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THE UNITED REPUBLIC OF TANZANIA

MINISTRY OF INFRASTRUCTURE DEVELOPMENT

TANROADS
TANZANIA NATIONAL ROADS AGENCY

DETAILED DESIGN FOR THE REHABILITATION OF KOROGWE – MKUMBARA – SAME ROAD

DESIGN REPORT – VOLUME III

Environmental and Social Impact Assessment (ESIA)

FINAL REPORT

January 2007

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THE STUDY TEAM

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In this study, Mr. Ako was responsible for conducting Biophysical survey to produce Environmental Impact Assessment (EIA) report; and Ms. Mramba was responsible for conducting Socio-economic survey to produce Social Impact Assessment (SIA) Report. In addition, Mr. Ako was responsible for combining the two reports to produce the Environmental and Social Impact Assessment (ESIA) Report.

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EXECUTIVE SUMMARY

1. INTRODUCTION

The purpose of this project is to rehabilitate 171 km of the existing Korogwe-Mkumbara-Same Road. The road, which forms part of the North Eastern Corridor (T2), is characterized by double surface bituminous carriageway.

The Government of Tanzania through TANROADS and The World Bank through the International Development Agency (IDA) finance the project as part of the Central Transport Corridor Project (CTCP).

However, before undertaking the rehabilitation works the Consultant was required to carry out Detailed Engineering Design and Preparation of Tender Documents. In addition, the consultant was required to conduct an Environmental and Social Impact Assessment (EIA and SIA). The intention is to identify potential environmental and social impacts and propose appropriate mitigation measures. In the long term the purpose of the study is to incorporate environmental and social concerns into the design processes. Ultimately, the overall objective is to make the project environmentally friendly, economically beneficial and socially sustainable.

2. PROJECT DESCRIPTION

2.1 Location

The Korogwe – Mkumbara – Same Road is located in the the two districts of Korogwe (Korogwe – Mkumbara (75 Km) and Mkumbara – Same (96 Km). The Korogwe – Mkumbara section, starts at Maili Kumi Village, located about 10 km west of Segera junction, and ends at Mkumbara. The Mkumbara – Same starts at Mkumbara village and ends in Same town

2.2 Justification

The Road, which has total length of about 171 Km, has a bituminous double surface dressed carriageway with various degrees of deterioration. Therefore, the road needs rehabilitation works before it becomes completely damaged, hence making it very costly to construct a new road.

This Road forms part of North East Corridor (T2), which is a major link between the East Coast (including Dar Es Salaam and Tanga Port) and the popular tourist destinations in the Northern circuit. It is also the main road link between Dar Es Salaam, the administrative Capital of Tanzania and Nairobi, the Capital City of Kenya.

The rehabilitation of this road is also economically justifiable and viable due to its high internal rate of return (28%), as shown in the Ten Year Development Study[1].

2.3 Current road conditions

Both sections have a bituminous double surface dressed carriageway with various degrees of deterioration. The Korogwe- Mkumbara Section was rehabilitated over the period 1991 to 1994 to double surface bituminous standard. The carriageway is 6.0 m wide with 1.0 m wide

[1] See the attached Terms of Reference in the EIA Report

shoulders. The condition of the road varies from fair to poor and the road requires widening and strengthening of the pavement to extend its design life and preserve the investment. The AADT recorded in 2005 on this section was 1056 vehicles per day.

The Mkumbara - Same section was constructed in the early 1960s also consists of a double surface bituminous road with a 6.0 m wide carriageway and 1.0 m wide shoulders. The last resealing of the section was carried out in 1990 and apart from some localized improvement to the drainage structures; no major rehabilitation or pavement strengthening has been undertaken since its construction. The road requires widening and strengthening of the pavement to extend its design life and preserve the investment. The AADT recorded in 2005 on this section was 630 vehicles per day.

2.4 Project activities

The rehabilitation works will involve improvement to the vertical and horizontal alignment plus widening and strengthening the existing pavement using a crushed road overlay with a two coat bituminous seal. The new road cross section will provide a 6.5 m wide carriageway and 1.5 m sealed shoulders. Construction of new box culverts and pipe culverts is also required together with extension of existing pipe culverts to match the widening road cross-section.

The elimination of a number of railway crossings by construction of reinforced concrete portal frame structures together with associated retaining walls is also being considered, to improve road safety.

A number of borrow pits and quarries located near the road alignment that were used to supply materials for construction of the original road will be reopened to provide materials for the road works.

The road rehabilitation will be confined within the existing alignment and no new land acquisition is required since none of the existing properties within the road reserve are affected by the construction work. In addition it is anticipated that the existing borrow pits and/or quarry sites will be used to obtain the required road construction material. Therefore, there will be no any resettlement or need for compensation in this project. Consequently preparation of a Resettlement Action Plan for this project is not required. This shall also apply to town centres like Mombo Township because there will not be any expansion or realignment of the road.

2.5 Consideration of Alternatives

2.5.1 No Project Alternative

The No Project alternative implies that the road should not be rehabilitated at all. Thus, leaving the road under the current condition would make it continue to deteriorate, hence making it completely impassable and become more expensive to rehabilitate. This would amount to constructing a new road.

Therefore, it is important that the current road condition should be improved through rehabilitation before it further deteriorates. In this case the No Project Alternative could not be selected.

2.5.2 Re-alignment Alternative

The re-alignment alternatives that needs consideration is the road section that passes through Mombo Township. Currently the road section cannot be expanded as most of the buildings are very close (within the road reserve). Thus, one of the alternatives could be to re-align the road to by-pass the Mombo Township. However, re-alignment of the road could be costly due to the fact that it will involve compensation / resettlement of affected people and possibly construction of the new bridge over the Mombo River.

In this case the re-alignment option can not be chosen due to high cost involved. Alternatively, it is decided that the construction activities should be confined to the existing road alignment, which passes through Mombo Town. There will be no significant expansion of the road within the Mombo Town and the width of the existing road side drainages will be maintained to avoid damage to the existing buildings.

3. STAKEHOLDERS CONSULTED AND RESULTS OF PUBLIC CONSULTATIONS

3.1 Stakeholders consulted

The consultation process involved various stakeholders at national, regional, district and community levels during the study. The important stakeholders include professionals from relevant institutions such as TANROADS HEADQUARTERS, NEMC, TANROADS Regional Managers, District Councils (DED, District Land Use Planners) and Ward Executives Officers and Local Community members from several Wards (Manundu, Kilole, Mbuyuni, Mkomazi, Mazinde and Mkumbara).

The professional consulted provided their views about the project and helped the consulting team with secondary data. However, they were also concerned about the problem of soil erosion and sedimentation of road pavement as well as HIV / AIDS transmission problems. In addition, the consultation meetings carried out with local community members from various Wards facilitated dialogue to identify of potential impacts and possible mitigation measures.

Other consultation was carried out with existing local Non-Governmental Organization NGOs such as Same Agricultural Improvement Programme (SAIPRO) and Same – Mwanga Environmental Conservation Advisory Office (SMECAO). These NGOs expressed their concern about the problem of soil erosion and sedimentation of road pavement between Hedaru – Chekelei section. They also gave their concern about the problem of HIV / AIDS and the possible implications to the project. The list of stakeholders consulted during the study is shown in **Appendix 1.**

3.2 Results of Public Consultation Process

The public consultation process identified a number of issues raised by various stakeholders and the local community members from some selected Wards. For example the majority of the people appreciated that the project will have some benefit to them in terms of employment creation and income generation.

However, the important issues of major concern to this project include:

- ③ Soil erosion and sedimentation of road pavement
- ③ Road safety issues
- ③ HIV / AIDS transmission

(a) Soil erosion and Sedimentation of Road Pavement

The problem of soil erosion is caused by local community activities on the upper catchment, hence resulting into severe land degradation. This in turn has resulted into soil erosion and destruction of culverts and bridge structures. The engineering method has been used but did not succeed. It has been proposed by the stakeholders that planting of vegetation on the upper catchment in conjunction with engineering method could minimize the problem. This could be done by establishment of vegetation belt comprised of sisal plants and other drought tolerant trees. The exercise would need involvement of the local communities and enforcement of the land use planning by the District Council in collaboration with Ward and Village Committees. However, a need to carry out detailed assessment has been proposed before undertaking the exercise. This should involve TANROADS Engineer, NEMC, District Council, Local Community leaders and Local NGOs.

(b) Road Safety

The local communities are concerned about the problem of increased road accidents due to speeding vehicles. The construction of speed bumps in village centres has been proposed as solution to minimize the problem. The disruption of livestock routes and community access to their business activities is another issues which ahs been identified. The problem of livestock route could be minimized by construction of road underpass in form of culverts is some areas. The pedestrian access could be restored by putting concrete slabs or culverts in pedestrian or Non-Motorized crossings.

(c) HIV / AIDS transmission

It gas been proposed that the problem of HIV / AIDS should be minimized by promoting intensive sensitisation campaign by TANROADS through provision of funds to the local NGOs. The campaign should also involve construction workforce and should be carried out by the Local NGOs. The workers Campsite should also be located far from village settlement to minimize interaction with local communities. In addition, the Contractor is advised to give priority to local communities during employment of unskilled labour to minimize the number of newcomers in the project area.

4. Description of impacts and mitigation measures

The study findings have identified some positive and negative impacts associated with the project. However, the results from impact analysis have shown that the project will have significant negative and positive impacts on socio-economic component, but will only have significant negative impacts on biophysical components. These findings imply that the positive impacts should be enhanced and negative impacts should be mitigated in order to make the project environmentally sustainable and economically beneficial. The significant positive impacts associated with the road rehabilitation project include:

- ③ Increased income generation during construction due selling food and other local products to construction work force by members of the local community residing along the road, especially women and youth.
- ③ Temporary employment to the local community members during road construction works.
- ③ Reduced vehicle maintenance and operation costs due to improved road condition.
- ③ Increased tourism activities due to improved road condition with faster and more comfortable journeys.

Although the project is going to have a number of negative impacts, most of them could be easily mitigated though good engineering practice. The identified significant negative impacts and their proposed mitigation measures are described in this section.

(a) Dust / Air Pollution

Exhaust emissions mainly comprised of Carbon monoxide (CO), Oxides of Sulphur (SO_x,), Oxides of Nitrogen (NO_x,), Hydrocarbons (HC) and possibly Lead (Pb) are expected to occur from operation of vehicles and construction equipment along the road alignment and borrow pits / quarry sites.

Dust will occur from excavations and operation of equipment and vehicles within the road alignment and on borrow pit / quarry sites

Mitigation measures

- Operate / maintain vehicles and equipment in good working condition.
- Provide workers with air masks
- Apply water, especially in settlement areas.
- Abatement of vehicle emissions and dust must be done as prescribed in the Standard Specifications for Road Works *(Section 1707* and *(Section 1708),* respectively[2].

(b) Noise / Vibration

The major sources of noise / vibration are expected from operation of vehicles / equipment / machinery on roadside and borrow pit / quarry sites. Other source of noise and vibration will be expected from the use of explosives in quarry sites.

Mitigation Measures

- Workers in vicinity of strong noise should wear earplugs and helmets and their working time should be limited.
- In construction sites within residential areas, noisy construction should be stopped during the night hours (18:00-06:00 hours).
- Maintenance of machinery and vehicles should be enhanced to keep their noise at a minimum.
- Contractor must follow procedures for noise abatement as prescribed in the in the Standard Specifications for Road Works *(Section 1709 and (Section 1222),* respectively.

(c) Soil and Water Pollution

The accumulation of solid wastes in construction camp site is likely to result into environmental pollution. Likewise uncontrolled discharge of liquid wastes will result into pollution of surface and ground water, especially to surface water sources around the workers campsite. For example, improper siting of pit latrines may result into contamination of both ground and surface water sources.

The spillage of fuels, oils, grease and paints may lead into land contamination and pollution of water sources, and ultimately may cause damage to natural vegetation and soil micro-fauna and flora.

Mitigation measures

- Avoid construction of workers camp site facilities close to surface water sources.
- Pit latrines must be located not less than 50 metres from surface water sources and the bottom of the pit latrine should not be less than 1 m below the water table.

[2] United Republic of Tanzania (2000). *Standard Specifications for Road Works.* Ministry of Works.

- Borrow pit / quarry sites and camp sites, including temporary work places must be provided with sanitary facilities (toilets) and must be located far from water sources. The facilities must be properly maintained and satisfactorily decommissioned after the project.
- Solid and liquid waste must be handled as prescribed in the Standard Specification for Road Works *(Section 1713)*

(d) Destruction of stream / river banks vegetation

The movement of heavy machinery and trucks close to the river bank could result into destruction of stream / river bank vegetations. This could lead into increased river bank erosion and sedimentation of stream / river beds.

Another cause is due to uncontrolled cutting and clearing of the vegetation during workings close to the river / stream banks. The presence of the heavy machinery and trucks could result into pollution of water source due to leakage of oils.

Mitigation measures

The Contractor must use a water pump to haul water from the river / stream at a distance of not less than 50 m from the river / stream banks. The Contractor must minimize destruction of stream / river bank vegetations by avoiding unnecessary cuttings / excavations during construction close to the stream / river banks. All bare areas around the stream / river banks must be planted with grass / shrubs immediately after construction

(e) Soil erosion and sedimentation of road pavement

The problem of soil erosion and sedimentation of road pavement along Hedaru-Makanya Road Section is mainly caused by local community activities on the upstream side of the road. This not only leads into sedimentation of road pavement but also destruction of bridges and culverts as well as downstream land use beyond the road pavement.

Mitigation Measures

- Problem of soil erosion due to community activities can be mitigated through construction of dam on the upstream side beyond the road pavement and planting of vegetation.

- Other measures are to educate the local communities on environmental protection and soil conservation measures such as tree planting, agro-forestry and contour farming.

(f) Soil erosion and sedimentation of stream / river beds

Improperly designed, inadequate number of culverts and wrongly located/placed culverts may cause concentration of storm water flow resulting into soil erosion and sedimentation of watercourse or destruction of adjacent land use and properties.

Another source of increased sedimentation of streams / river beds includes:

- Bridge construction activities
- Soil erosion along the road side drainages;
- Stock piling of soil along the river banks

Mitigation Measures

- Execute proper design and construction of roadside drainages
- Road run off must be channelled to natural water course through side drains in which baffles and rip rap are placed to check water velocity. Drains must be included at short intervals to cope with run –off.
- Adequate number of culverts must be designed and placed in such a way that storm water does not damage adjacent land use below the road bed.

(g) Destruction of adjacent land use and properties

Changes in drainage patterns my result into concentration of water flow leading into flooding, soil erosion and consequently damaging the adjacent farmlands, houses and other public properties below the roadbed. The destruction of adjacent lands may also occur due to uncontrolled stockpiling of spoils and movement of mobile equipment during road construction and/or workings of borrow pits.

Mitigation Measures

- Contractor must ensure proper design and placement of adequate number of culverts with wide aperture to avoid concentration of storm water flow to adjacent lands.
- Movement of equipment must be confined within the road reserve
- All spoils must be stockpiled and disposed of in permitted areas by Engineer

(h) Increased Traffic related road accidents

The improvement of road pavement condition can into increased risk of accidents to livestock and pedestrians due to speeding vehicles. This problem becomes more severe in urban or village centres where there is large concentration of people. It is common to find livestock crossing the road going to either directions searching for water or pastures.

Mitigation Measures

- Whenever possible Contractor should design and place a box culvert that can be used by livestock and local people as an under passage.
- Contractor must put road signs to indicate livestock and people crossing, especially school children
- In urban areas the contractor must put concrete slabs or culverts to allow access by local people to their houses / business activities.
- Provide clearly displayed name boards for each village at entrance and exits.
- Impose speed limits and reinforced by rumble strips at the entrance in village centres
- Speed humps should be used sparingly, since they constitute hazards for road users. However, they could be justified near schools and dispensaries but should be clearly marked as pedestrian crossings.

(i) Risk of accidents to livestock and people in borrow pits and quarry sites

Open borrow pits and quarry sites can pose a risk to life for livestock and people, especially children who usually like to play in abandoned borrow pits and quarry sites..

Mitigation Measures

- All borrow pits and quarry sites must be fenced off during construction to prevent access by livestock and people.
- All borrow pits must be restored by refilling with overburden before abandonment during decommissioning.
- Operations of borrow pits and quarry sites must be done as prescribed in the Standard Specifications for Road Works *(Section 3400)* and Mining Regulation[3]

(j) Increased incidence of HIV/AIDS and STIs

The interaction between construction workers may result into transmission of HIV/AIDS to local people and vice versa.

Mitigation Measures

This will require promotion of awareness to both workforce and local people. The local NGOs and government agencies already active in the project area are better placed to combat the spread of HIV AIDS and STIs. Their effort should be reinforced by TANROADS during the project period.

[3] United Republic of Tanzania. Mining Regulation (Environmental Management and Protection) Regulation of 1999.

Other measures is to locate construction camp site far from human settlements and a large umber of unskilled labour must come from within the local communities to minimize the number of new comers.

(k) Construction related accidents

The construction related accidents are likely to be inevitable when dealing with operation of heavy equipment, especially in borrow pits, quarry, and crusher and/or asphalt plant sites.

Mitigation Measures

- Contractor must take precautions and educate workers on the use of safety gears.
- Contractor must follow safety procedures prescribed in the Standard Specifications for Road Works *(Section 1237)* and Occupational Health and Safety Act No. 5 of 2003.

(l) Destruction of infrastructure / Social service utilities

The existing infrastructure and service utilities are likely to be damaged during construction such as railway lines, telephone lines, electricity lines and water supply pipelines. This may lead into disruption of community activities and economic / financial loss.

Mitigation Measures

The Contractor must avoid damage to existing infrastructure and social service utilities as necessary as possible. However, in case damage cannot be avoided the Contractor must carry out survey and notify the general public of any possible interruptions prior to commencement of works. The Contractor must make arrangement with responsible authorities before moving or altering the existing infrastructure and/ or service utilities.

The damaged infrastructure / service utilities must be restored immediately to avoid inconveniences to the public. The Contractor must follow the prescribed procedures in the Standard Specification for Road Works (*Section 1202)*.

(m) Disruption of pedestrian and non-motorized transport system

The existing pedestrian and non-motorized transport system is likely to be disrupted during construction and operation phase. The problem is likely to be significant in urban areas where pedestrians, cyclists and other non-motorized use roadside space.

Mitigation Measures

The Contractor must ensure that pedestrian and non-motorized lanes are provided during and after construction to avoid risk of accidents.

(n) Creation of breeding sites for mosquitoes and other water borne vectors

Usually borrow pits tend to accumulate water, which in turn becomes a potential breeding site for mosquitoes and become a major source of malaria and other water borne diseases. However, in some dry areas like Makanya and Hedaru borrow pits could be useful as a source drinking water for livestock or house construction works.

Mitigation Measures

All borrow pits must be drained and restored before abandonment. However, the views of the local communities must be obtained to determine whether a borrow pit should be drained / restored or allowed to retain water for their use, especially in drought stricken areas. In case they are to be retained they should be properly designed for the intended purpose and that should be included in to the Contract conditions for Contractors.

(o) Disruption of traffic flow during construction

The movement of heavy machinery and construction vehicles may result into traffic congestion during construction. Also, excavations and removal of culverts may result into only one side road to be used by vehicles, which may also result into slow movement and possibly traffic congestion.

Mitigation measures

Traffic jam during construction should be minimized through traffic management plan and use of road signs. Contractor should deploy personnel at crucial points to guide traffic movement. Involvement of Traffic Officers should also help to ensure smooth movement of traffic during

5. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

5.1 Implementation of Environmental and Social Management Plan (ESMP)

5.1.1 Integration of Efforts in ESMP

The effective implementation Environmental and Social Management Plan (ESMP) will require integration of efforts. It is important that all responsible agencies / stakeholders should appreciate that they are united in a common effort. It is important that after a meeting with local representatives and all agencies entrusted with any element of ESMP, different agencies should interact and work towards a common purpose. The detailed ESMP for this project is shown in **Table 5.1**.

5.1.2 Transfer of Technology and Human Resource Development

The transfer of technology through on-the training for the Road Inspector from TANROADS would be required to equip him / her with some knowledge about Environmental Code of Practice. This would help the Road Inspector effectively monitor the Contractor during construction.

However, the Road Inspector may require some training on Environmental Code of Practice. This will be a kind of on-the job training conducted by Environmental specialist from the Road Sector Environment Section (RS-ES). The purpose of the monitoring exercise is to ensure that the Contractor adheres to the Environmental Code of Practice and to ensure that maximum benefits are obtained from implementation of environmental and social mitigation measures.

5.1.3 Involvement of Local authorities, NGOs and Communities

In addition, the involvement of the local authorities and NGOs in the monitoring compliance mitigation measures would be essential. In that case it is important that one copy of this report should be available to them. It is also important that some budget should be allocated to the local authorities and NGOs to promote soil conservation and tree planting to control soil erosion and sedimentation of road pavement, especially within Makanya and Hedaru section. Other funds should also be provided to the local NGOs that are already active in the area to promote anti HIV / AIDS campaigns.

