

TERMS OF REFERENCE

CLIMATE RESILIENT ROADS FOR THE NORTH (CRRN)

**"Consultancy Services for Preparation of Feasibility Study,
Conceptual design, Environmental and Social Impact
Assessment and bidding documents for Civil Works under
Design, Build and Transfer Methodology
for the Roads**

**N361: Lichinga – Lago Niassa (98.0 km), and R733/R1211/R1215
Lussimbessse – Matchtdje (206 km) in Niassa Province"**

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1. INTRODUCTION

The Government of Mozambique (GoM) has received financing from the World Bank towards the cost of the Climate Resilient Roads for the North (CRRN), and intends to apply part of the proceeds for Consultancy Services for Preparation of Feasibility Study, Conceptual design, Environmental and Social Impact Assessment and bidding documents for Civil Works under Design, Build and Transfer Methodology for the Roads N361: Lichinga – Lago Niassa (98.0 km), and R733/R1211/R1215 Lussimbesse – Matchtdje (206 km) in Niassa Province with the objective to enhance access to markets, and other economic and social services.

Seeking to increase the efficiency and effectiveness with which the management and maintenance of the road network is carried out, the Government of Mozambique, through *Administração Nacional de Estradas* (ANE, IP) or (the National Road Administration), intends to engage a consulting firm to prepare Conceptual design, Environmental and Social Impact Assessment and bidding documents for Civil Works under Design, Build and Transfer Methodology for the N361: Lichinga – Lago Niassa (98.0 km), and R733/R1211/R1215 Lussimbesse – Matchtdje (206 km).

The main objective of these consultancy services is to assist ANE, IP to prepare Conceptual design, Environmental and Social Impact Assessment and bidding documents for Civil Works under Design, Build and Transfer Methodology for the N361: Lichinga – Lago Niassa (98.0 km), and R733/R1211/R1215 Lussimbesse – Matchtdje (206 km) to upgrade them to climate resilient standards and build a safer transport corridors.

These Terms of Reference (ToRs) describe the nature and scope of the services to be provided by the consultant.

2. OBJECTIVES

The project development objective is to enhance climate-resilient, road connectivity in the Northern provinces of Mozambique.

The rehabilitation/upgrading of the above-mentioned road section will be implemented in appropriate Lots. The interventions will include among others, design, road pavement rehabilitation/upgrade, rehabilitation or reconstruction of drainage structures such as bridges and culverts, improvement of intersections and rehabilitation/upgrading of road safety facilities. The Project will be packaged in lots considering the length and complexity of the works to be performed. Works on each lot shall be completed during the two years.

The concept design documents for the road shall be prepared to ensure compliance with design standards and specifications prepared recently for ANE as referenced below.

ANE Standards and Specifications

1.	Field and Laboratory Testing Manual, 2020
2.	Geometric Design Manual, 2019

3.	Geotechnical Design Manual, 2020
4.	Hydrology and Drainage Design Manual, 2019
5.	Pavement Design Manual, 2019
6.	Performance Specifications – OPBRC Manual, 2019
7.	Rehabilitation Design Manual, 2019
8.	Specifications for Bridge Loads, 2019
9.	Standard Details for Roads and Bridges, 2020
10.	Standard Specifications for Road and Bridge Works, 2020
11.	Site Investigations for Road and Bridge Works, 2019

The above standards and specifications are available at ANE – Headquarter in Maputo. These standards will be complemented by the regional Southern African Development Community (SADC) standards in use, as published by the Southern African Transport and Communication Commission (SATCC), September 1998 (Reprinted July 2001). Due consideration shall also be given to the SADC Road Traffic Signs Manuals. ASTM - American Society for Testing & Materials and AASHTO - American Association of State Highway and Transportation Officials guides shall be used where necessary.

In the absence of appropriate standards covered by the documents listed above the consultant should recommend and adopt recognized international standards in agreement with the Client.

The concept engineering designs must also focus on the government aspirations in achieving SDG 3.6 of decreasing the number of road crashes fatalities by 50 percent by 2030. In Mozambique, during the period 2011 – 2019, 22,385 road crashes were recorded which resulted in 53,359 victims, of which 13,500 were fatalities¹. the mortality rate per 100,000 inhabitants in Mozambique is among the highest mortality rates in the region and in the world.

Specific Objectives

ANE wishes to employ a consultant to prepare feasibility study, Conceptual design, Environmental and Social Impact Assessment and bidding documents for Civil Works under Design, Build and Transfer Methodology for the Roads N361: Lichinga – Lago Niassa (98.0 km), and R733/R1211/R1215 Lussimbesse – Matchtdje (206 km) to climate resilient standards and build a safer transport corridor. The objectives of these services are:

¹ Resolução No 68/2020 do Conselho de Ministros de 17 de Novembro de 2020: Política e Estratégia de Segurança Rodoviária (*Council of Ministers Resolution No 68/2020 of 17th November 2020: Road Safety Policy and Strategy*)

- a. To prepare a feasibility study and Conceptual design based on international standards and concept engineering designs, which will be a basis for a prospective contractor to develop detailed engineering designs;
- b. To prepare the ESIA for the road project sites to ensure the project design incorporates the mitigation measures for the potential negative impacts and maximizes the positive impacts of the project in a manner consistent with all applicable requirements of the World Bank Group Environmental and Social Framework (ESF) and the relevant national laws;

3. SCOPE OF THE SERVICES

3.1 General

ANE wishes to employ a consultant to prepare Feasibility study, concept engineering designs, and ESIA. The services will be divided in two parts.

Part A: ECONOMIC VIABILITY, TECHNICAL FEASIBILITY STUDY AND CONCEPT DESIGNS

Part B: PREPARATION OF THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA)

Part C: PREPARATION OF THE BIDDING DOCUMENTS

Details of each part are given below:

PART A: ECONOMIC VIABILITY, TECHNICAL FEASIBILITY STUDY AND CONCEPTUAL DESIGN

3.1.1 Economic Viability

The services shall include but not be limited to:

- a. Traffic Analysis
- b. Condition Survey-assessment of the surface condition and load-bearing capacity of the subgrade and the pavement
- c. Alignment options
- d. Assessment of Economic Costs and Benefits
- e. Economic Evaluation
- f. Assessment of the National/Regional effects of the proposed road investment
- g. Risks, sensitivity and switching values analysis

Specifically, the consultant shall conduct traffic surveys to determine the type and volume of the existing traffic along the selected roads by analyzing all existing statistical data, and by conducting and analyzing traffic counts and origin - destination studies. The Consultant shall undertake other field traffic investigations as deemed necessary to enrich the economic analysis. With respect to traffic projections, it is important to consider the impact of all other projects that are projected/under construction in the project influence area.

The traffic studies shall be prepared, and the consultant shall include:

- a) Existing traffic composition, occupancy, travel time from the starting to end points for each alternative, and volume counts;
- b) Origin-destination studies;
- c) Axle Load surveys; and
- d) Forecasts of annual average daily traffic composed of normal, generated and diverted flows by appropriate vehicle types

Manual classified traffic counts shall be carried out over a period of seven consecutive days (7-day 2-way counts) along the length of the project road. Traffic count stations shall be located outside of the towns and main trading centers. The counts are to include both motorized and non-motorized traffic. Counts at each location shall be for a continuous period of five days for 16 hours (6am- 10pm) and two days (1 weekday and 1 weekend) for 24 hours, and shall take into account fluctuations caused by local factors e.g. market days.

The detailed methodology on how each of the traffic surveys (Manual classified counts, Origin and Destination, Axle Load, and Traffic crashes) will be carried out including the number and location (chainage) of traffic count stations to be included in the Technical Proposal from the consultant. The Employer shall approve the proposed traffic surveys methodology including location of traffic count stations.

- a. Traffic surveys shall comprise an axle load weighing survey. The consultant shall carry out an axle load survey over a minimum of 3 days per road, which is to include information on origin and destination of all vehicles stopped. A minimum of two weighing stations on the project road (Link) is recommended. The Client shall approve any exceptions on the number of weighing stations.
- b. Where considered appropriate, the consultant shall divide the road into sections and conduct the traffic studies in relation to those separate sections.
- c. The Consultant shall identify, describe, and quantify existing and potential traffic generating factors in the immediate areas served by the project and in areas likely to be influenced by future economic development.
- d. Based on the above analyses, the Consultant shall provide detailed annual traffic forecasts for a period of 20 years after the completion of the road
- e. Although greater emphasis is given to accurate forecasting in the earlier part of the project's life, all traffic forecasts shall be given at three growth rates, namely, low, medium, and high.
- f. In developing the final traffic forecasts, the Consultant shall give particular attention to the future mix of vehicles in the traffic population. Due attention should therefore be given to changes in vehicle sizes and types that will arise when improvements are made in the condition of the roads.
- g. The Consultant shall assemble and evaluate available detailed crash data and seek to identify principal causes and assess the potential for the project to reduce road crashes and fatalities through road safety engineering measures, for example, improved junction layouts, the provision of pedestrian and non-motorized facilities or the provision of roadside safety restraint systems.
- h. The consultant shall produce the detailed crash data collected during the economic analysis to determine a reduction in costs arising out of reduced road crashes and victims.

Task A-1. Economic Cost

The Consultant shall examine all available information on vehicle operating and road maintenance costs and shall produce valid current estimates of such costs for the project road in its present and improved state. Attention should be given in the analyses to conditions affecting costs that are specific to Mozambique and the area of the project (Northern Mozambique).

Since the greatest element of measurable and quantifiable user benefits to be derived from the improvement of the road are, in practice, derived from savings in vehicle operating costs, the consultant shall give particular attention to the development of valid current estimates of such costs from collection of primary data.

The consultant shall identify and quantify cost and benefits and carry out economic evaluation of the project road using the Highway Development and Management Model (HDM-4). The consultant shall ensure that all individual factor unit costs (such as vehicle prices, interest rates, tires, fuel, crew wages, insurance, etc.) are input into the model derived from data acquired from a direct investigation of present costs.

The submission of the Draft and Final Economic Evaluation Report shall include a soft-copy of the HDM-4 Object Files (object.dat and object.idx) for review by the Client. This will be in addition to describing and including the HDM-4 inputs, assumptions and outputs in the relevant sections of the Feasibility Study Report.

