress reports	Ongoing	Contractor	MBS waste handling standards
1.6	Regular (weekly) emptying and collecting waste for disposal	Frequency & Quantity of waste disposed	Waste registers/ progress reports	Ongoing	Contractor	MBS waste handling standards
1.7	Prohibition of open burning of waste	# of sites with no evidence of waste burning on site	Inspection/progress reports	Ongoing	Contractor	MBS waste handling standards
1.8	When necessary, License shall be obtained from MEPA/District Councils for handling, transportation and disposal of waste according to EMA 2017	# of sites with licenses obtained	Copies of the Licenses	The first 2 months of commencement	Contractor	EMA 2017
1.9	All construction solid waste that cannot be reused or recycled in a practicable and feasible manner will be disposed of by burying at a pre-approved off-site disposal site (Preapproval should be by environmental authorities and should be specific to the types of wastes proposed for burial)	Location of disposal site & amount of waste disposed.	Waste registers/ progress reports	Ongoing	Contractor	MBS waste handling standards & EMA 2017
1.10	Prohibit dumping of waste in water bodies and general littering shall not be allowed**.**	# of sites with no trace of waste dumped	Waste registers/ progress reports	Ongoing	Contractor	IFC Performance Standards (2012) 1 & 3, ESS 1 & 3

No.	Contractor Measures	Output Indicator	Means of Verification	Time Frame	Responsible Person	Legal Limits / acceptable criteria
		in water bodies				
1.12	Other alternative disposal options will be evaluated on a situation- situation basis during construction and / or at start-up of work Phase.	# of sites with Identified alternative Disposal methods	Progress reports	Ongoing	Contractor	MBS waste handling standards & EMA 2017
1.13	Ensure that no waste materials are left at each project work site.	# of clean sites after sub-project closure	Progress reports	At the end of project	Contractor	IFC Performance Standards (2012) 1 & 3, ESS 1 & 3

A5.3.9 Performance Monitoring

1) Inspections: Sites inspections will be performed by the Health, Safety and Environment (HSE) Officer of the Contractor on weekly basis. Waste quantity shall be recorded (as number of 200L waste bins collected and disposed per week). These inspections will ensure that all commitments in this plan are being enforced and that specific waste management elements are verified.
2) Data Collection: Waste material register should be maintained to ensure the measurement of eliminated waste and of residual matter sent for reuse, recycling and others.
3) Audit: Six months since commencement of the project, a waste management audit should be performed, on sites all waste data collected, to identify waste streams and fate and develop ways to reduce waste production.

A5.3.10 Roles and Responsibilities

The roles and responsibilities inherent to this waste management plan are as per table below:

A5.3.10.1 Table Roles and Responsibilities

ENTITY	RESPONSIBILITY
PCU	• Enforce the Waste Management Plan. • Contractually obligate the contractor to meet the requirements of this Waste Management Plan.
Contractor	• Employ a person responsible for overseeing matters of environmental management. • Provide garbage receptacles to allow for waste segregation. • Develop a site-specific Waste Management Plan for the activities the Contractor is undertaking. • Educate all members of staff on the waste hierarchy. • Education is to be provided to each staff member prior to commencement of work, and regular refresher sessions are to be undertaken in the form of toolbox talks or training sessions throughout the contract period. • Provide and distribute Information, Education and Communication (IEC) materials to everyone on sites
District Councils/MEPA/other stakeholders and authorities	• Conduct audit and monitoring activities

A5.3.11 Contractor Responsibilities

THE CONTRACTOR and any of its sub-contractors working on site will be required to adhere to the requirements of this General Waste Management Procedure and all applicable environmental documentation and legislation.

THE CONTRACTOR will provide enough training to all staff to ensure that they are aware of the relevant aspects of this Procedure and are able to fulfil their respective environment and waste management functions.

THE CONTRACTOR will, if required appoint a reputable waste service provider to assist with safe disposal of any hazardous waste.