The project could obtain maximum benefit if it involves the local communities in the project, especially on Road Safety issues and maintenance of the Road Reserve. The existing villages along the road should be provided with some funds for road safety campaigns.

It is important to recognize that a number of issues require involvement of local communities failure of which will make its implementation futile. These include:

- ③ Provision of pedestrian foot paths separated from the pavement of the road;

- ③ Provision of clearly demarcated parking, resting and trading areas within village centres;
- ③ Creation of bus stops off the road;
- ③ Creation of shaded lays-bys large enough for trucks to pull in and in which villagers could, if they do wish, erect and operate small produce stalls;
- ③ Installation of clearly –marked pedestrian crossings on painted humps in village centres. Villagers should undertake to use the crossings and to repaint them from time to time;
- ③ Improved access to commercial areas with cleared demarcation of the access roads and clear separation from the trunk road by way of concrete block barriers;
- ③ Erection of Signboards at the entrance to each village, not only naming the village but demanding courteous road use, in English and Kiswahili;
- ③ Emplacement of rumble strips (not humps which are dangerous) within village centres and near schools;
- ③ Payment out of a some funds for villagers to maintain roadside verges;
- ③ Payment out of the some fund for each village and sub-village to engage the services of a uniformed traffic warden, equipped with a large "lollipop" sign, to work at each pedestrian crossing.
- ③ Maintenance of road reserve, including prohibiting advertisements on the road reserve.

Thus, pre-selecting such measures and simply incorporating them in the project would mean forgoing major benefit of public involvement. Inviting villagers to choose which measures should be implemented would provoke invaluable discussions, locally, about the road use-with the consequences of raising awareness of traffic hazards. It will also reduce the most negative social impacts associated with the project activities. Public involvement would help to ensure self-reliance and respecting the authority of local leaders in the decision-making about local development.

Village councils could also introduce fees for space to erect roadside advertisements. That means apart from prohibiting such advertisements in the road reserve, the village councils should charge annual fees for erecting them beyond the road reserve. Fees should be very high, to maximize income and to discourage advertisers from ruining the landscape.

5.2 Budget Estimates for ESMP

The mitigation measures that require contractor to adhere to good practice are normal costs, not extra costs arising out of the ESIA. Thus, they are not included into the ESMP budget or cost estimates for mitigation measures. Also, the project can not be responsible for costs that arise out of normal responsibility of the highway, environmental and local authorities. Therefore, for that reason, recurrent costs during road operation and maintenance are excluded.

The budget estimates for implementation of ESMP is shown in **Table 5.2** to finance some proposed mitigation measures as well as environmental monitoring and audit. If the budget is approved by project proponent this report should be made available to all mentioned agencies, so that they can comment, ready themselves for the proposed activity and network appropriately.

The cost estimates for mitigation measures given in **Table 8.2** are focused on the implementation of those proposed mitigation measures that are within the capability of this project. The total budget estimates for implementation of ESMP has been estimated by the Consultant to be about US $ 68,400[4].

TABLE 5.1: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

ENVIRONMENTAL ISSUES	MITIGATION MEASURES	IMPLEMENTORS	RESPONSIBLE ORGANIZATIONS
A. CONSTRUCTION PHASE			
A1. Dust pollution	Sprinkle water on bare areas and road surface during construction, especially within residential areas to minimize dust. Vehicles delivering construction materials should be covered to avoid spillage. Concrete mixing equipment should be well sealed, and vibrating equipment should be equipped with dust-removal device. Operators should pay attention to their health by wearing dust protection masks.	Contractor Supervised by (***Resident Engineer***)	TANROADS (***Highway Engineer and Environmental Officer***) Consulting Firm (***Highway Engineer***)
A2. Noise / Vibration	Workers in vicinity of strong noise should wear earplugs and helmets and their working time should be limited. In construction sites within residential areas, noisy construction should be stopped during the night hours (18:00-06:00 hours). Maintenance of machinery and vehicles should be enhanced to keep their noise at a minimum. Contractor must follow procedures for noise abatement as prescribed in the Standard Specifications for Road Works (Section 1709).	Contractor Supervised by (***Resident Engineer***)	TANROADS (***Highway Engineer and Environmental Officer***) Consulting Firm (***Highway Engineer***)
A3. Soil and Water Pollution	Measures must be taken at construction sites / borrow pits and quarry sites by	Contractor Supervised by (***Resident***	TANROADS (***Highway Engineer and***

[4] The estimates are based on the Consultant's experience on projects of similar nature and through consultation with relevant stakeholders.

ENVIRONMENTAL ISSUES	MITIGATION MEASURES	IMPLEMENTORS	RESPONSIBLE ORGANIZATIONS
	providing solid waste collection / garbage tanks and sanitation facilities. Garbage should be collected in a tank and disposed of periodically. Avoid construction of workers camp site facilities close to surface water sources. Borrow pit / quarry sites and camp sites, including temporary work places must be provided with sanitary facilities (toilets) and must be located far from water sources. The facilities must be properly maintained and satisfactorily decommissioned after the project. Solid and liquid waste must be handled as prescribed in the Standard Specification for Road Works *(Section 1713)* Solid waste resulting from road construction works could be disposed of as prescribed in the Standard Specification of Road Works (Section 1713)	***Engineer***)	***Environmental Officer***) Consulting Firm (***Highway Engineer***)
A4. Destruction of stream / river bank vegetation	Use a water pump to haul water from the river / stream at a distance of not less than 50 m from the river / stream bank. Contractor must minimize destruction of stream / river bank vegetations by avoiding unnecessary cuttings / excavations during construction. Bare areas around the stream / river banks must be planted with grass / shrubs immediately after construction	Contractor Supervised by (***Resident Engineer***)	TANROADS (***Highway Engineer and Environmental Officer***) Consulting Firm (***Highway Engineer***)
A5. Creation of breeding sites for water borne vectors (E.g. Mosquitoes)	Drain and restore all borrow pits before abandonment. Get the views of the local	Contractor Supervised by (***Resident Engineer***)	TANROADS (***Highway Engineer and Environmental***

ENVIRONMENTAL ISSUES	MITIGATION MEASURES	IMPLEMENTORS	RESPONSIBLE ORGANIZATIONS
	communities to determine whether a borrow pit should be retained for use as source of water, especially in drought stricken areas. In case they are to be retained they should be properly designed for the intended purpose and that should be included in to the Contract conditions for Contractors.		***Officer***) Consulting Firm (***Highway Engineer***)
A6. Destruction of infrastructure / Social service utilities	Avoid damage to existing infrastructure and social service utilities. But in case damage cannot be avoided it is important to carry out survey and notify the general public of any possible interruptions prior to commencement of works. Arrangement must be made with responsible authorities before moving or altering the existing infrastructure and/ or service utilities. The damaged infrastructure / service utilities must be restored immediately to avoid inconveniences to the public. The Contractor must follow the prescribed procedures in the Standard Specification for Road Works (*Section 1202)*	Contractor Supervised by (***Resident Engineer***) .	TANROADS (***Highway Engineer and Environmental Officer***) in collaboration with TANESCO, TTCL and Water Supply authorities (***Responsible Engineers***)
A7. Disruption of pedestrians and Non-Motorized transport (NMT)	Identify potential location of passageways for pedestrians and NMT and designed them to meet the needs of pedestrians and NMT.	Contractor Supervised by ***Resident Engineer***)	TANROADS (***Highway Engineer and Environmental Officer***) and Korogwe and Same District Councils (***Urban Planning Officers***) and Village Government (***Village / Ward Executive Officers***)
A8. Increased incidence of HIV/AIDS and STIs.	Locate the Construction camp site far from human settlements and employ a large number of unskilled labourers from within the local communities to minimize number of new comers.	Contractor Supervised by ***Resident Engineer***	TANROADS (***Highway Engineer and Environmental Officer***) and Korogwe and Same District Councils (***Urban Planning***

ENVIRONMENTAL ISSUES	MITIGATION MEASURES	IMPLEMENTORS	RESPONSIBLE ORGANIZATIONS
	Involve the local NGOs and government agencies already active in the project area in awareness creation and educating the local communities on HIV / AIDS and STIs prevention. The Some funds must be provided by TANROADS during project implementation to reinforce the effort being done by local NGOs and government agencies in the project area on HIV / AIDS campaigns. The funds should also help the local NGOs to create awareness and educate the Contractor's workforce on HIV / AIDS and STIs prevention.	***Active Local NGOs and Government agencies in the project area***	***Officers***) and Village Government (***Village / Ward Executive Officers***)
A9. Construction related accidental Risks	Safety signal devices should be installed to ensure safety during construction. Effective safety and warning measures should be taken to reduce accidents. Construction workers must be equipped with helmets and other safety gears. The management and use of blasting materials should be done by Contractor in strict conformity with the safety requirements for public security as stipulated in the Mining Act of 1998 and Mining (Safety and Occupational Health) Regulation of 1999. The Contractor most also follow procedures for handling explosives as prescribed in the Standard Specifications for Road Works (Section 1222)	Contractor Supervised by (***Resident Engineer***)	TANROADS (***Highway Engineer and Environmental Officer***) Consulting Firm (***Highway Engineer***) in collaboration with Ministry of Home Affairs (***Traffic Department***)
A10. Disruption of Traffic flow during construction	Traffic jam during construction should be minimized through traffic management plan and use of road signs. Contractor should deploy personnel at crucial points to guide traffic movement.	Contractor Supervised by (***Resident Engineer***)	TANROADS (***Highway Engineer and Environmental Officer***) Consulting Firm (***Highway***

ENVIRONMENTAL ISSUES	MITIGATION MEASURES	IMPLEMENTORS	RESPONSIBLE ORGANIZATIONS
	Involvement of Traffic Officers should also help to ensure smooth movement of traffic during construction.		***Engineer***) in collaboration with Ministry of Home Affairs (***Traffic Department***)
B. CONSTRUCTION / OPERATION PHASE			
B1. Destruction of adjacent land use and properties due to increased run-off, flooding and soil Erosion	In slopes and suitable places along the roadside, grass must be planted, and retaining wall, water intercepting ditches, and masonry rubbles must be built to prevent damage to adjacent properties. Temporary and permanent drainage systems must be designed to minimize the impact on adjacent properties during construction and operation, respectively.	Contractor Supervised by (***Resident Engineer***)	TANROADS (***Highway Engineer and Environmental Officer***) Consulting Firm (***Highway Engineer***)
B2. Soil erosion and sedimentation of road pavement along Hedaru - Chekelei road section	Problem of soil erosion due to community activities can be mitigated through construction of dam on the upstream side beyond the road pavement and planting of vegetation. Other measures are to educate local communities on good cultivation practice such as agro-forestry and contour farming. This will require provision of some funds to finance involvement of local NGOs that are active in the area. These NGOs should help to educate the local communities on environmental protection and conservation measures such as tree planting, agro-forestry and contour farming. They will also educate them on alternative source of house construction materials, which do not use wood fuel. Funds should also be provided to finance on the job training for Road Inspector from TANROADS to participate in the environmental protection and soil conservation activities and general environmental	Contractor Supervised by (***Resident Engineer***) Local NGOs TANROADS	TANROADS (***Highway Engineer and Environmental Officer***) in collaboration with Same District Council (***Land Use Planning Officer***) and Representative of Hedaru Ward Executive Committee and Local NGOs responsible of Environmental and Soil Conservation (E.g. ***SECAP, SMECAO and SAIPRO***)

ENVIRONMENTAL ISSUES	MITIGATION MEASURES	IMPLEMENTORS	RESPONSIBLE ORGANIZATIONS
	monitoring.		
B3. Soil erosion and sedimentation of watercourses	Road run off must be channelled to natural water course through side drains in which baffles and rip rap are placed to check water velocity. Drains must be included at short intervals to cope with run –off. Adequate number of culverts must be designed and placed in such a way that storm water does not damage adjacent land use below the road bed.	Contractor Supervised by (***Resident Engineer***)	TANROADS (***Highway Engineer and Environmental Officer***)
B4. Traffic related accidents	Put road signs to warn motorists of crossing livestock and pedestrians. Whenever possible use Box Culverts as road underpass in appropriate locations for use by crossing livestock. Provide clearly displayed name boards for each village at entrance and exits. Impose speed limits and reinforced by rumble strips at the entrance in village centres. Speed humps should be used sparingly, since they constitute hazards for road users. However, they could be justified near schools and dispensaries but should be clearly marked as pedestrian crossings. Allocate some funds to finance involvement of Local Communities residing along the road alignment to participate in road safety campaigns during project implementation.	Contractor Supervised by (***Resident Engineer***)	TANROADS (***Highway Engineer and Environmental Officer***) in collaboration with Korogwe and Same District Councils (***Urban Planning Officers***) and Village Government (***Village / Ward Executive Officers***)
B5. Risk of accidents to livestock and people in borrow pit and	All borrow pits and quarry sites must be fenced off during construction to prevent access by livestock	Contractor Supervised by (***Resident Engineer***)	TANROADS (***Highway Engineer and Environmental***

ENVIRONMENTAL ISSUES	MITIGATION MEASURES	IMPLEMENTORS	RESPONSIBLE ORGANIZATIONS
quarry sites	and people. All borrow pits must be restored by refilling with overburden before abandonment. Operations of borrow pits and quarry sites must be done as prescribed in the Standard Specifications for Road Works *(Section 3400)* and Mining Regulation[5]		***Officer***) in collaboration with Korogwe and Same District Councils (***Urban Planning Officers***) and Village Government (***Village / Ward Executive Officers***)
C. DECOMISIONING PHASE			
C1. Restoration of borrow pits / Quarry sites	In some areas, especially in dry areas the borrow pits could be used a source of water supply for the local communities and their livestock. In this case the Contractor should design the borrow pits to suit the purpose. Some times the borrow pits could be retained for future use as source of road rehabilitation / construction materials. These borrow pits should be fenced off to prevent access by people, especially children and livestock In case no future use is expected of the borrow pits should be restored by backfilling and planting with trees / shrubs.	Contractor in collaboration with the local authorities, under supervision by Resident Engineer.	TANROADS ***(Highway Engineer and Environmental Officer)***
C2. Construction Equipment / Vehicles / Machinery	All construction equipment / vehicles and machinery should be removed immediately from the site at the end of defects liability period.	Contractor supervised by Resident Engineer.	TANROADS ***(Highway Engineer and Environmental Officer)***
C3. Workers' Campsite, Workshops and other associated facilities.	The workers' camp site and other facilities should be removed at the end of defect liability period. The removed materials should be transported and kept in safe place for use by the Contractor in other works.	Contractor supervised by Resident Engineer.	TANROADS ***(Highway Engineer and Environmental Officer)***

[5] United Republic of Tanzania. Mining Regulation (Environmental Management and Protection) Regulation of 1999.

ENVIRONMENTAL ISSUES	MITIGATION MEASURES	IMPLEMENTORS	RESPONSIBLE ORGANIZATIONS
	However, in some cases the Workers' Campsite can be retained for use by the local communities as a school or dispensary as the case may be.		
C4. Site clearing	All debris, oils, grease and solid waste should be removed from construction sites The area should be cleaned and all domestic wastes, debris / waste metals, grease and oils must be cleaned up and disposed of in a manner approved by Resident Engineer.	Contractor supervised by Resident Engineer	TANROADS ***(Highway Engineer and Environmental Officer)***

TABLE 8.2: COST ESTIMATES FOR MITIGATION MEASURES

ENVIRONMENTAL MANAGEMENT MEASURES	IMPLEMENTORS (Recipient of funds)	PERCENTAGE OF TOTAL FUND	AMOUNT IN US $
1. Involvement of Local communities residing along the road alignment to participate in road safety campaigns.	Village committees residing along the road alignment	20%	13,680
2. Conducting awareness campaigns on HIV / AIDS and STIs prevention by local NGOs in the project area for local communities and the construction workforce.	Local NGOs	20%	13,680
3. On the job training on Environmental Code of Practice for Road Inspector from TANROADS to participate in the follow-up of environmental protection and soil conservation measures and general environmental monitoring during project implementation.	Environmental Specialist from RS-ES within the Ministry of Infrastructure Development	10%	6,840
4. Conducting awareness and education campaigns for the local communities on soil conservation measures such as tree planting, agro-forestry and contour farming methods, as well as on the use of alternative house construction materials which	Local NGOs and Same District Council	40%	26,000

do not use wood fuel. (E.g. red soil + cement bricks instead of burnt bricks).			
5. Independent Environmental Monitoring and Auditing	NEMC in collaboration with RS-ES and TANROADS	10%	6,500
	Total	**100**	**68,400**

6. ENVIRONMENTAL MONITORING AND AUDIT

6.1 Environmental Monitoring

The Contractor will be responsible for implementation of environmental and social mitigation measures under the Supervision of Resident and Environmental Officer from TANROADS. This is to ensure that technical and environmental clauses are followed and well implemented by the Contractor. The Environmental Compliance Monitoring Checklist is shown in **Appendix 9.**

A senior representative of the Contractor must be nominated to oversee compliance with environmental mitigation measures. The Contractor's representative must submit a monthly report to the Resident Engineer specifying that:

- ③ All previously notified failures to comply with the mitigation measures have been rectified.
- ③ All newly notified requirements have been fulfilled and all standard requirements (as specified in this report) have been put into effect.

During road construction the Road Inspector from TANROADS shall also be responsible for Environmental Monitoring in collaboration with an Environmental Expert.

The Resident Engineer must countersign the report and make it available to TANROADS, which in turn should pass a copy to the Ministry of Infrastructure Development (RS-ES), NEMC, Korogwe and Same District Councils within a reasonable period not exceeding 30 days from receipt.

The purpose of environmental monitoring is to ensure effective traffic management to minimize accidents and impacts on adjacent properties. This stage will also require the presence of National Environmental Agencies (NEMC, VPO) and other relevant stakeholders, including the Ministry of Home Affairs (Traffic Department).

The Resident Engineer's job is to ensure enforcement of mitigation measures. Any failure of a measure to mitigate an adverse impact should be reported to TANROADS, to find appropriate measures. It is important that the Resident Engineer understands and promotes the objectives of road rehabilitation with minimal adverse impacts, ecologically and socio-economically. This is to ensure that he / she promote environmentally friendly road construction works under all circumstances.

6.2 Environmental Audit

The Environmental audit should be conducted by a registered Environmental Auditor or Environmental Inspector or a Firm of Experts. The Environmental Audit should be

undertaken within 12 Months of the commencement of the operation and not more than 24 Months after completion of the project[6].

The purpose of Environmental Audit is to verify compliance with the recommended mitigation measures. Thus, the Environmental Audit Report should be specific to the compliance issues. The Environmental Audit study should be conducted in accordance with the Terms of Reference (TOR) developed by TANROADS in consultation with NEMC[7]. The TOR should focus on attainment of mitigation measures.

7. DECOMMISSIONING PLAN

7.1 General requirements

During decommissioning phase all work areas and offices and workshops /garages and other temporary installations must be cleaned up and the site restored. All temporary buildings, materials, wood, refuse, surplus materials, embankments or any other material that is not in the area before constriction works must be removed.

All natural drainages must be restored and excavated materials must be used to fill excavated areas. Damaged areas must be restored to make it compatible with future use. However, the Contractor must consult the local authority to obtain information about the envisaged use of the area.

Natural drainage must be preserved during rehabilitation and restoration works, ditches must be created to facilitate water run-off by installing drains and derivation dutches perpendicular to the slopes. All superfluous temporary drainage elements must be removed. Permanent installations must be restored / repaired to their initial state.

The compacted soils must be scarified to at least 15 cm deep to loosen it and facilitate vegetation growth. Concrete surfaces, paving stones and flagstones must be removed or broken and covered with 1 m of topsoil.

Damage trees must be chopped / lopped and crosscut after completion of construction works. The site must be cleared of equipment, materials, provisional installations, wastes, debris and overburden resulting from construction works. The adjacent strip of vegetation must be cleaned.

7.2. Specific requirements

7.2.1 Restoration of borrow pits and quarry sites

The restoration of borrow pits should be done by levelling the ground and planting trees, shrubs, grass or tree crops or other crops growing in and area. The holes in the quarry sites could be filled with earth or stones and planted with vegetation. The stockpiled soil around borrow pits and surplus excavated materials must be stabilized. The area must fit well with the surrounding landscape and should be sufficiently drained. The planted vegetation should be maintained for a period of 1 year after decommissioning period.

[6] See Section 46(5) of The Environmental Impact Assessment and Audit Regulations G.N. No. 348 of 2005

[7] See Section 46(7) of The Environmental Impact Assessment and Audit Regulations G.N. No. 348 of 2005.

However, in some drought stricken areas the borrow pits / quarry sites could be designed and water level adjusted for use by the local people and livestock. Also, in some cases the site could be transferred / handed over for use by another project.