The Consultant shall ensure that the individual parameters such as roughness, which is input into the model to determine the different component costs of vehicle operations, shall be those that apply to the individual design standard being evaluated. It is expected, therefore, that where design standards evaluated in the study have significantly different parameters, they will be reflected in vehicle operating costs.

The consultant shall carefully detail in the reports all the data, assumptions, and parameters used in developing estimates for current vehicle operating costs. For construction costs, the consultant shall give estimates separated into foreign and local currency components according to the details given for construction costs.

In determining the economic costs for all factors in the project, the consultant shall ensure that costs are net of all taxes and duties, or of any other transfer payments to Government, and shadow prices where appropriate shall be used to reflect the true scarcity value of the resources being used.

Task A-2 Economic Benefits

Economic benefits shall be expressed primarily in terms of:

- a. Savings in vehicle operating costs;
- b. Savings in road maintenance expenditure;
- c. Residual value of the road's structures at the end of the evaluation period;
- d. Value of time savings and reduced road crash costs;
- e. Greenhouse gas emission reduction, and

- f. Any other factors (exogenous benefits) that the consultant shall consider relevant for the analyses, for example: positive environmental and social impacts, employment generation, induced agricultural production, access to improved health care and education services etc.

The last factor(s), if concluded, must be of demonstrable transfer value within Mozambique's economy.

In view of the fact that some indirect economic and social benefits arising from the improvements in road conditions are intangible or difficult to quantify accurately, the consultant shall undertake detailed qualitative analyses of these benefits. Such benefits shall be clearly indicated and considered in the economic analyses.

Task A-3 Economic Evaluation

The consultant shall undertake evaluation of the economic feasibility of the project for Twenty years following the completion of the construction of the road using HDM-4. For this, the economic costs of construction of the design standard being evaluated shall be compared with the relevant level of economic user benefits arising from implementation of the project at the different design levels. That level of design that results in the greatest net present value shall be determined as the optimum design level. The net present value shall be calculated at the social discount rate equal to the opportunity cost of capital which rate shall be fixed in consultation with the Government of Mozambique and based on the recommendations of the Central Bank/Ministry of Economy and Finance.

The economic viability shall be expressed, for alternative homogeneous road sections as proposed and justified by the consultant for the entire road in terms of:

- a. The economic internal rate of return (EIRR);
- b. The net present value (NPV) in relation to the Government's current opportunity cost of capital;
- c. The benefit-cost ratio (BCR), and
- d. The Consultant will express the results of the economic analysis in terms of the first year rate of return (FYRR) to indicate the optimum year of construction and opening of the road. It is recommended to use the test discount rate of 6%

The consultant shall also undertake sensitivity analyses on the results of the selected design standards. The sensitivity analysis shall involve variations (+/- 20%) in traffic growth forecasts and variations (+/- 20%) in construction costs, and the worst-case scenario of simultaneous reduction in traffic levels (-20%) and increase in costs (+20%). The Consultant shall vary any other factors deemed appropriate to affect viability of the project. In addition, other levels deemed appropriate for the analyses and agreed upon between ANE and the Consultant shall be considered. The sensitivity analysis shall include a switching value analysis for construction costs and traffic levels. The Consultant shall also study the impact of 'shocks' (changes in the import prices of crucial inputs such as fuel, construction material etc.) on the economic viability of the project and prepare alternative scenarios.

The consultant shall provide a written economic justification based on the traffic analysis and forecast, cost and benefit as well as economic internal rate of return, net present value and sensitivity tests and switch values analysis.

Task A-4 Project Risk Analysis

Having established the Economic Viability of the proposed road, the Consultant shall conduct a risk analysis, which shall include all risks including work crashes or any anticipated incidences that are associated with the timely achievement of the project resulting from the study. The Consultant shall then recommend ways and means of mitigating the situation.

The Consultant shall execute a stochastic risk analysis on the central deterministic NPV and EIRR estimates. The consultant shall utilize a recognized risk assessment software package to generate a triangular type of probability distribution for those variables considered most likely to influence project net benefits including investment costs and traffic growth.

The Consultant shall include the cost of such data collection activities in their proposal as reimbursable.

3.1.2 TECHNICAL FEASIBILITY STUDY

Task A-5: Reconnaissance Visit and Alignment Improvement Report

The Consultant shall carry out the desk study of possible alignment alternatives in case improvement is required, using maps and imageries. Same shall then be investigated in the field reconnaissance. Coordinated meetings with local departments shall be done and minutes recorded (same shall be made part of the Report).

During the reconnaissance visit, particular requirements of project shall be identified that will be addressed in the Technical Study. In the reconnaissance visit, the Consultant shall record some geographic co-ordinates of physical features on ground using GPS (Dual Frequency, high accuracy). Control points shall be fixed not less than 5 km apart.

Data from various sources shall be collected at this stage:

- Topographic Maps
- Geological Reports available if any (from local departments, adjacent projects)
- Use of Satellite Imagery
- Agriculture Soil Reports
- Soil Survey Maps.
- Flood levels

Task A-6: Detailed Topographic Survey

Topographic Survey forms the basis for the Detailed Design. Poor quality of survey work produces not only incorrect designs but also results in post construction problems with variations in cost and claims. The Survey work shall be done to accepted International Standards. It is therefore recommended that the Consultant should use the latest technology for the Topographic Surveys.

Before mobilizing to Site for survey, the Consultants shall submit to the Client detailed Topographic Survey program with actual human resources planned to be deployed. The

Consultants shall specify the timeline of survey program. Total number of equipment with models and calibration certificates not more than 12 months old.

- Topographic Survey shall be performed taking into account all design and construction needs. Enough Spot Levels (points) shall be taken to create a topographic map in the scale of 1:2000.
- Extraction of features shall be done & points shall be taken beyond the ROW of 22 m on each side of the center line.

Task A-7: Engineering Investigations: Longitudinal Profile and Cross-Section

The Consultant shall specifically propose the Typical Cross-Sections on a Scale of 1/25 showing all details of road cross-sections in cuts and fills, side drains, pavement thickness, camber, super-elevation, and pavement widening. Regarding, the roadside safety measures, the consultant should refer and follow the Manual for Assessing Safety Hardware-MASH 2016.

The longitudinal profile plan shall be plotted in A1/A3 size (as requested by Client) to a scale of 1:2000 Horizontal and 1:100 Vertical with Chainage interval of 25 m unless otherwise specified or instructed by the Client. The cross-sectional plan of the existing road shall be plotted in A1 size to a scale of 1:100 both horizontal and vertical with 25 m interval. The plan shall show the Chainage interval as specified and the existing ground profile and all the existing features.

The following engineering investigations will be carried out but not be limited to:

- Ground reconnaissance survey to locate the position of the road;
- Concrete beacons firmly sited as agreed by the Government;
- The geometric characteristics of the centreline of the road; and
- Detailed site investigations and hydrological surveys, including a sufficient length upstream and downstream of proposed major structures to enable the hydraulic design of the structures to be proposed.

Task A-8: Consideration of Non-Motorized Traffic (NMT)

The consultant shall reflect the NMT in the cross-section proposals, considering the following:

The AASHTO Guide for the Development of Bicycle and pedestrian Facilities is the guide for planning, design, construction, maintenance, and operation of bicycle/Non-Motorized-Traffic (NMT) facilities. There are two types of bicycle facilities described in the guide.

The following specifications will apply in urban areas:

- NMT lanes should not be placed where angled parking is provided.
- The design of NMT lanes should also include appropriate signing and pavement markings at intersections to reduce the number of conflicts.
- The minimum paved width for a one-way bike path shall be 150 cm
- The vertical clearance to obstructions across the width of a bike path shall be a minimum of 250 cm and 200 cm over shoulder.
- NMT lanes intersections and their approaches should be on relatively flat grades.
- At unpaved roadway or driveway crossings, including bike paths or pedestrian walkways, the crossing roadway or driveway shall be paved a minimum of 50 m to minimize or eliminate gravel intrusion on the path.

- Bicycle path intersection design should address both cross-traffic and turning movements.
- If poles or other hard facilities are positioned very close to or on the bike lane, it could pose a safety risk for cyclists. In such cases, there is an increased likelihood of cyclists colliding with these obstacles, especially if the bike lane is narrow. For optimal safety, it's generally recommended to maintain a sufficient buffer space between the bike lane and any physical elements. The design should consider the width of the bike lane, visibility, and the potential impact on cyclist safety. If the placement of poles or other elements creates a hazard for cyclists, it may be advisable to re-evaluate the design and consider adjustments to improve safety conditions. This could involve repositioning the obstacles, providing adequate separation, or exploring alternative safety measures to protect cyclists while using the bike lane.

Task A-9: Hydrological/Hydraulic studies

The Consultants shall conduct hydrological/hydraulic studies and determine all necessary hydraulic and drainage structures as well as all the arrangements and provisions necessary for the protection of the road and its surroundings against erosions resulting from the discharges and flow, keeping in mind the need for climate resilience and flood protection.

The Consultants shall carry out detailed inspection of existing structures and based on condition of the structure shall recommend retention of existing structures or replacement. Where existing structures are retained, design for widening/ extension of existing structures shall be carried out commensurate with National Roads standards for cross-section of the road and structures. Condition Survey Report, along with two photographs of each existing structure will be submitted.

Task A-10: Soft Submission of Data and Drawings

The Consultant shall supply the digital ground model data, all Drawings and Reports suitable for input to the computer specification acceptable to Client. The data shall be supplied as specified below in order to preference: The CD-R (3 copies) and hard copy shall be supplied with an index scheduling the contents and referencing and shall remain the property of the ANE.

All field books and computer data must be properly kept and shall record all the survey work carried out. ANE's Representative may check the field books now and then to ensure that a high standard of work is maintained. He may request the Consultant to carry out some spot checks if he has reasonable doubt on the accuracy of the survey work.

Task A-11: Soil & Material Investigation

Soil & Material investigations shall be done to ascertain the index and engineering properties of soil & rock encountered. The Consultant is required to seek, interpret and evaluate subsurface and surface data in order to predict the behaviour of the soils and materials along, and adjacent to, the alignment. The resulting information should be presented in a logical and intelligible manner.

