

## **Section 7. Terms of Reference**

### **CLIMATE RESILIENT ROADS FOR THE NORTH (CRRN)**

**"Consultancy Services for Preparation of Feasibility Study, Conceptual Design, Environmental and Social Impact Assessment, Resettlement Action Plan and Bidding Documents of Civil Works under Design, Build and Transfer Methodology**

**for the Roads**

**N381: Mueda - Xitaxi (52.0 km), N380 Muagamula – Xitaxi (25 km) and N762: Metugi – Quissanga (88 km) in Cabo Delgado Province**

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It is expected that the services shall be carried out within Six months (180 days), 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 established at Maputo and sub-office in Northern Mozambique (Nampula or Pemba). The proposed total input for the key professionals is estimated to be **35 man-months**..... 24

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## 1. INTRODUCTION

Mozambique's economy grew steadily up to 2015, averaging 7.3 percent. From 2016 up to 2020 the economic activity decelerated sharply and in 2020, gross domestic product (GDP) declined by 1.2 percent, the first economic contraction in three decades. The economy has now shown signs of recovery, with growth estimated to have reached 2.2 percent in 2021, a combined outcome of agricultural growth, relatively strong recovery in services.

The recovery of the economy still has low impact on the reduction of poverty for the rural people as is driven by capital-intensive and import-dependent sectors, while low-skilled jobs in the agriculture sector continued to dominate employment. As a result, the poorest people, living mainly in rural areas of the central and northern provinces, have benefited less from economic growth than the overall population.

In this environment, agriculture-still the mainstay of Mozambique's economy-is critical for overall poverty reduction. However, agricultural productivity remains low and constrained by many factors, including limited access to transport infrastructure and services in rural areas. Agriculture employs about 80 percent of the total workforce and generates about 30 percent of gross domestic product (GDP).

In addition to the poverty and poor accessibility to rural areas, Mozambique is highly exposed to extreme rainfall and flooding that may become even more frequent because of global climate change. Catastrophic flooding occurs almost annually during the rainy season and is largely influenced by La Niña and the Intertropical Convergence Zone. During the past 7 years, the country registered several cyclones namely Kenneth, Chalane, Eloise, Gombe, Ana, Dumako, Idai and Freddy. In 2015 a devastating flood affected 326,000 people, killed 140, and caused damages estimated at US\$371 million in parts of Zambezia, Nampula, and Niassa Province, another northern province. In 2013, a flood affecting the Limpopo lower basin killed 113 people, displaced more than 200,000, and ruined nearly 89,000 ha of cultivated land. Other major floods (in 2000 and 2007) and cyclones (in 2008, 2012, and 2017) caused fatalities and severe damage in different parts of the country.

In the spring of 2019, Mozambique was hit by two cyclones: Idai in March and Kenneth in April. These cyclones affected over 1.7 million people, killed 644 people, and destroyed partially or totally around 275,000 houses. Cyclone Idai with heavy rains (more than 200 mm in 24 hours), winds (180 to 220 km per h), and flooding severely affected the central and northern regions of the country from March 4 to 17, 2019. On March 19, 2019, the Government of Mozambique (GoM) declared a national emergency, triggering major emergency response interventions. On April 25, 2019, Cyclone Kenneth hit the northern region of the country. Cyclone winds and floods destroyed or damaged critical infrastructure such as roads. In February 2023 cyclone Freddy also caused severe damages in the road infrastructure in the central and northern regions of the country.

Due to recurrent climatic impact, the road network has suffered extensive damage over the last 20 years, with substantial sums being diverted from network improvement to the repair of flood-related damage. As the Mozambican road network has a low redundancy, those disruptions

sometimes isolate communities for extended periods of time and thus have a significant detrimental impact on their local economies.

In Cabo Delgado province, the cyclones, heavy rains and floods destroyed various infrastructures including roads and bridges, hitting an already vulnerable population, which was in many areas affected by terrorism violence and poverty.

In the districts of Quissanga, Mueda, Muidumbe, Macomia, Metuge, Mecufi and Ibo (the most affected) entire villages were destroyed with communities in need of humanitarian assistance which, despite the improvements in terms of security caused by terrorism, the poor condition of roads and bridges has created difficulties for the transportation of the human aid for the population.