7.2.2 Temporary Access Roads and Culverts

The temporary access roads must be closed to prevent public access. However, the Contractor must make consultation with the local authorities to decide about the possible future use of the roads. The slopes must be stabilized by spreading topsoil spread and planting vegetation at entrances and exits in prominent areas such as in borrow pits or quarry sites.

Temporary culverts must be removed and the natural drainage restored. In streams / river crossings it is important to restore normal flow. The river beds and river banks must be restored as mush as possible to their original conditions.

7.2.3 Workshops / Garages and Materials storage areas

The workshop and other materials storage areas must be cleaned to remove petroleum products like oils and grease. The petroleum products should be handled in accordance with the provisions given in the Standard Specification for Road Works (2000).

All asphalts, cements, stockpiled gravels and any other surplus materials must be removed from the Materials storage yard. The useable materials should be taken away and stored in a safe place far from the abandoned site. The spilled materials must be removed and the site must be properly cleaned and restored to its original state. If possible the site must be prepared and planted with vegetation.

7.2.4 Solid Waste Dump sites

The solid waste dump site must be cleaned, levelled and returned to a regular form. All wastes in the dump site should be thoroughly covered with a soil. The Contractor must ensure that no wastes are visible and no surface water drains into the site.

The eliminated dry materials should form a stable slope and must be in harmony with the surrounding landscape. The wastes should be covered with 1 m of earth or granular material. The soils should be compacted thoroughly, the slope flattened and spread a layer of additional cover material and cover with topsoil and plant with vegetation.

8. CONCLUSION AND RECOMMENDATIONS

Most of the negative impacts identified in this study are of low significance and could be easily, mitigated through design and good engineering practice. Moreover, the project will not have any significant impact on any buildings or properties and therefore there won't be any resettlement / compensation to be made during implementation of this project. That should also be the case because the rehabilitation work will be confined to the existing alignment and there won't be any land acquisition for borrow pits or quarry sites.

In addition, it is anticipated that the existing borrow pits and/or quarry sites will be used to obtain the required road construction material. Therefore, there will be no any resettlement or need for compensation in this project.

The most important issues of major concern to this project are the problem of soil erosion and sedimentation of road pavement between Chekelei Village (CH. 109+800) and Hedaru (CH. 119+100). However, the problem could be mitigated through soil conservation methods and

engineering design. This will also require involvement of local communities and NGOs to introduce soil conservation methods such as agro-forestry, contour farming on hilly areas and planting trees. The local NGOs should also initiate awareness and education campaigns for local people to use alternative method of making bricks that does not rely on fuel wood. Nevertheless, those interventions would require some financial support from TANROADS to assist the local NGOs, whenever possible.

It is therefore recommended that the project should be implemented as planned. Nevertheless, of much importance to this project is the involvement of local communities, NGOs and District Councils in various phases of project implementation.

For example, public participation could be useful to reduce the traffic hazard. This will help to raise the people's awareness on the traffic safety. Their involvement will also help to show at least the local communities have some say in what happens in their villages. In general, effective implementation of mitigation measures would require active involvement of various stakeholders, especially the local communities.

In order to effectively implement mitigation measures and ESMP the Consultant provides the following specific recommendations:

In addition to the general recommendations, the Consultant would like to give the following specific recommendations:

a) Environmental Specialist from TANROADS should be involved in monitoring to ensure smooth implementation of proposed mitigation measures.
b) One Road Inspector from TANROADS should obtain on-the job training on Environmental Code of Practice to effectively undertake environmental monitoring under Environmental Specialist from Road Sector Environment Section (RS-ES).
c) A small budget should be allocated by TANROADS for the District Councils and Local NGOs to promote soil conservation, tree-planting activities to control soil erosion and sedimentation of road pavement.
d) TANROADS should involve the local communities in the implementation of mitigation measures and road maintenance (E.g. control of road side vegetation and cleaning of road side drains).
e) TANROAD should involve the local communities and local NGOs in the monitoring of the Contractor to ensure compliance with the proposed mitigation measures.
f) TANROADS should contribute to anti-AIDS campaigns during road construction phase by allocating some funds to the local NGOs that are active in the area.
g) One copy of ESIA Report should be sent to Korogwe and Same District Councils so that they are well informed at the design stage.

ACKNOWELEDGEMENT

The Consultant would like to thank various stakeholders who contributed in ons way or another in facilitating the implementation of the ESIA Study, which ultimately resulted into production of this valuable report.

The District Executive Directors (DED) for Korogwe and Same District Councils and their staff are thanked for devoting their time during interviews with the Study Team and for making the Team accessible to various documents. The TANROADS HQ Staff and the respective Regional Mangers for Tanga and Kilimanjaro Regions are thanked for their cooperation.

The local community leaders, especially the Ward Executive Officers for Manundu, Kilole, Mbuyuni, Mkomazi, Mazinde and Mkumbara Wards are thanked for facilitating the consultation meetings with the local community members from various villages. However, it will not be fair not to appreciate the participation of the local NGOs, especially SAIPRO and SMECAO for their valuable contribution.

The Consultant would also like to recognize the inputs provided by the National Environment Management Council (NEMC), through its Technical Advisory Committee (TAC). Their constructive comments during the technical review meeting are highly appreciated.

Finally, but not least the Consultant would like to extend many thanks to the Government of Tanzania (GOT), through TANROADS and The World Bank, through the International Development Association (IDA) for financing this study.

ABBREVIATIONS AND ACRONYMS

AADT : Average Annual Daily Traffic
ADT : Annual Daily Traffic
AIDS : Acquired Immunity Deficiency Syndrome
CO : Carbon Monoxide
CTCP : Central Transport Corridor Project
DOE : Directorate of Environment
EIA : Environmental Impact Assessment
EIS : Environmental Impact Statement
EMP : Environmental Management Plan
EMP : Environmental Management Plan
GOT : Government of Tanzania
HC : Hydrocarbons
HIV : Human Immune Virus
IDA : International Development Agency
ILO : International Labour Organization
KIKUHE : Kikundi cha Kupambana na Ukimwi Hedaru
KIKUKASA : Kikundi cha Kupambana na Ukimwi cha Kanisa la Sabato
KIWAKIKI : Kikundi cha Wanawake cha Kupambana na Ukimwi Kilimanjaro
MCT : Ministry of Communication and Transport
MEM : Ministry of Energy and Minerals
MHA : Ministry of Home Affairs
MIT : Ministry of Industries and Trade
MLHSD : Ministry of Lands, Housing and Settlement Development
MLYD : Ministry of Labour and Youth Development
MOH : Ministry of Health
MOW : Ministry of Works
MCDWC : Ministry of Community Development, Women's Affairs and Children
MWLD : Ministry of Water and Livestock Development
NACP : National HIV / AIDS Control Programme
NEMC : National Environment Management Council
NEP : National Environment Policy
NGOs : Non-governmental Organizations
NMT : Non-Motorized Transport
NO_x : Nitrogen Oxides
Pb : Lead
PLHAS : People Living with HIV / AIDS
RAP : Resettlement Action Plan
RIAM : Rapid Impact Assessment Matrix
RS-ES : Road Sector Environment Section
SAIPRO : Same Agricultural Improvement Programme
SECAP : Soil Erosion Control and Agro-forestry Project
SIA : Social Impact Assessment
SMECAO : Same – Mwanga Environmental Conservation Advisory Office
SO_x : Sulphur Oxides
STIs : Sexually Transmitted Infections
TAC : Technical Advisory Committee
TANROADS : Tanzania National Roads Agency
TOR : Terms of Reference
URT : United Republic of Tanzania
VPO : Vice President's Office
WB : The World Bank
WHO-GPA : World Health Organization Global Programme for AIDS

INTRODUCTION

1.1 Background to the Project

The Korogwe-Mkumbara-Same road section (171-km) forms a part of the existing Tanga-Moshi-Arusha Road (435-km). The road links the east coast of the country (which includes Dar Es Salaam and Tanga Ports) with popular tourist destinations in the northern circuit. These include Mt. Kilimanjaro, Mt. Meru, Lake Manyara National Park, Ngorongoro Conservation Area (NCA), Tarangire National Park, and the Serengeti National Park. It also links the Dar Es Salaam and Tanga Cities with Arusha City and other trade centres in the northern part of the country and East African countries of Kenya and Uganda.

The purpose of this project is to rehabilitate the Korogwe-Mkumbara-Same Road section, by improving the existing road section into double surfaced bitumen standards. The rehabilitation works will involve detailed engineering design and preparation of tender documents for contractors.

However, in addition to the mentioned assignment the Consultant was required to conduct Environmental and Social Impact Assessment (EIA and SIA) studies before project implementation. The overall objective was to integrate / incorporate important environmental and social issues into the road designs process. Ultimately, the intention is to ensure that the project is carried out in an environmentally sound, socially beneficial and economically sustainable manner. It is thus obvious that the project links well with the current Government efforts towards poverty alleviation in the country.

In that regards, the Tanzania National Roads Agency (TANROADS) – hereinafter called the Client, contracted the project to SMEC INTERNATIONAL (PTY) LTD from Australia (hereinafter called the Consultant). To facilitate effective execution of this assignment the Consultant associated with Engineering Research Associates (ERA) Ltd from Tanzania (hereinafter called the Sub-consultant). The Environmental and Social Impact Assessment (ESIA) Studies were carried out by Mr. AKONAAY M.L. AKO (Environmental Expert) and Ms. ROSE MRAMBA (Socio-economic Expert), respectively.

1.2 The Scope of the Study

In this assignment, as shown in the Client's Terms of Reference (TOR) the Consultant was required to carry out Environmental and Social Impact Assessment (ESIA) studies **(Appendix 9)**. In addition, the TOR required the Consultant to follow the World Bank Guidelines and the Environmental Impact Assessment and Audit Regulations G.N. No. 348 of 2005. In addition to the mentioned guidelines and regulations, the Consultant also considered the recently developed Environmental Assessment (EA) and Management Guidelines for Road Sector (2004).

Specifically the Consultant was required to:

- ③ Describe the proposed works;
- ③ Collect baseline data and relevant information on environmental characteristics;
- ③ Identify potential impacts (adverse and positive);
- ③ Prepare Environmental Management Plan (EMP), including cost estimates;

- Prepare Social Impact Mitigation Plan, including RAP and associated costs;
- Identify institutional needs to implement EMP and
- Prepare Monitoring Plan of proposed mitigation measures.
- Design HIV / AIDS awareness and prevention programme, targeted at the road construction workers and the local communities within the area of influence of the project.

1.3 General Approach and Methodology

In this study, the term "Environment" has been considered in its broad definition to incorporate social and socio-economic issues. Thus, the study focused on identification, analysis and assessment of the potential impacts on:

Biophysical environment:

- Land degradation and soil erosion;
- Vegetation loss;
- Stream and river sedimentation;
- Noise nuisance and air pollution;
- Changes to drainage patterns;
- Soil pollution of soil and water sources

Socio-economic (human) environment:

- Loss of agricultural and residential areas;
- Destruction of adjacent land use and properties;
- Relocation of infrastructure and social service utilities;
- Involuntary resettlement;
- Social disruption;
- Interference with movement of livestock and local residents;
- Traffic accidents;
- Construction workers' health and safety;
- Destruction of cultural, historical sites and archaeological artefacts / relics;
- Community health (including STIs, HIV / AIDS)

Furthermore, the definitions given in the World Bank, National EIA Guidelines and Procedures and the EA and Management Guidelines for Road Sector have been adopted in this report.

Although the project area could be considered to be the whole of Korogwe and Same Districts the biophysical and socio-economic surveys were confined to the existing road alignment / corridor, its immediate vicinities and borrow pit / quarry sites. The road alignment and the borrow pits / quarry sites areas have been considered to be the Direct Impact Areas (DIA) whereas the immediate vicinities including nearby villages are considered to be the Areas of Influence (AI)

1.3.1 The Approach

The general approach in this study has been to divide the study into two parts: (1) deskwork and (2) fieldwork.

Deskwork
The deskwork involved acquisition and review of relevant drawings / maps and publications / reports, which among others, include:

- ③ Drawings / Maps:
- ③ Topographic maps (1:50 000);
- ③ Geological maps (1:250 000)
- ③ Publications / Reports
- ③ Existing Policies
- ③ Existing Guidelines and Procedures
- ③ Existing Legislation and Regulations
- ③ Atlas of Tanzania
- ③ District Socio-economic Profiles, etc.

Fieldwork
The fieldwork involved collection of biophysical and socio-economic baseline data through physical observation and informal / formal interviews with relevant stakeholders. The approach also includes defining the existing road alignment as a route corridor with a width of about 200-m (i.e. 100 m on the Left and 100 m on the Right), with the existing road alignment as the centreline. The route corridor was then further divided into survey blocks, starting from Maili Kumi (CH. 0+000) towards Same (CH. 171). Overlain in **Appendix 1** is the juxtaposition of topographic maps of 1:50 000 scale to define the route corridor.

1.3.2 Methodology

(a) Baseline Data Collection
The methodology involved identification of survey blocks both on the map and on the actual ground based on the existing local place names or any important physical attributes (e.g. bridge, rivers / streams). Consequently, the route corridor was divided into 25 survey blocks with variable lengths.

The survey was done by using a 4WD Vehicle and on foot whenever possible. The experts were also interviewing the local people encountered *en-route* (along the route). The local people helped to advice on the local place names and presence of any important features of cultural, historic and / or archaeological significance.

The methodology for SIA involved carrying out local meetings and interest group consultations at Regional, District and Village levels. The public consultation methodology was based on qualitative approach.

Random samples of 5 to 10 people were selected from five (5) Wards, namely Kilole, Manundu, Makuyuni, Mazinde and Mkomazi. Several meetings and focus group discussions were also held at Village levels.

The biophysical and socio-economic characteristics of the route corridor are shown in **Appendix 2.** In addition, the list of people contacted during the study and the list of photographs taken during the fieldwork are shown in **Appendix 3** and **4**, respectively.

(b) Assessment and Analysis of Impacts

The technique involves three steps, whereby the first one involves categorization of impacts according to the environmental components that are being or likely to be affected by the project actions. This technique makes use of the Rapid Impact Assessment Matrix (RIAM)[8] shiown in **Appendix 5.** The second step is to categorize impacts into biophysical and socio-economic aspects basedon the project activities by using Impact Identification Matrix **(Appendix 6).**. Finally, the third step is characterization of impacts by using Impact Evaluation Matrix shown in **Appendix 7.**

The application of these techniques is necessary in order to enable the reader understand the logical and systematic way of identifying environmental impacts. The techniques allow subjective judgments to be quantitatively recorded and to make assessment of impacts become easy.

1.4 The Report Format

The report is divided into two parts, whereby Part I is Executive Summary and Part II is the Main Text. The Main Text is comprised of several chapters, bibliographic references and appendices. Chapter 1 is Introduction, which gives the background information about the project, scope of work, approach and methodology used in carrying out the study. Chapter 2 describes the relevant Policies, Legal and Institutional framework governing EIA requirements and environmental management in the country.

In Chapter 3, the report describes the project in terms of its location, justification and activities that would be carried out during rehabilitation works. Chapter 4 provides the baseline information on the biophysical and socio-economic environments. In Chapter 5 the deals with public consultations, outlining issues of major conern to the public.

Chapter 6 is assessment and analysis of impacts, followed by Chapter 7, which briefly describes the identified impacts (environmental and social) associated with the project and their mitigation measures. Chapter 8 outlines the Environmental and Social Management Plan (ESMP), followed by Chapter 9, which deals with Environmental monitoring and Audit.

The Decomissioning plan is dealt with in Chapter 10, followed by Conclusions and Recommendatins. Finaly, the report ends with Bibliography and Appendices.

[8] Environmental Impact Assessment Using the Rapid Impact Assessment Matrix (RIAM). Ed. Kurt Jensen. Published by Olsen & Olsen, 1998.

POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

2.1 POLICY

2.1.1 National Environment Policy (1997)

The National Environment Policy (NEP, 1997) is the main policy document governing environmental management in the country. The policy addresses environmental issues as both natural and social concerns, and adopts the key principle of sustainable development. The policy has also proposed framework environmental legislation to take account of the numerous agencies of the Government involved in regulating the various sectors. Thus, the policy provides strategic plans on environmental management at all levels. It provides the approach for mainstreaming environmental issues for decision-making and defining sectoral policy action plans.

In terms of environmental management and protection the policy identifies six key problem areas as:

- ③ land degradation;
- ③ lack of access to good quality water;
- ③ environmental pollution;
- ③ loss of wildlife habitat and biodiversity;
- ③ deterioration of aquatic ecosystems and
- ③ deforestation.

The policy requires EIA to be mandatory for all development projects likely to have significant environmental impacts. The intention is to ensure that the development projects are implemented in an economically sustainable manner while safeguarding environmental and social issues for the benefit of the present and future generations.

Relevance to the project

The project will be required to address policy objectives by ensuring that environmental degradation / pollution is minimized during implementation.

2.1.2 The World Bank Operational Policy on Involuntary resettlement

The World Bank operational Policy on Involuntary resettlement acknowledges that development projects that displace people generally gives rise to economic, social and environmental problems. The Bank guidelines prescribe measures to minimize the negative impacts and ensure that the displaced community benefits from the project. Therefore the policy requires that displaced people should be:

- Compensated for their losses at full replacement costs prior to the actual move;
- Assisted with the move and supported during the transition period in the resettlement site;
- Assisted in their effort to improve their former living standards, income earning capacity and production levels or at least restore them;
- Integrated socially and economically in the host communities so that adverse impacts in the hoist communities are minimized. The best way of achieving this integration is for resettlement to be planned through consultation involving affected people.

In addition, land, housing, infrastructure and other compensation should be provided to the adversely affected population, indigenous groups, ethnic minorities, and pastoral people who may have usufruct or customary rights to the land and other resources taken for the project. The absence of legal title to land by such groups should not be a bar to compensation.

The existing policies, land laws and regulations regarding land acquisition and compensation in Tanzania are consistent with the World Bank Operational Guidelines. Therefore, compensation issues could still be handled within the existing regulations without contradicting the World Bank Policy requirements. However, since the road construction works for this project will be confined within the existing right-of-way and no significant damage to properties will be expected from the rehabilitation works.

Relevance to the project
Compensation for damaged properties may be an issue in some areas 'during actual implementation of this project. In that case the project management will be required to adhere to the policy guidelines, especially when the project is being financed by the World Bank.

2.1.3 National Transport Policy (2003)

The policy vision is to have efficient and cost effective domestic and international transport services, while at the same time maintaining maximum safety and minimum environmental degradation.

The policy emphasizes on having bitumen roads fro all trunk roads but at the same time ensure that all regional and district roads are sufficiently rehabilitated and maintained to ensure smooth traffic flow.

The policy recognizes the importance of involving the private sector and local communities in the planning and rehabilitation of the road that pass within their areas. The policy wants urban residents to contribute towards maintenance of the road in their areas through direct involvement or through user charges.

It wants the design of residential area to be done in tandem with provision of adequate transport infrastructure to ensure security, safety and comfortability to pedestrians and cyclists by providing them with dedicated lanes, especially in urban areas. The policy promotes / supports on going programmes by encouraging improvement of transport infrastructure and services to inaccessible parts of the country.

The policy identifies the need to provide adequate and reliable transport services to other priority sectors. It gives priority to new investment in the construction and rehabilitation / maintenance of the existing roads for development of export markets for strategic agricultural products such as sisal, coffee, tobacco and cashew nut. The policy is also geared towards enhancement of natural resource conservation programmes such as forestry and fisheries and all programme geared to environmental sustainability.

The policy considers planting of flora including trees and flowers along the urban roads to provide attractive road scene and shade to pedestrians from direct sun. It requires people to influence land use planning and settlement patterns to achieve easy access to amenities. It discourages the use of road reserve to prevent smooth flow of traffic and future road expansion.

The policy recognizes the need to provide urban transport that is environmentally friendly and sustainable. It recognizes the importance of providing sewerage and drainage systems when developing road infrastructure. The policy calls for timely and adequate road maintenance to avoid flooding and damage to infrastructure and road pavement. Thus, the policy calls for:

- ③ reduction of traffic generated pollution;
- ③ enhancement of traffic safety and management;
- ③ promoting environmental awareness;
- ③ strengthening human resource development;
- ③ provision of adequate and comprehensive drainage system during design and maintenance of urban road infrastructure.

Relevance to the project

The policy is relevant to this project because the road infrastructure project which is addressed in the policy as one of the important transport infrastructures. Thus, to address the policy objectives the project management would be required to adhere to the relevant issues outlined in the policy regarding the road infrastructure development.

