CLIMATE RESILIENT ROADS FOR THE NORTH (CRRN)

PROJECT IMPLEMENTATION UNIT (PIU)

TERMS OF REFERENCE FOR SENIOR HYDRAULIC ENGINEER/HYDROLOGIST

1 INTRODUCTION

Transport infrastructure plays a vital role in Mozambique's development, connecting communities, enabling trade, and expanding access to essential services such as education, healthcare, and employment. Recognising the sector's transformative potential, the Government of Mozambique—through the Ministry of Transport and Logistics (MTL)—has launched a strategic effort to modernise, expand, and coordinate transport systems nationwide. To support this effort, the World Bank has committed substantial funding to upgrade Mozambique's logistics and transit infrastructure across five strategic active transport initiatives:

1. Climate Resilient Roads for the North (CRRN)
    - **Objective:** Improve climate-resilient road connectivity and access in the northern provinces, primarily focusing on Cabo Delgado.
    - **Focus:** Enhancing infrastructure durability against extreme weather conditions, managing road assets, and promoting local social inclusion.
2. Transport Corridors for Economic Resilience (TRACER - SOP 2)
    - **Objective:** Improve regional transport connectivity, climate resilience, and road safety.
    - **Focus:** Modernizing the key **Nacala corridor** and its feeder roads, boosting trade facilitation, and linking small-scale farmers to regional market value chains.
3. Safer Roads for Socio-Economic Integration (SRSEI)
    - **Objective:** Enhance the connectivity, safety, and institutional management of Mozambique's primary transit routes.
    - **Focus:** Directing major interventions toward the rehabilitation of critical stretches along **National Road Number 1 (N1)**.
4. Southern Africa Trade and Connectivity Project (SATCP)
    - **Objective:** Reduce trade costs and transit times while strengthening regional integration with landlocked neighbors.
    - **Focus:** Streamlining border crossing infrastructure, improving targeted road corridors, and upgrading trade logistics systems.

To support this vision, and with the backing of the World Bank, the Ministry is establishing a Project Management Unit (PMU) to oversee the preparation and management coordination of key initiatives across all transport sub-sectors, including roads, rail, ports, maritime, logistics, civil aviation, and urban mobility. The centralised structure is designed to ensure that investments are strategically planned, efficiently executed, and institutionally anchored, with clear accountability and results tracking.

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Operating from within the Ministry, the PMU will coordinate closely with key agencies—such as the Road Fund (FE), National Road Transport Institute (INATRO), Mozambique Railway Institute (IFEPOM), Maritime Transport Institute (ITRASMAR), Maputo Metropolitan Transport Agency (AMT), and the National Roads Administration—as well as with provincial entities and development partners. Its work will be aligned with Mozambique's national transport strategy and broader development priorities, contributing to the country's long-term resilience, economic growth, and social inclusion.

(1) The PMU will serve as the central implementation mechanism for all major transport initiatives and reforms. Its core functions include:

- Comprehensive Project Management: Overseeing planning, execution, supervision, and closeout of transport infrastructure projects at both central and provincial levels.
- Institutional Coordination: Aligning technical and policy efforts among national agencies, development partners, and private sector actors across the transport ecosystem.
- Resource Mobilisation and Budget Oversight: Managing donor and government funds with full fiduciary compliance and strategic financial planning.
- Infrastructure Delivery: Supporting civil works and systems for roads, ports, terminals, rail lines, aviation facilities, urban mobility corridors, and integrated transport hubs.
- Policy and Regulatory Reform Support: Contributing to sector-wide reform processes, including institutional capacity building, legal frameworks, PPPs, and professionalisation of transport services.
- Monitoring and Evaluation: Tracking performance against agreed objectives, reporting on progress, and ensuring learning for continuous improvement.
- Citizen Engagement and Visibility: Promoting transparency, stakeholder engagement, and communication to strengthen public trust and inclusiveness.
- Contingency Response and Resilience Building: Enabling rapid response capacity in the event of crises or climate-related disruptions.

This integrated approach ensures that the PMU is not only a delivery platform but also a strategic driver of institutional transformation and long-term sectoral capacity.

The PMU will also include Project Implementation Units (PIUs), whose main functions will be to manage contracts for the implementation of activities in the field, and in particular infrastructure works and supervision services, site implementation of social and environmental safeguards management plan, including Sexual Exploitation and Abuse and Sexual Harassment (SEA/SH), Health and Safety, road safety strengthening, monitoring of activity development, ensuring the involvement of local communities and authorities during implementation, as well as participation in activity planning and drafting of terms of reference within the scope of the project.

