



**AFRICAN DEVELOPMENT  
BANK GROUP**

**PROJECT: EAST AFRICAN COASTAL CORRIDOR  
DEVELOPMENT PROJECT: BAGAMOYO –  
TANGA – HOROHORO/ LUNGA LUNGA –  
MALINDI ROAD PROJECT: PHASE 1**

**COUNTRIES: KENYA AND TANZANIA**

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**ESIA SUMMARY FOR THE PROPOSED UPGRADING TANGA -  
PANGANI - SAADANI - MAKURUNGE (229 KM) ROAD TO BITUMEN  
STANDARD IN TANGA AND COAST REGIONS, TANZANIA**

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## 1. INTRODUCTION

**1.1** The Government of the United Republic of Tanzania (GOT) and the Government of the Republic of Kenya (GOK), with the support of the East Africa Community (EAC), intend to improve the transport infrastructure in order to support economic development programs within the two countries, deepen economic co-operation and foster regional integration within the EAC. EAC has received a grant from the African Development Bank (AfDB) to carry out the Feasibility Studies and Detailed Engineering Design of the Tanga-Pangani-Saadani-Makurunge Road (179km).

**1.2** The proposed Tanga – Pangani – Saadani - Makurunge road forms part of the East African Community Regional Road Network Programme. In Kenya, the road links with Malindi – Mombasa - Lunga Lunga Road. This road is the most important link between Tanzania and Kenya, to and from Coastal areas of Tanzania and Kenya. The road facilitates cross border trade with Kenya (through Horohoro). The movement of people, goods, including agricultural produce from Tanga and Coast regions will be facilitated at national and international levels. The project road therefore provides an alternative trunk road between Dar es Salaam, Tanga and Mombasa facilitating transport and travel along the road impact areas and beyond.

## 2. PROJECT DESCRIPTION AND JUSTIFICATION

**2.1** The scope of work involves upgrading the Makurunge-Saadani-Pangani-Tanga road starting from Makurunge village then to Goma via Saadani, Mkwaja and Pangani to Tanga town to bitumen standard. The project road is located in Coast and Tanga region. The project has a total length of 178km starting from Makurunge village and ending at Tanga Municipality. The existing road is built to gravel and earth standard. The road forms part of the Eastern Corridor that connects Dar-Es-Salaam to Tanga and Mombasa in Kenya. The present state of the road requires major rehabilitation and frequent maintenance. The upgrading aims at revamping its versatility so as to contribute more to the socio economic progression of the Coast and Tanga Regions, and especially Bagamoyo and Pangani Districts.

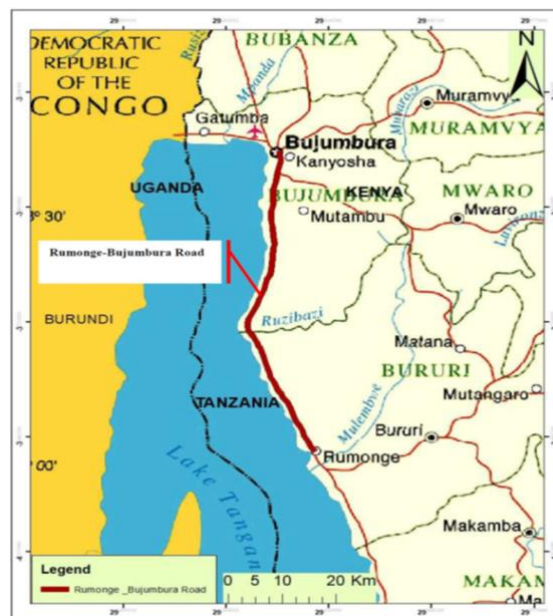


Figure 1: Map of the Project Area

**2.2 Major parts of the existing road are in poor conditions making it impassable during the rainy seasons.** The lack of a bridge at the Wami River Crossing aggravates the problem further. This condition hinders those leaving along the project road from accessing social services and reliable markets for their agricultural and fishing products. It also frustrates tourism activities in the Saadani National Park.

**2.3 Project Justification:** The project scope shall also involve developing the following links considered to be of economic importance:

- Series of spine roads to the tourist destinations and ports in Pangani including Ushongo beach road, and link road to the Safari Lodge and Kapumbwi Road;
- Bypass at Tanga to connect the Tanga – Segera and Tanga – HoroHoro roads; and
- Develop two bridges at the Wami and Pagan rivers bncrossing.
- The upgrade of the project road shall revamp the project areas versatility which shall contribute to the socio-economic progression of the Coast and Tanga Regions, and especially Bagamoyo and Pangani Districts. The road will also provide an alternative trunk road between Dar es Salaam, Tanga and Mombasa in neighbouring country of Kenya. This shall ease and enhance communication between Tanzania and Kenya from Dar es Salaam via the touristic and historical town of Bagamoyo, Pangani, Tanga Mombasa to Malindi.
- The northern part of the road i.e. Pangani and Saadani via Mkwaja is normally covered in two hours while using a 4x4 vehicle, and becomes impassable after the rains. The problem is even serious in the southern part of the same road (a coastal route to Saadani) because of lack of a bridge at Wami River North of Bagamoyo. This short coming in areas transport infrastructures forces commuters to take a circuitous route from Dar es Salaam via Chalinze to Bagamoyo then further North which translate to takes 4-5 hours of additional travel time. The development of the proposed road from Makurunge with the construction of a bridge at Wami River crossing will attract visitation to the closest wildlife destination to Dar es Salaam located 130km away which offer combination of beach and wildlife viewing opportunity.
- The improvement of the road is also intended to facilitate economic growth as it will reduce transportation costs and hence stimulate the movement of agricultural products to markets as well as enable exploitation of potentials fisheries and, minerals resources and, other social and cultural resources in the project regions. Specifically the project will improve transportation within Bagamoyo, Pangani, Handeni and Tanga districts and the respective regions.