The delays in rebuilding of road infrastructures caused by insufficient financial resources, had increased the degradation of the road network and bridges, especially steel bridges, causing partial isolation of the Mueda, Quissanga, Muidumbe, Macomia, Mecufi and Metuge districts, affecting around 378,762 people.

As the security situation has improved, there is a need to urgently reconstruct the affected road network to ensure the implementation of all reconstruction projects in Cabo Delgado province and provide the minimum conditions for the movement of goods and people.

The World Bank and GoM is preparing a US\$ 125 million project, for among other services to upgrade about 52 km of the secondary road N381 Mueda – Xitaxi, and 15 km of critical sections of the tertiary road R762 Muepane – Quissanga (88 km), and rehabilitation of 25 km of sealed secondary road N380 Muagamula – Xitaxi to enhance connectivity to markets, and other economic and social services in Cabo Delgado province.

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)*, intends to combine the well-known and traditional methods of road rehabilitation and maintenance contracting with new concepts and instruments for the management of a part of the national road network.

The main objectives of these consultancy services are to assist ANE in its objective to upgrade and rehabilitate the above-mentioned roads to climate resilient standards and build a safer transport corridor. The selected consultant will prepare conceptual engineering design, bidding documents, environmental and Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP).

These Terms of Reference (ToR) 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, safe and sustainable road connectivity in the Northern provinces of Mozambique.

The rehabilitation/upgrading of the above-mentioned road sections will be implemented over a period of two years. The interventions will include among others, road pavement rehabilitation/upgrade, rehabilitation or reconstruction of drainage structures such as bridges and culverts, improvement of intersections, rehabilitation/upgrading of road safety facilities followed by road maintenance following level of service. The Project will be packaged in lots considering differences in their locations. Works on each lot will comprise rehabilitation or upgrading during the two years.

The concept design documents for the roads 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. In the absence of appropriate standards covered by the documents listed above the consultant should recommend and adopt recognized international standards in agreement with 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 fatalities <sup>1</sup>.

### **Specific Objectives**

ANE wishes to employ a consultant to assist in preparing the concept engineering designs, bidding documents, ESIA and RAP. The objectives of these services are:

- a. To prepare a feasibility study based on international standards and concept stage engineering designs, which will be a basis for a prospective contractor to develop detailed engineering designs.
- b. The consultant will prepare the bidding document to be used by ANE in procurement of civil works under design build and transfer methodology.
- c. To prepare the ESIA for the road projects 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;
- d. To prepare the RAPs for the identified roads project sites to ensure the Project affected People (PAP), communities, businesses structures, and services along the road within the right of way for the road project are adequately identified, consulted upon and compensated for their land and assets acquired for the project. The RAP will ensure that the planned activities are socially implemented in full compliance with Mozambique's law and the World Bank's ESF, with emphasis on Environmental and Social Standard 5 on Land Acquisition, Restrictions on Land Use and Involuntary Resettlement.
- e. Identify future developments based on lessons learnt during different phases of this assignment.

## **3. SCOPE OF THE SERVICES**

### **3.1 General**

The scope of services include:

**Part A: Economic Viability, Technical Feasibility and Concept designs**

**Part B: Preparation of the Environmental and Social Impact Assessment (ESIA), and the Resettlement Action Plan (RAP),**

**Part C: Preparation of 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 under this Phase shall include but not be limited to:

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<sup>1</sup> 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 17<sup>th</sup> November 2020: Road Safety Policy and Strategy*)

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

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 take into account 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 roads. 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 week day 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 Accidents) 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 and more general projections of future traffic for the following 20 years.
- 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 accident data and seek to identify principal causes and assess the potential for the project to reduce accidents through, for example, improved junction layouts or the provision of pedestrian and non-motorized facilities.
- h. The consultant shall produce the accident data collected during the economic analysis to determine a reduction in costs arising out of reduced accidents.

### **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 or 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 Objects 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 on 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.

### **Tak 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 accident cost;
- e. Greenhouse gas emission reduction, and
- f. Any other factors (exogenous benefits) that the consultant shall consider relevant for the analyses, for example: employment generation induced agricultural production, accident prevention, 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. Only when such benefits can be firmly demonstrated in quantitative terms shall they be included in the economic analyses. In all other cases these benefits will not be included in the economic evaluation of the project but may be used as secondary justification for project implementation. A detailed write-up must be provided on the project benefit.