Each Project Implementation Unit (PIU) will be led by a Coordinator assisted by a technical team, including one project assistant, who will deal with day-to-day technical aspects, serving as a liaison officer between the PIU and the PMU technical team.

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In this context, through the *Climate Resilient Roads for the North Project (CRRN),* the Ministry of Transport and Logistics is seeking to hire a SENIOR HYDRAULIC ENGINEER/HYDROLOGIST to support the preparation and implementation of projects, through day-to-day liaison among the PMU and PIU team, ensuring that all projects are delivered on time, within budget, and to the highest quality standards.

2 OBJECTIVES

This contract aims to strengthen the Portfolio Management technical capacity in order to ensure that transport and logistic PIUs adopt adequate project resilience measures during the entire project life cycle. The Hydraulic Engineer/Hydrologist is being recruited to provide technical support to the entire Transport Portfolio, through the Project Management Unit (PMU), and to assist in the implementation of climate-resilient transport infrastructure activities by the following five Project Implementation Units (PIUs):

a) **CRRN:** Climate Resilient Roads for the North Project
b) **TRACER:** Transport Corridors for Economic Resilience Project (Specifically active in the region as part of the *Transport Corridors for Economic Resilience Mozambique Series of Projects*).
c) **MOVE: Move Maputo** program, implemented under the Maputo Metropolitan Area Urban Mobility Project.
d) **SRSEIP:** Safer Roads for Socio-Economic Integration Program Project (also referred to as the *Safer Roads for Economic Integration Project*).
e) **SATCP:** Southern Africa Trade and Connectivity Project

This includes, but is not limited to, works supervision, review of consultancy services, and other technical assignments required under the various transport projects.

The consultant will be responsible for providing technical oversight and guidance in the planning, design review, and implementation of road and bridge infrastructure, ensuring compliance with applicable standards, including ANE guidelines, manuals, and design specifications, with particular emphasis on climate resilience.

In this role, the consultant will work closely with other technical specialists within the PMU and PIUs to ensure that all transport-related interventions incorporate appropriate climate adaptation and resilience measures. This coordination will support the successful and sustainable implementation of the transport investment program.

The Hydraulic Engineer/Hydrologist will operate under the overall guidance and supervision of the Project Coordinator, who leads the Project Management Unit.

The objective of this assignment is to strengthen the technical capacity of the PMU and the five PIUs to ensure the effective, efficient, and coordinated implementation of the Transport Portfolio, including the Climate Resilient Roads for the North (CRRN) Project and other related interventions. The Hydraulic Engineer/Hydrologist will play a central role in supporting the review, supervision, and coordination of hydrological and hydraulic aspects of bridges, drainage systems, and associated infrastructure.

The assignment aims to ensure that all transport infrastructure investments are implemented in accordance with established national guidelines, ANE standards, and international best practices, while

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fully integrating climate-resilient and risk-informed design principles. In addition, the role requires close collaboration with multidisciplinary teams to ensure compliance with environmental and social safeguards, as well as the overall sustainability, safety, and resilience of the national transport network.

3 BRIEF DESCRIPTION OF THE TRANSPORT PORTFOLIO

The Transport and Logistics Portfolio Includes, not limited to the following:

(1) *Integrated Feeder Roads Development Project, IFRDP (US$285m):* The project targets to improve 1,300km of rural roads in Nampula and Zambezia and 70km of N10/N1 in Zambezia.

(2) *Safer Roads for Socio-Economic Integration, SRSEI (US$400m, Phase 1):* The project aims safe and climate resilient rehabilitation, improvement, and maintenance of the most critical and climate vulnerable sections (508 km) of the N1 corridor.

(3) *Climate Resilient Roads for the North, CRRN (US$125m):* The objective is to improve climate resilient road connectivity in the Northern Provinces of Mozambique. These comprises 92km of road upgrade and rehabilitation, construction of 5 major bridges and at least 1500m of metallic bridges.

(4) *Southern Africa Trade and Connectivity Project, SATCP (US$93m):* The project development objective is to support Malawi and Mozambique in increasing regional trade coordination, reducing trade costs and time, developing regional value chains, and improving access to infrastructure.