**2.1. Justification for ESIA:** It is a known fact that development of road projects often brings significant economic and social improvements. However, if these projects are designed and implemented without adequate integration of social, chemical and bio-physical environmental concerns, they might cause significant adverse impacts on the local communities, the general public and the natural environment. As a part of the larger project, the Environmental and Social Impact Assessment (ESIA) is used for the purpose of guiding the incorporation of the various environmental management considerations in the planning and development process of the project. The implementation of the findings from the ESIA enhances the project proposal to be implemented in sustainable manner.

### **3. POLICY AND LEGA FRAMEWORK**

Important laws that have relevance to road development in respect of environmental management include;

- Environmental Management Act No. 20 of (2004), Cap. 191.
- The Land Act No. 4 of 1999 and the Village Land Act No. 5 of (1999).
- The Water Resources Management Act No. 11 of 2009.
- Energy and Water Utilities Regulatory Authority Act, 2001.
- The Road Act, 2007 Protected Places and Areas Act (1969).
- Land Use Planning Act (2007).

- Occupation Health Safety (2003).
- Local Government Acts No.7 & 8 of 1982.
- Forest Act, 1957 (Revised in 2002).
- Explosives Act, 56/63.
- Regional and District Act No 9, 1997.
- Mining Act (1998) T.
- The Land Acquisition Act 1967.
- Employment and Labour Relations Act No. 6 of 2004.
- Engineers Registration Act and its Amendments 1997 and 2007.
- The Contractors Registration Act (1997).
- The HIV and AIDS (Prevention and Control) Act of 2008.

## 4. DESCRIPTION OF PROJECT ENVIRONMENT

**4.1. Location:** The Tanga - Pangani - Saadani - Makurunge road is located in Coast and Tanga regions. The project has a total length of 179km including link roads and bypasses, starting from Makurunge village located in Bagamoyo in the Coastal Region traversing through the Saadani National Park and Zarinenge Forest found along the eastern Coast of Tanzania. The road proceeds further through Pangani and, Muhenza district and ends at Tanga Municipality in Tanga District in Tanga Region. The main road is majorly located in Tanga region (more than 100km) and is built to gravel and earth standard and its layout is provided in Figure 2.1 below. In the Coast region, the road is entirely in Bagamoyo district, while in Tanga the road passes in Pangani, Muheza and Tanga district. In each side the road passes along various villages and settlements such as Makurunge, Saadani, Buyuni, Mukocheni, Pangani and Kingombe. The road forms part of the Eastern Corridor that connects Dar-Es-Salaam to Tanga and Mombasa in Kenya.

**4.2. The project area experiences moderate temperatures and rainfall with the average annual temperatures being 32°C.** The warm season normally runs from October to February. There are two major rainfall seasons namely the long rains which occur between March and May and short rains which occur between October and December with average annual quantities of 1200mm. However, the average annual rainfall varies from year to year and between the various ecological zones. Moreover, the coastal nature which forms the larger part of the Region affects the patterns of temperature and rainfall. The coastal plains in Tanga, Pangani and Bagamoyo districts, and part of Muheza district experience moderate high annual rainfall of 800-1,400mm while the dry plains mostly in Handeni and parts of Bagamoyo districts receive low rainfall ranging from 200 to 600mm annually.

**4.3. The core impact zone includes the area immediately bordering the project (local).** In the case of this project, local impacts will include the site of the construction (borrow areas, quarries and the actual road construction site) and the immediate surrounding areas. The influence impact zone includes the area beyond 500m –1000m from the road alignment. Based on the environment surrounding the road the influence impact zone includes areas such as Saadani Park, the Indian Ocean and the forest.

**4.4. Main Road from Bagamoyo to Tanga:** The main north-south corridor along the Tanzanian coast from Bagamoyo to Tanga namely the Makurunge-Saadani-Pangani-Tanga road is an existing poor quality gravel road, which reduces to a track in places. The existing route is currently discontinued at the Pangani River, where crossing is only made possible by a ferry and at the Wami River, where crossing is currently provided by a temporary Bailey bridge.

**4.4.1. Bagamoyo (Makurunge) to Wami River:** The project road starts at Makurunge at the T-junction with the Bagamoyo - Msata road, which has recently been upgraded to bitumen surfaced standards. From the junction, the road moves in a northern direction for 32km as an existing gravel road/earth track, up to

the Wami River. This road has a relatively low formation and at places is nearly flush with the surrounding terrain. The in-situ material consists mainly of expansive clays. The pavement manual requires a minimum of 1m fill between the pavement and the black cotton soil, which implies that the formation will have to be raised substantially. A temporary Bailey bridge currently provides limited access across the Wami River and pedestrians can cross by means of small row boats or canoes. Currently vehicles travelling north from Bagamoyo, have to cross the Wami River at the existing single lane bridge, about 50km upstream, near Mandera on the Msata-Segera road.