2.1.4 National Policy on HIV/AIDS (2001)

The National Policy on HIV/AIDS (2001) was formulated by the Government of Tanzania (GOT) under technical support from the World Health Organization Global Programme on AIDS (WHO-GPA) that led to the establishment of National HIV/AIDS Control Programme (NACP) under the Ministry of Health. However, due to its multi-sectoral nature there was a need to involve all sectors and community participation was found to be crucial. One of the government strategic initiatives is to establish Tanzania Commission for AIDS (TACAIDS) under the Prime Minister's Office. The Commission provides leadership and coordination of national multi-sectoral response to the HIV/AIDS epidemic. The management functions, institutional and organizational arrangement of TACAIDS are outlined in the National Policy. The Policy identifies HIV/AIDS as a global disaster, hence requiring concerted and unprecedented initiative at national and global levels. It recognizes HIV/AIDS as an impediment to development in all sectors, in terms of social and economic development with serious and direct implication on social services and welfare. Thus, the policy recognizes the linkage between poverty and HIV/AIDS, as the poor section of the society are the most vulnerable.

The main policy objective is reflected well in the establishment of TACAIDS. However, the policy has also set a number of strategic objectives to deal with specific HIV/AIDS problems:

- ③ Prevention of transmission of HIV/AIDS;
- ③ HIV Testing;
- ③ Care for People Living with HIV/AIDS (PLHAS);
- ③ Enhance Sectoral roles through participation and financial support;
- ③ Promote and participate in research on HIV/AIDS-including dissemination of scientific information and development of HIV vaccine;
- ③ Creating a legal framework through enactment of laws on HIV/AIDS-governing ethical issues and legal status of HIV/AIDS affected families;

Other objectives:

- ③ monitoring and safeguarding rights of infected or affected people;

- prevent human rights abuse, discrimination and social injustice;
- provide effective treatment for opportunistic diseases;
- promote fight against drug substance abuse;
- prohibit misleading advertisements of drugs and other products for HIV/AIDS prevention, treatment and care.

Relevance to the project

The project will involve construction of workers camp site, hence leading into possible interaction between the workers and the local community members. This may lead into increased transmission of HIV / AIDS to both the workforce and the local communities. In this case the contractor would be required to follow the policy directives to minimize the problem.

2.1.5 National Human Settlements Development Policy (2000)

The overall goal of the National Human Settlement Development Policy (2000) is to promote development of sustainable human settlement and to facilitate provision of adequate and affordable shelter to all people, including the poor. The policy outlines a number of objectives including the environmental protection within human settlement and protect natural ecosystem against pollution, degradation and destruction with the aim of attaining sustainable development.

The policy recognizes the role of the National Environment Policy and other sectoral policies for attainment of urban development. Thus, the policy identifies the need for coordination and cooperation with other sectors / stakeholders, including CBOs, and NGOs in urban development planning.

It recognizes environmental planning and management as one of the broad human settlement issues. According to the policy, "environment means the physical, economic and social conditions in which people live, influencing their feelings and development. Human activities take place in human settlements affecting the environment positively or negatively. In that regard the policy identifies environmental protection as one of the strategic issue in human settlement planning and development.

On environmental management the policy singles out poor solid waste management, crude dumping of industrial toxic chemical compounds, industrial effluents and air pollution due to industrial and gasoline emissions as one of the health problems facing well-being of urban population. As such major issues in the policy include:

- Poor management of solid and liquid waste, leading into environmental deterioration;
- Emission of noxious gases from vehicles and industrial activities as a major cause of air pollution in urban areas;
- Encroachment into fragile and hazardous lands (river valleys, steep slopes and marshlands-leading into land degradation, pollution of water sources, etc;
- Increasing dependence on fuel wood and charcoal as a main source of energy in human settlements leading into depletion of forests, hence environmental deterioration and air pollution and
- Unauthorized sand mining in river valleys leading into environmental hazards.

On urban agriculture the policy recognizes its importance as a source of income, source of supplementary food supply at affordable prices and employment to urban population.

However, improperly practiced urban agriculture leads into conflict with other urban land use and land degradation, water pollution and a potential threat to health and safety of urban population. Thus, policy calls for well-planned urban agriculture to minimize land use conflicts and environmental degradation.

Relevance to the project
The policy recognizes the impacts of human activities within residential areas. Since the project road passes through human settlements the project management will be required to ensure environmental protection within human settlement, for example by minimizing dust pollution. The road crosses several streams / rivers; hence in this case the project management will be required to ensure that natural ecosystems like natural rivers / streams are protected from pollution as directed in the policy objective.

2.1.6 National Land Policy (1995)

The National Land Policy of 1995 (Revised in 1997) recognizes the need for protecting environmentally sensitive areas. The policy emphasizes on the protection of environment and natural ecosystems from pollution, degradation and physical destruction.

In addition, the policy recognizes the importance of social services such as water, roads, energy and solid waste management for environmental protection. Finally, the policy identifies the need for conservation and preservation of prehistoric / historic sites and buildings.

Relevance to the project
The project management will be required to ensure protection of existing social services. Also the management will be required to ensure proper disposal of solid wastes, especially within campsite.

2.1.7 Construction Industry Policy (2002)

The policy regards construction industry as a fundamental economic sector in the country. The important issues of major concern in the policy document range from planning, design, construction / production, procurement, repair, maintenance and demolition of physical infrastructure. It recognizes the need for delivery of good quality and valuable service in the development and maintenance of physical infrastructure.

According to the policy the important infrastructures of major concern include:

- Buildings
- Transportation systems and related facilities: airports; harbours; highways; subways; bridges; railroads; transit systems; pipelines and transmission / power lines
- Structures –water treatment and distribution, sewage collection and treatment, systems; sedimentation lagoons, dams and irrigation and canal systems
- Underground structures such as tunnels and mines

The policy recognizes the importance of involving various organizations and persons including companies, firms and individuals working as consultants, main contractors and sub-contractors, materials and equipment producers, plant and equipment suppliers, builders and merchants. According to the government as a purchaser, financier, regulator and operator maintain close relationship with clients and other financiers.

Relevance to the project
The policy requires the project management to give priority to local people / consultants / contractors. It will also be required to use locally available materials and ensure delivery of good quality road infrastructure.

2.1.8 The National Water Policy (2002)

The policy objective is to develop a comprehensive framework for sustainable management of the national water resources. In this case the policy recognizes the need to protect water sources against pollution and environmental degradation.

The policy recognizes the role of road transport system as one of the effective tool in the implementation of water resource management activities.

Relevance to the project
The road project could result into degradation of water source if not carried properly. In this case the project management are required to ensure that pollution of water source is avoided or minimized during road construction.

2.1.9 The Energy Policy of Tanzania (1992)

The objective of the policy is to provide input into development process through the establishment of an efficient energy production, procurement, transportation, distribution and end use in an environmentally sound manner and with due regard to gender issues.

The policy recognizes the critical role of energy in all sub-sectors of the economy, including the road sector. It underscores the importance of having sufficient supply and efficient use of energy in order to realize sustainable development and satisfy basic needs of the society.

The policy recognizes the relationship between road condition and fossil fuel consumption energy by vehicles, which is one of the important sources of energy in the country. Therefore, the policy recognizes the need to rehabilitate roads to minimize fuel consumption.

Relevance to the project
The policy is relevant to this project because the road transportation relies on fossil fuel, which is the major source energy supply in the transport sector. However, poor road condition may lead into increased consumption of fuel, with low efficiency. Not only that poor road condition also leads into increased emission of exhaust fumes due to overworking of vehicle engines. Therefore, it is expected that the road rehabilitation project will ensure efficient use of energy resource is being used efficiently in an environmentally sound manner.

2.1.10 National Gender Policy (1999)

The objective of this policy is to provide guidelines to ensure gender sensitive plans, programmes and strategies in all sectors and institutions. The policy gives emphasis on gender equality.

The policy aims at establishing strategies on poverty eradication through ensuring that both women and men get access to existing resources for their development. It values the role played by women in bringing about development in the society.

The road sector is also highly committed to gender mainstreaming at all levels, through provision of equal opportunities to both men and women in road works and related activities.

Relevance to the project
The policy requires the project management to ensure that gender issues are given emphasis. It also requires that women and men are given equal employment opportunities in the project, whenever possible.

2.1 LEGAL FRAMEWORK

2.1.8 The Constitution of Tanzania (1977-1995)

The constitution of the United Republic of Tanzania (1977 – 1995, Revised 1997) recognizes the basic rights for its people as outlined in Part III section 14 and 24 (Act No. 15 of 19874). Section 14 states that every person has the right to life – that every person has the right to live and to the protection of his / her life by the society in accordance with the law.

Section 24 stipulates that every person is entitled to own property and has a right to the protection of his property held in accordance with the law. However, there are certain limitations upon enforcement and preservation of basic rights, freedom and duties as stipulated in the Act No. 15 of 1984 Section 6 and Act No. 34 of 1994.

Section 30(2)- has the provision that contain in the constitution, which states that "freedom and duties do not invalidate existing legislation or prohibit the enactment of any legislation or the doing of any lawful act in accordance with such legislation for the purpose of – among others-ensuring the defence, public safety, public order, public morality, public health, rural and urban development and utilization of minerals or the increase and development of property or any other interest for the purpose of enhancing the public benefit".

Relevance to the project
The national constitution must observed by project proponent, especially in matters concerning human rights as stipulated in the constitution. This should be the case because road development project may lead into land acquisition and loss of private properties. Under such circumstances the project proponent would be required to execute compensation or resettlement according to the country laws.

2.2.2 The Environmental Management Act (2004)

The Environmental Management Act No. 20 of 2004 is the principle legislation governing environmental management in the country. The Act recognizes …the right of every citizen to clean, safe and heath environment, and the right of access to environmental resources for recreational, educational, health, spiritual, cultural and economic purposes."

Thus, the Act… provides a legal framework for coordinating harmonious and conflicting activities by integrating those activities into overall sustainable environmental management system by providing key technical support to Sectoral Ministries."

For effective implementation of the national environmental policy objectives the Act has identified and outlined specific roles, responsibilities and functions of various key players and provides a comprehensive administrative and institutional arrangement, comprised of:

③ National Advisory Committee

- ③ Minister Responsible for Environment
- ③ Director of Environment
- ③ National Environmental Management Council (NEMC)
- ③ Sector Ministries
- ③ Regional Secretariat
- ③ Local Government Authorities (City, Municipal, District and Town Councils

Part VI Sub-section 81(1) the Act requires a project proponent or developer of a project to undertake Environmental Impact Assessment (EIA) at his / her own cost prior to commencement or financing of the project or undertaking. The types of projects requiring EIA are listed in the THIRD SCHEDULE of the Act. Thus, in that regard the Act prohibits any development to be initiated without an Environmental Impact Assessment (EIA) Certificate.

Sub-section 86(1) stipulates …" the Council shall upon examination of a project brief, require the proponent of a project or undertaking to carry out an Environmental Impact Assessment study and prepare an Environmental Impact Statement". According to the Act (Sub-section 1-4) the EIS should be submitted to the Council, which carries out a review through its Technical Review Committee (TRC). The Council is also required to make a site visit during the review process for inspection and verification at the proponent's cost.

Relevance to the project

The Act is relevant to the project because the project is expected to have some impacts (noise and air pollution) to the environment. Thus, monitoring of the mentioned parameters would require adherence to the developed environmental standards (international and/or national).

2.2.3 The Environmental Impact Assessment and Audit Regulations (2005)

The Environmental Impact Assessment and Audit regulations (2005) are made under Environmental Management Act No. 20 of 2004. The regulations provides basis for undertaking Environmental Impact Assessment (EIA) and Environmental Audit for various development projects with significant environmental impacts in the country. This section gives a brief description of some provisions in the regulations that are relevant to this study.

Part III of The Environmental Impact Assessment and Audit Regulation, formed under G.N. No. 349 of 2005, deals with project registration and screening procedures. Section 5 requires the registration applicant for Environmental Impact Assessment Certificate to submit a project brief report in the format shown in the THIRD SCHEDULE of the EMA (2005) and FIRST SCHEDULE of the regulation. According to the provision, the applicant is required to submit a project brief report to the National Environment Management Council (NEMC). Section 6(1) requires a developer / project proponent to register the project in accordance with format specified in the THIRD SCHEDULE of the regulations. The section also, specifies issues to be covered by the proponent in the project brief report. Section 6 (3) requires a project brief to be prepared by a registered environmental impact assessment expert.

According to Section 11(1) the proponent is required to undertake an environmental impact assessment if the project brief has no sufficient mitigation measures or undertake a preliminary assessment if more information is required to determine a screening decision.

Section 11(2) outlines relevant steps for undertaking a preliminary environmental assessment (PEA). These include:

- ③ Description of the project characteristics and the affected environment.
- ③ Identification of impacts on the local environment and
- ③ Assessment or evaluation of the significance of the impacts.

Part IV Section 13(1) requires the proponent to conduct EIA in accordance with the general environmental impact assessment guidelines and in accordance with the steps outlined in the FOURTH SCHEDULE of the regulations. Section 16 specifies EIA study should cover environmental, social, cultural, economic and legal issues.

The FIRST SCHEDULE gives list of projects requiring and not requiring EIA and it categorises projects into two types:

- ③ Type A – projects requiring a mandatory EIA.
- ③ Type B – project requiring PEA.

According to the schedule, Type B Projects are those projects that are likely to have some significant adverse impacts but the magnitude of impacts is not well known. Thus, a PEA is required to determine whether the project should proceed without a full EIA.

Part X Section 44 (1 and 2) outlines the objectives of Environmental Audits and its principal functions. Section 45 outlines the basic principles under which the environmental audit is conducted and Section 46(1) specifies the type of projects requiring environmental audits as specified in the THIRD SCHEDULE to the EMA (2005) and the FIRST SCHEDULE of the regulations

Relevance to the project

The project management will be required to undertake environmental monitoring and environmental audit.

2.2.3 Highway Ordinance (Amendment) Act (1967)

The Act is an amendment to Highway Ordinance No. 27 of 1967. The Act has the following relevant Sections outlined in Part V and VI of the Act:

Part VI Section 31 – deals with removal of obstruction or encroachment to the public right of way (RoW). It restricts people from constructing, farming or doing any activities within the road reserve. Under the Act the Road Authority can enter into a house, garden, enclosure or any other premises with instruments / machinery for removal or abatement and recover the cost thereby occasioned from the person so offending.

Section 32 – deals prevention of soils or any debris from being washed into the highway. The Road Authority shall give notice to owner of any land abutting upon any public highway, It requires the land owner to within 28 days to fence off, channel or embank the land to prevent soils, debris or refuse from such land from falling upon or being washed or carried into the public highway or into any sewer or gully. The Road Authority may carry the work and recover the cost from the land owners / offender.

Section 33 – deals with placement of bridge over drain beside the highway and recover the cost from the owners of premises / house. This section addresses the question of access across

the road side drainage (e.g. storm water drainage. That means it shall be the responsibility of the premise owners to construct a slab over the drainage to allow access to their premises.
Section 34 – allows the Authorized Public Officer to erect temporary premises within the road reserve. But for other persons the Road Authority has to grant a license for erecting of temporary fences and / or enclosure for the purpose of building, pulling down or repairing their houses.

Part VI Section 37 –prohibits destruction of milestones, bridges, road signs, etc.

Section 38 – deals with injury of public highway by animals (e.g. livestock); obstruction of passage of water from public highway; removal of timber, stone; digging soils from reserved land. That means it prohibits any cultivation within the road reserve. Under this section no person is allowed to carry out any exposure of goods or merchandize of any description within the public highway or road reserve.

Section 41 – gives restrictions on the placement of rails, beams, pipe, cable, over the public highway or putting pipe, cable, wire along or across the public highway without consent from the Road Authority in writing.

Section 42 – restricts placement of ropes across the public highway in such a way as to cause danger and requires any person doing so to take necessary precautions.

Section 45 – requires any land owner to remove fencing or hedge that creates an obstruction of view by road users.

Relevance to the project
All the outlined sections are relevant to this project, especially when considering the current problem of soil erosion and sedimentation along Hedaru – Same section due to adjacent land use activities by the local people on the upstream side of the road.

The legislation is also relevant to this project due to the fact that in recent years there has been a problem of people removing pieces of metals, road signs and stones from the road, leading into severe damage to the road and accidents. In this regard the project proponent through contractor should ensure that road signs are maintained / protected from damage throughout the project implementation.

The existing road is crossed in several parts by the railway line and rail track built by sisal plantation owners. This is a subject of major concern that will need to be addressed during the road construction works.

The problem of livestock crossing in several locations is another important issue to be addressed. The livestock have been found to increase problem of soil erosion, and hence sedimentation of the pavement during rainfalls, and also cause physical damage to the road itself.

In terms of restriction of public access due to creation of road side storm water drainage it is clear that the project is not obliged to build crossover bridges for the land / house owners. However, the project proponent can provide pedestrian / non-motorized crossover bridges when it deems necessary at critical points for the benefit of the public.

2.2.4 Mining (Environmental Management and Protection) Regulation (1999)

The Mining (Environmental Management and Protection) Regulation of 1999 was established under the Mining Act of 1998. The Act requires mining applicants to undertake EIA for mining projects. It also requires Environmental Impact Statement (EIS) and Environmental Management Plan (EMP) to accompany application for mineral rights.

Relevance to the project

Opening and operation of new borrow pit and quarry sites will require application for mining license. Also, the owners and operators of borrow pit and quarry sites will be required to:

- ③ Undertake EIA and submit EIS and EMP.
- ③ Restore borrow pits and quarry sites before abandonment.
- ③ Follow environmental Standards (noise, air and water quality).

However, for the road projects no separate EIA will be required for development and operation of new borrow pits and quarry sites. Moreover, the ESIA study carried out for this project adequately addresses environmental and social issues for acquiring new borrow pits / quarry sites.

2.2.5 The Mining (Safe Working and Occupational Health) Regulation (1999)

The Mining (Safe and Occupational Health) Regulation of 1999 also formed under the Mining Act of 1998, deals with safety precautions and procedures to be observed in the mining areas.

Relevance to the project

The legislation requires owners of borrow pits and quarry sites to ensure that:

- ③ No undercutting of any face or sidewall;
- ③ No sidewall will have a vertical height of more than 1.5 meters, unless such face or sidewall is terraced or sloped at an angle sufficient to ensure the safety of persons or is adequately supported.
- ③ Unless mechanical equipment is used in such a way that no exposure of operator of such equipment or any other person to danger.

With regard to natural and physical properties and other circumstance of such face or sidewall no fall or dislodgement of any earth or other material is likely to occur so as to endanger persons employed there.

Operators will be required to be provided with helmets, foot wear and other safety gears for protection of workers.

2.2.6 The Land Act (1999) and The Land Regulations (2001)

(a) The Land Act (1999)

Compensation under Section 156 of the Land Act No. 4 of 1999 applies for non-governmental corporate body, institutions or group of persons. Section 156 of the Land Act 1999 requires compensation to be paid to any person for the use of land of which he / she is in lawful or actual occupation as a communal right of way and with respect to a way leave. These include:

- Any damage suffered in respect of trees, crops, and buildings as result of creation of way leave;
- Damage due to surveying or determining the route of that way leave.

It is the responsibility of the government department of Ministry, Local Government authority or corporate body that applied for right of way to pay compensation.

Relevance to this project:
The road infrastructure project may involve destruction of properties or land acquisition hence requiring compensation to be effected according to existing legislation.

(b) The Land Regulations (2001)
According to *The Land (Compensation Claims) Regulation 2001*, made under the Land Act No.4 of 1999, the following are eligible for compensation / resettlement:

- Holder of right of occupancy (Section 22 of the Land Act of 1999);
- Holder of customary right of occupancy whose land has been declared a hazard land (Section 49 of the Land Act, 1999)
- Holder pf customary land, whose land becomes granted to other person and is moved or relocated under Section 34 of the Land Act, 1999;
- Land obtained as a consequence of disposition by a holder of right of granted or customary right of occupancy but is refused a right of occupancy under section 54 of the Land Act, 1999;
- Urban or peri-urban land acquired by the President under Section 60 of the Land Act, 1999.

Sub-section 2 of Section 9 applies to all applications or claims for compensation against government or Local Government authority, public body or institution.

According to Section 10(1) compensation shall take the form of:

- Monetary compensation;
- Plot of land of comparable quality, extent and productive potential to the land lost;
- A building or buildings of comparable quality, extent and use comparable to the building or buildings lost;
- Plants and seedlings;
- Regular supplies of grain and other basic foodstuffs for a specified time.

Relevance to the project
The project proponent will be required to carry out compensation according to the prescribed procedures in the regulation.

The Land (Assessment of Value for Compensation) Regulation, 2001 applies to any application or claim for compensation by any person occupying land and shall include:

- The value of un-exhausted improvements on the occupied land;
- Grazing land

The regulation states …" basis for assessment of the value of any land and un-exhausted improvement ---shall be the market value of such land". The market value is arrived at by the use of comparative method proved by actual recent, sales of similar properties or by use of income approach or replacement cost method, in case the property is of special nature and not saleable.

According to the regulation an assessment of the value of land and un-exhausted improvements is done by Qualified Valuer and verified by the Chief Valuer of the Government or his / her representative.
The compensation issues include:

- ③ Value of un-exhausted improvement;
- ③ Disturbance allowance;
- ③ Transport allowance;
- ③ Accommodation allowance and
- ③ Loss of profits.