The Consultant is required to carry out following tasks:

- Determine needs of the design,

- Carry out complete ground investigations,
- Carry out complete laboratory testing,
- Evaluate results for final design.

As per fixed horizontal and vertical alignment, identify the areas of deep cuts and high fills. Study precise geometry of the roadway structures and develop design requirements.

Field investigations shall be carried out in three main areas:

- Investigation along the length of the proposed alignment to determine the pavement support potential offered by the subgrade soils
- Investigation to determine the source and quantity of naturally occurring construction materials
- Examine specific sites such as deep cuts, retaining walls and culverts etc.

For testing of materials, following codes and standards shall be followed:

- a) ASTM - American Society for Testing & Materials.
- b) AASHTO - American Association of State Highway and Transportation Officials.

Task A-12: Material Investigation

Every effort should be made to locate sufficient quantities of naturally occurring construction materials at regular intervals along the alignment and as close to the alignment as possible. In case of potential quarry sites, test borings are likely to be necessary to confirm the quantity and quality of material available. Bulk samples for quality testing may be obtained from adjoining bedrock outcrops provided that the samples obtained from such sources are truly representative. Test results from any nearby operational quarries should also be included.

Considerable amount of water is likely to be required for the proper compaction of earthworks, and water points will be necessary at frequent intervals along the alignment. An assessment should be made of the likely sources of water from any existing wells and from the geological formations underlying the route. Samples for tests to assess the suitability of water for concrete will be necessary.

Task A-13: Soil Classification

Soil description is necessary for all test pits and boring logs. The descriptions should be standardized so that the main characteristics are given in the same order i.e. Mass Characteristics shall include field strength, moisture content, bedding state if applicable discontinuities and state of weathering. Material Characteristics shall cover Colour, Composition, and grading. Particle shape, soil name and soil group. AASHTO classification shall be used.

Task A-14: sub soil investigation for structure foundation

The consultant should conduct enough investigations to provide sufficiently accurate estimate of foundations for bridge piers and abutments, as well as for other major structures. This will include field investigation using trenching, hand auguring, penetrometer, drilling if necessary, sampling and laboratory tests.

Task A-15: Climate Vulnerability Risk Assessment (CVRA)

The purpose of a CVRA is to identify and evaluate the effects of climate change in roads covered in this assignment to identify the most vulnerable sections and recommend climate adaptation measures to increase their resilience. The CVRA makes use of geo-spatial data, in which data layers of Exposure, Vulnerability and Hazard are overlaid in a GIS-based analysis to identify climate related hotspots and prioritize adaptation measures, which will then be included in the concept design. The CVRA approach combines a quantitative and qualitative assessment using primary and secondary data sources. Important sources of primary data are stakeholder consultations to identify vulnerable road sections that, historically, have been exposed to extreme weather events. But equally, the CVRA should consider exposure to future (projected) climate hazards such as increased risk to river channels from flash flooding due to changes in extreme rainfall intensities or due to changes in land-use such as extensive deforestation, farming, residential or industrial developments, and risk of extreme temperatures and exposure of pavement surface to high levels of ultraviolet light. As part of its technical approach and methodology, the Consultant should propose in detail how it plans to carry out the CVRA. Several flood events have occurred in the recent years, the Consultant shall analyze the damage to flood affected areas related to these events and include the need for specific climate resilient solutions at these locations in the design requirements. Information regarding these events will be collected from the ANE, IP Headquarters and Provincial Delegations.

The consultant shall consider the issue of flooding in the update of the vertical alignment and propose updates to the drainage system and protection against erosion in order to resolve the occurrence of damage and the interruption to traffic caused during flooding events

The consultant should integrate downscaled climate projection models, including Intergovernmental Panel on Climate Change scenarios in assessing climate risks. The climate models should incorporate projections of extreme rainfall events, temperature increases, and sea-level rise where applicable. Additionally, real-time climate monitoring data from Mozambique's meteorological services should be used to calibrate risk models. The consultant should ensure that all hydrological and flood risk assessments account for a minimum of a 1-in-100-year flood event scenario to reflect the increasing intensity of extreme weather conditions.

Task A-16: Road Safety Assessment/Appraisal

The Consultant should collect data as minimum requirement to conduct a road safety assessment under the study. This data should be collected for the Baseline (existing) Scenario and subsequently for the Project Scenario. However, the analysis of the Baseline scenario and various project alternatives should inform the design of the Project (concept and detailed designs)

- General characteristics:
 - Segment length in Km (different homogeneous segments may need to be identified, based on the road characteristics i.e., area type, such as urban/inter-urban/rural and road users present)
 - Area type
 - GDP per capita
 - Growth rate GDP per capita (%)

- Crash Data:
 - Baseline Fatalities
 - i. Annual fatalities (according to road segments if applicable)
 - ii. Serious Injury/Fatality Ratio
 - Baseline annual fatalities breakdown (percentage or number)
 - i. Vehicle Occupants
 - ii. Motorcyclists
 - iii. Pedestrians
 - iv. Bicyclist

The consultant shall conduct a Road Safety assessment/appraisal on the existing road to identify high-risk, crash-prone locations². The consultant shall collect road safety necessary data to measure the project's road safety impact. This data shall include crash data, traffic flow data (both motorized and non-motorized traffic), and, where available, speed data. For crash data, at least three complete years of data shall be collected and disaggregated by crash location, type of injury, initial impact, road user involved, gender, date and time, and mode of transport. The crash data shall be obtained from police stations within the corridor's zone of influence and analyzed based on the road sections adopted for traffic data analysis. If the crash data is insufficient, the Consultant shall carry out a proactive risk assessment to identify potential safety issues, complementary to the previous crash history review.

Task A-17: Construction Machinery Report

A detailed report on construction resource shall be prepared. It will include, based on the construction duration, the amount and type of key construction machinery required. Based on the Construction plan developed in Primavera/Microsoft Project, the resource allocation/ the Cash flow required shall be stated. Computations and assumptions for productions shall be attached in the report. The cost of any equipment required to be imported shall be reflected in the USD currency portions of the cost estimates.

Task A-18: Cost Estimates

In order to make a fair and reasonable estimate of the cost of the project, the Consultant shall prepare a unit price analysis of each major item of the project (based on conceptual design) using basic cost elements (labor, materials, equipment, tools, overheads, on-site costs, profit, etc.). He shall show separately the cost of all taxation (direct or indirect). In addition, the cost of monitoring of construction by the Consultant shall be analyzed on a unit price basis and included in the overall cost estimates. The estimated financial cost resulting from this analysis shall be accurate to within +/- 20%, and shall be compared with costs of previous projects or similar works executed in Mozambique. Should any differences be found, the causes shall be identified, and studies made to arrive at comparable market prices. The estimates for the right-of-way acquisition shall be made on the basis of the unit prices to be furnished by licenced Real

² This assessment/appraisal shall also take into consideration potential road safety issues related to wildlife crossings, as these may generate traffic crashes.

Property Valuers or mandated public entity in Mozambique for each type of land and property utilization.

The Consultant shall prepare a price estimate separately for the design and build civil works contract to be tendered and for the follow-up 3-year routine maintenance. This shall include, in accordance with the definitions of the Bidding Document, price estimates for (i) the design and (ii) upgrading/rehabilitation works.

The cost estimate will be based on conceptual designs and road works specifications for each road, which will include the typical cross sections and other typical geometric design parameters and be based on basic field surveys (traffic counts and forecasting, topographical and soils/materials).

the Consultant shall determine the proportion of the estimated cost that is in local currency and in foreign exchange. The Consultant shall also determine appropriate weightings and price indices for the respective construction resource inputs (equipment, fuel and lubricants, cement, steel, bitumen, etc.) in local and foreign currency (say USD) payments.

3.1.3 CONCEPT/PRELIMINARY ENGINEERING DESIGNS

Task A-20: Concept Designs.

The Consultants shall undertake an analysis to estimate the investment requirements, using relationships such as those contained in the HDM IV model or similar. The Consultants shall ensure that the modeling relationships are properly calibrated and used to suit the objectives of the contract. The Consultants shall finalize in detail the required initial capital investment. The conceptual design will include details of structures, cross sections; longitudinal and horizontal alignment; pavement details; drainage details; details of topographical survey polygon, details of road safety engineering measures, etc.

Climate change impact and adaptation should be considered in the preparation of the conceptual design. Hydraulic discharge capacity of structures should be calculated using historical extreme rainfall analysis (baseline) that corresponds to the chosen design period of the structure, and the projected uplift/decrease (% change) as a result of climate change based on:

- Greenhouse gas emission scenario: Representative Concentration Pathways (RCP) 8.5
- Source of data: Intergovernmental Panel on Climate Change (IPCC), Global Climate Models (GCM), extreme value data set, regionally downscaled
- Confidence level: 90% percentile values of projected extreme rainfall (max. 24h and max. 5-day rainfall)

Alternately, the Consultant may consider other adaptation measures such as submersible sections of the road to allow flood water to flow over as sheet flow during high flood events. A key factor is to balance the cost of hardening that may still fail vs. cost of temporary disruptions.

The conceptual design and book of drawings will include details of structures, cross sections (typical at scale 1:50), longitudinal and horizontal alignment at 1: 2,000 scale, pavement design

and its composition with material classification, drainage details, details of topographical survey polygon, GIS, etc.), standard drawings for structures, etc. The Consultants shall also carry out cost /benefit analysis using the concept of life cycle cost (inclusive of sensitivity analysis).

The outcome of the concept design stage should be a set of design documents that allows bidders to compete on equal footing i.e. bid proposals are comparable in terms of minimum required: design life, finished road level, standard cross section, location and minimum opening of drainage structures, whilst allowing sufficient room for bidders to propose innovative and cost-effective engineering solutions for pavement design, use of local materials, recycling technology, surfacing technology and structural design. However, bidders (contractors) under design and build are free to propose additional investments (e.g., embankment levels, more drainage structures) if according to their assessment this may result in cost savings during the maintenance (performance period).