**4.4.2. Wami River to Mkwaja:** From the Wami River the existing road passes through the Saadani National Park up to Mkwaja. For long stretches, the existing road is merely a track. The existing road roughly moves parallel to the coast line with some section having a corridor of about 1km between it and the beach such as at Saadani Village. At the time of the study, the road was being improved and culverts were being installed in the sections within Saadani National Park. The section through Saadani is in the order of 60km and raises environmental issues. The upgrading improvements that were on-going at the time of our field investigations will have to be verified during the detail design review, in view of the presence of clay conditions and drainage structure capacities. Due to the environmental sensitivity of the park, issues were raised in regards to upgrading the road through Saadani Park and due to these, two additional alternative routes navigating around the park were investigated. These routes will also require bridging across the Wami River but will be discussed separately.

**4.4.3. Mkwaja to Pangani River** Two alternatives have been proposed to go around the Saadani Park from Kiwangwa to Kwamsisi then re-join the main road at Mkwaja. The road from Mkwaja to Pangani is a gravel road in good condition. The first 15km of the road forms the eastern boundary of the Saadani Park. Thereafter, the road traverses through Sisal (*Agave sisalana*) plantations, up to the Pangani River. The road ends on the southern embankment of the Pangani river. The Pangani town is situated on the northern bank of the River. A new ferry is currently in operation at the Pangani River crossing near its mouth with the Ocean. The feasibility and detail design of a bridge at Pangani is also part of this study. Traffic volumes are fairly low and no queue was experienced during our field investigations. The pictures below show the condition of the gravel road and structures between Mkwaja and Pangani.

**4.4.4. Pangani to Tanga:** The road through Pangani town is surfaced. However, if a bridge is to be constructed across the Pangani River, careful consideration will have to be given to the route selection through the town. Our proposed position for such a bridge will incorporate a bypass around the town to allow for approaches to be constructed. Land availability at the current ferry crossing is not sufficient on both banks to allow for construction of the bridge approaches. The road section between Pangani and Tanga is currently a gravel surfaced road with a rough surface that results in poor riding quality. The formation is good and can be utilised by adding the strength layers on top. A section at Kirare is hilly with significantly steeper slopes and sharper curves than the rest of the road section. The project road ends at the Mabanda Pappa roundabout in Tanga. The last 3.2km of the road in Tanga is surfaced. A bypass at Tanga forms part of this study.

**4.4.5. Tanga Bypass:** The aim of the Tanga bypass is to connect three major roads namely: Tanga - Horo Horo road; Tanga - Segerer road; and Tanga - Pangani road. An existing ring road exists on the outskirts of Tanga town, but this road is not suitable for upgrading to a bypass, due to the residential surroundings and limited road reserve width. The Tanga -Horo Horo road is currently being upgraded to a bitumen surfaced road by MCA-T. A route for the bypass was identified in the Tanga Master Plan. Only the option as proposed in the Master Plan was considered and investigated. Under the Tanga - Horo Horo design project, the link between the Segerer and Horo Horo roads, was planned, but not included in the construction contract. The kilometre distance was adopted from this previous design to limit confusion. The first 2km from Horo Horo road to Segerer road is steep as it climbs up from sea level to 40m above mean sea level,

over a distance of 1.3km and a slope of 7.2%. This is currently a gravel road. At kilometre 1.6, the road passes a large power substation. The road will have to be realigned at this section so as to eliminate impacts on the substation land.

**4.4.6. A railway line runs parallel to the Segera road.** This railway line connects to the Tanga port but is not operation at the current time. A bridge-over-rail-and-road is foreseen to be incorporated in the construction of the bypass. After crossing the Segera road, the bypass will pass between the Tanga airport and the industrial area. There is no existing road on this section of the bypass and will be a new construction. The bypass will link up with the Pangani road approximately 1.7km from the Mabanda Pappa roundabout, at the detergent factory. The last kilometre of the bypass is through a build-up area where land could be affected.

**4.5. Bypasses in the Project:** Only one bypass has been proposed for this project which is the Tanga bypass. If the bridge at Pangani is implemented, a bypass might be required around Pangani town, to allow sufficient space for bridge approaches.

**4.5.1. Being a coastal road, the main road provides access to a series of coastal resorts** in Kenya and Tanzania. Some of the access roads to these hotels and resorts were identified for inclusion under this project for upgraded to surfaced standards.

**4.5.2. The Mwarongo link road is located approximately 20km south of Tanga and** it leads to the Safari Lodge. It also provides access to Mwarongo village, where salt mining is a major activity. A smaller village about 1.4km from the main road will also benefit from the improved access. This link road is 4.6km in length and will terminate at the entrance to Mwarongo village, with a small roundabout.

**4.5.3. Ushongo Link Road: Ushongo beach is located between Mkwaja and Pangani** at approximately km 120. There are five resorts along the beach road. Access to this beach is via the Mwera Sisal Estate. Currently the most frequently used access meanders through the built-up area of the estate, where the processing takes place. The TANROADS representatives indicated the original alignment of the access road, which has not been maintained and is now over-grown with grass vegetation. This old alignment is now proposed for the new access to be constructed. The length of the link road is 6.2km. The existing structure over the Tungamaa River found on the link road does not meet the required safety standards and need to be reconstructed as part of this link road.