A5.3.11.1 Specific Contractor Responsibilities:

Responsible Person	**Responsibility**
Project Director	• Will ensure that there are enough resources (people and money) to manage and monitor the waste issues of the project. • Will ensure that the Waste Management reflects any changes during the construction process that may have a significant environmental impact and manage them accordingly. • Will ensure the waste records are returned to Head Office for review.
Project Manager	• Will be responsible for ensuring that all site staff, including sub-contractors, and activities comply with the General Waste Management Procedure. • Will ensure that all environmental incidents are reported and dealt with effectively.
HSE Officer	• Will ensure that environment and waste management activities comply with applicable ESHS standards and all project Safeguards Instruments. • Ensure that signage for waste segregation and other relevant safety signs are clearly posted as required. • Will ensure a chemicals usage register is kept on site.
Site Supervisors	• Will work in close coordination with the HSE Supervisor. • Will be responsible, with the assistance of the HSE officer, for ensuring at their level that all site staff, including sub-contractors, works in accordance with the environmental requirement relevant to their activity. • Will be responsible for reporting to the Project Manager and/or to the HSE Officer any deviation from the Environment Management System requirements, or any environmental incident that they could observe on the site.

A5.3.12 Record Keeping

Data on waste production and disposal will be gathered continually via waste registers. These records will be maintained on site and made available to all authorities and any other body to audit or assess the waste management practices on site. This data will include the final destination of each waste stream and where disposal has occurred proof of safe disposal will be required (such as stamped waste disposal ticket issued by a sanitary landfill). A cost will be paid for safe disposal of any hazardous wastes. Evidence of waste disposal will always be maintained.

A5.4 SEA and SH Prevention and Response Plan.

A5.4.1 Objectives of the Plan

This Sexual Exploitation and Abuse (SEA) / Sexual Harassment (SH) Prevention and Response Plan has been developed to accompany the implementation of the Project and ensure that it does not have any negative impacts or further promotes SEA/SH. It presents operational activities as well as recommendations for SEA/SH risk mitigation measures that build on existing mechanisms. The SEA/SH Prevention and Response Plan is based on the commitments made by Malawi in its respective gender policies and laws, and on the commitment made in the ESCP. It provides procedures for grievances related to such abuses in relation to project activities. It is based on existing protection, prevention and mitigation strategies as coordinated through the GBV sub-cluster.

This Plan has been developed to accompany the implementation of the Project and ensure that the Project does not have any negative impacts or further promotes SEA/SH. It presents operational activities as well as recommendations for SEA/SH risk mitigation measures that build on existing mechanisms in the Project areas. The Action Plan also provides procedures for SEA/SH grievances in the project areas. It is based on existing protection, prevention and mitigation strategies and measures as coordinated through key actors and the GBV sub-cluster group in Malawi. The following activities are conducive to the recognition by all project contractors of the risks of SEA/SH and the specific vulnerabilities of women and girls. These measures will be updated as needed throughout the life of the project. SEA/SH response measures are designed based on WB recommendations for improving gender outcomes.63

The Plan includes the following sections: Strengthen institutional capacity for SEA/SH; prevention, capacity building and communication on SEA/SH for contractors, suppliers, and communities; inclusion of SEA/SH requirements in the tender processes; Preparation of SEA/SH risks assessments at sub- project sites; strengthening of GBV service provision and referral pathways; SEA/SH reporting protocol & referral pathways; and monitoring and supervision of the Plan[1].
”

A5.4.2 Definition of SEA/SH

According to the World Bank Good Practice Note on GBV in civil works, ‘GBV is an umbrella term for any harmful act that is perpetrated against a person’s will and that is based on socially ascribed gender differences.’64 It can thereby occur in a variety of different ways, including through the infliction of physical, mental, and sexual harm or suffering’ threats of such acts, as well as coercion and other deprivations of liberty. Sexual Exploitation and Abuse (SEA) and Sexual Harassment (SH) are manifestations of GBV. Both are relevant for the Project. The Good Practice Note defines these as follows:

- SEA: is the exploitation of a vulnerable position, differential power, or trust for

[1] World Bank’s Good Practice Note: Addressing SEA/SH in IPF with Major Civil Works, the Secretary-General’s Bulletin ST/SGB/2003/13, dated 9 October 2003, on “Special measures for protection from sexual exploitation and sexual abuse”, as well as the Secretary-General’s Report A/71/818 dated 28 February 2017 on “Special measures for protection from sexual exploitation and abuse: a new approach”.

sexual purpose; or actual or threatened sexual physical intrusion.

- Workplace SH: are unwanted sexual advances; requests for sexual favors; and sexual physical contact.