(5) *Transport Corridors for Economic Resilience Pipeline Project, TRACER SOP2 (US$ 123m):* The objective is to improve efficiency, connectivity, climate resilience and road safety along the Nacala Corridor in Mozambique.

4 SCOPE OF ACTIVITIES

The Hydraulic Engineer/Hydrologist will provide technical assistance to the Project Management Unit (PMU) in supporting the implementation of the entire Transport Portfolio and all Project Implementation Units (PIUs). The consultant will ensure that all transport infrastructure investments, including roads and bridges, are planned, designed, and implemented in accordance with hydrological, hydraulic, and climate-resilient engineering standards and best practices.

(1) Technical Planning, Design Review and Modeling

a) Coordinate and supervise all hydrological and hydraulic studies, including modeling and design activities during project preparation, design, and implementation phases across the Transport Portfolio.
b) Provide technical expertise in hydrological data collection, analysis, and modeling, including the use of advanced tools such as satellite imagery, LiDAR, photogrammetry, and drone-based surveys for climate-risk-informed infrastructure planning and asset management.

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c) Review and validate hydrological and hydraulic studies, including rainfall analysis, catchment delineation, flood estimation, peak flow assessment, runoff characteristics, and climate change projections.
d) Ensure the application of appropriate hydrological and hydraulic models in line with international best practices and climate-resilient design standards.
e) Evaluate and validate design assumptions used in hydraulic analyses for bridges, culverts, drainage systems, and flood protection structures.
f) Review and provide recommendations on hydraulic designs, including sizing and configuration of drainage infrastructure to ensure adequate capacity under current and future climate scenarios.
g) Assess river hydraulics, scour potential, sediment transport, and channel stability at bridge and road crossing sites.
h) Advise on integration of climate change adaptation measures, including freeboard requirements, flood mitigation structures, and nature-based solutions.

(2) Risk Management and Climate Resilience

a) Identify hydrological and flood-related risks and propose mitigation and adaptation measures to enhance infrastructure resilience.
b) Evaluate flood risks, extreme weather impacts, and ensure incorporation of climate resilience measures into design and implementation.
c) Support the development and application of guidelines for climate-resilient drainage and flood management systems.
d) Establish and support performance indicators related to drainage performance, flood resilience, and infrastructure durability.

(3) Field Investigations and Site Supervision

a) Support and supervise hydrological and hydraulic field investigations, including river surveys, flow measurements, and flood level assessments.
b) Conduct site visits to verify drainage patterns, hydraulic structures, and site-specific conditions.
c) Identify data gaps and recommend appropriate measures for additional data collection and monitoring.
d) Provide technical support during construction to ensure compliance with approved hydraulic designs and specifications.
e) Review method statements for river works, diversions, dewatering, erosion protection, and related activities.
f) Monitor implementation of drainage and hydraulic works and address technical issues as they arise.

(4) Environmental, Social and Institutional Coordination

a) Work closely with environmental and social safeguards specialists to ensure integration of mitigation measures related to flooding, erosion, and water resource impacts.
b) Support the integration of ESIA and RAP requirements into hydrological and hydraulic design solutions.

c) Coordinate with government agencies and stakeholders involved in water resources management and climate risk management to ensure data sharing and alignment of interventions.

(5) Procurement and Project Implementation Support

a) Assist in the preparation and review of procurement documents, including Terms of Reference (ToR), technical specifications, and bidding documents for hydrological and hydraulic services.
b) Review technical submissions, designs, and reports prepared by consultants and contractors, and provide recommendations for improvement.
c) Address technical comments from the Client, funding agencies, and other stakeholders.

(6) Monitoring, Reporting and Portfolio Support

Work closely with PMU and PIU Monitoring & Evaluation (M&E) teams to support data collection and updating of project indicators and results frameworks.

a) Support preparation of quarterly progress reports, technical notes, and safeguards compliance reports related to hydraulic and hydrological aspects.
b) Participate in site meetings, technical discussions, inspections, and stakeholder consultations across all PIUs under the Transport Portfolio.

(7) Capacity Building and Knowledge Transfer

a) Provide technical guidance and on-the-job training to PMU and PIU staff in hydrology, hydraulics, and climate-resilient infrastructure design.
b) Contribute to strengthening institutional capacity in climate-resilient water infrastructure planning, design, and management.

(8) General Support

a) Perform any other related duties as may be assigned by the PMU Coordinator in support of the Transport Portfolio.