**4.5.4. Kipumbwi Link Road:** This link road provides access to Kipumbwi from Kwakibuyu on the main road. Kwakibuyu village is located between Mkwaja and Pangani at km 104 on the main road. Kipumbwi is a local fishing port. The link road is currently gravel surfaced, about 4km in length and traverses a fairly flat terrain. The road will cross the Beji and Manomvi streams and will end at the entrance to the Kipumbwi village with a small roundabout. The proposal is to upgrade the road to bitumen surfaced standards.

#### **4.6. Bridging Options**

**4.6.1. Pangani River:** Pangani town is situated on the northern bank near the mouth of the Pangani River. On the southern embankment, a large hill restricts the geometrical alignment of the road on the approach to the river. The river is currently crossed by means of a ferry. At the ferry crossing the river is about 300m wide. River traffic appears limited, with a regular ferry during the day and some dows and motorboats moving out to the sea. Three alternative routes were investigated at the Pangani crossing. The first option is to improve the existing road alignment slightly and to cross over the river at the current ferry position, which is the shortest distance. On the northern side, the bridge approach will have to line up with the existing street approach to the ferry docking position, which comes directly from the town centre. This will have a major social impact due to the higher traffic volumes, higher speeds and expropriation of historical

buildings to enable construction of the bridge approaches. The second option investigated was a bridge crossing closer to the sea. This would require a much longer bridge as well as a new road corridor through old section of Pangani town. This option was not deemed viable due to poor foundation conditions and the associated cost of the long structure required and not pursued any further. The third option investigated was to cross the river inland of the ferry with a fairly short structure similar to the first option. This will require a new road alignment to be constructed that will bypass Pangani town on the western side, with less social impact on the town, and will divert around the western side of the hill on the southern bank.

**4.6.2. Wami River:** The Wami river crossing is near Gama in the Kisauke area. The river is meandering in this area. At the normal crossing point, with normal flow conditions, the river is about 50m to 100m wide. A ferry did operate in the past at Gama, but was washed away during the 1997/8 El Nino floods. Currently only pedestrians use with crossing and are ferried across the river with a canoe. Just upstream of Gama River lays Matipwili, where an existing non-operational railway line crosses the Wami River. This bridge is still intact, but not accessible to vehicles. This structure could be converted or widened to accommodate vehicles in a low cost solution. The river embankments at this rail bridge have been protected to ensure that the river does not meander away from the bridge.

**4.7. The Road Reserve:** In Tanzania the road reserve width is 60m as per the new Road Act of 2007. The preliminary drawings show a significant number of buildings encroaching into the road reserve. TANROADS has started with a nationwide project to identify structures within the road reserves, since the 2007 Act enlarged the ROW from 45m to 60m. The structures located in the addition road reserve width of 7.5 m will be compensated when there is a need to use this additional reserve.

**4.8. Project Design:** The road will be an international through route between the two countries and therefore classified as a Trunk Road (Class A). This type of classification leads to design criteria for mobility such as higher speed, higher level of service and longer trips with less access where low speed is required for controlled access. With a functional classification of A, the traffic volume is used to determine the road design class. A DC3 road design class is recommended for an **AADT value between 1000 and 4000**. This DC3 design class recommends a 3.5m lane with surfaced shoulders.

**4.8.1. Typical Cross-Section:** The project has a single typical road cross-section. The design Class (DS3) has specified the road width and carriageway widths. The normal cross-fall of the road will be 2.5% from the road centre line. The maximum super elevation of 8% has been implemented on the flat and rolling sections with a 6% maximum on mountainous sections and in villages with 50km/h speed limit. The typical side slopes and back slopes of the road that has been used are given on the typical drawings. These comply with the maximum rates as specified in the RGM. In this project there are three variations to the typical cross-section. At climbing lanes an extra lane of 3.5m width is added and the shoulder is reduced to 1.0m. In the urban areas such as Pangani and Tanga, walkways for the non-motorised traffic will be provided. The shoulders widths on these urban sections are reduced to 1.5m and 3.0m wide walkways are added on both sides. The third variation is where black cotton soils are encountered. The PMM specify flatter side slopes of 1:6 instead of the typical 1:2 side slope for 1 to 3m fill heights. On fills higher than 6m a bench of 4m wide was added to limit the extent of the side slope and to improve access for maintenance. A similar bench was also introduced on 6m or deeper cuttings.