Relevance to the project
The Act will require:

- ③ Selections of road alignment, location of borrow pits, quarry sites and other road infrastructure to avoid hazard lands.
- ③ Prompt compensation to be paid for acquired land or damaged properties.
- ③ Project to involve Qualified Valuation Officer and follow all procedures as outlined in The Land (Compensation Claims) Regulations (2001) and The Land (Assessment of Value for Compensation) Regulations (2001).

2.2.7 The Occupational Health and Safety Act (2003)

The Occupational Health and Safety Act No. 5 of 2003, deals with regulation of health, safety and welfare of workers in factories / workplaces. Some of the provisions that could be relevant to the road sector are outlined in this section.

Relevance to the project
The Act will require the Contractor to:

- ③ appoint safety and health representative and committee;
- ③ register their workplace (campsite, borrow pit and quarry sites) before operation.
- ③ Provide safety precautions;
- ③ Ensure health and welfare of workers
- ③ Ensure proper handling of hazardous materials / chemicals and process.

2.2.8 The Road Traffic (Amendment) Act (1990)

The Road Traffic (Amendment) Act No. 4 of 1990 amended Section 28 of The Road Traffic Act of 1973, which is the principal Act. The Act deals, among others, with damage or destruction of traffic signs, electric poles or any other structures erected along the road. It requires individuals to pay sum equal to the cost of repairing any damage or destruction so caused.

Relevance to the project:
The Act will require the Contractor to ensure that all road signs are properly placed and protected during construction. Contractor should take appropriate measures against individuals who vandalize the road / traffic signs.

2.2.9 Explosives Act (1963) and Explosives Regulation (1964)

The Explosive Act of 1963 and the Explosives Regulations of 1964 provide for the control of the manufacture, importation, exportation, purchase, sale, possession and use of explosives.

According to the provisions of the Act and its Regulations no person is allowed to acquire, posses and disposal of explosives without permission from the Commissioner of Mines. The regulation requires such a person to obtain a license from the Commissioner for Mines and such person must hold a Blasting Certificate in order to carry out blasting operations.

Relevance to the project

The project involves operation of quarry sites and removal of stone / rocks from the road or borrows pits in some areas during construction works. In such circumstance the Contractor shall be required to adhere to the conditions of dealing with explosives as stipulated in the legislations.

2.3 INSTITUTIONAL FRAMEWORK

The relevant institutional set-up is adequately established for handling EIA recommendations and environmental management issues in for this project. In this project the most relevant and directly responsible institutions are the National Environmental Management Council (NEMC); Local Government Authorities (District Councils and Village Governments); District Standing Committees; Ward and Village Standing Committees.

2.3.1 National Environment Management Council

It is corporate body capable of suing and being sued as well as capable of holding, purchasing or acquiring and disposing of movable and immovable property. The body is responsible for undertaking enforcement; compliance, review and monitoring of environmental impact assessment (EIA). It prepares and submits bi-annual report on the implementation of the provisions given in the National Environment Management Act of 2004, and how it has fulfilled the objectives and purpose for which it has been established.

The Director General appointed by the President heads the Council. The Council is under the Board of Directors, which consists of:

- ③ Chairperson appointed by the President;
- ③ Director General - as the Secretary to the Council
- ③ Director of Environment
- ③ Seven members appointed by the Minister

2.3.2 Local Government Authorities

The District Environmental Management Officers are appointed by the District Councils. The environmental management officers are responsible among others for:

- ③ Ensuring enforcement of the Environment Act;
- ③ Advising the environment management committees;
- ③ Promoting environmental awareness;
- ③ Gathering and managing information on environment and utilization of natural resource;
- ③ Preparing periodic reports on the state of the environment;
- ③ Monitoring the preparation, review and approval of environmental impacts assessment for local investment;
- ③ Reviewing by-laws on environmental management and on sector specific activities related to environment;
- ③ Reporting to the Director of Environment (VPO) and the Director General (NEMC).

2.3.3 The District Standing Committees

The District Standing Committees[9] Committee on Economic Affairs, Works and Environment has been established under Sub-section (1) of 74 of the Local Government (District Authorities) Act, 1982. For standing committees there is a District Environment Management Committee.

The District Environment Management Committees are responsible for functions provided under Sub-section (1) and (2) of Section 55 of the Local Government (Urban Authorities) Act, 1982 and Sub-sections (1) and (2) of Section 118 of the Local Government (District Authorities) Act, 1982.

They perform functions as prescribed by the Environment Act and/or as may be assigned by the Minister by notice published in the *Gazette* carry out directives given by the Minister in relation to the promotion and enhancement of sustainable management of the environment.

2.3.4 Ward Development Committee

At Ward level there is Ward Development Committees, which was established under Sub-section (1) of Section 31 of the Local Government (District Authorities) Act, 1982

The committees are responsible for:

- ③ Proper management of the environment in their areas of jurisdictions
- ③ Perform duties as assigned by the Minister of Councils
- ③ Carry out directives given by the Minister to promote and enhance sustainable management of the environment and as provided under the Local Government;
- ③ Performing any functions as provided by the Local Government (District) Authorities Act, 1982.

2.3.5 Village Development Committees

For Villages there is the Village Development Committee responsible for proper management of the environment and other functions as provided in paragraphs (a), (b), (c) and (d) of sub-section (1) of Section 38 of the Environment Management Act, 2004. From village to Sun-village levels there is an Environmental Management Officers who are responsible for coordination of all functions and activities for protection of environment within their areas.

PROJECT DESCRIPTION

1.4 Location

The Korogwe – Mkumbara – Same Road can be sub-divided into two distinct sections, namely Korogwe – Mkumbara (76 km) and Mkumbara – Same (96 km). Both sections have a bituminous double surface dressed carriageway with various degrees of deterioration.

The Korogwe – Mkumbara section, starts at Maili Kumi Village, located at about 10 km west of Segera junction, and ends at Mkumbara. The Mkumbara – Same starts at Mkumbara village and ends in Same town.

[9] The local government authorities Act No. 7 and 8 of 1982.

1.5 Justification

The Korogwe – Mkumbara – Same Road forms part of North East Corridor (T2), which is a major link between the East Coast (including Dar Es Salaam and Tanga Port) and the popular tourist destinations in the North including Mount Kilimanjaro, Mount Meru, Lake Manyara, the Ngorongoro Conservation Area, Tarangire National Park and the famous Serengeti National Park. It is also the main road link between Dar Es Salaam, the administrative capital of Tanzania, and Nairobi, the capital city of Kenya.

Apart from its importance as main link in the northern circuit to administrative centres and tourist destinations the road is economically justifiable and viable due to its high internal rate of return. According to the TOR the Ten Year Development Study has estimated the Mkumbara-Same section to have an internal rate of return (IRR) of about 28%.

1.6 Current road conditions

Both sections have a bituminous double surface dressed carriageway with various degrees of deterioration. The Korogwe- Mkumbara Section was rehabilitated over the period 1991 to 1994 to double surface bituminous standard. The carriageway is 6.0 m wide with 1.0 m wide shoulders. The condition of the road varies from fair to poor and the road requires widening and strengthening of the pavement to extend its design life and preserve the investment. The AADT recorded in 2005 on this section was 1056 vehicles per day.

The Mkumbara - Same section was constructed in the early 1960s also consists of a double surface bituminous road with a 6.0 m wide carriageway and 1.0 m wide shoulders. The last resealing of the section was carried out in 1990 and apart from some localized improvement to the drainage structures; no major rehabilitation or pavement strengthening has been undertaken since its construction. The road requires widening and strengthening of the pavement to extend its design life and preserve the investment. The AADT recorded in 2005 on this section was 630 vehicles per day.

1.7 Project activities

The proposed rehabilitation works for both road sections will involve improvement to the vertical and horizontal alignment plus widening and strengthening the existing pavement using a crushed road overlay with a two coat bituminous seal. The new road cross section will provide a 6.5 m wide carriageway and 1.5 m sealed shoulders. Construction of new box culverts and pipe culverts is also required together with extension of existing pipe culverts to match the widening road cross-section.
Elimination of a number of at-grade railway crossings by construction of reinforced concrete portal frame structures together with associated retaining walls is also being considered to improve road safety.

A number of borrow pits and quarries located near the road alignment that were used to supply materials for construction of the original road are be reopened to provide materials for the roadwork.

The road rehabilitation will be confined within the existing alignment and no new land acquisition is required since none of the existing properties within the road reserve are affected by the construction work. In addition it is anticipated that the existing borrow pits and/or quarry sites will be used to obtain the required road construction material. Therefore,

there will be no any resettlement or need for compensation in this project. Consequently preparation of a Resettlement Action Plan for this project is not required. This shall also apply to town centres like Mombo Township because there will not be any expansion or realignment of the road.

3.5 Consideration of Alternatives

3.5.1 No Project Alternative

The No Project alternative implies that the road should not be rehabilitated at all. Thus, leaving the road under the current condition would make it continue to deteriorate, hence making it completely impassable and become more expensive to rehabilitate. This would mean constructing a new road.

Therefore, it is important that the current road condition should be improved through rehabilitation. Furthermore, the road forms an important link with the major economic centres in the East African region. It is also an important transport infrastructure in the country as it is used by tourists and business communities. In this case the No Project Alternative could not be selected due to the need economic importance of this road.

3.5.2 Re-alignment Alternative

The re-alignment alternatives that needs consideration is the road section that passes through Mombo Township.

Currently the road section cannot be expanded as most of the buildings are very close (within the road reserve). Thus, one of the alternatives could be to re-align the road to by-pass the Mombo Township. However, re-alignment of the road could be costly due to the fact that it will involve compensation for affected properties and possibly construction of the new bridge over the Mombo River.

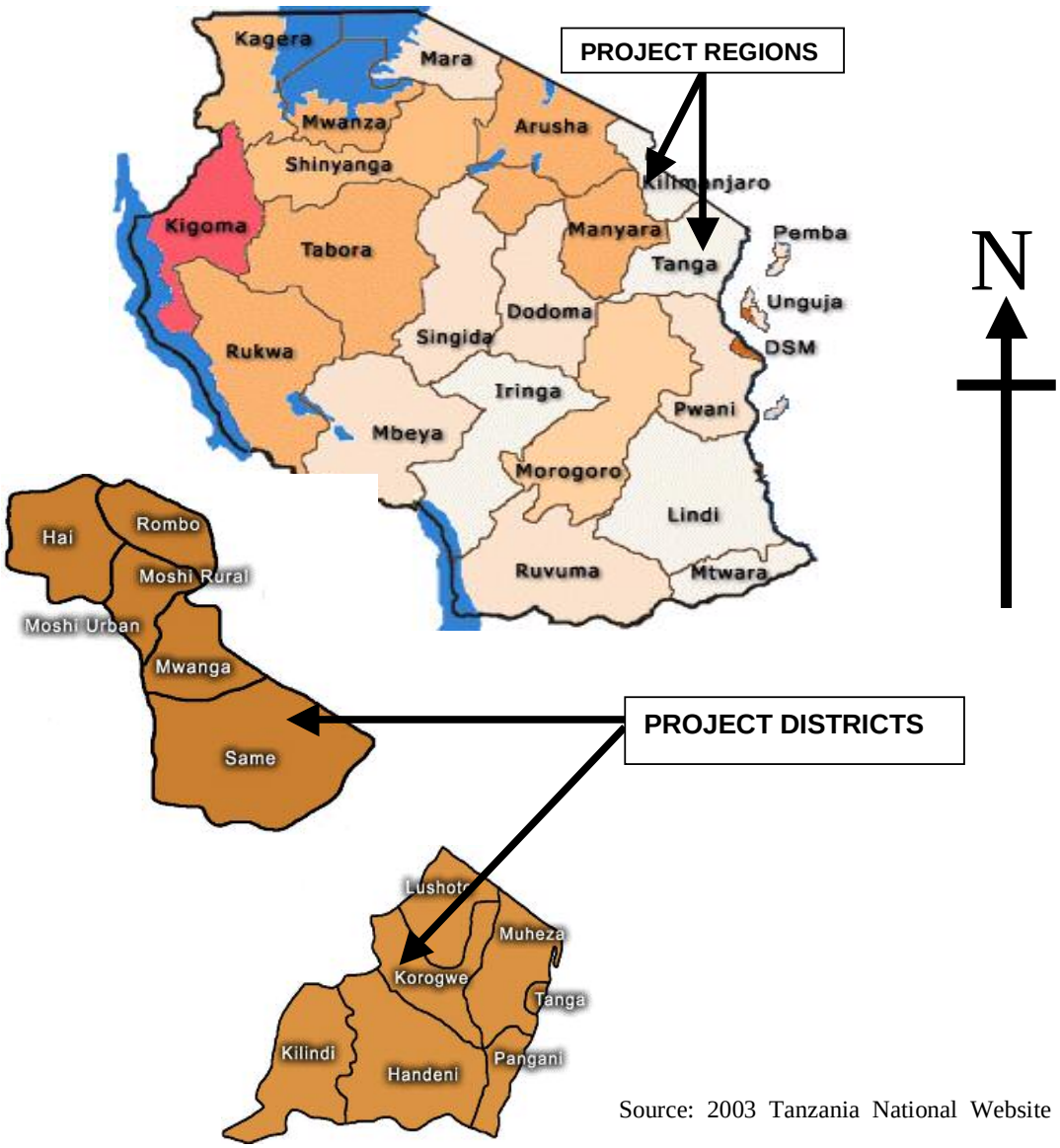
In this case the re-alignment option can not be chosen due to high cost involved. Alternatively, it is decided that the construction activities should be confined to the existing road alignment, which posses through Mombo Town. There will be no significant expansion of the road within the Mombo Town and the width of the existing road side drainages will be maintained to avoid damage to the existing buildings.

4. THE EXISTING ENVIRONMENT

4.1 Biophysical Environment

4.1.1 Location

In general the project road is located in the two Districts of Korogwe (Tanga Region) and Same (Kilimanjaro Region) between 5° 15/ S, 38°30/ E near Segera (CH. 0 + 0.000) and 3°00/S, 37°40/ at Same Town (CH. 171 + 100). The location of the project area is shown in Fig. 4.1.



Source: 2003 Tanzania National Website

Figure 4.1: Map of Tanzania showing the location of the Project Area

4.1.2 Climate

The climate varies from tropical near on the south-eastern part with mean annual rainfall ranging between 800-1000 mm to semi-arid on the north-western side with annual of between 600-800 mm. However, the mountainous areas receive relatively higher precipitation with mean annual rainfall ranging between 1600-2000 mm.

4.1.3 Topography

The road traverses through slightly hilly terrain from Korogwe to dominantly undulating topography towards Same. The altitude ranges between 200 – 1000 meters above sea level (m.a.s.l.). On the north-eastern side the project area is characterized by series of West Usambara and South Pare Mountain ranges with altitude ranging between 1500-3000 m.a.s.l.

4.1.4 Geology and Soils

The geology of the Project Area is mainly dominated by ARCHAEAN formations comprised of marble, quartzite, graphitic schist, chlorites, amphibole, mica and kyanite schist; hornblende; biotite and garnet gneiss; acid gneiss; granulite and chernockites. However, in some parts, especially around Korogwe and Mkomazi the geological formations are mainly of NEOGENE origin and may be comprised of Lacustrine sand, silt, limestone (including travertine).

Topsoils vary from deep red sandy loam in most parts to shallow stony grey in some areas. Soils are comprised of loam *entisols* (in hilly areas) and *ultisols* (in undulating plains) with good drainage[10].

4.1.5 Hydrology and Drainage

The Pangani River forms tributaries with several streams flowing from the existing mountains on the north-eastern side of the road alignment. There is no significant presence of wetlands apart from the existing swamps / marshlands within the Chekelei and Mkomazi River basins.

The existing streams/ rivers being crossed by the road at various points include: the Mandera stream (CH. 3 + 000), Pangani river (CH. 13 + 000), Msambiazi stream (CH. 20+600), Mtibi stream (CH. 23 + 800), and Chekelei stream (CH. 45 + 300). Mombo stream (CH. 57 + 4000 and Mkomazi stream (CH. 93 + 700).

4.1.6 Air Quality and Noise Emissions

The air quality and noise along the road alignment is influenced by passing vehicles and human activities. The major source of air emissions is from vehicles and human activities like bush fires and the uses of fuel wood / charcoal as the major source of energy. Although no analysis has been made on air quality and noise their background levels can be considerable in urban centres due to concentration of vehicles and operation of milling machines / small factories.

4.1.7 Vegetation and Wildlife

In general the route corridor is dominated by human settlement and cultivation / sisal plantations but intercepted in some areas by natural vegetation mainly comprised of

[10] United Republic of Tanzania (1976). Atlas of Tanzania. Second Edition.

scrubland with isolated trees and *Acacia* bush land / thicket towards Same. However, the existing Forest Reserve (planted with some exotic species) near Korogwe (CH. 0 + 000) and some vegetation along the existing streams /river banks (riverine vegetation) exhibit a distinct characteristics of the remaining natural vegetation.

There is no significant presence of wildlife along the road alignment that has been reported by local people. However, during the survey the Environmental expert found a carcass of spotted hyena *(Crocuta crocuta*) on the road (CH. 83 + 300). The dead animal seems to have come from the nearby Mkomazi Game Reserve. The dead animal could be considered to have originated from the nearby Mkomazi Game Reserve (about 15 km from the existing road alignment). The Environmental expert has noted some monkeys crossing the road at CH. 129 + 600. The presence of monkeys in the area can be associated with existing riverine vegetation and cultivation, which provide a potential source of food for them. Nevertheless, these findings do not justify the significant presence of wildlife habitats or migration routes because the road alignment and its immediate vicinities are already occupied by human settlement and cultivation.

4.1.8 Borrow pit and Quarry Sites

Most of the abandoned borrow pits are located close to the road. Former contractors did no restore the borrow pits. However, there is not any significant soil erosion because the formerly exposed areas have been colonized by native vegetation, mainly grass, shrubs and herbs. Some of the identified borrow pits include:

- Borrow pit No.1 near Msambiazi village (CH. 23 + 400);
- Borrow pit No. 2 near Makuyuni Village (CH. 36 + 700);
- Borrow pit No. 3 near Mpirani Village (CH. 37 + 000)
- Borrow pit No. 3 near Chekelei Village (CH. 48 + 600);
- Borrow pit No. 3 near Makanya village (CH. 136 + 600)-0.6 km from the road;

Some abandoned quarry sites have been identified in several areas such as Mombo (CH. 54 + 900 - about 600 m from the main road), Gudusheni (CH. 32 + 100), Kwamboya (CH. 42 + 600), Mazinde, Msambiazi (CH. 27 + 100) and Bwiko (CH. 92 + 700). Most of the quarry sites are located far from human settlements. In general, no significant land degradation has been noted around all quarry sites. However, like borrow pits, the existing quarry sites have not been fenced off to prevent encroachment. In addition, there is not any restoration works around quarry sites. For example, a crusher and excavator have been abandoned at Mombo quarry (CH. 54 + 900).

4.2 Socio-Economic Environment

4.2.1 Water Resources Use

The existing streams / rivers provide a major source of water for the local communities residing along the route corridor. However, in some areas the local people depend on ground water from boreholes and shallow wells.

In urban areas people depend on piped water supplies obtained from the existing natural sources. No attempt has been made to determine the water quality but visual survey revealed the Pangani River was found to be more turbid than its tributaries, especially during rainfalls. The high turbidity in the Pangani River can be associated with cultivation activities within the

river basin. However, in general the quality of surface water is influenced by sanitation and hygienic practice of the local communities living around the existing water sources.

4.2.2 Adjoining Land Use

The relative composition of adjoining land use along the route corridor is shown in Fig. 4.3**.**

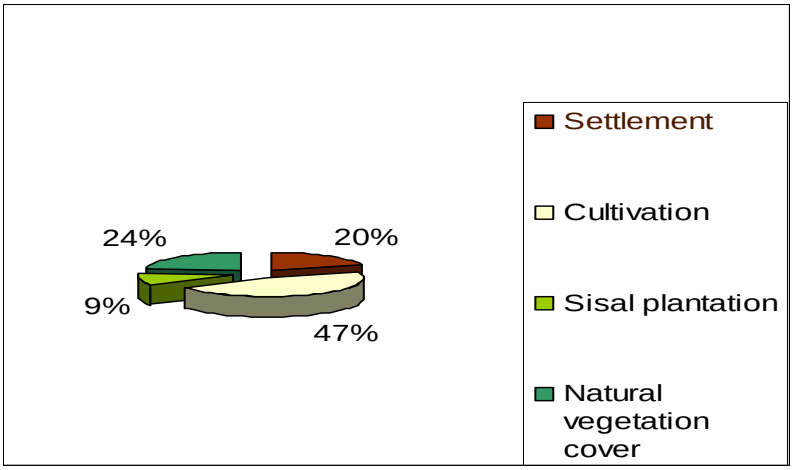


Figure 4.2: Adjoining Land use pattern along the route corridor

4.2.3 Infrastructure and Service utilities

The existing railways line the major linear infrastructure that either crosses or runs parallel to the existing road. The railway line has been found to cross the road at various points (CH. 13+400; 35+000; 39+600; 42+000; 44+900; 56+800) and runs closely (□5-15 m) parallel to the existing road. For example at CH. 26 +000 the railway line is very close within less than 5 m from the road. At CH. 92+800 there is railway line crosses the road through an overpass bridge.