### **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 section 2 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. The test discount rate is 12%.

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 RTDA 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 roads, the Consultant shall conduct a risk analysis, which shall determine the principal risks including work accidents or any anticipated incidence 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 probability distributions for those variables considered most likely to influence project net benefits including investment costs and traffic growth.

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

### **3.1.2 TECHNICAL STUDY**

#### **3.1.2.1 UPGRADING/REHABILITATION WORKS TO DOUBLE BITUMINOUS SURFACE TREATMENT (DBST) PAVEMENT**

#### **Task A-5: Reconnaissance Visit and Alignment Improvement Report**

The Consultant shall carry out the desk study of possible alignments alternatives in case improvement is required, using maps and imageries. Same shall then be investigated in the field reconnaissance. **The site visits shall be carried out by a Senior Highway Engineer of not less than 15 years of experience.** Coordinated meetings with local departments shall be done and minutes recorded (same shall be made part of the Alignment 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 should 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.

#### **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. It is desired that the Survey work should be done to generally accepted International Standards, and shall become property of ANE at the completion of the services. It is therefore recommended that Consultants 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 time line of survey program. Total number of equipment with models and calibration certificates not more than 12 month old shall be produced.

- Topographic Survey will be performed within the ROW Limits. At important control section, if the large-scale structures are proposed to be built on the sections, the survey range can be extended reasonably if necessary. 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. The latest version of **AASHTO Road Side Design Guide** shall be followed.

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:

- Ground reconnaissance survey to locate the position of the road;
- Concrete beacons firmly sited as agreed by the Government;

- The geometric characteristics of the centerline of the road; and
- Detailed site investigations and hydrological surveys at the bridge sites including a sufficient length upstream and downstream to enable the hydraulic design of the structures to be effected.

**Task A-8: Consideration of Non-Motorized Traffic**

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

The **AASHTO Guide** for the Development of Bicycle 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. These are NMT lanes and NMT paths.

The following specifications will apply:

- NMT lanes should not be placed where angled parking is provided.
- The design of bicycle 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 5m to minimize or eliminate gravel intrusion on the path.
- Bicycle path intersection design should address both cross-traffic and turning movements.
- Bicycle parking facilities may be provided as is appropriate and convenient at well-lighted locations when an administration, agency or other public entity will agree to maintain them. Parking facilities should be durable; offer protection from theft, damage and weather; and be consistent with the maintaining entity's standard designs

**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.

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 to 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 Surveyor shall supply the digital ground model data, All Drawings, 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 truthfully 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 Surveyor to carry out some spot checks if he has reasonable doubt on the accuracy of the survey work. The Surveyor shall comply with such requests unless he can prove to the client's representative for his satisfaction that such checks are unnecessary.

#### **Task A-11: Soil & Material Investigation**

Soil & Material is shall be done to ascertain the index and engineering properties of soil & rock encountered. The Consultants is required to seek, interpret and evaluate subsurface and surface data in order to predict the behavior of the soils and materials along, and adjacent to, the alignment. The resulting information should be presented in a logical and intelligible manner so that it can be used correctly and efficiently by the non-specialist.

The Consultants is required to carry out following steps:

- 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 and 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 Color, 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 summary but 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-14: 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 its 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. 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.

**Task A-15: Road Safety Assessment/Appraisal**

The consultant shall carry out a Road Safety assessment/appraisal on the existing road for identification of existing accident high-risk locations along the roads<sup>2</sup>. The Consultant should

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

identify and engage an accredited road safety auditor for this purpose. The client expects to undertake a separate road safety audit at the time of detailed design by the contractor.

#### **Task A-16: 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 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-17: Review of the contracting capacity to undertake and manage the works**

A general assessment on contracting and consulting capacity at the level of ANE, IP has confirmed that there is scope for implementation of design and build road contracts in Mozambique. However, a more detailed assessment of technical (specifically, design and build capability); financial and managerial capacity shall be undertaken to identify:

- The number of potential bidders for such work<sup>3</sup>;
- Specific issues of risk which will require mitigation when developing the contract documents and
- The value of contract/(s) packages and phasing that will best fit foreign and local capacity.

The review shall consider both the consulting and contracting firms, particularly in northern Mozambique and include awareness-raising activities to inform the market of the opportunities presented by these contracts and assess levels of interests and concerns expressed by the industry.