A5.4.3 SEA/SH-related Project Risks

The SEA/SH risk rating is considered to be substantial. Malawi has high rates of Gender Based Violence (GBV) including intimate partner violence, sexual violence. Key drivers include high rates of early marriage and childbirth, low levels of economic independence and low levels of education. While legislation exist to prevent and respond to GBV there is weak enforcement and critical national action plans on GBV require updating. Resources to address GBV are also limited and fragmented in the Southern Region. Within the Shire Valley GBV related incidences have been reported on other project sites where prevention and response measures are in place indicating the level of risks and tolerance for GBV by workers and in the community.

Labor influx is anticipated during construction with works located close to rural villages. There is therefore the risk of workers subjecting community members including minors to SEA/SH. This may take the form of rape as well as transactional sexual relations. SEA/SH may also occur on worksites, in camps or in exchange for employment opportunities on the project usually perpetrated by men against female workers. The Project will be implemented over a dispersed geographical footprint with multiple sites where male and female workers may be in close proximity or where male workers will be close to communities with limited supervision.

A5.4.4 Grievance Redress Mechanism

The Project will establish a Project GRM, as described in the SEP and in the ESMF above. The GRM will provide a systematic mechanism for collecting suggestions and complaints from beneficiaries or those who consider that they have been harmed by the project. SEA/SH grievances can be reported through the GRM channels. All recipients will be trained in the appropriate handling of SEA/SH cases.

The PCU will contract a GBV service provider to assist the Project with SEA/SH related tasks. The GBV service provider will map SEA/SH reporting channels at the district level as part of the project´s communication campaign. The PCU and the GBV Service Provider will ensure that a SEA/SH Focal Point is designated for key subproject areas at district level or above (depending on the subproject activities). The SEA/SH Focal Points with the GRM Team will be the designated persons to adequately refer SEA/SH complaints, if received directly and outside of the GRM. They will have specific responsibilities and will be trained on SEA/SH mechanisms. The PCU Social Safeguards Specialist and the GBV Service Provider will identify specific responsibilities and train the SEA Focal Points on SEA/SH mechanisms and to receive SEA/SH complaints, considering the degree of confidentiality and the need to refer victims to support institutions in (i) health; (ii) psychosocial; and, (iii) legal support.

Cases of SEA/SH will be reported through the Project GRM. The GRM Operators will be trained to receive those cases in an appropriate manner and specific responsibilities in handling

SEA/SH complaints will be identified prior to receiving complaints. The GRM will be implemented in all Project districts and will be operationalized in all the geographical areas of the Project.

Complaints can be made physically or remotely through the contacts and channels that must be available and disclosed in the community for the purpose. In the event of discomfort in filing the complaint, the complainant may choose to forward it directly to the PCU or the GBV Service Provider.

Generally, the PCU Social Safeguards Specialist or the GBV Service Provider will provide clarification to the complainant on the matter in question, with a view to resolving the complaint. Anonymous complaints can be registered, for which the complainant must provide detailed information and allow the case to be followed without, however, exposing the survivor.

If the perpetrator of the act is a project worker, it is important that the case is notified to the contractor management so that the appropriate penalties associated with the Action Plan and Code of Conduct (CoC) for GBV prevention are triggered. Depending on the severity of the complaint, the aggressor is referred to the police, and the victim for hospital and psychological care, if the victims consents.
Cases reported through the Project GRM: the GRM Operator needs to report the case immediately and in any case within 48 hours after learning of the incident. Cases reported through the SEA/SH Focal Points will be reported immediately and directly to the Project GRM, which will then report to the GBV Service Provider and the PCU. The SEA/SH Focal Points or GBV Service Provider will inform the victim about referral pathways and available GBV support services.

Staff receiving and/or reporting allegations who are not a designated SEA/SH focal points or members of the GRM team must upon consent of the affected person, inform a designated Sea/SH focal point, the GBV Service Provider or the PCU at the field or country level as soon as possible and provide accurate information about where to receive assistance including medical, legal, psychosocial support and reporting of cases to the police. All workers, SEA/SH focal points and the GBV Service Provider are bound to maintain confidentiality of all reported allegations, including the identity of complainant and subject.

A5.4.4.1 Confidentiality

All grievance recipients and anyone handling SEA/SH must maintain absolute confidentiality in regards to the case. Maintaining confidentiality means not disclosing any information at any time to any party without the informed consent of the person concerned. There are exceptions under distinct circumstances, for example a) if the survivor is an adult who threatens his or her own life or who is directly threatening the safety of others, in which case referrals to lifesaving services will be sought; b) if the survivor is a child and there are concerns for the child's health and safety. The survivors need to be informed about these exceptions.