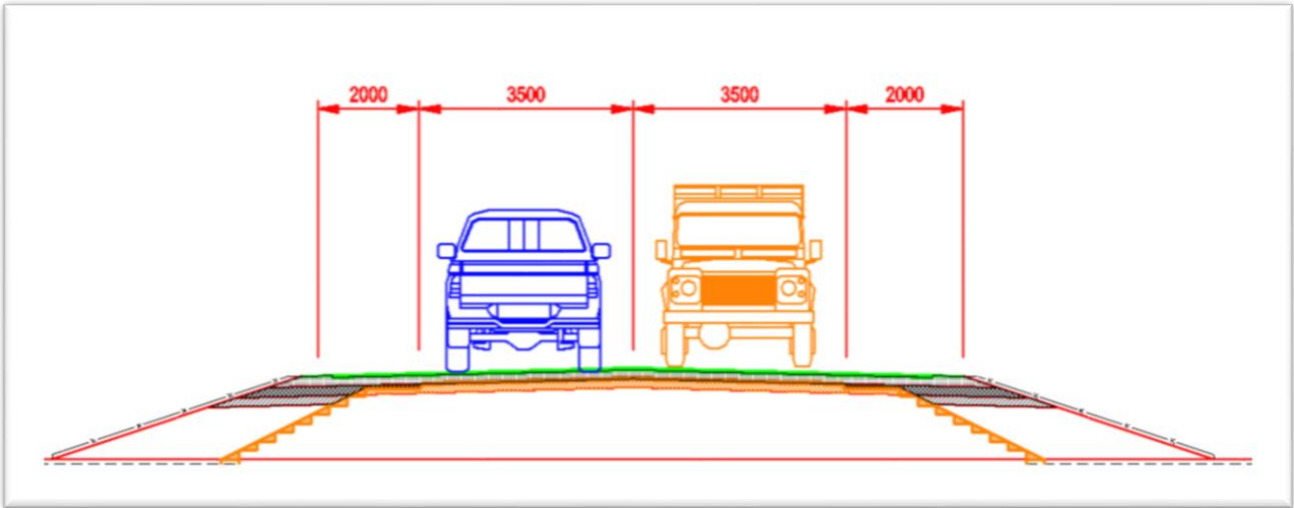


Figure 2: Typical Cross Section

**4.8.2. Design Speed:** The Design Speed of a road dictates various geometrical design elements. The recommended design speeds for Design Class 3. Where the road passes through villages the Speed limit will be 50km/h.

**4.8.3.** The horizontal alignment contains 25 curves on this section of the road of which 11 curves have a radius of less than 750m. Five curves have a radius of 600m which is the desirable minimum radius. The spacing of the curves is sufficient to fit the super elevation run-off lengths.

**4.8.4. Vertical Alignment:** The terrain is very flat with most of the road longitudinal slope less than 1.0%. The Wami river flood plain starts at km 26.5 and ends at km 32.9, thus 6.4km in length. Another low area is from km 20.8 to km 24.4 with the natural ground level below 10m. The road will thus mainly be in raised to fill conditions due to the flat terrain and the clay soil.

#### **4.8.5. Drainage Structures**

##### **Cross Drainage**

The drainage requirements across the road have been determined by the hydrological study. The drainage structure will consist of concrete pipe structures. The pipe drainage structures consist of two sizes namely 900mm diameter and a 1200mm diameter. The two sizes will ease the construction process. The nominal size of 900mm is currently specified mainly for maintenance and cleaning purposes.

##### **Side drains**

Side drains will be constructed in all cuttings and are mainly gravel lined. Concrete lining of the side drains are expected where the slope is steeper than 6%. Side drains with slopes steeper than 4% will be protected against erosion with energy dissipaters. The erosion potential of the soil in which the side drain is excavated will ultimately govern the protection required. Where the side drains cross through side access roads a 900mm diameter concrete pipe needs to be installed.

##### **Subsoil drains**

Subsoil drains are normally installed where the ground water could influence the road pavement structure. During the material investigation ground water was encountered and subsequently provision has been made to install subsoil drainage in deep cuttings. The extent and final position of the subsoil drains need to be determined during construction.

**4.9. Road Design Furniture:** The proposed road signs and road markings are shown on the Plan and Profile drawings. There is also Schedule Drawings containing the road signs. The proposed sign size as per Traffic Sign Guide of 2007.

**Safety Features at the Park:** Due to the fact that part of this road is passing in the periphery of Saadani National Park, special features will be installed for animal safety. Warning boards, day and night speed limit signs will be installed in the road. Also proper marking and speed humps will be installed.

Guardrails will be provided on the approaches to all the bridges as well as at all box culverts. Where the fill is more than 4m, guardrails will also be provided where the side slope is 1:1.5. The guardrails will be the standard w-shape steel profile on steel post.

**Road Edge Markers:** The Draft Tanzania Traffic Signs Manual specify that warning signs be placed on curves with a radii of 600m or smaller. Hazard signs W401 or W402 should also be provided at drainage structures. The Tanzania Traffic Manual is in line with the SADC Manual on the use of road signs. The Tanzania Geometrical Manual however specifies concrete road edge markers. The Bill of Quantities includes both concrete markers and road signs and TANROADS should instruct the contractor on the final markers to be placed.

**Kilometer markers:** Concrete kilometer markers will be installed at 5km intervals on alternating sides of the road. The two destinations are Tanga and Bagamoyo. The distance from Bagamoyo to Makurunge is 13km. The project road length to Tanga is 229km, thus the distance Bagamoyo to Tanga will be 241km or rounded to 240km. The abbreviation on the markers will be TNG for Tanga and BGM for Bagamoyo.

**Service ducts:** It is proposed that dual 300mm service ducts are installed for future underground services such as electricity or telecommunication cables. The position of such service ducts is at all type 1 and 2 junctions as well as at villages at 500m intervals.

**Utilities:** Electrical services are all overhead power-lines. The water services are mainly along the existing gravel roads from Kwamsisi to Tanga. Water service features were also surveyed at Gama and Matipwili. Telephone lines were surveyed in Tanga town and at km 171 in Mzambarauni. The existing railway line is crossed at three places by means of new bridges. The railway line at Matipwili and at Mkalamo is currently in disuse. The railway line at Tanga next to the Segera road is the third crossing.

**Street lighting:** Provisional sums for street lighting along the Tanga Bypass and Pangani Bypass was included in the Bills of Quantities. The successful Contractor must provide the detail design as part of the installation of the street lighting.