The electricity lines, telephone lines and water supply pipelines are the major service utilities in the road alignment. The service utilities are more significant in urban areas as an overhead passage, and therefore could be easily located during the survey. The water supply pipelines are mainly underground, hence difficult to locate them during the survey. However, during the field survey it was possible to identify a leaking water supply pipeline at CH. 66+600.

4.2.4 Livestock routes

Livestock keeping is common in several villages along the route corridor. The livestock routes cross the road in several areas. These include: Gobe Village (CH. 26 + 100); Kiloza Village (CH. 29 + 000); Mpirani Village (CH. 36 + 000); Chekelei Village (CH. 48 + 100); Mazinde Village (CH. 68 + 600); Saweni Village (CH. 123 + 300); Mkwini Village (CH. 129 + 600). The contractor would be required to pay attention to these areas during road construction works.

4.2.5 Community Activities

The local community activities with significant implication to the project could be related with presence of informal bus stops at several points within village centres. These areas would need to be considered during construction works. The Contractor would be required to

retain these areas and properly design for use by the public. The examples include Mpirani village (CH. 40 + 800); Makuyuni village (CH. 38 + 700) and Mkumbara village (CH. 78 + 000).

Other significant activities include cutting trees and selling charcoal / fuel wood along the road. This attracts more customers hence, increase the exploitation of forest resources within the project area, leading into land degradation with consequential impact on the road pavement in some areas such as Makanya – Hedaru section. The local authorities would be required to promote awareness and education campaign on the sustainable way of utilizing the natural resource (E.g. by promoting tree planting). The Contractor would be advised to ensure that construction workforce do not engage in trading for charcoal or fuel wood during project implementation.

4.2.6 HIV / AIDS Status

There is no information on the status of HIV / AIDS for specific villages or townships traversed by the road project. However, there are some data at District levels. The general trend is that HIV / AIDS cases have been increasing in Korogwe and Same Districts. Table 4.1 shows the cumulative cases for Korogwe District from 2002 – 2004 and. Same District from 1999 – 2003, respectively[11].

The major cause of HIV / AIDS transmission among the local communities residing along the route corridor has been identified to be due to interaction between long distance truck drivers and the local people, especially at Mombo and Hedaru. Other factors influencing high prevalence of HIV/AIDS in the area include:

- ③ easy communication network;
- ③ urbanisation (most of the affected wards are mainly sub-urban towns);
- ③ presence of large farms and plantations (e.g. sisal and paddy farms);
- ③ presence of trading centres and mining centres (e.g. gypsum mining in Makanya).

The National HIV/AIDS policy requires District, wards and villages to formulate HIV/AIDS "Committees". Based on this, the District has formulated committees from the District to the village and sub-village levels. There are also NGOs working for HIV prevention in the Districts such as KIKUHE, WAMATA, BAKWATA and KIWAKUKI

TABLE 4.1: HIV / AIDS CUMULATIVE CASES FOR KOROGWE AND SAME DISTRICTS

KOROGWE DISTRICT COUNCIL				SAME DISTRICT COUNCIL					
AGE ROUP	2002	2003	2004	AGE GROUP	1999	2000	2001	2002	2003
0-14	0	0	0	0-14	0	0	0	0	0
15-24	26	53	65	15 - 34	17	25	24	51	16
25-34	94	131	112	35 -49	7	14	34	26	34
35-49	121	90	11	50	3	3	5	5	24
45+	35	23	84						
DEATHS	11	24	27						
TOTAL	287	321	299	TOTAL	27	42	68	92	75

[11] Data sources are from Korogwe District Hospital, 2004 and Same Community Development Officer (CDO), respectively

5. PUBLIC CONSULTATION PROCESS

5.1 Consultation during Biophysical Survey

During biophysical survey the public / stakeholder consultation process the issues of major concern include:

- Soil erosion and sedimentation of road pavement
- Disruption of pedestrian and non-motorized transportation in urban areas
- Severance of community access to other side of the road
- HIV/AIDS

5.1.1 Soil Erosion and Sedimentation of Road Pavement

The problem of severe soil erosion and sedimentation of road pavement has been noted by the Environmental expert to occur between Chekelei Village (CH. 109 + 800) and Hedaru (CH. 119 + 100). Interview carried out with various stakeholders indicated that the problem has been caused by several factors. These include:

- Bad cultivation practice by local community leaving on the upstream side;
- Vegetation clearing, especially trees by local community mainly for bricks burning and domestic fuel wood / charcoal;
- Overgrazing by livestock, which create bare areas with loose soils that become easily washed out and transported to the road pavement.

Proposed Mitigation measures

- Construction of embankment and canalisation;
- Introduction of soil conservation measures through involvement of local communities and local NGO like SAIPRO and SMECAO;
- Creation of vegetation belt on the upstream side comprised of sisal rows mixed with other vegetation
- Enforcement of land use planning by the District Council in collaboration with local communities

However, it was proposed that a thorough assessment the situation should be done. That should also involve a joint visit brainstorming meeting should be carried out by involving representative from:

- NEMC – Environmental Officer;
- TANROADS – Environmental Engineer and Resident Engineer;
- CONSULTANT – Resident Engineer, Environmental Expert, Sociologist
- DISTRICT COUNCIL – Land Use Planner
- LOCAL COMMUNITY –Ward Executive Officers
- LOCAL NGOs – SAIPRO, SMECAO and SECAP

5.1.2 Disruption of Pedestrian and Non-motorized transport in urban areas

The concern on the impact of traffic on pedestrian and non-motorized transport system has been raised by District authorities. The authorities were concerned on the possibility of increased traffic accidents due to speeding vehicles.

Proposed Mitigation measures: Provide dedicated lanes for pedestrians and NMT.

5.1.3 Severance of community access and livestock routes

The local people were concerned that road construction may cut off access to their farms / business activities. They were also concerned that their livestock routes may be disrupted, hence leading into increased animal killing by speeding vehicles.

Proposed Mitigation measures

- Provision of underpass bridges, whenever possible in livestock route crossings;
- Provision of concrete slabs / culverts across road side drainages at pedestrian / Non-Motorized crossings in urban areas

5.1.4 HIV/AIDS transmission

The concern has been on possible increase on HIV/AIDS during project implementation in already critical areas like Hedaru, Mombo and Korogwe towns. During the field survey it was noted that there is high rate commercial sex promoted by truck drivers who make stopovers in those towns.

Proposed Mitigation measures

- TANROADS should promote sensitization and awareness campaign among the local community in collaboration of local authorities and existing local NGOs;
- Workers campsite should be located far from the local residents;

So far the following NGOs have been found to be actively involved in awareness campaigns against HIV/AIDS problem:

- KIKUHE – Kikundi cha Kupambana na Ukimwi Hedaru
- KIWAKUKI – Kikundi cha Wanawake cha Kupambana na Ukimwi Kilimanjaro
- KIKUKASA – Kikundi cha Kupambana na Ukimwi cha Kanisa la Sabato

5.2 Public Consultation during Socio-Economic Survey

5.2.1 Design of public participation

Local meetings: Since the project is to be carried out in rural areas where other methods of consultations are limited, local meetings were used so as to ensure effective participation.

Interest group consultations: Consultations with various professionals served to provide appropriate views and advice. The consultations and participation involved regional, District and local authorities in the project area. To make the discussion easy, a summary of impacts and mitigations was presented and, the study team facilitated the discussions.

The consultation process has been designed at the following levels:

- Regional level: - individuals were consulted to obtain secondary data relevant to the study and also to obtain their views.

- Districts level: - meetings with few professional were conducted and their views were incorporated in the scooping report.

- Community level: - consultations involved meetings which facilitated dialogue between community members and the study team.

As said earlier consultations at community level mostly took the form of meetings where potential impacts were presented and discussed during these meetings. Such consultations were carried in six Wards. These include Manundu, Kilole, Mbuyuni, Mkomazi, Mazinde and Mkumbara. The Ward officials were informed in advance about the consultations and were requested to inform members of local communities. In most cases the meetings lasted between 1-1½ hours.

5.2.2 Implementation of Public consultation

Consultations with members of the public employed a variety of methods with an emphasis on qualitative approach. Semi-structured interviews were the principal method employed especially with officials at Regional and District levels and a random sample of 5 to 10 people from five wards – Kilole, Manundu, Makuyuni, Mazinde and Mkomazi. At the grassroots, meetings and focus group discussion were conducted.

The environmental and social issues of major concern to this project were presented for discussion. The discussion also aimed at understanding the social psychological attitude of community members towards the project as well as bringing out other issues for dialogue and discussion.

Some issues discussed during the consultation process include:

- HIV / AIDS and other communicable diseases
- Road traffic accidents
- Noise
- Construction related diseases
- Cultural tension
- Temporary employment
- Income generation activities
- Soil erosion and sedimentation of road pavement
- Disruption of pedestrian and non-motorized transport in urban areas
- Severance of community access and livestock routes

Below is the summary output of community consultations.

(a) HIV/AIDS and Other Communicable Diseases

- The contactor /government should arrange for HIV/AIDS prevention programme targeting both the construction camp and local communities.
- Positive discrimination in favour of resident workers to minimize risk of increased infection rates among local population
- Programme on HIV/AIDS should target groups at risk such as commercial sex workers (at Mombo and Hedaru), barmaids as well as food venders, and business women at the construction camp site.
- NGOs and CBOs working for HIV/AIDS prevention in the area should be consulted during the implementation of HIV prevention.
- Construction camp should be located far enough from local communities so as to avoid sexual interactions

(b) Road Accidents

- Bumps should be inserted where the road passes through human settlements, schools and strong corners.
- Police department should be keen in controlling the quality of drivers.
- TANROADS should ensure road signs are appropriately placed along the road.
- The road design should ensure space/lane for non-motorized road users.

(c) Noise

It is temporary and can be tolerated.

(d) Construction related accidents

- The contractor should be brought to knowledge and abide in standards of human safety during construction.
- Training construction workers on proper use construction machines.

(e) Cultural Tension

- Contractors / TANROAD should maintain regular meetings with community representative.
- Allow friendly environment for community members to communicate their concerns about the behaviour of construction workers.

(f) Temporary employment

- Community members who will work with the project, especially youth will benefit from the proposed project.
- The contractors should use local casual labour.
- Skills acquired during recruitment and construction will remain an asset to community members.

(g) Income generation

- Youth and women will benefit from doing business with construction workers selling foods, drinks ,etc
- Expenditure of workers will add to community business.

(h) Soil Erosion and Sedimentation of Road Pavement

- Poor land use has at Hedaru has resulted into soil erosion and deposits on the road during rain season.
- For the past years there has been significant deposit on Makanga - Hedaru road section.
- Erosion has resulted into death (one individuals eroded from the mountains, 2 houses eroded. In 2004 about half a kilometre of railways was washed away.
- A need to raise the road bed.

GENERAL CONCLUSION

(a) Soil erosion and Sedimentation of Road Pavement

The problem of soil erosion is caused by local community activities on the upper catchment, hence resulting into severe land degradation. This in turn has resulted into soil erosion and destruction of culverts and bridge structures. The engineering method has been used but did not succeed. It has been proposed by the stakeholders that planting of vegetation on the upper catchment in conjunction with engineering method could minimize the problem. This could

be done by establishment of vegetation belt comprised of sisal plants and other drought tolerant trees. The exercise would need involvement of the local communities and enforcement of the land use planning by the District Council in collaboration with Ward and Village Committees. However, a need to carry out detailed assessment has been proposed before undertaking the exercise. This should involve TANROADS Engineer, NEMC, District Council, Local Community leaders and Local NGOs.

(b) Road Safety

The local communities are concerned about the problem of increased road accidents due to speeding vehicles. The construction of speed bumps in village centres has been proposed as solution to minimize the problem. The disruption of livestock routes and community access to their business activities is another issues which ahs been identified. The problem of livestock route could be minimized by construction of road underpass in form of culverts is some areas. The pedestrian access could be restored by putting concrete slabs or culverts in pedestrian or Non-Motorized crossings.

(c) HIV / AIDS transmission

The proposed that the problem of HIV / AIDS should be minimized by promoting intensive sensitisation campaign by TANROADS through provision of funds to the local NGOs. The campaign should also involve construction workforce and should be carried out by the Local NGOs. The workers Campsite should also be located far from village settlement to minimize interaction with local communities. In addition, the Contractor is advised to give priority to local communities during employment of unskilled labour to minimize the number of newcomers in the project area.

6. ASSESSMENT AND ANALYSIS OF IMPACTS

The assessment and analysis of impacts requires several techniques. The first one is to categorize impacts according to environmental components that are likely to be affected. The second technique involves categorization of impacts into biophysical and socio-economic aspects based on project activities. The third one is to determine the characteristics of each impact. The checklist of identified impacts (positive and negative) is shown in Table 6.1. The detailed description of impacts and their mitigation measures are dealt with in Chapter 7.

6.1 Categorization of impacts

In this study the categorization of impacts according to environmental components has been done by using Rapid Impact Assessment Matrix (RIAM) to determine the most affected environmental components in this project **(**See **Appendix 5).** The results of the analysis (Figure 5.1) show that cumulatively the project will have both significant positive and negative impacts on the socio-economic components. The project will also have significant negative impacts on biophysical component but will have no significant positive impacts. These findings indicate that there shall be a need to enhance the identified positive impacts and minimize or mitigate the negative impacts. This is to ensure that that the project is environmentally sustainable and socio-economically beneficial.

The categorization of impacts based on project activities was done by using impact identification matrix shown in **Appendix 6** to determine which types of impacts are biophysical and socio-economic in nature.

The result of the analysis (Figure 6.2) indicates that the project will have both negative and positive impacts on socio-economic components. It also shows that it will have negative impacts on biophysical components but will have no positive impacts. The result of this matrix is also consistent with those obtained by using the RIAM matrix and therefore the same conclusion can be made from these results.

TABLE 6.1: CHECKLIST OF ENVIRONMENTAL IMPACTS

A.	**POSITIVE IMPACTS**
1)	Increased income generation during construction
2)	Temporary employment during road construction works.
3)	Reduced vehicle maintenance and operation costs
4)	Increased tourism activities
B.	**NEGATIVE IMPACTS**
1)	Dust Pollution
2)	Noise / Vibration
3)	Soil and Water Pollution
4)	Destruction of stream / river banks vegetation
5)	Soil erosion and sedimentation of road pavement
6)	Soil erosion and sedimentation of stream / river beds
7)	Destruction of adjacent land use and properties
8)	Increased traffic related accidents
9)	Risk of accidents to livestock and people in borrow pits and quarry site areas
10)	Increased incidence of HIV/AIDS and STIs
11)	Construction related accidents
12)	Destruction of Infrastructure and social service utilities
13)	Disruption of pedestrian and non-motorized transport
14)	Creation of breeding sites for water borne vectors
15)	Disruption of traffic flow during construction

6.2 Characterization of Impacts

To determine the characteristics of impact the Consultant applied impact evaluation matrix shown in **Appendix 7**. The criteria for characterization of impacts were based on the following factors:

- Type of impact – whether positive or negative
- It effects – whether direct, indirect or cumulative
- Intensity – whether low, intermediate or high
- Magnitude – whether site specific , local or regional
- Duration – whether permanent , or temporary; short term or long term;
- Reversibility- reversible of irreversible
- Significance- whether low, intermediate or high.

The frequency of occurrence of each factor for a given impact has been used to obtain the characteristics of impacts as shown in Figure 6.3: The results indicate that most of the impacts are:

- Negative;
- Indirect;
- Have low intensity;
- Site specific;
- Temporary (Short term);
- Reversible and have low significance.

The most important output in this analysis is the significance of impacts, which is determined by considering intensity, magnitude and duration[12]. For example, if the impact has a low intensity, site specific and temporary; then its significance is low. The detailed methodology for determining the significance of impacts is shown in **Appendix 8**.

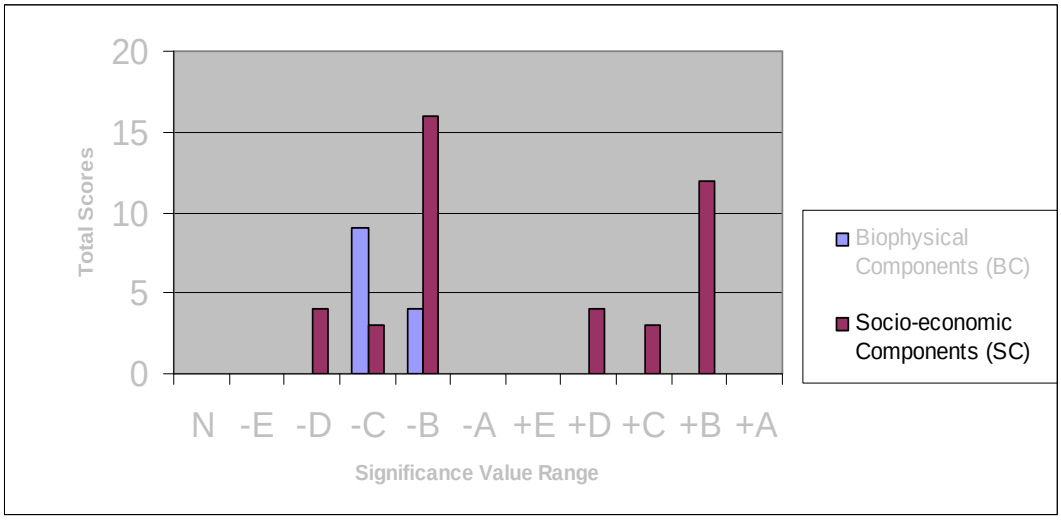


Figure 6.1: Categorization of impacts based on RIAM matrix

[12] For definition of these terms see Environmental Assessment (EA) and Management Guidelines fro Road Sector. Ministry of Works. July 2004

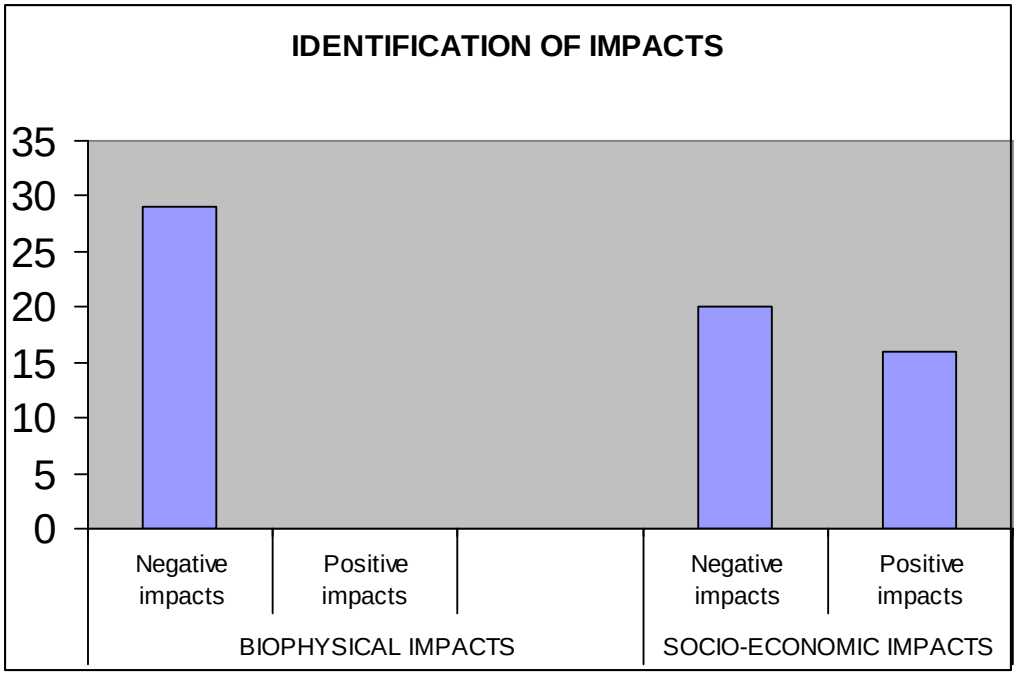


Figure 6.2: Categorization of impacts based on project activities

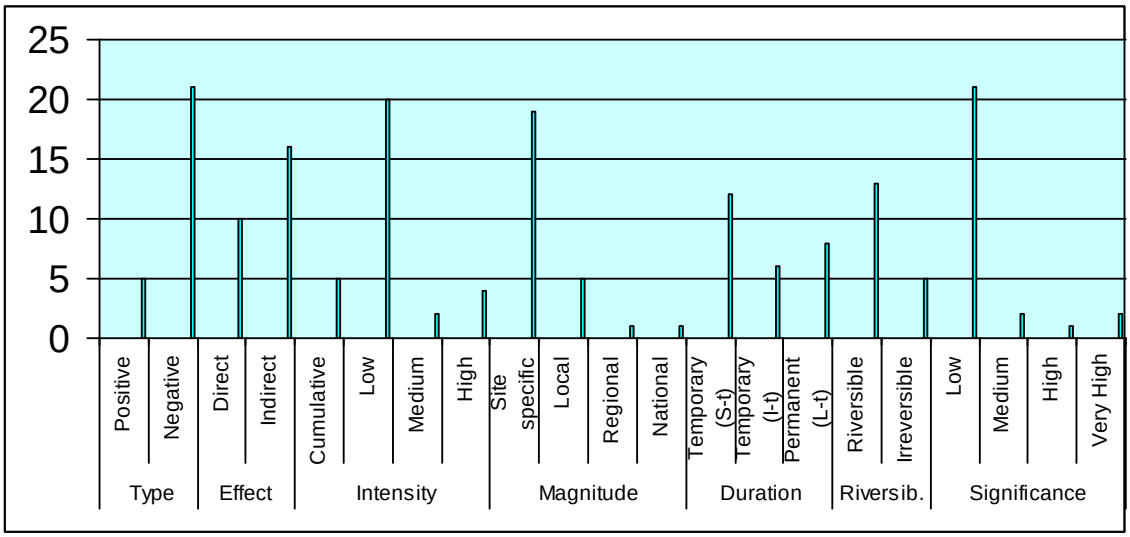


Figure 6.3: Characteristics of impacts

7. ENVIRONMENTAL / SOCIAL IMPACTS AND MITIGATION MEASURES

This Section deals with description of potential environmental / social impacts and their possible mitigation measures during construction. Implementation of mitigation measures during construction is primarily the responsibility of the Contractor under the supervision of Resident Engineer to ensure that all mitigation measures are implemented. There should be a strong unambiguous statement in the contract to guide the Contractor. However, notwithstanding the Contractors and Engineers responsibilities some mitigation measures are best undertaken by local communities with the support of government agencies and NGOs.