5 QUALIFICATIONS

(1) Minimum Requirements

a) **Education:** MSc. Degree in civil engineering, water resources engineering, or a related field with specialization in hydrology or hydraulics.
b) **Experience:**
   - At least 15 years of professional experience in road drainage, flood risk analysis, stormwater management, or climate-resilient water infrastructure.
   - Experience of working in the northern region of Mozambique is an advantage.
   - Prior experience in Sub-Saharan Africa or similar environments will be considered an advantage.
c) **Project Track Record:** Minimum of 3 to 5 road projects involving inputs as Project Engineer/highway/roads engineer in the last 10 years.

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d) **Experience:** must have an experience in climate-resilient infrastructure design and integration of climate risk considerations.
e) **Technical Modeling:** Strong knowledge in conducting hydrological analysis using specialized computer modeling applications software packages. addressing both hydrological and hydraulic schematization aspects.
f) **Core Technical Design:** Sound understanding of river hydraulics, sediment transport, scour analysis, and drainage design.
g) **Language:** Fluency in written and spoken English is required.

(2) Desirable Competencies

a) **Climate Resilience:** Experience in climate-resilient infrastructure design and integration of climate risk considerations.
b) **Satellite Data:** Familiarity with state-of-the-art data collected from satellite imagery (e.g., land use change, analyzing trends, terrain level data).
c) **Surveying Technology:** Familiarity with state-of-the-art data surveying and monitoring techniques (e.g., LiDAR airborne technologies, drones, aerial photogrammetry).
d) **International Standards:** Familiarity with international design standards and guidelines for hydraulic structures.
e) **Quality Assurance:** Experience in reviewing technical reports, drawings, and specifications.
f) **Donor Projects:** Experience working on donor-funded projects (e.g., World Bank, AfDB, or similar) will be an asset.
g) **Language Asset:** Proficiency in Portuguese is desirable.

(3) Other Competencies & Attributes

a) **Analytical Skills:** Experience in report writing with strong analytical and conceptual skills.
b) **Stakeholder Management:** Ability to work effectively with different stakeholders.
c) **Resilience:** Ability to work under pressure and meet challenging timescales.

6 REPORTING

The Hydraulics Engineer/Hydrologist will report to the Portfolio Coordinator as leader of the PMU

DURATION OF THE ASSIGNMENT

The Hydraulics Engineer/Hydrologist will be based at the PMU in Maputo and provide support to implementation of all transport projects under the MTL. The assignment is expected to last four years. The initial contract duration will be two years with a probation period of six (6) months. Annual performance assessment will be conducted for this position to review the level of support provided for the project based on performance indicators. The contract can be renewed for a further two years subject to satisfactory performance and availability of funds.

7 REMUNERATION

A competitive salary will be negotiated based on the Ministry of Finance salary structure & threshold, qualifications and experience of the selected candidate.

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8 PERFORMANCE INDICATORS

Activity	Indicator	Annual Goal	Frequency
Review and validation of drainage projects	Projects with correctly dimensioned drainage structures and with verification report	100% of the projects	Quarterly
Issuance of technical opinions	Hydraulic/hydrological opinions submitted within the deadline	≥ 90%	Monthly
Climate change integration	Projects with adequate sizing to climate change scenarios	≥ 85%	Quarterly
Identification of water risks	Number of water risk hotspots identified and mitigated	≥ 75% (according to the size of the project)	Quarterly
Promoting resilience	% of projects with adaptation and resilience measures included (e.g. enhanced drainage, slope protection)	≥ 90%	Quarterly
Innovation in flood mitigation	Projects that adopt innovative flood mitigation measures	100% of relevant projects	Annual
Normative technical production	Number of manuals, guides or technical notes for flood/overtopping risk mitigation	≥ 2 per year	Annual
Field supervision	Field visits completed following the approved plan	≥ 90% of the plan fulfilled	Monthly
Quality control on site	% of hydraulic non-conformities identified and resolved during construction	≥ 95% resolved	Monthly
Efficiency in technical response	Response time and quality of technical advice	≤ 10 working days + qualitative evaluation ≥ "Good"	Monthly

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Activity	Indicator	Annual Goal	Frequency
Technical training	Number of technicians trained in hydrology/hydraulics	≥ 20 technicians/year	Monthly
Continuing education	Number of training sessions held	≥ 4 sessions/year	Quarterly

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