A5.4.4.2 Informed Consent

The victim can only give approval to the processing of a case when he or she has been fully informed about all relevant facts. The survivor must fully understand the consequences of actions when providing informed consent for a case to be taken up.

Asking for consent means asking the permission of the victim to share information about him/her with others (for instance, with referral services), and/or to undertake any action (for instance investigation of the case). Under no circumstances will the victim be pressured to consent to any conversation, assessment, investigation or other intervention with which she does not feel comfortable. A victim can also at any time decide to stop consent.

Where possible, a consent form can be used (in cases of direct person-to-person reporting). By signing this form the victim can formally agree (or disagree) with the further processing of the case. The form will clearly state how information will be used, stored and disseminated.

If a survivor does not consent to sharing information, then only non-identifying information can be released or reported on. In the case of children, informed consent is normally requested from a parent or legal guardian and the children.

The GRM operators, SEA/SH Focal Points and staff of the GBV Service Provider will be trained in the process of obtaining informed consent and in emphatic and non-judgmental listening at the beginning of their deployment.

A5.4.4.3 Table Informed Consent Process

Informed Consent Process	
1.	Tell a victim what is going to happen to him/her.
2.	Explain to him/her the benefits and risks of an intervention (investigation)
3.	Explain that s/he has the right to decline or refuse any part of an intervention.
4.	Explain that pressure will not be exerted in any form.
5.	Explain that if the victim does not want to be interviewed about the event or does not agree to any further investigations, this will NOT affect access to health and other services and does not preclude participation in future proceedings related to legal justice.
6.	Inform the victim that there is no mandatory reporting in the setting.
7.	Inform the victim that information about him/her will be discussed in the team.
8.	Inform that the de-identified data for program information purposes
9.	Emphasize the security of client information

	Informed Consent Process
10.	Ensure that the victim understands what you have told him/her.

A5.4.4.5 Empathetic and non-judgmental listening

All grievance recipients will further follow guidelines for empathetic, non-judgmental listening to a survivor when recording a complaint.

A5.4.4.6 Table Call Answering Protocol SEA/SH Cases

	Call Answering Protocol for SEA/SH Cases
1.	Answer call according to standard script
2.	Ensure confidentiality
3.	Collect intake information
4.	Provide emotional and psychological support
5.	Detect if there is immediate danger for the victim
6.	Explain informed consent, obtain if victim agrees
7.	Provide contacts for referral services and assistance to access then where required

A5.4.4.7 Table Guidelines for empathetic and non-judgmental listening

Guidelines for empathetic, non-judgmental listening to a survivor when recording a complaint.
➢ Listen, inquire, validate enhance safety and support
➢ Be patient and give compassionate responses to the caller, particularly because the caller is likely to be upset and in distress
➢ Responses will be dealt with in a calm way
➢ Do not make judgements or ask inappropriate questions
➢ Be sensitive to cues survivors may give

A5.4.4.8 Registration of SEA/SH Cases

Registration of SEA/SH cases will take place through the form below, which is based on the World Bank's incident reporting format for SEA/SH cases. Most importantly, the victim will not be named and will only receive a Code. Employment of a coding system will ensure that the client names are not easily connected to case information. A data storage system will be selected that allows for the encoding of cases.

A5.5 Traffic Safety Management Plan Framework

This framework provides minimum requirements and guidance for the preparation of a site-specific Traffic Safety Management Plan (TSMP) for the Project. It aims to ensure the safe movement of project vehicles, workers, and the general public across all construction sites, haulage routes, and access roads. The Contractor shall use this framework to develop a plan suited to site-specific risks and submit it as part of the Contractor's Environmental and Social Management Plan (C-ESMP) for approval before mobilisation.

A5.5.1 Project and Site Description

- Include a detailed map showing construction roads, access routes, and haul roads relative to nearby sensitive receptors such as schools, health centres, markets, trading centres, and residential areas.
- Overlay a Google Earth or satellite image indicating bridge locations, approach roads, material storage yards, and construction camps.
- Present a site layout plan highlighting:
    - Entry and exit points
    - Parking areas
    - Material loading/unloading zones
    - Refuelling and wash-down bays
    - Emergency access and evacuation routes
    - Worker rest zones, canteens, sanitary facilities, and pedestrian accessways
- Explain how road suitability was assessed (e.g. slope, surface condition, safety) and describe alternative routes considered.