Road Safety standards. The Consultants should follow international best practices while carrying out the Conceptual Design (such as Roadside Design Guide, 4th Edition). Based on the results of the Road Safety Assessment/Appraisal, the Consultant shall integrate proposed improvements into the concept engineering designs³. The designs should also highlight any potential road safety concerns that could emerge with the new road configuration in the proposed conceptual design and the mitigation measures. The Consultant is requested to propose measures in the action plan regarding techniques intended to safeguard the future Right of Way (ROW) of the road. If approved, these measures may be included in the requirements of the works contract.

Confidential Price estimate. The Consultants shall prepare a confidential price estimate for the civil works contract(s) to be tendered for the road sections under consideration. This shall include price estimates for (i) maintenance services during rehabilitation/upgrade phase, and (ii) rehabilitation/upgrade works. The purpose of the confidential price estimate is to obtain a benchmark price for civil works package/s (contract/s), against which actual bids can later be compared. The basis for the conceptual design may include a simplified BOQ in order to reach the cost estimate for the adopted option, based on the unit cost analysis, broken down to taxes, levies and other costs and then be compared with the project cost.

The cost estimates will provide for the planned activities within the right-of-way for the selected roads including realignments where applicable. Cost of all environmental and social impacts mitigation measures including GBV/SEA/SH response and mitigation measures, HIV / AIDS interventions included in the project's ESMF, ESIA/ESMP, LMP, SEP will also be added. The conceptual design will include all required technical specifications, standards, management measures, etc. for the planned activities in the design and construction phases of the project.

The cost estimate will be based on conceptual designs and road works specifications for each road section, which will include the typical cross sections and other typical geometric design

³ Wildlife crossings should be considered if they are relevant road safety issues. Appropriate mitigation measures must be considered in the conceptual design work and elaborated as requirements for the project during the implementation phase.

parameters and be based on basic field surveys (traffic counts and forecasting, topographical and soils/materials).

Specifically, the Consultant for this assignment, based on his completed review and the subsequent data collection fieldwork, will prepare the required information in the following areas which will be available to the bidders in the form of an “information Memorandum”:

- (i) Generic and specific technical studies (traffic volumes, traffic model for predicted traffic within the pavement design period of 20 years;
- (ii) Basic Field investigations, specifically the pavement investigations (using non-destructive methods such as FWD) and subgrade characteristics;
- (iii) Definition of LOS, which must be specified for the upgraded/Rehabilitated Road sections; and
- (iv) All other relevant information to assist bidders to bid on relatively equal terms

Integration of ESIA in Development of the Conceptual Design. To ensure that all relevant ESIA issues and applicable mitigation measures will be adequately integrated in the development of the Conceptual design, observing all requirements stated in the national E&S regulatory framework and World Bank ESF, it is fundamental that the specialists involved in Parts A and B of this ToRs work together. This work approach aims to maximize the interactions between the teams involved in both assignments, thus ensuring the environmental and social soundness of the proposed project solutions/alternatives, as well as full reciprocity of information between the Conceptual Designs and the ESIA.

To this aim, the methodological approach and work plan proposed by the Consultant should specifically identify key inputs required of the ESIA specialists at different stages of the work. The scope of services includes, but not be limited to, the following main tasks:

- Conduct regular meetings to (i) show how the E&S issues/constraints and mitigation measures identified in the ESIA are reflected in the conceptual design; and (ii) provide updated information on the conceptual design to the ESIA experts, so that the latter can better assess the project’s anticipated E&S risks and impacts and detail the required mitigation measures;
- Verify if road design related mitigation measures defined in the ESIA are adequately taken into consideration in the conceptual design and priced in the cost estimate;
- If the road pass through undeveloped areas of terrain which provide habitat for a rich biodiversity of wildlife, the biodiversity specialists shall be involved in developing appropriate measures aimed at reducing the risks that arise from this conflict, both to wildlife crossing the road and from a road safety perspective.

Task A-21: Development of a comprehensive approach to allocation and mitigation of Project Risks

MovThe Risks allocation Matrix is a key component of design and build contracts. The Consultants shall identify all associated risks related to the proposed design and build contract, analyze them, quantify them, and prepare the cost estimates in the table format. Each risk will be analyzed and allocated to the respective party which is best able to manage the risk.

Unallocated risk and the risk allocated to ANE, IP will be covered under Provisional Sum in the Contract, which can be utilized only with a specific approval of the Client. Some of the risks identified initially, but not limited to, are:

- *Detailed Design Phase.* These involve potential challenges with conducting field investigations and their ramifications for detailed designs.
- *Inflation.* The contracting industry has concerns with bidding for a long-term contract if they are not to be adequately protected against inflation and exchange rate fluctuation.
- *Traffic growth.* Traffic levels have a significant impact on construction costs in terms of the degree of damage caused to the pavements.
- *Traffic overloading.* Mozambique has a significant problem with overloaded trucks using the network. Since overloading has a significant impact on the price, the consultant should consider the most recent GOM policy/legislation and make recommendations for mitigating this issue when proposing the conceptual design.
- *Emergencies and natural hazards (e.g. slip/breach etc.).* The approach to managing emergencies will need to be covered in the design and build contract. Various methods have been used elsewhere for such items – open book accounting, coverage of work up to a certain value by the contractor above which the client makes extra payment, or rate fixing at market rates – and each have their advantages and disadvantages.
- *Construction Phase: Upgrading/Rehabilitation works and future potential development work.* These risks are both similar and complex involving a period during the construction implementation, for instance the cost and possible implementation delays related to the removal of public utilities such as telecommunication lines including fiber optical cables, power supply, water supply, etc. The approach to share as much information as possible and keep a provisional sum to cover the cost of removal of such utilities.
- *Environmental and Mining licenses:* The Ministry of Mineral Resources and Energy issues all mining licenses in Mozambique. Similarly, Ministry of Environment is tasked with issuance of environmental licenses after the provincial authorities have cleared it. Previous projects have faced consistent delay in issuance of these licenses. Appropriate approach to mitigate the delay risk needs to be designed.
- *Delays in land acquisition.* This delay can have significant impact on the execution of rehabilitation works. This risk may have different implications for the contractor and employer depending on timing of civil works and selected payment model. The consultant may propose methods to mitigate this risk.
- *Road safety and climate resilient risks:* These have traditionally been analyzed as interventions and not been subjected to market forces. By identifying them and assigning them to the responsible contract party, these risks can be addressed during contract preparation and costing applied to risks that lend themselves to assessment. These risks should be analyzed at all contract phases i.e. design, construction, operation and maintenance.

Other risks can be:

- Work undertaken by Utility operators within the Road Right of Way.
- Environmental Compliance.

- Influx of migrant labor to rural communities.
- Access control or lack thereof.
- Any other risks directly or indirectly related to the project area.

The Consultant shall follow a comprehensive approach to identify such risks and propose appropriate risk-mitigation plan.

PART B: PREPARATION OF ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA)

4. PREPARATION OF ESIA

LIST OF ACRONYMS AND ABBREVIATIONS

ANE, IP	National Roads Administration, Public Institute (<i>Administração Nacional de Estradas, Instituto Público</i>)
CRRN	Climate Resilient Roads for the North
ESHS	Environmental, Social, Health and Safety
ESF	Environmental and Social Framework
ESHS	Environmental, Social, Health and Safety
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
ESRC	Environmental and Social Risk Classification
ESS	Environmental and Social Standard
GBV	Gender-Based Violence
GoM	Government of Mozambique
GRM	Grievance Redress Mechanism
IPF	Investment Project Financing
MTA	Ministry of Land and Environment (<i>Ministério da Terra e Ambiente</i>)
NGOs	Non-Governmental Organization
NTS	Non-Technical Summary
OHSMP	Occupation Health and Safety Management Plan
PAP	Project Affected Persons
QNP	Quirimbas National Park
KPI	Key Performance Indicators
SEA	Sexual Exploitation and Abuse
SEP	Stakeholders Engagement Plan
SH	Sexual Harassment
ToR	Terms of Reference
VECs	Valued Ecosystem Components
WB	World Bank

1. SCOPE OF THE SERVICES

The purpose of the ESIA is to:

- (i) determine the E&S baseline conditions at the project's area of influence;
- (ii) analyze all feasible project alternatives;
- (iii) assess the E&S risks and impacts (direct, indirect, cumulative, including impacts on vulnerable project affected persons (PAP) / groups) resulting from the construction, operation and decommissioning of the Project, including ancillary⁴ and associated⁵ facilities;
- (iv) identify appropriate / effective / practicable mitigation measures, and develop E&S management and monitoring programs, based on a clearly articulated mitigation hierarchy (avoid / minimize / mitigate / compensate and/or offset); and
- (v) throughout the ESIA process, effectively identify and consult with PAP and their representatives, members of the general public, and other key stakeholders in relation to potential project benefits and negative E&S impacts and demonstrate that stakeholder views have been incorporated into the project E&S design.

The Consultant shall undertake the following work:

- Propose a specialized team of experts required to undertake the ESIA;
- Review all available existing information on E&S baseline conditions and potential impacts related to the Project, and ancillary and associated facilities;
- Review, analyze and provide the policy, legal, and administrative framework for the road projects as part of the ESIA reports.
- Undertake E&S scoping desk-based, and early review of available primary and secondary data, to focus on key issues/impacts;
- Clearly define the road projects' area of influence, including ancillary and supporting facilities that are part of the project, and the area of influence related to Associated Facilities;
- Conduct E&S desktop and as necessary field-based E&S baseline studies;
- Conduct site visits, with the team of experts, including formal and informal discussions/meetings with local communities, government entities and other key stakeholders, in each project affected area/ influence area (municipality level and district level). Consultations will enable both verification of the information reviewed from existing sources about the road projects' E&S context, an initial screening of likely E&S impacts and sensitivities, and for all relevant stakeholders to be informed about the Project. Any contact or interviews for preparation of baselines or social assessment should be planned and carried out in a culturally appropriate manner, in a language acceptable and used by the communities. Consultations shall be held in the national and/or relevant local language (or with translation).

⁴ Ancillary facilities may include campsites, temporary access roads, areas for sourcing construction materials (i.e., borrow pits, quarries), among others.

⁵ For definition of Associated Facilities please refer to paragraph 11 and footnote 18 of the Environmental and Social Policy for Investment Project Financing (IPF) available at <https://thedocs.worldbank.org/en/doc/360141554756701078-0290022019/original/WorldBankEnvironmentalandSocialPolicyforInvestmentProjectFinancing.pdf>.