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

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

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<sup>3</sup> For the purpose of identifying gender gaps among contractors, the consultant shall identify the number of potential bidders that are women led contractors.



### 3.1.3 Preparation of Concept/preliminary engineering designs

#### **Task A-19: Conceptual Designs, Financial Model/payment Schedule and Cost Estimate for Emergency Works.**

The Consultants shall undertake an analysis to estimate the long-term 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 etc. and those updated during the review.

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 allow 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. Based on the results of the Road Safety Assessment/Appraisal, the Consultant should also include proposed improvements to the

existing accident high-risk locations along the roads<sup>4</sup> in the proposed conceptual design. 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.

The Consultant should collect data as minimum requirement to conduct a road safety analysis 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

Based on the capabilities of contractors identified under the Task A-17, the Consultants will confirm the adequacy of the size of the selected road sections for design and build contract, in terms of the number of road-km included in the contracts. Any variation in length will not influence the overall requirements and associated compensation of the Consultant under this assignment.

The financial model and the associated payment model (cost recovery model) in at least three alternatives as mentioned in Task A-18 shall be confirmed to define the most suitable and optimized method of payment schedule to the contractor, as well as to define “the best value for money” the client will pay to the contractor.

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 Bidding Documents will explain the financial and payment models which will be mandatory and will be one of the conditions of the civil works.

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<sup>4</sup> 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.

### **Task A-20: Estimate and Pricing for Emergency Works**

In coordination with ANE, IP, the Consultant shall determine and justify whether unit prices for Emergency works should be subject to bidding or should rather be fixed in advance based on existing market rates. If the latter option is elected, he shall identify the prevailing market rates based on recent contracts or those under execution. He shall further determine the provisional sum for Emergency works for the contracts. Also, he shall identify the work units applicable for emergency works for which unit prices are to be established.

The Consultant shall include the provisional sum in the bid document to cover Emergency Works. The consultant shall provide a detailed breakdown of the anticipated quantities, materials, or items that the provisional sum covers, along with any associated unit rates or pricing information. He shall also establish a clear procedure for approving and executing provisional sum works during the project, including any necessary documentation or reporting requirements.

## **PART B: PREPARATION OF ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN (RAP)**

### **3.3.4: Preparation of ESIA**

*Please refer to appendix 1*

### **3.3.5: Preparation of RAPs**

*Please refer to appendix 2*

## **Part C: PREPARATION OF BIDDING DOCUMENT FOR DESIGN AND BUILD ROAD CONTRACT**

### **3.1.3: 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 consultant should develop at least three alternatives for payment distribution models so as to define the most suitable and optimized method for calculating the payment to the Contractor, as well as to identify “the best value for money” option. 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. The financial model for each of the options should show the cash flow projections requirements for the Contract. The Consultant may explore the option(s) of using Bank Guarantee(s) to improve the cash flows of the Contractor.

#### **Task C-2: Review of the contracting capacity to undertake and manage the works.**

A detailed assessment of technical (specifically, design and build); financial and managerial capacity to implement works in conflict or post conflict environment shall be undertaken to identify:

- The number of potential bidders for such work<sup>5</sup>;
- Specific issues of risk which will require mitigation when developing the contract documents and
- The value of contract/(s) packages and phasing that will best fit foreign and local capacity.

The review shall consider both the consulting and contracting industry and include awareness-raising activities to inform the market of the opportunities presented by these contracts and assess levels of interests and concerns expressed by the industry.

### **Task C-3: Industry Consultation Workshop**

The Consultants shall organize and conduct one “approach-to-market” workshop with representatives from the industry (contractors, consultants and other interested parties) to outline the draft contract strategy and gain their feedback before producing the Final Report and Draft Bidding Documents.

### **Task C-4: 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, for instance the requirement to carry out demining operations and the removal of unexploded ordnance.
- *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 growth.* Traffic levels have a significant impact on the price of the contract in terms of the degree of damage caused to the pavements. The approach can be to place the risk of traffic growth with the contractor, up to a threshold value beyond which the client compensates the effect of additional growth.
- *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

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<sup>5</sup> For the purpose of identifying gender gaps among contractors, the consultant shall identify the number of potential bidders that are women led contractors.

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.