A5.5.2 Site-Specific Risk Assessment

Conduct a thorough site-level risk assessment including:

- Conflict points where construction traffic intersects with pedestrians or public vehicles.
- Blind spots and narrow turns where vision is restricted by stockpiles, vegetation, structures, or scaffolding.
- Activities involving proximity to moving equipment, such as crane operations, excavator use, and reversing trucks.
- Common transport-related hazards, including:
    - Falling or unsecured materials during transport or lifting
    - Flying debris from blasting or loading operations
    - Vehicle collisions and tip-over risks
    - Obstruction from poorly stored materials or equipment
- Assign responsibilities for implementation and outline mitigation measures, e.g. traffic marshals, signage, exclusion zones, fencing, and spotters.
- Identify locations near sensitive receptors (e.g. schools or churches) and ensure speed and access control.

A5.5.3 Vehicle and Plant Movement Management

- Provide a table listing:

    - Types of construction vehicles and plant (trucks, loaders, concrete mixers, cranes, etc.)
    - Typical load types and maximum capacity
    - Planned use and frequency
- Include:
    - Construction vehicle routing plans showing designated access between construction sites and key material sources (e.g., borrow pits, quarries).
    - Turn-around areas and designated no-go zones for heavy vehicles.
    - Requirements for:
        - Daily vehicle inspections (tyres, brakes, lights, hydraulics)
        - Use of reflective markings and signs
        - Speed limits and gradient controls (avoid gradients exceeding 1:10)
        - Use of spotters and reversing alarms
        - Traffic separation (barriers, temporary fencing, pedestrian crossings)
        - Adequate lighting for night works
        - Emergency vehicle access routes

A5.5.4 Loading and Unloading Safety

- Develop Safe Operating Procedures (SOPs) for:
    - Material loading and offloading
    - Use of forklifts, cranes, and winches
    - Prevention of overloading
    - Covering/uncovering loads safely
    - Coupling and uncoupling of trailers
- Include procedures for stabilising loads and restricting access during lifting or unloading activities.

A5.5.5 Hazardous Materials Transport and Spill Control

Coordinate with the Hazardous Substances and Waste Management Plans to include:

- Inventory of hazardous materials transported (e.g., fuel, oil, chemicals)
- Location of Material Safety Data Sheets (MSDS)
- Driver and handler training in material handling
- Equipment for spill control (e.g., absorbents, booms, fire extinguishers)
- Designated parking, transfer, and storage zones
- Procedures for spill reporting, clean-up, and disposal

A5.5.6 Traffic Rules, Communication, and Training

- Establish site-specific traffic rules including:
    - Speed limits, right-of-way, parking zones, and one-way systems
    - Prohibited practices (e.g., reversing into public roads, idling near schools)
    - Prohibited parking near unstable structures or work zones
- Describe communication and training measures:
    - Induction training for all workers and drivers
    - Toolbox talks focused on route changes, safety alerts, or incidents

- Visual aids (e.g. maps, pictograms, signage)
- Emergency contact protocols
- Inclusion of rules in the Code of Conduct (CoC)

A5.5.7 Worker Transportation Safety

- Define measures for transporting workers safely to and from sites:
  - Use of roadworthy vehicles equipped with seatbelts
  - Competent drivers with proper licences
  - Compliance with maximum occupancy limits
  - Scheduled routes and designated drop-off zones
  - Safe loading/unloading away from high-risk traffic zones

A5.5.8 Standard Operating Procedures (SOPs)

Include SOPs for the following:

- Fleet management, including maintenance logs and vehicle tracking
- Driver screening and deployment
- Check-in procedures and fatigue management
- Emergency response during traffic-related incidents
- Maintenance of haul roads and access roads (e.g., pothole filling, dust suppression)

A5.5.9 Traffic Control for Works on Public Roads

If works are conducted on or adjacent to public roads:

- Prepare a Traffic Control and Signage Plan aligned with SATCC standards.
- Include:
  - Signage for detours, speed reduction, and flaggers
  - Barriers separating work zones from public lanes
  - Reflective vests and flags for spotters
  - Coordination with local traffic police and District Council
- Provide instructions for:
  - Machinery movement on public roads
  - Access to and from resource points (quarries, borrow pits, water sources)
  - Public safety notices and consultation with affected communities