- Conduct, using the specialized team of experts, baseline studies, covering the whole spectrum of analysis and modelling relevant to the construction and operation of the road projects.
- Based on the above, prepare standalone ESIA reports consistent with the applicable national and international Standards (see following sub-sections);
- Design, carry out, and document the public/stakeholder consultations and engagement throughout the ESIA process. This will lead to preparation of (i) the project's grievance redress mechanisms and channels; and (ii) a project Stakeholder Consultation Plan, annexed to the ESIA's main report. All relevant project's interested parties, whether affected by the project or not, and including vulnerable groups/persons, should be included in the stakeholder identification and analysis. This will ensure the impacts and mitigation measures are properly consulted with affected communities and any received feedback incorporated into the mitigation and management measures.
- The ESIA's shall include detailed ESMPs in compliance with the applicable requirements, which may include but not limited to:
 - a) Environmental and Social Monitoring Program and Key Performance Indicators (KPI);
 - b) Labor Management and Working Conditions;
 - c) Local Recruitment and Training Plan;
 - d) Occupation, Health and Safety Management Plan (OHSMP) and procedures;
 - e) Environmental, Social, Health and Safety (ESHS) Training Management Plan;
 - f) Environmental education in the project area;
 - g) Pollution Prevention and Control Plan;
 - h) Hazardous Materials Management Plan;
 - i) Waste Management Plan;
 - j) Resource Efficiency and Conservation Management Plan;
 - k) Water Conservation / Minimization Plan;
 - l) Wastewater Management Plan;
 - m) Restoration and Revegetation Plan (including Topsoil Management);
 - n) Traffic Management Plan;
 - o) Community Health and Safety Management Plan;
 - p) Labor Influx Management Plan;
 - q) Security Personnel Management Plan;
 - r) Biodiversity Management Plan;
 - s) Cultural Heritage Protection and Management Program (including chance find procedure);
 - t) Emergency Preparedness and Response Plan (EPRP).

Issue all disclosure documents in Portuguese and English for web disclosure and hard copy distribution to the public. The Consultant shall comply at any time with the relevant national and international data protection law and regulations.

2. OUTPUTS

2.1. Inception report

As part of the inception report for phase 1, the Inception Report shall detail the methodological approach and proposed work plan for preparing the ESIA's. It shall include a recommended Site Survey Priority List specifying themes and geographic areas/sites to be visited and stakeholders to be interviewed during the first field visit, along with justification to support the objectives of this scope.

2.2. Environmental and Social Scoping report

During the feasibility phase, an initial assessment of the potential E&S risks and impacts associated with the project must be undertaken, considering the geographical, physical, biological, social, economic, and cultural characteristics of the territory crossed. Such an assessment shall be conducted by the Consultant as part of the Environmental and Social Scoping Study required by the Mozambican legislation as part of the ESIA process and considering the World Bank ESF requirements.

Within the scoping study, the Consultant shall identify the key E&S issues related to the Project to be considered in the ESIA process. The ultimate objective of the scoping stage is to focus the remainder of the ESIA process on the risks and impacts of the Project that are likely to result in significant effects on the environment and/or people.

Scoping will involve mapping and consultation with the project stakeholders, whether affected parties or other stakeholders, including project-affected persons and their representatives, governmental entities (central, regional, and local), local authorities, civil society organizations and others mapped as relevant stakeholders. The consultations shall be undertaken according to the guidelines set in the Stakeholder Engagement Plan (SEP) prepared by ANE, IP and approved by the World Bank as part of the project preparation.

During scoping, the Consultant shall collect sufficient environmental and social baseline information and data to allow the preliminary assessment of the project's anticipated risks and impacts. The focus will be on collecting data for those resources/receptors with a reasonable potential to experience significant impacts. Data collected during this stage is expected to be primarily secondary (desktop review of previous E&S studies in the study area that are publicly available, the projects' preliminary layout, sensitive receptors identified through satellite imagery and web searches, topographic or cadastral map if available), combined with information obtained during the initial site visits and through stakeholder consultations which are considered an integral part of the scoping process. At this stage, the Consultant shall identify any gaps between available baseline data and the data required to conduct the ESIAs commensurate and proportional to the potential risks and impacts of the road projects, identifying the actions to fill these gaps, including further environmental or social baseline studies required.

The scoping stage activities will culminate in an Environmental and Social Scoping Report and Draft Terms of Reference for the ESIA (one for each standalone ESIA). The Scoping Report is expected to include, but not be restricted to, the following:

- A brief description of the Project, its scope, alternatives considered and justification;
- Applicable national legislation, ESF requirements and international standards;
- An overview of the environmental and social baseline, including studies to be undertaken to inform the ESIA;
- Main potential environmental and social risks and impacts to be studied, justifying those screened out during the scoping process;
- Relevant outcomes of the scoping stage stakeholder engagement;

- Summary of key stakeholders and a description of the envisaged stakeholder engagement process for the ESIA;
- ESIA work program including environmental and social baseline studies, impact modelling and assessment, ESMP; and
- Proposed schedule for completion of the ESIA.

The Environmental and Social Scoping Report and the ESIA Terms of Reference shall be submitted to the review of the World Bank and national impact assessment authorities for approval.

The Consultant is also expected to attend a follow-up meeting with the ANE's Project team and World Bank Team in which the Scoping Report will be presented, highlighting key findings. This meeting might be held in video-conference call or in person.

2.1. Environmental and Social Impact Assessment

The Consultant shall prepare ESIA for the roads to be upgraded and rehabilitated based on the Conceptual Designs. The development of these services needs to occur in parallel as they inform and are informed by each other. The ESIA shall observe of applicable requirements of the Mozambican regulations on Impact Assessment (specifically article 11) and the requirements of the World Bank ESF. Each ESIA shall include the content detailed below.

a) Introduction

Overview of the Project and the objectives of the ESIA.

b) ESIA Methodology

The Consultant shall describe the methods used for conducting the ESIA (scoping, impact analysis and stakeholder engagement process, etc.). The approach adopted for stakeholder engagement and level of participation should be described. The process to identify and methods for determining significance, of impacts (positive and negative) shall also be included.

c) Description of the Project

The Consultant will provide a description of the likely activities to take place during the project phases (planning and construction, operation and decommissioning), associated facilities (if any), auxiliary facilities (campsites, borrow pits, quarries, disposal areas, bitumen/concrete plants) and expected timelines for execution of main project development phases (particularly the phasing of the construction process). The description should include, in a separate sub-section, a presentation of the Project's Area of Influence covering: the Project footprint and other areas likely to be directly affected by project activities; the area likely to be affected by indirect impacts from unplanned but predictable developments caused by the project, that may occur later or at a different location; indirect project impacts on biodiversity or on ecosystem services upon which Affected Communities' livelihoods are dependent; associated facilities; and cumulative impacts.

The description shall be accompanied by clearly illustrated maps showing the Project site and the Project Area of Influence. The project Area of Influence is likely to vary depending on the environmental aspect under consideration and this should be clearly reflected.

d) Policy, Legal and Institutional Context

The Consultant shall:

- Describe the ESF requirements relevant for the project.
- Describe the pertinent regulations and standards governing environmental quality, health and safety, protection of sensitive areas, protection of endangered species, land use control, socio-economic and sociocultural aspects, land tenure, etc., at national and local levels.
- Identify the project activities that should comply with, or are relevant to, the identified regulations. In addition, any permitting requirements that the construction contractor(s) are expected to obtain should be listed.
- Describe the current national administrative arrangements for environmental regulation, enforcement and management.
- Provide a general assessment of the relevant government agencies involved in environmental and social management issues, and those who will be involved in ESMP implementation. Any clear capacity building measures that are required, should be captured in the ESMP.

e) Biophysical, Socioeconomic and Sociocultural Baseline

The ESIA report shall include a comprehensive description of the current state and likely evolution (in the absence of the Project) of the physical, biological, socioeconomic and sociocultural environments present in the Project impact area. The environmental and social baseline shall be based on recent data and consist of a combination of already gathered and available studies, as well as additional field work.

It is expected that the Consultant will undertake field work for all the relevant specialist studies. In addition, collection of baseline data and surveys will be undertaken to enable a robust assessment appropriate to the nature and scale of the Project. The spatial and temporal extent of the baseline surveys will be determined through professional judgment and industry best practice. Data will be relevant to inform decisions about project location, design, construction, operation, and mitigation measures. This section will indicate the accuracy, reliability, and data sources. Baseline information will be supported with figures and maps where possible.

Listed below are the indicative topics on which the E&S baseline may be carried out. It is Consultant's responsibility to add any topics not listed below but required to meet the objective of this activity and fully characterize the E&S baseline.