### **3.1.4 Preparation of design and build bidding documents.**

### **Task C-5 Bidding Documents**

The Consultant shall prepare the bidding documents based on the latest available Standard Bidding Document (SBD) for the road upgrading works using Design and Build methodology. 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.

### **Task C-6 Project Procurement Strategy**

The procurement will be done based on the World Bank's "Procurement Regulations for IPF Borrowers" dated September 2023 "Procurement Regulations". The consultant shall prepare a project procurement strategy document, that includes a construction market analysis of potential bidders to justify the cost estimate, outcome of the Task A-18: Cost Estimates. 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.

## **4. REPORTS**

### **4.1 Inception report**

Within 3 weeks of mobilization based on the desk review of all available data and providing a clear way forward including any adjustment required to the Terms of Reference and proposed methodology for delivering the above said services described in Part A, B, and C.

### **4.2 Feasibility study report:**

The consultant shall produce a report presenting their findings and update of all aspects outlined above. This report should be availed within Fourth months after the start of the services (Part A and B). The consultant should provide all electronic documents (source files and PDF files) including traffic data, natural topographical/surveying data, and elements of the model calibration of HDM-4 of the economic calculation of the road project. After the no objection by the Client, the Consultant will present and publish the final reports of studies in English. This report will cover the economic analysis, its results, conclusions and recommendations.

### **4.3 ESIA and RAP reports:**

The draft reports (ESIA and RAP) will be submitted within fifth month (after completion of Feasibility Study). ANE will have a maximum of 10 calendar days to check the documents and give comments. The comment/modifications to be made on the documents will be submitted to the consultant in writing and must be integrated during the editing of the final version. The final version of ESIA and RAP reports will be presented within 5 calendar days after submitting the comments to the consultant.

The Final version of the ESIA and RAP report will be presented in 3 printed copies and one CD. The client may request the firm at any time to present any desired clarification about the progress of the assignment when it is determined to be necessary. RTDA will seek to the World Bank for no objection to both ESIA report and RAP report. The ESIA report approved will also be

submitted to Ministry of Land and Environment. In the event Ministry of Land and Environment or the World Bank requires some clarifications to be made on the report, the consultant holds the responsibility to address issues raised until the World Bank Clearance and/ or Ministry of Land and Environment Certificate of approval are obtained. Once reports are approved, they will be disclosed in Mozambique and submitted by ANE to the Bank for disclosure.

**4.5 Bid Document for Design and Build (D&B) approach:**

The consultant shall produce the final D&B bidding documents within five months of commencement of the consultancy services.

**4.6 Final Reports on all the three road segments, namely, Feasibility study, ESIA & RAP and BD for DBM contract (within sixth month after start of services):**

The Consultants shall propose a framework for a project document control system to be used for monitoring the project during implementation. This system will be used to maintain all engineering reports and records to adequately document the programs and performance of the work. The system shall be designed and developed consistent with standard formats that can be used to document decisions, minutes of meetings and any other communications, which might direct actions on the project. Document control shall involve sequential logging of incoming and outgoing correspondences on a computerized system to establish a chain trail of correspondences for custody. The control function shall be designed to ensure distribution to all concerned.

The submission and acceptance of the complete Final Reports and Bidding Documents will be seen as the final output for this task. The Final Feasibility Study, Conceptual Engineering Design Report, ESIA, RAP and Bidding Documents will be prepared and issued for comments to the Client and the World Bank first in Draft Format so as to receive the necessary comments/observations/ suggestions, which will thereafter be incorporated in the Final Documents. If required, the Consultants will also prepare Pre- Qualification Documents, in accordance with the World Bank procedures. The Draft and Final Reports will include an Executive Summary, as well as all information/options/analysis and the preferred alternative for each road, that have been collected and analyzed during the process of the implementation of this assignment.

## 5.0 DURATION OF THE ASSIGNMENT AND REQUIRED INPUT

It is expected that the services shall be carried out within **Six months (180 days)**, 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 established at Maputo and sub-office in Northern Mozambique (Nampula or Pemba). The proposed total input for the key professionals is estimated to be **35 man-months**.

## 6.0. TEAM COMPOSITION

### 6.1 Team Composition for Phase 1 and 2

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.

### 6.2 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 evaluation will be based on the following key professional staff.