Where temporary diversions or bypasses are required to facilitate bridge construction over rivers, the Contractor shall:

- Prepare a detailed Diversion Plan showing:
  - Location and design of temporary crossings (culverts, bailey bridges, detours)
  - Traffic flow direction (one-way/two-way)
  - Structural integrity, width, and load-bearing capacity
  - Separation of construction equipment and public traffic
- Undertake a hydrological assessment before constructing any river diversion to:
  - Prevent obstruction of river flow
  - Avoid increased flood risks upstream/downstream
  - Minimise scouring, bank erosion, or habitat disruption

- Implement environmental protection measures:
    - Silt fences and bunds to prevent sediment runoff
    - Spill kits and containment booms for fuel transport
    - Avoid diversion works during peak rainy season where possible
- Ensure pedestrian safety:
    - Provide safe footbridges or footpaths across the diversion
    - Clearly separate from heavy vehicle routes
- Rehabilitate diversion sites post-use:
    - Remove temporary structures
    - Stabilise soils and re-vegetate if necessary
    - Restore the river's natural flow path if altered

A5.5.10 Monitoring and Reporting

- Define monitoring indicators (e.g. near-miss logs, speed compliance, road condition reports)
- Assign responsibility to the Site Safety Officer or Traffic Safety Supervisor
- Maintain an incident register and submit monthly traffic safety reports to the Supervising Engineer

Annexes and Tools to Include in the Plan

- Traffic Route Maps
- Daily Vehicle Inspection Checklist
- Incident/Near-Miss Reporting Form
- Emergency Contact List
- Signage Specifications and Placement Plan
- Training Attendance Logs

A5.6 Guideline for Siting, Management, and Development of Construction Camps

A5.6.1 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.

A5.6.2 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, selection of the site will be made keeping in mind 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

A5.6.3 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.

A5.6.4 Setting Up of Construction Camp

(i) ***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 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 annexure in 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.

(ii) ***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:

a. The DG set will be provided with acoustic enclosure/acoustic treatment with an insertion loss of minimum 25 dB(A).
b. The DG set will be provided with proper exhaust muffler with insertion loss of minimum 25dB(A).
c. A proper, routine and preventive maintenance procedure for the DG set will be set and followed in consultation with the DG set manufacturer.
d. 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 DDSE.

(iii) ***Sanitation Facilities:*** Adequate no. 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.

a. 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.

(iv) ***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.

(v) ***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.

(vi) ***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.

(vii) ***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.

A5.6.5 Operation of Construction Camp

During the operation phase of the camp, it is important to ensure that all vehicles and machineries are maintained regularly and their Pollution certificates are renewed at regular intervals. All pollution control devices will be monitored and maintained properly at regular intervals. In case of process disturbance/ failure of pollution control equipment, the respective units will be shut down and will not be restarted until the control measures are rectified to achieve the desired efficiency. All units will operate only between 6 am and 10 pm. Oil and grease waste generated from garages in construction camps will be drained out through oil interceptors and they will be maintained properly. Necessary arrangements will be made for regular sprinkling of water for dust suppression. Raw materials and products will be transported with proper cover to prevent spreading of dust. Hygienic environment must be ensured by (i) provision of safe drinking water, (ii) proper maintenance of toilets including daily cleaning and disinfection using proper disinfectants, (iii) regular cleaning of drains by removing the silt and solid waste, (if any) and iv) appropriate waste management practices. While it is of utmost importance to ensure that firefighting equipment like fire extinguishers are in working condition, it will also be monitored that construction workers use the personal protective equipment provided to them and they are replaced when necessary. All these facilities will be inspected on a weekly basis to achieve the desired levels of safety and hygiene standards.

Environmental monitoring will be undertaken by the Contractor as stipulated in the ESMP. If any standard is set by MEPA for hot mix plant emissions, the Contractor will collect samples of emission from all the chimneys and analyse for the parameters at least once in a month. A register will be maintained at the site office which provides (i) a one-page format for each migrant labourer which will give their personal profile (including name, age, sex, educational qualification, address, blood group and any major illness), along with a copy of any ID proof and an original photograph, (ii) a copy of the ID card of local labourers. A copy of the details of the migrant labourers will be submitted to the local police station.