Topic	Indicative Scope
Geology, soil, and land cover	Detailed site survey of the Project site to identify and map geological and geotechnical/ hydrogeological features along with their relevance to the project. Geo-hazards and any negative impacts should be identified and assessed. Description and analysis of land cover, soil types, quality, and distribution over the interested area

Topic	Indicative Scope
Land Use	Detailed site survey of the Project site to map all sensitive receptors along with a description of their relevance to the project. This should include: (i) physical structures (e.g. temporary and permanent houses, shelters, commercial areas, etc.); (ii) economic activities that lead to income sources or other means of livelihood (e.g. farming areas, grazing, livestock, and other as applicable); and (iii) formal and informal land users within the project site to include any potential vulnerable groups. Consultations should be undertaken with such land users and landowners when identified to the extent possible to understand activities undertaken. In addition, consultations with relevant local entities should be undertaken as applicable to determine any additional land uses not recorded onsite (e.g. seasonal land uses) as well as to verify information above. Formal E&S land use planning for the area to determine any (e.g., protected areas, important bird areas, etc.). Description and analysis of the different types of land tenure and ownership systems of the project and associated facility sites, or any land legacy issues. A particular focus will be on whether any of the lands considered (either by law or in actual practice) to be of traditional / customary ownership and/or tenure.
Biodiversity	Detailed site survey and secondary data review to identify vegetation cover, existing flora and fauna, threatened or range-restricted species, invasive alien species, proximity to protected and/or sensitive habitats, and priority ecosystem services. Map the extent and condition of Natural and Modified Habitats, as defined in ESS 6. Consultation with local experts to assess potential for the presence of sensitive species. Special attention should be given to the areas located within the boundaries of the QNP and respective buffer zone. Through survey and consultation with QNP Administration, assess potential impacts to QNP, including potential impacts from the Project's ancillary and associated facilities. Provide a list of potential priority biodiversity values associated with the project according to the principles of vulnerability and irreplaceability ESS6. Confirm Habitat designation based on priority biodiversity values, and if Critical Habitat is confirmed a Critical Habitat assessment as per ESS6 requirements should be conducted.
Cultural Heritage	Site survey and review of secondary data by an archaeology and cultural heritage expert to ascertain the presence of any archaeological, paleontological and historical remains within the Project site, as well as tangible and intangible cultural heritage items. Any sites of importance should be recorded and delineated appropriately and their implications for the Project assessed. In addition, consultation should be undertaken with relevant authorities as applicable to determine if there any additional requirements which the Project is required to consider.
Landscape and Visual	Based on the site visit, identify general landscape and topography conditions within the area of influence. In addition, based on site assessment and

Topic	Indicative Scope
	consultations with relevant entities, identify any key visual receptors which could be impacted (touristic sites, villages, key archaeological sites, etc.).
Air Quality	Air quality monitoring baseline should be undertaken at the Project site, and any sensitive off-site locations which may be impacted by the Project. The minimum suite of air quality parameters that will be monitored are those that are expected to be affected by the Project's development. The Consultant is expected to provide a classification of site environment, establish present background air pollutants, applicable ambient air quality limits for the area, local dimensioning practice, and assessment of future expected air quality. This should consider any implications for the Project design.
Noise & Vibration	Noise, and if applicable vibration, monitoring baseline should be undertaken at the Project site, and any sensitive off-site locations which may be impacted by the Project. The Consultant is expected to provide a classification of the site environment, establish present background noise level, identify applicable noise limits and location of boundary, describe mitigation measures envisaged and assess the future expected noise, and if applicable vibration, levels during operations.
Water Resources	Assess the water sourcing & permitting requirements as well as potential impacts on local communities. If groundwater resources are potentially limited and/or there is an indication of potential impacts on other users to ecological aspects, a groundwater model should be developed.
Wastewater & Solid Waste	List expected types of waste and existing management options (including identification of licensed operators. Map local disposal options and associated quality requirements, including the permitting status of local landfills and their compliance with international standards and guidelines. Assess local recycling capacity for wastes generated by the Project (including the potential for waste to energy), and any needs, longer term, for building local capacity.

Topic	Indicative Scope
Socioeconomic Conditions	Identify directly and indirectly affected communities, including vulnerable persons/groups, and ethnic groups/communities within the Project's area of influence. Social and economic conditions of the communities in the area of influence of the Project should be characterized and assessed to include demographic dynamics, population characteristics, employment status, income distribution, community structure, gender, livelihoods, community health, poverty status, economic indicators, labor status, access to social services, existing context regarding GBV/SEA/SH and other data sets. In general, this should be based on sufficient secondary data available as well as consultations with relevant local entities. Description of the political environment (local government and administration, government policies, local Non-Governmental Organizations (NGOs) and community-based organizations (CBOs), social organization and leadership, social network structures), as part of stakeholder identification and analysis. Social and other community services and facilities (education, health, police and security, religious, etc.). Analysis of persons and assets/structures that will be physically and/or economically displaced by the Project (if any). Where physical/economic displacement is expected, establish whether and how many displaced persons are from each of the following categories: (i) those who have formal legal rights to land; (ii) those who do not have formal legal rights to land but have a claim to such land or assets recognized under national laws; (iii) those with no recognizable legal right or claim to the land they are occupying
Infrastructure and Utilities	Site survey and review of secondary data to determine any infrastructure elements within the Project site (e.g. roads, telecommunication towers, electricity lines, petroleum activities, etc.). In addition, infrastructure and utility requirements for project should be identified in relation to: (i) access roads, (ii) transport (iii) water resources and water supply, (iv) wastewater infrastructure and utilities; (v) solid waste infrastructure and utilities; (vi) hazardous waste infrastructure and utilities. Consultation should be undertaken as relevant to verify infrastructure and utility elements within the area, and the degree of influence the Project has on the development and routing of those being implemented to support the Project.

f) Potential Impacts of the Proposed Project and Mitigation

Using the collected baseline data, Project information, and following good industry practice and methodologies for impact identification and assessment, the Consultant shall assess the potential adverse environmental, social, health and safety (ESHS) risks and impacts of the Project across its lifecycle (planning, design, construction, operation and de-commissioning phases), as well as opportunities (positive impacts) that the Project may provide. It should also consider any legacy environmental and social risks and impacts which the Project may generate (e.g. closure of other Client facilities).

The ESIA shall include an analysis of the likely risks and impacts of the proposed Project and associated facilities on the physical, biological, socioeconomic and sociocultural environment to provide an identification and detailed characterisation of potential adverse and beneficial ESHS impacts. This shall include an identification of impacts that could be experienced disproportionately by vulnerable groups. The assessment will include potential ESHS impacts (prior to the application of mitigation measures) and residual impacts. Maps shall be prepared wherever needed to properly illustrate impacts, especially those with a significant spatial dimension.

The key areas of potential impacts which may be considered are as, but not limited to, the following:

- Soil erosion and stability;
- Water resources;
- Flood risks (if applicable);
- Air quality;
- Noise & vibration;
- Waste management;
- Biodiversity;
- Landscape and visual;
- Land use;
- Archaeology and cultural heritage;
- Occupational health and safety and worker accommodation;
- Community health and safety;
- Infrastructure and utilities;
- Socio-economics aspects including:
 - Land acquisition and involuntary resettlement
 - Economic displacement
 - Aspects related to project-induced migration (cost of living, pressure in social services, crime, etc.)
 - Socio-economic development opportunities (jobs, capacity development, etc.)

Impacts on the different components of the physical, biological, socioeconomic, and sociocultural environments shall be assessed using good practice ESIA techniques (e.g., (numerical) modelling, risk assessment, expert judgement, etc.) and through the consistent and transparent application of an impact assessment methodology that would consider, amongst other, the following criteria as applicable:

- Nature of impact (positive or negative);
- Type of impact (direct or indirect);
- Impact likelihood (unlikely, likely, certain);
- Duration of the impact (temporary, permanent);
- Extent of the impact (local, regional, national, transboundary);
- Reversibility of the impact (reversible; irreversible);
- Sensitivity, importance and vulnerability of the affected resource or receptor;
- Defined quantitative limits (e.g. emission limits and air quality standards);
- Magnitude of impact (low, moderate, high);
- Significance of the impact (low, moderate, high).

The Consultant shall present in the ESIA report a significance rating for each residual impact.

The impact assessment shall include, but not be limited to, consideration of the following impacts during the construction phase:

- Impact on surface water flows and the functionality and ecological services of wetlands.
- Impact on habitat loss and threats to Red Data species.
- Impact on areas of conservation significance, including nature reserves, other recognised conservation areas, areas potentially qualifying as WB-defined Critical Habitat.
- Impact of the potential spread of invasive species caused by construction vehicles from outside the Project site and disposal of exotic food waste.
- Pollution impact caused by the use of hazardous materials and products, waste generation, sanitation at work camps and construction sites and domestic waste generation and disposal.
- Impact on employment and disposable income.
- Impact on labour, including assessment of issues related to working conditions, unfair labour practices, gender equality, occupational health and safety, HIV/Aids and GBV/SEA risks, and safety and health concerns for temporary and migrant workers. Analysis of gender impacts shall make use of existing country gender diagnostics, country-wide region-specific data on violence against women, data and / or information about cultural practices vis-à-vis women (early marriage, physical practices), and existing services available from GBV service providers. Analysis of gender equality shall review gender policies as well as the social and gender policies for the utilities and shall consider the types of project activities that can increase women's economic opportunities.
- Impact due to land acquisition and involuntary resettlement for the rights-of-way.
- Impact on surrounding communities caused by workers and work camps (if relevant), including spread of HIV/Aids, GBV/SEA risks and child protection.
- Impact on surrounding communities caused by labour influx.
- Impact on surrounding communities caused by the temporary use of land, loss of property access and construction traffic (safety, noise and dust).
- Impact on cultural heritage resources, including physical artefacts and sacred sites.

g) Assessment of Reasonable Alternatives

An alternatives assessment should be made for the road intervention area, design, construction techniques/technology and operational procedures, as applicable. For each of the alternatives assessed, the Consultant shall present a quantification of the anticipated environmental and social impacts to the extent possible and estimate the economic value (cost) of the required mitigation measures, where feasible.

h) Assessment of Cumulative, Indirect / Induced Impacts

The ESIA report shall address all cumulative impacts to the extent that these can reasonably be predicted, as well as indirect/induced impacts that could be generated by the development of the Project.

The Consultant will undertake an assessment of other existing or planned/permitted projects which along with the Project could have cumulative impacts on Valued Environmental and Social

Components (VECs)⁶. This should recognize that Cumulative Impacts are contextual and encompass a broad spectrum of impacts at different spatial and temporal scales. Cumulative impacts should be considered in the development of the management plans to avoid and/or minimize these impacts to the greatest extent possible. The approach to identify and assess cumulative impacts should follow the WBG rapid cumulative impact assessment (RCIA) methodology⁷.

i) Environmental, Social, Health and Safety Management Plan and Monitoring Program

The Consultant will develop detailed Environmental, Social, Health and Safety Management Plans (“ESMP” or “ESHS MP”) that identify for each impact the mitigation, monitoring and management measures to be taken during the various phases of the project (construction, operations, decommissioning) to avoid, reduce, mitigate, or compensate for adverse environmental, social, and health and safety impacts.