(a) Dust / Air Pollution

Exhaust emissions mainly comprised of Carbon monoxide (CO), Oxides of Sulphur (SO_x,), Oxides of Nitrogen (NO_x,), Hydrocarbons (HC) and possibly Lead (Pb) are expected to occur from operation of vehicles and construction equipment along the road alignment and borrow pits / quarry sites.

Dust will occur from excavations and operation of equipment and vehicles within the road alignment and on borrow pit / quarry sites

Mitigation measures

- Operate / maintain vehicles and equipment in good working condition.
- Provide workers with air masks
- Apply water, especially in settlement areas.
- Abatement of vehicle emissions and dust must be done as prescribed in the Standard Specifications for Road Works *(Section 1707* and *(Section 1708),* respectively[13].

(b) Noise / Vibration

The major sources of noise / vibration are expected from operation of vehicles / equipment / machinery on roadside and borrow pit / quarry sites. Other source of noise and vibration will be expected from the use of explosives in quarry sites.

Mitigation Measures

- Workers in vicinity of strong noise should wear earplugs and helmets and their working time should be limited.
- In construction sites within residential areas, noisy construction should be stopped during the night hours (18:00-06:00 hours).
- Maintenance of machinery and vehicles should be enhanced to keep their noise at a minimum.
- Contractor must follow procedures for noise abatement as prescribed in the in the Standard Specifications for Road Works *(Section 1709 and (Section 1222),* respectively.

(c) Soil and Water Pollution

The accumulation of solid wastes in construction camp site is likely to result into environmental pollution. Likewise uncontrolled discharge of liquid wastes will result into pollution of surface and ground water, especially to surface water sources around the workers campsite. For example, improper siting of pit latrines may result into contamination of both ground and surface water sources.

[13] United Republic of Tanzania (2000). *Standard Specifications for Road Works.* Ministry of Works.

The spillage of fuels, oils, grease and paints may lead into land contamination and pollution of water sources, and ultimately may cause damage to natural vegetation and soil micro-fauna and flora.

Mitigation measures

- Avoid construction of workers camp site facilities close to surface water sources.
- Pit latrines must be located not less than 50 metres from surface water sources and the bottom of the pit latrine should not be less than 1 m below the water table.
- Borrow pit / quarry sites and camp sites, including temporary work places must be provided with sanitary facilities (toilets) and must be located far from water sources. The facilities must be properly maintained and satisfactorily decommissioned after the project.
- Solid and liquid waste must be handled as prescribed in the Standard Specification for Road Works *(Section 1713)*

(d) Destruction of stream / river banks vegetation

The movement of heavy machinery and trucks close to the river bank could result into destruction of stream / river bank vegetations. This could lead into increased river bank erosion and sedimentation of stream / river beds.

Another cause is due to uncontrolled cutting and clearing of the vegetation during workings close to the river / stream banks. The presence of the heavy machinery and trucks could result into pollution of water source due to leakage of oils.

Mitigation measures

The Contractor must use a water pump to haul water from the river / stream at a distance of not less than 50 m from the river / stream banks. The Contractor must minimize destruction of stream / river bank vegetations by avoiding unnecessary cuttings / excavations during construction close to the stream / river banks. All bare areas around the stream / river banks must be planted with grass / shrubs immediately after construction

(e) Soil erosion and sedimentation of road pavement

The problem of soil erosion and sedimentation of road pavement along Hedaru-Makanya Road Section is mainly caused by local community activities on the upstream side of the road. This not only leads into sedimentation of road pavement but also destruction of bridges and culverts as well as downstream land use beyond the road pavement.

Mitigation Measures

- Problem of soil erosion due to community activities can be mitigated through construction of dam on the upstream side beyond the road pavement and planting of vegetation.

- Other measures are to educate the local communities on environmental protection and soil conservation measures such as tree planting, agro-forestry and contour farming.

(f) Soil erosion and sedimentation of stream / river beds

Improperly designed, inadequate number of culverts and wrongly located/placed culverts may cause concentration of storm water flow resulting into soil erosion and sedimentation of watercourse or destruction of adjacent land use and properties.

Another source of increased sedimentation of streams / river beds includes:

- Bridge construction activities
- Soil erosion along the road side drainages;
- Stock piling of soil along the river banks

Mitigation Measures

- Execute proper design and construction of roadside drainages
- Road run off must be channelled to natural water course through side drains in which baffles and rip rap are placed to check water velocity. Drains must be included at short intervals to cope with run –off.
- Adequate number of culverts must be designed and placed in such a way that storm water does not damage adjacent land use below the road bed.

(g) Destruction of adjacent land use and properties

Changes in drainage patterns my result into concentration of water flow leading into flooding, soil erosion and consequently damaging the adjacent farmlands, houses and other public properties below the roadbed. The destruction of adjacent lands may also occur due to uncontrolled stockpiling of spoils and movement of mobile equipment during road construction and/or workings of borrow pits.

Mitigation Measures

- Contractor must ensure proper design and placement of adequate number of culverts with wide aperture to avoid concentration of storm water flow to adjacent lands.
- Movement of equipment must be confined within the road reserve
- All spoils must be stockpiled and disposed of in permitted areas by Engineer

(h) Increased Traffic related road accidents

The improvement of road pavement condition can into increased risk of accidents to livestock and pedestrians due to speeding vehicles. This problem becomes more severe in urban or village centres where there is large concentration of people. It is common to find livestock crossing the road going to either directions searching for water or pastures.

Mitigation Measures

- Whenever possible Contractor should design and place a box culvert that can be used by livestock and local people as an under passage.
- Contractor must put road signs to indicate livestock and people crossing, especially school children
- In urban areas the contractor must put concrete slabs or culverts to allow access by local people to their houses / business activities.
- Provide clearly displayed name boards for each village at entrance and exits.
- Impose speed limits and reinforced by rumble strips at the entrance in village centres
- Speed humps should be used sparingly, since they constitute hazards for road users. However, they could be justified near schools and dispensaries but should be clearly marked as pedestrian crossings.

(i) Risk of accidents to livestock and people in borrow pits and quarry sites

Open borrow pits and quarry sites can pose a risk to life for livestock and people, especially children who usually like to play in abandoned borrow pits and quarry sites..

Mitigation Measures

- All borrow pits and quarry sites must be fenced off during construction to prevent access by livestock and people.
- All borrow pits must be restored by refilling with overburden before abandonment during decommissioning.
- Operations of borrow pits and quarry sites must be done as prescribed in the Standard Specifications for Road Works *(Section 3400)* and Mining Regulation[14]

[14] United Republic of Tanzania. Mining Regulation (Environmental Management and Protection) Regulation of 1999.

(j) Increased incidence of HIV/AIDS and STIs

The interaction between construction workers may result into transmission of HIV/AIDS to local people and vice versa.

Mitigation Measures

This will require promotion of awareness to both workforce and local people. The local NGOs and government agencies already active in the project area are better placed to combat the spread of HIV AIDS and STIs. Their effort should be reinforced by TANROADS during the project period.

Other measures is to locate construction camp site far from human settlements and a large umber of unskilled labour must come from within the local communities to minimize the number of new comers.

(k) Construction related accidents

The construction related accidents are likely to be inevitable when dealing with operation of heavy equipment, especially in borrow pits, quarry, and crusher and/or asphalt plant sites.

Mitigation Measures

- Contractor must take precautions and educate workers on the use of safety gears.
- Contractor must follow safety procedures prescribed in the Standard Specifications for Road Works *(Section 1237)* and Occupational Health and Safety Act No. 5 of 2003.

(l) Destruction of infrastructure / Social service utilities

The existing infrastructure and service utilities are likely to be damaged during construction such as railway lines, telephone lines, electricity lines and water supply pipelines. This may lead into disruption of community activities and economic / financial loss.

Mitigation Measures

The Contractor must avoid damage to existing infrastructure and social service utilities as necessary as possible. However, in case damage cannot be avoided the Contractor must carry out survey and notify the general public of any possible interruptions prior to commencement of works. The Contractor must make arrangement with responsible authorities before moving or altering the existing infrastructure and/ or service utilities.

The damaged infrastructure / service utilities must be restored immediately to avoid inconveniences to the public. The Contractor must follow the prescribed procedures in the Standard Specification for Road Works (*Section 1202).*

(m) Disruption of pedestrian and non-motorized transport system

The existing pedestrian and non-motorized transport system is likely to be disrupted during construction and operation phase. The problem is likely to be significant in urban areas where pedestrians, cyclists and other non-motorized use roadside space.

Mitigation Measures

The Contractor must ensure that pedestrian and non-motorized lanes are provided during and after construction to avoid risk of accidents.

(n) Creation of breeding sites for mosquitoes and other water borne vectors

Usually borrow pits tend to accumulate water, which in turn becomes a potential breeding site for mosquitoes and become a major source of malaria and other water borne diseases. However, in some dry areas like Makanya and Hedaru borrow pits could be useful as a source drinking water for livestock or house construction works.

Mitigation Measures

All borrow pits must be drained and restored before abandonment. However, the views of the local communities must be obtained to determine whether a borrow pit should be drained / restored or allowed to retain water for their use, especially in drought stricken areas. In case they are to be retained they should be properly designed for the intended purpose and that should be included in to the Contract conditions for Contractors.

(o) Disruption of traffic flow during construction

The movement of heavy machinery and construction vehicles may result into traffic congestion during construction. Also, excavations and removal of culverts may result into only one side road to be used by vehicles, which may also result into slow movement and possibly traffic congestion.

Mitigation measures

Traffic jam during construction should be minimized through traffic management plan and use of road signs. Contractor should deploy personnel at crucial points to guide traffic movement. Involvement of Traffic Officers should also help to ensure smooth movement of traffic during

8. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

8.1 Implementation of Environmental and Social Management Plan (ESMP)

8.1.1 Integration of Efforts in ESMP

The integration of efforts will be required in order to have effective EMP. Thus, it is important that all responsible agencies / stakeholders should appreciate that they are united in a common effort. It is important that after a meeting with local representatives and all agencies entrusted with any element of ESMP, different agencies should interact and work towards a common purpose. The detailed ESMP for this project is shown in **Table 8.1**.

8.1.2 Transfer of Technology and Human Resource Development

TANROADS does not require much ability to do EIA in order to draft TOR and negotiate knowledgeably with consultants and financing agencies. So far in recent years the TANROADS Engineers have been attending Training Courses on EA and Management in the Road Sector conducted by Ministry of Infrastructure Development under the RS-ES. Thus, what is required now is to provide them with practical skills in the form of on the job training. It is therefore proposed that one Road Inspector from TANROADS obtain on-the job training under Environmental Specialist from the RS-ES through out the project duration.

8.1.3 Involvement of Local Authority and Local Institutions

It is important that the District Councils be well informed and invited to comment on the project at the design stage rather when all major decisions have been taken. One copy of this report should be sent to Korogwe and Same District Councils, SAIPRO, SMECAO and SECAP with a view to involve them in monitoring compliance with mitigation measures.

A small budget should be allocated for the local NGOs and District Councils to promote soil conservation and tree planting activities to control soil erosion and sedimentation of road pavement, especially with a road section between Makanya and Hedaru.

8.1.4 Public Participation / Communities Involvement

TANROADS should prepare and distribute a short hand-out which would summarize the project and advice whom should be contacted before and during construction. Villagers *en route* could earn small but regular income from payment for maintenance of the roadside verges and drains, but this requires prior decision-making by TANROADS.

In general, the local communities support the road rehabilitation and agree to respect the existing road reserve. However, the project can obtain maximum benefit if it involves the local communities and spends some little amount of funds for the local communities. The expenditure would be justified because the local communities endure the passage of long-distance traffic through their village centres and in the outskirts gaining no advantage there from. Nevertheless they do gain from the convenience of the passenger bus transport service along the road.

Since the road cannot be re-routed due to too much cost involved in doing so it is reasonable to reduce the impact of having the road through village settlements. This is no longer

tolerated in the rich developed countries, whereby all through traffic have bee removed to by-passes.

The possible mitigation measures that require involvement and some degree of local decision making of local communities include:

- ③ Provision of pedestrian foot paths separated from the pavement of the road;
- ③ Clearly demarcated parking, resting and trading areas within village centres;
- ③ Creation of bus stops off the road;
- ③ Creation of shaded lays-bys large enough for trucks to pull in and in which villagers could, if they do wish, erect and operate small produce stalls;
- ③ Installation of clearly –marked pedestrian crossings on painted humps in village centres – villagers should undertake to use the crossings and to repaint them from time to time;
- ③ Improved access to commercial areas with cleared demarcation of the access roads and clear separation from the trunk road by way of concrete block barriers;
- ③ Signboards at the entrance to each village, not only naming the village but demanding courteous road use, in English and Kiswahili;
- ③ Emplacement of rumble strips (not humps which are dangerous) within village centres and near schools;
- ③ Payment out of a small funds for villagers to maintain roadside verges;
- ③ Payment out of the same fund for each village and sub-village to engage the services of a uniformed traffic warden, equipped with a large "lollipop" sign, to work at each pedestrian crossing.

It should be noted that pre-selecting such measures and simply incorporating them in the project would mean forgoing major benefit of public involvement. Thus, inviting villagers to choose which measures should be implemented would provoke invaluable discussions, locally, about the road use-with the consequences of raising awareness of traffic hazards.

It will also reduce the most negative social impacts which arise when large project works are undertaken without local involvement. Public involvement would help to ensure self-reliance and respecting the authority of local leaders in the decision-making about local development.

Village leaders should attend meetings and given the opportunity to discuss road safety campaign proposals. However, it should be made clear from the very beginning that the campaign is mainly for road safety and therefore proposals for other issues like water supply, schools, medical care however worthy could not be entertained.

Price tags should be attached to each measure and divide the available fund between each village *en route* equitably. The village committees would be presented with "shopping lists" of the possible improvements, on the understanding that they could choose up to the agreed amount (E.g. divided among the existing wards affected by the project). Villagers should be assured that their choice would not be disregarded under any circumstances, even if the project proponent or other powerful decision-makers held other views about what could be purchased with the funds.

Village committees would be entitled to make other suggestions. If related to road safety and approved as such by TANROADS they could be priced and included on the list. Other village councils would be advised of the additional option and its price –tag.

Village committees could contribute funds or labour but that would complicate the process. It is therefore intended that the Contractor would carry out all the work, at the time of passing through that particular village. However, villages are free to organize their own mini-projects at any time.

It is proposed that a certain percent of the project cost should be paid into a bank account and divided among the existing wards. The money would be held in escrow such that the road contractor could not withdraw it except on the instructions of the Resident Engineer. The money would also be bonded such that it could only be spent on purposes nominated by village committees and approved by the TANROADS. That would ensure that the money would be spent on intended mitigation measures related to traffic safety and roadside improvements.

Village councils could also introduce fees for space to erect roadside advertisements. That means apart from prohibiting such advertisements in the road reserve, the village councils should charge annual fees for erecting them beyond the road reserve. Fees should be very high, to maximize income and to discourage advertises from ruining the landscape.

8.1.5 Anti-AIDS Measures

Since the road facilitates traffic which in turn is the main vector of HIV and AIDS is appropriate to make contribution to anti-AIDS campaigns. It is proposed that some funds should be allocated to the local NGOs that are already active in the area. Also some small assistance should be sought from the District Councils and Representatives from the Ministry of Health and Ministry of Community Development, Women's Affairs and Children.

8.1.6 Mitigation of Adverse Impacts during Operation & Maintenance

The recommendations provided in this report can be re-applied by TANROADS during future routine maintenance. Most of the mitigation measures during operation relate to traffic speed and safety.

Oil leakage from vehicles cannot be easily mitigated due to lack of high standards of vehicle maintained in the country. It is common to see Buses and Lorries leaking oil and/or belching dense cloud of diesel smoke without penalty. The exhaust fumes can be reduced but not within the scope of this project. However, the Police Department can be asked to attend to this matter at their routine roadblocks.

It is not expected that the road maintenance would involve the use of persistent and/or volatile pesticides to suppress re-growth of vegetation within the way leaves. However, it is common to find some workers using bush fires to control grass. This habit should be prohibited to avoid risk of fires to the adjacent vegetation, farmlands and human settlements.

8.1.7 Cost Estimates for Mitigation Measures

Mitigation Costs to be internalised

It is understood that the mitigation measures that require contractor to adhere to good practice are normal costs, not extra costs arising out of the ESIA. Thus, they are not included into the environmental mitigation budget or cost estimates for mitigation measures. Also, the project can not be responsible for costs that arise out of normal responsibility of the highway,

environmental and local authorities. Therefore, for that reason, recurrent costs during road operation and maintenance are excluded.

Mitigation Costs to be contributed by the Project

It is understood that the capability do exist to implement some of the proposed environmental management / mitigation measures. Otherwise the project might be approved and financed on the basis of assumptions that would not be tenable. Thus, the cost estimates for mitigation measures given in **Table 8.2** are focused on the implementation of those proposed mitigation measures that are within the capability of this project. The total cost for road rehabilitation could be estimated to be about US $ 68,400,000 (i.e. US $ 400,000/Km x 171 Km of Asphalt Concrete)[15]. It is assumed the project could allocate at least 0.1% of the total cost to finance environmental management aspects, which is about US $ 68,400. The cost estimates arising from this budget is shown in Table 8.2 to finance some proposed mitigation measures as well as environmental monitoring and audit. If the budget is approved by project proponent this report should be made available to all mentioned agencies, so that they can comment, ready themselves for the proposed activity and network appropriately.

TABLE 8.1: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

ENVIRONMENTAL ISSUES	MITIGATION MEASURES	IMPLEMENTORS	RESPONSIBLE ORGANIZATIONS
A. CONSTRUCTION PHASE			
A11. Dust pollution	Sprinkle water on bare areas and road surface during construction, especially within residential areas to minimize dust. Vehicles delivering construction materials should be covered to avoid spillage. Concrete mixing equipment should be well sealed, and vibrating equipment should be equipped with dust-removal device. Operators should pay attention to their health by wearing dust protection masks.	Contractor Supervised by (***Resident Engineer***)	TANROADS (***Highway Engineer and Environmental Officer***) Consulting Firm (***Highway Engineer***)
A12. Noise / Vibration	Workers in vicinity of strong noise should wear earplugs and helmets and their working time should be limited. In construction sites within residential areas, noisy construction should be stopped during the night hours (18:00-06:00 hours).	Contractor Supervised by (***Resident Engineer***)	TANROADS (***Highway Engineer and Environmental Officer***) Consulting Firm (***Highway Engineer***)

[15] This is according to the Design Engineer's estimates.