**Bus bays** will be provided at all villages and towns. The proposed position of the bus bays are provided in the drawings. These need to be finalized during construction in liaison with the local authorities.

**4.10. Construction Materials:** The main construction materials for the road include sand, gravel, hard stones (aggregates), reinforcement iron bars, water and bitumen. Most of the materials shall be obtained locally (within Tanzania) except bitumen which shall be imported. Material investigations have been made with the aim of identifying sources for suitable construction materials including borrow pits, sand pits, construction water sources and quarry sites. The investigations were carried out during the preliminary design phase.

- Based on field studies several burrow pits were seen especially along the Pangani-Tanga and Pangani-Mkwaja sections of the road.
- Five quarries were identified in the project area and these include Lugoba, Msata, Kitumbi, Kisasa and Mkata. The first four are located along the Chalinze-Segera road while the Mkata one is a potential quarry located in Mkata village along the Mkata-Saadani Road.
- The Lugoba and Msata quarries are operational and are the only sources of granite aggregates which are used within the Coast region. Records show that the crushed aggregates from these two quarries comply with the Tanzanian Standard Specification for Road Works (2000).
- The Lugoba quarry is located about 70km from Makurunge and 92km from Saadani. It is the main quarry in the area with four commercial crushing plants. The site is set on 100 hectare piece of land and has a depth of 30m and is considered to be ample for supply to the proposed project.
- The Msata quarry is located about 60km from Makurunge and 80km from the Saadani National Park. This is also an operational quarry with one private crushing plant. It is located in 120 hectares of land with a depth of 10m and was considered adequate for the development of the proposed project.
- The Kitumbi quarry is located about 120km from Tanga and 90km from the Saadani National Park. This is also an existing quarry which was used as the material source during the construction of Chalinze-Segera Road in the early nineties. The rocky hill occupies 20 hectares of land and has a depth of 20m. However the use of the quarry is constrained as locals have developed a village around it thus not found suitable for the project as it shall require resettlement and other environmental mitigation measures.
- Kisasa hill is located about 106km from Tanga and 100km from the Saadani National Park. This is a virgin site located in Kisasa village near Kitumbi. The hill occupies about 16 hectares and is considered adequate for the proposed project.
- Mkata site is located about 106km from Mkwaja village in the Saadani National Park. This rock hill occupies 5 hectares and is adequate for utilisation and is also considered as adequate for the project construction.
- Three sand sources were identified at the project area and these included: Bigo Primary School located in Makurunge at km 0 on the LHS at an offset of 2km; Wami River at km 32 on the LHS and Mkwaja Village located at km 84+500 on the RHS at an offset of 0.2km
- The Bigo Primary School source is found in Makurunge village at the beginning of the project road. The source is being used for small-scale construction by the locals. However the area is large but the grading of the sand varies as shown by its profile some areas have fine and coarse sand while others shows the sand is dominated with silt thus will require careful selection during utilisation.
- The sand at Wami shall be sourced from the River banks and its deltas located at least 32km from Makurunge. The sand at this site was seen to be clean with good grading. Apart from its favourable quality, the site was seen to be located in areas where major drainage works such as the Wami Bridge shall be developed.
- The sand source at Mkwaja village is located at least 46km from Pangani town. The sandy area stretches under shrubs other potential sandy site near Mkwaja is Makorora village. The grading of the sand varies from coarse to fine.

**4.11. Construction Water Sources:** The area has four main perennial rivers which shall be used as source of water for the proposed project and these rivers are; Ruvu located at km 0+000; Wami located at km 32+000; Mafuleta located at km 102; and Kirare located at km 159. Samples of water from the sites were analysed and the results showed that the water is suitable for construction apart from Mafuleta which had higher chloride content.

## 5. PROJECT ACTIVITIES

The project shall have four major activities namely pre-construction, construction, operation and decommissioning.

**5.1. Mobilization or Pre-Construction Phase:** This phase entails mobilization of labour force, equipment and construction of offices/camps as well as acquisition of various permits as required by the law. The implementation of the project's design and construction phase will start with thorough investigation of the site biological and physical resources in order to develop a baseline data bank that shall guide in impact monitoring.

**5.2. Construction Phase Activities:** The overall objective of the road construction works is to: Improving the structural capacity, drainage and ride ability of the existing road with some improvement and realignment of the road geometry; and Improve the width to standards acceptable for a trunk road in Tanzania. The construction phase which shall be undertaken by contractors shall commence after the ESIA has been approved and the affected people resettled. The project implementation activities undertaken by the contractor shall be supervised by a contracted resident engineer and monitored by an ESIA expert, TANROADS and NEMC. The road will be developed to a bitumen surface finish having proper and adequate drainage structures to ensure passage of traffic throughout the whole year. The road section is categorised as a national road under the category MOI which is required to have a road reserve of 60m this is 30m from the either side of the road's centreline. It is envisage the proposed road will follow existing road profile in most of the areas apart from sections traversing the Saadani National Park which shall be realigned to enable reduce impacts of the National Park and its associated ecosystems this is forests and Ocean.