For each identified impact the Consultant will establish:

- A set of mitigation measures that will include feasible measures to prevent significant adverse impacts or reduce them to acceptable levels applying a mitigation hierarchy⁸. Such measures will involve technical requirements, guidelines or procedures and practices to be implemented during design, construction, operation and decommissioning phase of the Project. Measures to enhance Project benefits shall also be identified. Where affected individuals or groups are identified as disadvantaged or vulnerable during the appraisal process, the ESMP shall include differentiated measures so that adverse impacts do not fall disproportionately on them, and they are able to take advantage of opportunities to benefit from the Project.
- A set of monitoring requirements that ensure that the identified mitigation measures are considered, implemented properly and are sufficient for protecting the environment, natural resources, local communities, and workers.

The monitoring is critical for the successful implementation of the ESMP and ensure that construction activities are in compliance with the requirements established for all levels and stages of the project implementation. It also helps identify how well mitigation measures are working. The monitoring program shall define environmental and social performance indicators as well as identify what information should be collected, how, where and how often.

In addition, as part of the ESMP, the Consultant shall also identify the proposed ESMS structure that will be followed for the project. The ESMS requirements will be included in detail for all the parties involved, including, the Sponsor, EPC and O&M contractor.

This ESMS shall be aligned with the principles of ISO 14001 and OSHAS 18001/ISO 450001 and include the necessary Elements, Programs and Management Plans and Procedures to manage the identified Project risks. As part of the ESMS, management plans will be developed in line

⁶ VECs are environmental and social attributes that are considered to be important in assessing risks; they may be: (i) physical features, habitats, wildlife populations (e.g., biodiversity), (ii) ecosystem services, (iii) natural processes (e.g., water and nutrient cycles, microclimate), (iv) social conditions (e.g., health, economics), or (v) cultural aspects (e.g., traditional spiritual ceremonies).

⁷ For further details see IFC's *Good Practice Handbook: Cumulative Impact Assessment and Management*, available at <https://www.ifc.org/en/insights-reports/2013/publications-handbook-cumulativeimpactassessment>.

⁸ The ESIA shall apply a mitigation hierarchy, which will: i. Anticipate and avoid risks and impacts; ii. Where avoidance is not possible, minimize or reduce risks and impacts to acceptable levels; iii. Once risks and impacts have been minimized or reduced, mitigate; iv. Where significant residual impacts remain, compensate for or offset them, where technically and financially feasible.

with the applicable requirements for the key aspects identified in the ESIA such as: pollution prevention (noise, dust, fuels, hazardous materials), solid and liquid waste, flora and fauna, water management, occupational health and safety, influx, land compensation and resettlement (if applicable), transportation management, security management, emergency response, labor and supply chain management.

The Consultant will develop an outline management structure which will ensure the implementation of all the required mitigation and/or monitoring activities is achievable. This will include recommended training activities, and any additional management tools, etc.

j) Stakeholder Engagement and Public Consultation Process

A summary of activities and outcomes of the stakeholder engagement process shall be integrated in the ESIA. A separate Stakeholder Engagement Report, including a Comments and Response Report detailing all engagement activities and the Consultant's response to questions and issues raised, shall be appended to the ESIA. Reporting on stakeholder engagement during the ESIA shall demonstrate compliance with the requirements of the environmental regulators and ESF (namely ESS10).

l) Non-Technical Summary

The Consultant shall prepare a Non-Technical Summary (NTS) which concisely discusses meaningful information on the project, its environmental and social footprint and impacts, significant findings and recommended actions in easily understandable (non-technical) language. This initial section will include a summary of the ESIA undertaken (project description, baselines, impact analysis and mitigation measures for the environmental, social and health and safety negative and positive impacts) and a summary of the stakeholder engagement process. The NTS will be provided in English and Portuguese language. Considerations should be given to translating the NTS to the local languages.

The three key specialists identified above shall be supported by a team of non-key ESIA specialists, with adequate qualifications and language skills, who will cover the following areas:

- Pollution prevention and management (air quality, noise and vibration, waste management);
- Soils, geology, topography/landscape;
- Hydrology, hydrogeology and water quality;
- Cultural heritage;
- Stakeholder engagement and consultation.

LANGUAGE OF THE DOCUMENTS

The official correspondence, communication related to the assignment shall be in English language. All reports shall be submitted in English and Portuguese.

5. PREPARATION OF BIDDING DOCUMENTS

5.1. Development of Contract Strategy

Task C-1: Cost Benefit Analysis

The Consultant shall carry out a cost benefit analysis for the proposed engineering options including a sensitivity analysis, to substantiate the best “value for money” option chosen for the implementation. The cost estimate will be based on conceptual designs for each road which will include the typical cross sections and other typical geometric and pavement design parameters. At this stage the cost estimate will be based on a market analysis of similar road rehabilitation and improvement works in Mozambique over the last 5 years.

Task C-2: Development of a comprehensive approach to allocation and mitigation of Project Risks

The Risks allocation Matrix is a key component of design and build contracts. The Consultants shall identify all associated risks related to the proposed design and build contract, analyze them, quantify them, and prepare the cost estimates in the table format. Each risk will be analyzed and allocated to respective party which is best able to manage the risk. Unallocated risk and the risk allocated to ANE, IP will be covered under Provisional Sum in the Contract, which can be utilized only with a specific approval of the client. Some of the risks identified initially, but not limited to, are:

- *Detailed Design Phase.* These involve potential challenges with conducting field investigations and their ramifications for detailed designs.
- *Inflation.* The contracting industry has concerns with bidding for a long-term contract if they are not to be adequately protected against inflation and exchange rate fluctuation. An index for escalation during the contract shall need to be developed to mitigate the risk.
- *Traffic overloading.* Mozambique has a significant problem with overloaded trucks using the network. Since overloading has a significant impact on the price, the consultant should consider the most recent GOM policy/legislation and make recommendations for mitigating this issue.
- *Emergencies and natural hazards (e.g. slip/breach etc.).* The approach to managing emergencies will need to be covered in the design and build contract. Various methods have been used elsewhere for such items – open book accounting, coverage of work up to a certain value by the contractor above which the client makes extra payment, or rate fixing at market rates – and each have their advantages and disadvantages.
- *Construction Phase: Upgrading/Rehabilitation works and future potential development work.* These risks are both similar and complex involving a period during the construction implementation, for instance the cost and possible implementation delays related to the removal of public utilities such as telecommunication lines including fiber optical cables, power supply, water supply, etc. The approach to share as much information as possible and keep a provisional sum to cover the cost of removal of such utilities.
- *Environmental and Mining licenses:* The Ministry of Mining issues all mining licenses in Mozambique. Similarly, Ministry of Environment is tasked with issuance of environmental licenses after the provincial authorities have cleared it. Previous projects have faced consistent delay in issuance of these licenses. Appropriate approach to mitigate the delay risk needs to be designed.

- *Change in Law.* Change in law can cause a significant impact on the cost or reduction in net after tax return or other financial burden. One approach can be to place the risk of change in law with the contractor up to a threshold value beyond which the client compensates the effect of increase in cost, decrease in return for additional financial burden imposed.
- *Delays in land acquisition.* This delay can have significant impact on the execution of rehabilitation works. This risk may have different implication for contractor and employer depending on timing of civil works and selected payment model. The consultant may propose methods to mitigate this risk.
- *Road safety and climate resilient risks:* These have traditionally been analyzed as interventions and not been subjected to market forces. By identifying them and assigning them to the responsible contract party, these risks can be addressed during contract preparation and costing applied to risks that lend themselves to assessment. These risks should be analyzed at all contract phases i.e. design, construction, operation and maintenance.

Other risks can be:

- New roadside development.
- Capital/improvement works being undertaken by others.
- Work undertaken by Utility operators within the Road Right of Way.
- Environmental Compliance.
- Influx of migrant labor to rural communities.
- Access control or lack thereof.
- Any other risks directly or indirectly related to the project area.

The Consultant shall follow a comprehensive approach to identify such risks and propose appropriate risk-mitigation plan.

5.2. Preparation of design and build bidding documents.

Task C-4 Bidding Documents

The Consultant will complete the bidding documents for Design and Build methodology, including reports, plans, maps, drawings, sketches, specifications, bills of quantities etc. by first submitting the draft report and bidding documents to the Client for review and, after receipt of the Client's comments, finalizing the same for advertisement.

The bidding documents shall be based on the latest available Standard Bidding Document (SBD) for the road rehabilitation/upgrading works using Design and Build methodology and the rated (technical and financial) criteria for evaluation of bids. The bidding document shall comply with the requirements of the World Bank and shall include:

- The Tender notice, tender documents (Instruction to bidders, data sheet, evaluation criteria's, etc.),
- Employer's requirements for mobilization, design, construction works, Environmental, Social, Health and Safety requirements, and Design Parameters based on the technical study outcome from the Part B.
- Contract documents.

The Consultant's proposal should be developed to ensure maximum local participation through skills transfer, capacity building or any other strategy that will promote the development of the domestic construction industry.

6. REPORTS TO BE SUBMITTED

The following reports shall be submitted by the consultant and shall cover all aspects indicated in the ToRs.

Deliverable	Report	Due Date	No. of Copies	
			Hard Copy	Soft Copy
Phase 1: Preparation of Feasibility Study, Concept Design, Bidding Documents, ESIA and RAP				
D1	1. Inception Report	3 weeks after commencement	3	2
D2	2. Draft Feasibility study report	3 months after commencement	3	2
	3. Environmental and Social Scoping Report		3	2
D3	4. Updated/revised report, Drafts of conceptual engineering design and draft bidding documents	5 months after commencement	3	2
	5. Draft Environmental and Social Impact Assessment		3	2
	6. Draft bidding documents		1	1
D4	7. Final feasibility report, conceptual engineering design report and bidding documents	8 months after commencement	3	2
	8. Environmental and Social Impact Assessment		4	2
	9. Final RAPs Report, for each subproject (road section) including Inputs for Liability Remediation Plan,		4	2

	Stakeholders Engagement Plan and Grievance Redress Mechanism			
	10. Bidding Documents		4	2

7. DURATION OF THE ASSIGNMENT AND REQUIRED INPUT

It is expected that the services shall be carried out within eight (08) months during which the Consultant's key professional staff team shall spend almost all their time on this assignment in Mozambique with necessary technical and engineering support from the head office of the firm. The team shall operate from an office preferably established in Northern Mozambique (Nampula or Pemba). The proposed total input for the key professionals for the contract is estimated to be 45 man-months.