N°	Description	Unit
1.	List of Key Positions whose C.V. and Experience would be evaluated	man-months
1.1.	Team Leader/Senior Highway Engineer	6
1.2.	Transport Economist	4
1.3.	Pavement Design Specialist	3
1.4.	Soils/Materials Engineer	2
1.5.	Hydraulics and Drainage Specialist	2
1.6.	Environmental Specialist	4
1.7.	Social and GBV Specialist	4
1.8.	Procurement/Contracts Specialist	2
1.9.	Road Safety Specialist	2
2	List of Key Positions whose C.V. and Experience will not be evaluated but shall be submitted for approval of the client before mobilization	
2.1	Ecologist/Natural Resource Management Specialist or specialist in Biology (Botany or Zoology):	1
2.2	Water resource management Specialist	2
2.3	Certified Valuator	2
2.4	Database/GIS management Specialist	1
	<b>TOTAL</b>	<b>35</b>



**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 2 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/Financial Model Analyst:** The candidate must have a minimum of 15 years' experience in financial management applied in major infrastructure projects. Minimum of 4 years accumulated experience in the last 10 years in a similar position and role, covering: OPBRC financial modeling and preparation of maintenance payment schedule options. A minimum equivalent education comparable to BSc. in Engineering or Business Management. Fluency in both written and spoken English language.

**Pavement Design Specialist:** The candidate should have BSc degree in Civil engineering with minimum of 15 years of experience in Pavement 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.

**Soils/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:** The candidate will 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. Fluency in both written and spoken English language and ability to communicate are essential.

**Hydraulics and Drainage Specialist/Climate Change Adaptation 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.

**Procurement/Contract Specialist:** Minimum BSc degree in Engineering or an equivalent relevant qualification. Minimum of 15 years professional experience in the procurement of works, services and goods. Minimum of 4 years accumulated experience in the last 10 years in a similar position and role, covering: DBMO contracting methodologies (preferable OPBRC), FIDIC conditions of contract, preparation of civil works bid documents using the World Bank Standard Bidding Documents, bid evaluation including analysis of unit rates. Fluency in both written and spoken English language.

**Environmental, Health and Safety Specialist:** The candidate must have a minimum BSc degree in Environmental Science or an equivalent relevant qualification with some certification on health and safety matters. Minimum of 10 years professional experience in environmental safeguards preparation and management of which minimum 5 years in developing countries. Experience in Southern African countries will be an added advantage. Minimum of 5 years accumulated experience in the last 10 years in a similar position and role. The assignment will require strong experience covering the preparation of Environmental documentation for road projects in developing countries using World Bank environmental safeguard policies.

**Social and GBV Specialist:** The candidate must have a minimum BSc degree in Social Science, Public Health, Intercultural Communication, or an equivalent relevant qualification. A minimum of 10 years professional experience in social safeguards document preparation and management of which minimum 5 years should be in developing countries. A minimum of 3 years of professional experience in gender and/or gender-based violence-related prevention and response programming, with strong understanding of a survivor-centered approach and ethical management of sensitive GBV data in accordance with international best practices. Experience in Southern African countries will be an added advantage. A minimum of 5 years accumulated experience in the last 10 years in a similar position and role. The assignment will require stronger experience covering the preparation of social safeguard documentation for road projects in developing countries using World Bank social safeguard policies.

## **7. 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 accident 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.

## **8. 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 Phases 1 and 2 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 the Phases 1 and 2 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.

## **9. LOGISTICAL SUPPORT**

### **Liaison Officer**

ANE, IP will appoint a 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.

## **10 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.

Should the contract require payment of such taxes, it shall also include provision for reimbursement to said firm and its expatriate personnel exclusively for the amounts actually paid subject to the submission of documented evidence. These taxes must be separately identified and detailed in the financial proposal, and if awarded, the contract.

## **11. 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:** 10% of the price Contract after presenting the Inception Report of the Project and being approved by the Client as satisfactory.
- b. **2nd payment:** 20% of the Contract price, after presenting the Interim Report 1 and being approved by the Client as satisfactory;
- c. **3rd payment:** 20% of the Contract price, after presenting the Draft Final Report and being approved by the Client as satisfactory; and
- d. **4th payment:** 20% of the Contract price, after presenting the Final feasibility report, conceptual engineering design report and the bidding documents for the Project and being approved by the Client as satisfactory.

# ANNEX 1: LOCALITY MAP