**5.3. Demobilization Phase:** Upon completion of the Contracted Work, the contractor shall remove all of its tools, materials and other articles from the construction area. Should the Contractor fail to take prompt action to this end, TANROADS at its option and without waiver of such other rights as it may have, upon sixty- (60) calendar days' notice, may treat such items as abandoned property. The Contractor shall also clean areas where he worked, remove foreign materials and debris resulting from the contracted work and shall maintain the site in a clean, orderly and safe condition. Materials and equipment shall be removed from the site as soon as they are no longer necessary to minimize the demobilization work after completion of the project. Before the final inspection, the site shall be cleared of equipment, unused materials and rubbish so as to present a satisfactory clean and neat appearance. All the campsites will be built as temporary structures and these will also include the use of movable structures such as movable containers. All the temporary structures will be demolished after accomplishing the contracted jobs.

**5.4. Operation Phase:** The actual usage of the roads is expected to commence after the construction works. The project road is under "trunk road" category and therefore will be directly managed by TANROADS. During this time, TANROADS will carry out routine maintenance by attending to cracks, pot holes, clearance of vegetation within the ROW (road reserve area) and monitoring. Other activities includes Installation of road signs, thermo-plastic road marking, reinforcement and replacement of road furniture, control of litter accumulation on road sides, awareness rising on proper road use and road management to the communities, monitoring and evaluation, management to reduce pollutant concentrations in runoff, disposal of wastes from road maintenance activities, storage and management of maintenance materials and equipment. The duration of this phase will be twenty (20) years for roads and fifty (50) years for the bridge.

## 6. STAKEHOLDER AND COMMUNITY ENGAGEMENT

**6.1 Stakeholder's analysis for the project was undertaken and the key stakeholders identified included:** TANROADS Regional Offices, National Environmental Management Council (NEMC), Tanzania Nation Park (TANAPA), District Councils, Departmental Heads at Municipal Councils, Local elders among others. All the key stakeholders were consulted on the proposed project through one to one interviews and stakeholders forums.

**6.2** The following issues were the major raised by stakeholders;

- There is need to choose an alternative route so as to avoid the park and at the same time look for a route that shall serve the locals found in the villages neighboring the park;
- Increase in traffic will translate to increased road accidents affecting people and wildlife. Possibility of increased in human activities in the park thus leading to poisoning of animals, poaching and forest fires;
- Contractor should use the existing borrow pits, stone quarries and sand pits in order to minimize the land degradation at new sites;
- Possible population influx into the project areas as a result of improved services and possible with spread of communicable diseases (i.e. HIV/AIDS) and competition for the meagre resources;
- Project Affected People (PAPs) should be compensated using current rates and Local leaders at Wards, street/mtaa level should be involved during the process of compensation; and
- The public should be made aware of the developments planned at their area in advance
- Dust and noise generation during the construction activities should be controlled.

## 7. MAJOR BENEFICIAL AND ADVERSE IMPACTS

**7.1** *The development of road infrastructure can cause a wide range of positive and negative impacts* on a number of receptors. The significant environmental and social impacts identified for the proposed project included:

### 7.2 Positive Impacts

- Improvement of transportation services;
- Improved community life and services;
- Job creation and improved employment opportunities;
- Reduced production costs of goods and improved market penetration;
- Increased tourism along the coast.

### 7.3 Negative Impacts

- Loss of natural habitat;
- Destruction of spawning grounds for fish thus affecting the fishing industry;
- Attracting high population around the Park that will conflicts with wild life;
- Attracting poaching and related activities;
- Serving relatively small proportion of population (by routing road through the park;).
- Increased accidents due to over speeding vehicles leading to death and injury of wildlife;
- Safety and health risks;
- Landscape modification;
- Immigration /influx of people from other areas;
- Increased spread of HIV/AIDS and other diseases;
- Land expropriation and relocation/ resettlement; and

- Linear settlement along the road reserve once the road is operational which lead to several multiplier impacts such as increased accidents, challenges in road maintenance and expansion, traffic congestions among other impacts.

## 8. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

**8.1.** The Environmental and Social Management Plan (ESMP) presents the implementation schedule of the proposed mitigation measures for the project's identified impacts. The ESMP also includes the associated costs needed to implement the recommended mitigation measures. The implementation steps will involve the contractor, the Resident Engineer, Environmentalist, Sociologist, Health and Safety Expert, Municipal Councils, infrastructure users and the local communities at large.

**8.2. *Environmental Monitoring:*** The national EIA guidelines require the developer to prepare and undertake monitoring plan and regular auditing. Monitoring is needed to check if and to what extent the impacts are mitigated, benefits enhanced and new problems addressed. Recommendations for monitoring have been included in the ESMP (Table 9.1). The ESMP also assigns responsibilities for monitoring activities. The However, the divisional/ward/village environmental committees and district environmental committee will participate in the long-term daily monitoring of the project road.

**8.3. *Environmental Audit:*** Environmental audits determine the long-term effects of adopted mitigation measures. It is recommended that environmental audits be carried out on the project as part of the ongoing maintenance programme. The audits will unveil the actual performance of mitigation measures and will allow effective measures to be included in future projects based on the audit results. As per operative ESIA documents in Tanzania, environmental audits would be a responsibility of the developer (TANROADS).

**8.4. *Implementation of the ESMP:*** TANROADS as the proponent shall be the Implementer of the ESMP through other organs. The environmental measures incorporated in the detailed engineering design will be attached to the Contract Documents. The Contractor shall take stock of the contents of the Environmental Impact Assessment Statement of the Project. An environmental expert should be appointed to assist the resident engineer, in order to make sure that the environmental measures recommended in this report are effectively complied with and timely adjusted whenever necessary. The expert will be familiar with the scientific measurement of environmental impacts and remedies. He/she will work on a part-time basis and may be selected, by the firm in-charge of supervision works, from the roster of national environmental experts. He will liaise with the relevant public agencies and will carry out the training scheme associated to his assignment.