8. TEAM COMPOSITION

8.1 Team Composition

It is the Consultant's responsibility to provide the required inputs of Key Professionals for the assignment; provide necessary logistic arrangements to render these services efficiently and diligently. When proposing the team members, the Consultants should make sure that the proposed staff are actually available and aware of the intensity of the required travel. Any change in key personnel shall be permitted only under exceptional circumstances and if evidenced as equal or better than the initially approved candidate.

8.2 Staff Qualifications

The Consultants shall submit names, Curriculum Vitae (CVs) and copies of qualifications for all these key professional staff. The copies of qualifications shall be in English or accompanied by translations in English where the original qualifications are not in English. All the key staff are required to be proficient in English. The estimated man-months of each key staff and for evaluation purpose will be as follows:

Activity	List of Key Positions whose C.V. and Experience would be evaluated	man-months
Preparation of Feasibility study and concept designs	Team Leader/Senior Highway Engineer	8
	Transport Economist	3
	Pavement Design and Management Specialist	5
	Bridge Engineer/ Structural Engineer	5
	Geotechnical/Materials Engineer	5
	Road Safety Specialist / Traffic & Safety Engineer	5
	Hydrologist/Hydraulics and Drainage Specialist	5
Preparation of ESIA	Environmental, Health and Safety Specialist	4
	Biodiversity Specialist	2
	Social and GBV/SEA/SH Specialist	3
	TOTAL	45

Team Leader (Senior Highway Engineer): He should have BSc degree in Civil/Highway Engineering with minimum of 15 years professional experience in the road sector as a team leader of which 10 years in developing countries. Minimum of three (3) similar projects successfully completed in the last 10 years in a similar position and role, covering: highway/ road design and maintenance in tropical countries and experience in the use of D&B contracting modalities. Previous proven involvement, in leading role for D&B/PPP type of projects is required. Fluency in both written and spoken English language.

Transport Economist: The candidate must have a minimum of 15 years' experience in economic analysis applied in major infrastructure projects. Minimum of 4 years accumulated experience in the last 10 years in a similar position and role, covering: Application of the HDM-4 Model for evaluation of highway investments. A minimum equivalent education comparable to BSc. in Engineering/Economics or Business Management. Fluency in both written and spoken English language.

Pavement Design and Management Specialist: The candidate must have BSc degree in Civil engineering with minimum of 15 years of experience in Pavement design and management systems of which 7 years in developing countries. Minimum of 2 similar projects successfully completed in the last 10 years in a similar position and role, covering pavement management systems. Fluency in both written and spoken English language. Note: Significant experience (4 years or more) of sealed road construction, routine and periodic maintenance should be encountered in this candidate or in the Team Leader.

Bridge Engineer/ Structural Engineer: BSc. in Civil Engineering/ Structural Engineering. Minimum of 15 years professional experience in the design of bridges and other drainage structures of which 7 years in developing countries. Minimum of 2 similar projects successfully completed in the last 10 years in a similar position and role, covering: bridge design, geotechnical investigations and CAD related work. Fluency in both written and spoken English language

Geotechnical/Materials Engineer: The candidate must have BSc degree in Civil engineering, Geology or related field with minimum of 15 years professional experience in the pavement engineering and materials of which 7 years in developing countries. Minimum of 2 similar projects successfully completed in the last 10 years in a similar position and role, covering: pavement design, materials and sub-grade investigations. Fluency in both written and spoken English language.

Road Safety Specialist / Traffic & Safety Engineer: The candidate shall have BSc degree in civil engineering and minimum 10 years of working experience of which minimum 7 years' experience in conducting road safety assessments (including stakeholder consultations, crash data collection) and traffic engineering as part of highway design projects. The Road Safety

Specialist should have successfully completed three (3) similar assignments of comparable scope to the project. Fluency in both written and spoken English language and ability to communicate are essential

Hydrologist/Hydraulics and Drainage Specialist: Minimum BSc degree in Civil Engineering, Hydrology, Water Management, Flood Management. Minimum of 15 years professional experience in the hydrological analysis and hydraulic design of drainage structures of which 7 years in developing countries. Minimum of 2 similar projects successfully completed in the last 10 years in a similar position and role, covering: statistical analysis of historic rainfall, conducting climate vulnerability and risk analysis, determination of uplift factors for extreme rainfall, hydraulic design of road drainage and structures including climate adaptation measures, using Standard Engineering Software Packages (HEC-RAS or similar). He/she shall be conversant with estimating flood discharge together with designing and checking vent way requirements for drains, culverts, and bridges. Fluency in both written and spoken English language.

Road Safety specialist: BSc. in Civil Engineering. Minimum of 10 years professional experience in conducting road safety audits during the design stage of the project of which at least 7 years in developing countries. Minimum of 5 years accumulated experience in the last 10 years in a similar position and role, covering: road safety audits in major highways, design road safety improvement schemes. Fluency in both written and spoken English language.

Environmental, Health and Safety (EHS) Specialist

The candidate must have a Master's degree in environmental sciences or a directly related field; At least 15 years of experience in impact assessment and management of EHS risks and impacts of major infrastructure projects, including road projects (at least three road projects), experience in preparing ESIA/ESMP following the World Bank ESF requirements, or other equivalent standards of international donors, for complex engineering and construction projects (at least two assignments); proven experience working with Health and Safety international standards and best practices (international certification in the area will be considered a competitive advantage); working experience in sub-Saharan Africa (experience in Fragility, Conflict and Violence contexts will be considered a competitive advantage); fluency in Portuguese is an advantage and in English is required.

Biodiversity Specialist: The candidate must have a Master's degree in biology, ecology, or a directly related field; at least 8 years of experience in assessment and management of risks and impacts on biodiversity from infrastructure projects, including road projects (at least three road projects); experience in preparing Biodiversity Management Strategies and/or Plans following the World Bank ESF requirements, or other equivalent standards of international donors, for complex engineering and construction projects (at least one assignment); proven experience in preparing Wildlife Road Permeability Studies (at least one assignment); Fluency in Portuguese is an advantage and in English is required.

Social and GBV/SEA/SH Specialist: The candidate must have at least a bachelor's degree in social sciences or a directly related field; at least 15 years of experience in assessment and management of social risks and impacts for major infrastructure projects, including road projects (at least three road projects); proven experience in preparing social assessments, conducting stakeholder engagement and public consultation processes, following the World Bank ESF requirements, or other equivalent standards of international donors, for complex engineering and construction projects (at least two assignments), experience developing and/or implementing mitigation measures designed to address SEA/SH risks ; professional experience

in gender and/or gender-based violence-related prevention and response programming to provide a strong understanding of a survivor-centered approach and principles of survivor care and ethical management of sensitive GBV data in accordance with international best practices; working experience in sub-Saharan Africa (experience in Fragility, Conflict and Violence contexts will be considered a competitive advantage); fluency in Portuguese is an advantage and in English required.

9. DATA, FACILITIES AND RESOURCES TO BE PROVIDED BY THE EMPLOYER

Available information in respect of existing road inventories including data on pavement history and condition, traffic statistics and road crash statistics, geographical maps of all districts including category of road thereon.

ANE will make available electronic copies of relevant road design manuals and specifications.

However, the consultants shall be required to collect any necessary information, which is not available with ANE and shall be responsible for any translation of documents and for processing of data.

10. CONSULTANT'S OBLIGATIONS

General

The Consultant shall perform the services specified in the "Terms of Reference" under "Scope of Services," and shall provide the personnel listed under, "Consultant Personnel," to perform the Services.

The Consultant shall submit to the Client the reports in the form and within agreed time periods specified under "Consultant's Reports and Documentation

Transportation Requirements

During the implementation of these services, the Consultant will be responsible for the costs and provision of adequate transport for their personnel.

Staff Housing

During the implementation of these services, the Consultant will be responsible for the costs and provision of adequate accommodation or housing for their project staff.

Offices for Consultant's personnel

The consultant shall be responsible for meeting all costs of office provision, operation, supplies, communications, secretarial services, document translation and logistical services during Phases 1 and 2.

Travel Related Costs and Allowances for Consultant's personnel

The Consultant is responsible for all travel related costs (tickets, visa cost, medical exams, vaccinations, etcetera) and out of duty station allowances for its personnel.

Road Surveys

The Consultant is responsible for all staff requirements and software for undertaking road technical surveys, investigations and preparing the concept engineering designs such as topographical surveys, traffic counting, axle load surveys, CAD (and GIS) design software, meteorological data collection.

Reimbursable Expenditure

The consultant is required to provide evidence of expenditure incurred for all reimbursable expenditure that is to be paid under this Contract. Reimbursement will be made in the currency in which it is incurred or at the exchange rate on the date of purchase.

11. LOGISTICAL SUPPORT

Liaison Officer

ANE, IP will appoint the project implementation unit coordinator in Cabo Delgado as the liaison officer through whom all requests for information, guidance and assistance should be addressed. All reasonable assistance will be provided, including liaison with other Government departments and access to any relevant data that is not classified as restricted. Other personnel provided will be as agreed during contract negotiations and the kick-off meeting.

ANE, IP shall provide the consultant, without charge, the following:

Assistance in obtaining any required customs clearances, visas and any other official permits, as may reasonably be required. Such other support facilities as may reasonably be needed for the expeditious performance of the required services, including pertinent files, documents and working papers.

12. LOCAL TAXES

Consistent with the provision of the Terms of Agreement, the consulting firm and its expatriate personnel providing services under the contract for which these TOR are written shall be required to pay local taxes on the income and profits derived from these services, unless otherwise provided in the respective contract.

13. PAYMENT SCHEDULE

The services provided will be implemented under a lump sum contract and the service provider will receive payments as follows:

- a. **1st payment:** 20% of the price Contract after presenting the delivery D1 of the Project and being approved by the Client as satisfactory.

- b. **2nd payment:** 30% of the Contract price, after presenting the Delivery D2 of the Project and being approved by the Client as satisfactory;
- c. **3rd payment:** 30% of the Contract price, after presenting the Deliverable D3 of the Project and being approved by the Client as satisfactory; and
- d. **4th payment:** 20% of the Contract price, after presenting Deliverable D4 of the Project and being approved by the Client as satisfactory.

ANNEX 1

LOCALITY MAP