**8.5. *Training Requirements:*** The effective implementation of EMP requires that all persons working for the project are aware of the importance of environmental requirements of the project; their roles and responsibilities in the implementation of the EMP. They should also be aware of the significant actual or potential environmental impacts of their work activities; the benefits of improved performance and the consequence of not complying with environmental requirements.

**8.6. *Institutional Arrangements and Reporting Procedures:*** The City and district councils, assisted by specialists, will be responsible for reviewing civil works contracts in accordance with the ESIA report; (e.g., Ward Development Committees; monitoring the implementation of the ESMP and the civil works contracts in collaboration with NEMC and PMO-LGRG; and, preparing annual environmental progress reports.

**8.7.** The purpose of environmental and social monitoring is to quantitatively measure the environmental effects of the road project. The environmental monitoring program will operate through the pre-

construction, construction, and operation phases. It will consist of a number of activities, each with a specific purpose, key indicators, and significance criteria.

**8.8.** An Environmental/Social Specialist will carry out the monitoring of mitigation measures during design and construction. He/she will conduct mitigation monitoring as part of the regular works inspections. The responsibility for mitigation monitoring during the operation phase will lie with the Environmental Section in TANROADS.

**8.9.** The TANROADS will provide PMO-LGRG and NEMC with reports on environmental compliance during implementation as part of their annual progress reports and annual environmental monitoring reports. Depending on the implementation status of in environmentally sensitive areas, NEMC will perform annual environmental reviews in which environmental concerns raised by the project will be reviewed alongside project implementation.

**8.10. Environmental cost:** The principal environmental cost includes the cost of implementing the mitigation measures proposed and that of carrying out monitoring of specific environmental parameters. These costs are indicated in Table below It should be noted that most of the costs for mitigation measures are already included in the bills of quantities of the overall works. The costs of the environmental supervisor shall be included in the overall supervision cost of the works.

***Cost of mitigation and monitoring throughout the Project Cycle***

Budget Item	Cost in USD
Preparation activities and Capacity Building	131,000
Mitigation Measures during Construction Phase	213,500
Mitigation Measures during Operation Phase	59,500
Cost of Baseline Studies Pre-Construction Phase	47,200
Costs of Monitoring During Construction Phase	128,000
Costs of Monitoring During Operation Phase	22,000
<b>Total</b>	<b>601,200</b>

## **9. SUMMARY AND CONCLUSION**

**9.1.** The ESIA study results show that the project is associated with negative environmental and social impacts despite that, the project has high socio-economic benefits to the people of Tanga City, Bagamoyo, Pangani, Handeni and Muheza districts and adjoining regions as well. The associated negative impacts, to a large extent can be minimized through appropriate decision, good engineering design and, envisaged construction practices and the mitigation measures proposed in this report. The mitigation measures shall offset some of the inherent adverse impacts especially those linked to land, water and air pollution. Implementing these mitigation measures would increase environmental soundness of the project.

**9.2.** Due to anticipated negative impacts of the Makurunge – Saadani – Pangani - Tanga Road on the park and its associated ecosystems, the several alternative route were evaluated namely option B, C and D as shown on the map found under Annex 5. After assessment of alternatives, the best alternative was selected based on the environmental impacts and engineering reason. Three alternative routes were assessed



where by the best alternative was selected. The selected alternative is alternative B and C implemented together which its route is Makurunge – Mkwaja – Kwamsisi - Pangani – Tanga with a total of 229 km.

**9.3.** The proposed alternative road will alleviate problems likely to affect the National Park such as pollution, wildlife poaching and accidents among others. In addition, the alternative route identified traverse areas with high potential for agricultural production and tourism development. The identified alternative routes are likely to have sub-spatial contribution towards socio-economic development compared to the Mkwaja-Saadani road, due to the fact that it shall serve a number of people and enhance the economic potential of the project area in activities such as small scale-fishing, subsistence farming and livestock keeping. The alternative routes is expected to provide services to more than 17,278 people living in the area as compared to Mkwaja-Saadani Route, that will serve a small proportion of the population residing in the area.

**9.4.** Road transport reduces absolute poverty by improving economic efficiency, as it decreases costs and prices and enhances trade and employment opportunities Based on our assessment particularly in regards to the well-being of the people, it suffice to say that, the alternative route consideration has to be evaluated in order to minimize negative impact to the national resources and address socio-economic problems in this area such as serving a big proportion of people within the project area.

**9.5.** It is, therefore, concluded that, implementation of the proposed project will entail no detrimental impacts provided that the recommended mitigation measures are adequately and timely put in place. The identified adverse impacts should be managed through the proposed mitigation measures and implementation regime laid down in this ESIA. The responsible parties should be committed in implementing all the recommendations given in the report and further carry out environmental auditing and monitoring schedules to gauge the effectiveness of the mitigation measures.

## **10. REFERENCES AND CONTACTS**

### **10.1. Reference**

GOT (2019) Environmental and Social Impact Study for PROPOSED UPGRADING TANGA - PANGANI - SAADANI - MAKURUNGE (229 KM) ROAD TO BITUMEN STANDARD IN TANGA AND COAST REGIONS

### **10.2. Contacts**

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