ENVIRONMENTAL ISSUES	MITIGATION MEASURES	IMPLEMENTORS	RESPONSIBLE ORGANIZATIONS
	Maintenance of machinery and vehicles should be enhanced to keep their noise at a minimum. Contractor must follow procedures for noise abatement as prescribed in the Standard Specifications for Road Works (Section 1709).		
A13. Soil and Water Pollution	Measures must be taken at construction sites / borrow pits and quarry sites by providing solid waste collection / garbage tanks and sanitation facilities. Garbage should be collected in a tank and disposed of periodically. Avoid construction of workers camp site facilities close to surface water sources. Borrow pit / quarry sites and camp sites, including temporary work places must be provided with sanitary facilities (toilets) and must be located far from water sources. The facilities must be properly maintained and satisfactorily decommissioned after the project. Solid and liquid waste must be handled as prescribed in the Standard Specification for Road Works *(Section 1713)* Solid waste resulting from road construction works could be disposed of as prescribed in the Standard Specification of Road Works (Section 1713)	Contractor Supervised by (***Resident Engineer***)	TANROADS (***Highway Engineer and Environmental Officer***) Consulting Firm (***Highway Engineer***)
A14. Destruction of stream / river bank vegetation	Use a water pump to haul water from the river / stream at a distance of not less than 50 m from the river / stream bank. Contractor must minimize destruction of stream / river	Contractor Supervised by (***Resident Engineer***)	TANROADS (***Highway Engineer and Environmental Officer***) Consulting Firm (***Highway***

ENVIRONMENTAL ISSUES	MITIGATION MEASURES	IMPLEMENTORS	RESPONSIBLE ORGANIZATIONS
	bank vegetations by avoiding unnecessary cuttings / excavations during construction. Bare areas around the stream / river banks must be planted with grass / shrubs immediately after construction		***Engineer***)
A15. Creation of breeding sites for water borne vectors (E.g. Mosquitoes)	Drain and restore all borrow pits before abandonment. Get the views of the local communities to determine whether a borrow pit should be retained for use as source of water, especially in drought stricken areas. In case they are to be retained they should be properly designed for the intended purpose and that should be included in to the Contract conditions for Contractors.	Contractor Supervised by (***Resident Engineer***)	TANROADS (***Highway Engineer and Environmental Officer***) Consulting Firm (***Highway Engineer***)
A16. Destruction of infrastructure / Social service utilities	Avoid damage to existing infrastructure and social service utilities. But in case damage cannot be avoided it is important to carry out survey and notify the general public of any possible interruptions prior to commencement of works. Arrangement must be made with responsible authorities before moving or altering the existing infrastructure and/ or service utilities. The damaged infrastructure / service utilities must be restored immediately to avoid inconveniences to the public. The Contractor must follow the prescribed procedures in the Standard Specification for Road Works (*Section 1202)*	Contractor Supervised by (***Resident Engineer***) .	TANROADS (***Highway Engineer and Environmental Officer***) in collaboration with TANESCO, TTCL and Water Supply authorities (***Responsible Engineers***)
A17. Disruption of pedestrians and Non-Motorized transport (NMT)	Identify potential location of passageways for pedestrians and NMT and designed them to meet the needs of pedestrians and NMT.	Contractor Supervised by ***Resident Engineer***)	TANROADS (***Highway Engineer and Environmental Officer***) and Korogwe and Same District Councils (***Urban Planning Officers***) and

ENVIRONMENTAL ISSUES	MITIGATION MEASURES	IMPLEMENTORS	RESPONSIBLE ORGANIZATIONS
			Village Government (***Village / Ward Executive Officers***)
A18. Increased incidence of HIV/AIDS and STIs.	Locate the Construction camp site far from human settlements and employ a large number of unskilled labourers from within the local communities to minimize number of new comers. Involve the local NGOs and government agencies already active in the project area in awareness creation and educating the local communities on HIV / AIDS and STIs prevention. The Some funds must be provided by TANROADS during project implementation to reinforce the effort being done by local NGOs and government agencies in the project area on HIV / AIDS campaigns. The funds should also help the local NGOs to create awareness and educate the Contractor's workforce on HIV / AIDS and STIs prevention.	Contractor Supervised by ***Resident Engineer*** ***Active Local NGOs and Government agencies in the project area***	TANROADS (***Highway Engineer and Environmental Officer***) and Korogwe and Same District Councils (***Urban Planning Officers***) and Village Government (***Village / Ward Executive Officers***)
A19. Construction related accidental Risks	Safety signal devices should be installed to ensure safety during construction. Effective safety and warning measures should be taken to reduce accidents. Construction workers must be equipped with helmets and other safety gears. The management and use of blasting materials should be done by Contractor in strict conformity with the safety requirements for public security as stipulated in the Mining Act of 1998 and Mining (Safety and Occupational Health) Regulation of 1999. The	Contractor Supervised by (***Resident Engineer***)	TANROADS (***Highway Engineer and Environmental Officer***) Consulting Firm (***Highway Engineer***) in collaboration with Ministry of Home Affairs (***Traffic Department***)

ENVIRONMENTAL ISSUES	MITIGATION MEASURES	IMPLEMENTORS	RESPONSIBLE ORGANIZATIONS
	Contractor most also follow procedures for handling explosives as prescribed in the Standard Specifications for Road Works (Section 1222)		
A20. Disruption of Traffic flow during construction	Traffic jam during construction should be minimized through traffic management plan and use of road signs. Contractor should deploy personnel at crucial points to guide traffic movement. Involvement of Traffic Officers should also help to ensure smooth movement of traffic during construction.	Contractor Supervised by (***Resident Engineer***)	TANROADS (***Highway Engineer and Environmental Officer***) Consulting Firm (***Highway Engineer***) in collaboration with Ministry of Home Affairs (***Traffic Department***)
B. CONSTRUCTION / OPERATION PHASE			
B6. Destruction of adjacent land use and properties due to increased run-off, flooding and soil Erosion	In slopes and suitable places along the roadside, grass must be planted, and retaining wall, water intercepting ditches, and masonry rubbles must be built to prevent damage to adjacent properties. Temporary and permanent drainage systems must be designed to minimize the impact on adjacent properties during construction and operation, respectively.	Contractor Supervised by (***Resident Engineer***)	TANROADS (***Highway Engineer and Environmental Officer***) Consulting Firm (***Highway Engineer***)
B7. Soil erosion and sedimentation of road pavement along Hedaru - Chekelei road section	Problem of soil erosion due to community activities can be mitigated through construction of dam on the upstream side beyond the road pavement and planting of vegetation. Other measures are to educate local communities on good cultivation practice such as agro-forestry and contour farming. This will require provision of some funds to finance involvement of local NGOs that are active in the area. These NGOs should help to educate the local communities on environmental protection and conservation measures such as tree planting, agro-forestry	Contractor Supervised by (***Resident Engineer***) Local NGOs	TANROADS (***Highway Engineer and Environmental Officer***) in collaboration with Same District Council (***Land Use Planning Officer***) and Representative of Hedaru Ward Executive Committee and Local NGOs responsible of Environmental and Soil Conservation (E.g. ***SECAP, SMECAO and SAIPRO***)

ENVIRONMENTAL ISSUES	MITIGATION MEASURES	IMPLEMENTORS	RESPONSIBLE ORGANIZATIONS
	and contour farming. They will also educate them on alternative source of house construction materials, which do not use wood fuel. Funds should also be provided to finance on the job training for Road Inspector from TANROADS to participate in the environmental protection and soil conservation activities and general environmental monitoring.	TANROADS	
B8. Soil erosion and sedimentation of watercourses	Road run off must be channelled to natural water course through side drains in which baffles and rip rap are placed to check water velocity. Drains must be included at short intervals to cope with run –off. Adequate number of culverts must be designed and placed in such a way that storm water does not damage adjacent land use below the road bed.	Contractor Supervised by (***Resident Engineer***)	TANROADS (***Highway Engineer and Environmental Officer***)
B9. Traffic related accidents	Put road signs to warn motorists of crossing livestock and pedestrians. Whenever possible use Box Culverts as road underpass in appropriate locations for use by crossing livestock. Provide clearly displayed name boards for each village at entrance and exits. Impose speed limits and reinforced by rumble strips at the entrance in village centres. Speed humps should be used sparingly, since they constitute hazards for road users. However, they could be justified near schools and dispensaries but should be clearly marked as pedestrian crossings.	Contractor Supervised by (***Resident Engineer***)	TANROADS (***Highway Engineer and Environmental Officer***) in collaboration with Korogwe and Same District Councils (***Urban Planning Officers***) and Village Government (***Village / Ward Executive Officers***)

ENVIRONMENTAL ISSUES	MITIGATION MEASURES	IMPLEMENTORS	RESPONSIBLE ORGANIZATIONS
	Allocate some funds to finance involvement of Local Communities residing along the road alignment to participate in road safety campaigns during project implementation.		
B10. Risk of accidents to livestock and people in borrow pit and quarry sites	All borrow pits and quarry sites must be fenced off during construction to prevent access by livestock and people. All borrow pits must be restored by refilling with overburden before abandonment. Operations of borrow pits and quarry sites must be done as prescribed in the Standard Specifications for Road Works *(Section 3400)* and Mining Regulation[16]	Contractor Supervised by (***Resident Engineer***)	TANROADS (***Highway Engineer and Environmental Officer***) in collaboration with Korogwe and Same District Councils (***Urban Planning Officers***) and Village Government (***Village / Ward Executive Officers***)
C. DECOMISSIONING PHASE			
C1. Restoration of borrow pits / Quarry sites	In some areas, especially in dry areas the borrow pits could be used a source of water supply for the local communities and their livestock. In this case the Contractor should design the borrow pits to suit the purpose. Some times the borrow pits could be retained for future use as source of road rehabilitation / construction materials. These borrow pits should be fenced off to prevent access by people, especially children and livestock In case no future use is expected of the borrow pits should be restored by backfilling and planting with trees / shrubs.	Contractor in collaboration with the local authorities, under supervision by Resident Engineer.	TANROADS ***(Highway Engineer and Environmental Officer)***
C2. Construction Equipment / Vehicles	All construction equipment / vehicles and machinery	Contractor supervised by	TANROADS ***(Highway***

[16] United Republic of Tanzania. Mining Regulation (Environmental Management and Protection) Regulation of 1999.

ENVIRONMENTAL ISSUES	MITIGATION MEASURES	IMPLEMENTORS	RESPONSIBLE ORGANIZATIONS
/ Machinery	should be removed immediately from the site at the end of defects liability period.	Resident Engineer.	***Engineer and Environmental Officer)***
C3. Workers' Campsite, Workshops and other associated facilities.	The workers' camp site and other facilities should be removed at the end of defect liability period. The removed materials should be transported and kept in safe place for use by the Contractor in other works. However, in some cases the Workers' Campsite can be retained for use by the local communities as a school or dispensary as the case may be. The area should be cleaned and all domestic wastes, debris / waste metals, grease and oils must be cleaned up and disposed of in a manner approved by Resident Engineer.	Contractor supervised by Resident Engineer.	TANROADS ***(Highway Engineer and Environmental Officer)***

TABLE 8.2: COST ESTIMATES FOR ENVIRONMENTAL MANAGEMENT MEASURES

ENVIRONMENTAL MANAGEMENT MEASURES	IMPLEMENTORS (Recipient of funds)	PERCENTAGE OF TOTAL FUND	AMOUNT IN US $
6. Involvement of Local communities residing along the road alignment to participate in road safety campaigns.	Village committees residing along the road alignment	20%	13,680
7. Conducting awareness campaigns on HIV / AIDS and STIs prevention by local NGOs in the project area for local communities and the construction workforce.	Local NGOs	20%	13,680
8. On the job training on Environmental Code of Practice for Road Inspector from TANROADS to participate in the follow-up of environmental protection and soil conservation measures and general environmental monitoring during project implementation.	Environmental Specialist from RS-ES within the Ministry of Infrastructure Development	10%	6,840

9. Conducting awareness and education campaigns for the local communities on soil conservation measures such as tree planting, agro-forestry and contour farming methods, as well as on the use of alternative house construction materials which do not use wood fuel. (E.g. red soil + cement bricks instead of burnt bricks).	Local NGOs and Same District Council	40%	26,000
10. Independent Environmental Monitoring and Auditing	NEMC in collaboration with RS-ES and TANROADS	10%	6,500
	Total	**100**	**68,400**

9. ENVIRONMENTAL MONITORING AND AUDIT

9.1 Environmental Monitoring

The Contractor will be responsible for implementation of environmental and social mitigation measures under the Supervision of Resident and Environmental Officer from TANROADS. This is to ensure that technical and environmental clauses are followed and well implemented by the Contractor. The Environmental Compliance Monitoring Checklist is shown in **Appendix 9[17].**

During road construction the Road Inspector from TANROADS shall also be responsible for Environmental Monitoring in collaboration with an Environmental Expert. However, the Road Inspector may require some training on Environmental Code of Practice. This will be a kind of on-the job training conducted by Environmental specialist from the Road Sector Environment Section (RS-ES). The purpose of the monitoring exercise is to ensure that the Contractor adheres to the Environmental Code of Practice and to ensure that maximum benefits are obtained from implementation of environmental and social mitigation measures.

A senior representative of the Contractor must be nominated to oversee compliance with environmental mitigation measures. The Contractor's representative must submit a monthly report to the Resident Engineer specifying that:

- ③ All previously notified failures to comply with the mitigation measures have been rectified.
- ③ All newly notified requirements have been fulfilled and all standard requirements (as specified in this report) have been put into effect.

The Resident Engineer must countersign the report and make it available to TANROADS, which in turn should pass a copy to the Ministry of Infrastructure Development (RS-ES), NEMC, Korogwe and Same District Councils within a reasonable period not exceeding 30 days from receipt.

The purpose of environmental monitoring is also to make sure that there is proper traffic management to minimize accidents and impacts on adjacent properties. This stage will also require the presence of National Environmental Agencies (NEMC, VPO) and other relevant stakeholders, including the Ministry of Home Affairs (Traffic Department).

There must be a feed back from monitoring to ensure that failure to implement an approved measure incurs a penalty to the Contractor. The Resident Engineer's job should include enforcement of mitigation measures. But such an approved measure may turn out to have no desired effect or unforeseen adverse impacts. Thus, failure of a measure to mitigate an adverse impact should be reported to TANROADS-which would need to be capable of finding out why, and of commissioning appropriate further measures, otherwise absence of that mechanism would render the whole mitigation and monitoring process become futile.

The first responsibility of Resident Engineer is to ensure that he understands and promotes the objectives of road rehabilitation with minimal adverse impacts, ecologically and socio-

[17] MOW (2004). Environmental Assessment and Management Guidelines for Road Sector. Ministry of Works

economically, regardless of whether they have been specified in this report. In that way he/she promote environmentally –friendly road construction under all circumstances.

9.2 Environmental Audit

According to the regulation Environmental audit should be conducted by a registered Environmental Auditor or Environmental Inspector or a Firm of Experts. The regulation also requires Environmental Audit study to be undertaken within 12 Months of the commencement of the operation and not more than 24 Months after completion of the project[18].

The purpose of Environmental Audit is to verify compliance with the recommended mitigation measures. Therefore, Environmental Audit Report should be specific to the compliance issues rather than being general about the project or about the area. The auditing team should be accompanied by one social scientist and one ecologist.

The Environmental Audit study should be conducted in accordance with the Terms of Reference (TOR) developed by TANROADS in consultation with NEMC[19]. The environmental auditing TOR should be sharply focused on attainment of mitigation and they should be empowered to require the application of stronger and / or alternative measures where failure occurs. It is recommended that the provision for environmental audit should be made within the total project cost to ensure that it is funded from the very beginning.

10. DECOMMISSIONING PLAN

10.1 General requirements

In general during decommissioning phase all work areas and offices and workshops /garages and other temporary installations must be cleaned up and the site restored. The includes removal or re-use of temporary buildings, materials, wood, refuse, surplus materials, embankments or any other material that is not in the area before constriction works.

All natural drainages must be restored and excavated materials must be used to fill excavated areas and spread. The damaged areas must be restored to make it compatible with future use. However, the contract must consult the local authority to obtain information about the envisaged use of the area.

Natural drainage must be preserved during rehabilitation and restoration works, ditches must be created to facilitate water run-off by installing drains and derivation dutches perpendicular to the slopes. All superfluous temporary drainage elements must be removed. Permanent installations must be restored / repaired to their initial state.

The compacted soils must be scarified to at least 15 cm deep to loosen it and facilitate vegetation growth. Concrete surfaces, paving stones and flagstones must be removed or broken and covered with 1 m of topsoil.

Damage trees must be chopped / lopped and crosscut after completion of construction works. The site must be cleared of equipment, materials, provisional installations, wastes, debris and

[18] See Section 46(5) of The Environmental Impact Assessment and Audit Regulations G.N. No. 348 of 2005
[19] See Section 46(7) of The Environmental Impact Assessment and Audit Regulations G.N. No. 348 of 2005.

overburden resulting from construction works. The adjacent strip of vegetation must be cleaned.

10.2. Specific requirements

10.2.1 Restoration of borrow pits and quarry sites

The restoration of borrow pits should be done by levelling the ground and planting trees, shrubs, grass or tree crops or other crops growing in and area. The holes in the quarry sites could be filled with earth or stones and planted with vegetation. The stockpiled soil around borrow pits and surplus excavated materials must be stabilized. The area must fit well with the surrounding landscape and should be sufficiently drained. The planted vegetation should be maintained for a period of 1 year after decommissioning period.

However, in some drought stricken areas the borrow pits / quarry sites could be designed and water level adjusted for use by the local people and livestock. Also, in some cases the site could be transferred / handed over for use by another project.

10.2.2 Temporary Access Roads and Culverts

The temporary access roads must be closed to prevent public access. However, the Contractor must make consultation with the local authorities to decide about the possible future use of the roads. The slopes must be stabilized by spreading topsoil spread and planting vegetation at entrances and exits in prominent areas such as in borrow pits or quarry sites.

Temporary culverts must be removed and the natural drainage restored. In streams / river crossings it is important to restore normal flow. The river beds and river banks must be restored as mush as possible to their original conditions.

10.2.3 Workshops / Garages and Materials storage areas

The workshop and other materials storage areas must be cleaned to remove petroleum products like oils and grease. The petroleum products should be handled in accordance with the provisions given in the Standard Specification for Road Works (2000).

All asphalts, cements, stockpiled gravels and any other surplus materials must be removed from the Materials storage yard. The useable materials should be taken away and stored in a safe place far from the abandoned site. The spilled materials must be removed and the site must be properly cleaned and restored to its original state. If possible the site must be prepared and planted with vegetation.

10.2.4 Solid Waste Dump sites

The solid waste dump site must be cleaned, levelled and returned to a regular form. All wastes in the dump site should be thoroughly covered with a soil. The Contractor must ensure that no wastes are visible and no surface water drains into the site.

The eliminated dry materials should form a stable slope and must be in harmony with the surrounding landscape. The wastes should be covered with 1 m of earth or granular material. The soils should be compacted thoroughly, the slope flattened and spread a layer of additional cover material and cover with topsoil and plant with vegetation.

11. CONCLUSION AND RECOMMENDATIONS

Most of the negative impacts identified in this study are of low significance and could be easily, mitigated through design and good engineering practice. Moreover, the project will not have any significant impact on any buildings or properties and therefore there won't be any resettlement / compensation to be made during implementation of this project. That should also be the case because the rehabilitation work will be confined to the existing alignment and there won't be any land acquisition for borrow pits or quarry sites.

In addition, it is anticipated that the existing borrow pits and/or quarry sites will be used to obtain the required road construction material. Therefore, there will be no any resettlement or need for compensation in this project.

The most important issues of major concern to this project are the problem of soil erosion and sedimentation of road pavement between Chekelei Village (CH. 109+800) and Hedaru (CH. 119+100). However, the problem could be mitigated through soil conservation methods and engineering design. This will also require involvement of local communities and NGOs to introduce soil conservation methods such as agro-forestry, contour farming on hilly areas and planting trees. The local NGOs should also initiate awareness and education campaigns for local people to use alternative method of making bricks that does not rely on fuel wood. Nevertheless, those interventions would require some financial support from TANROADS to assist the local NGOs, whenever possible.

It is therefore recommended that the project should be implemented as planned. Nevertheless, of much importance to this project is the involvement of local communities, NGOs and District Councils in various phases of project implementation.

For example, public participation could be useful to reduce the traffic hazard. This will help to raise the people's awareness on the traffic safety. Their involvement will also help to show at least the local communities have some say in what happens in their villages. In general, effective implementation of mitigation measures would require active involvement of various stakeholders, especially the local communities.

In order to effectively implement mitigation measures and ESMP the Consultant provides the following specific recommendations:

In addition to the given recommendations, the Consultant would like to give the following specific recommendations:

h) Environmental Specialist from TANROADS should be involved in monitoring to ensure smooth implementation of proposed mitigation measures.
i) One Road Inspector from TANROADS should obtain on-the job training on Environmental Code of Practice to effectively undertake environmental monitoring under Environmental Specialist from Road Sector Environment Section (RS-ES).
j) A small budget should be allocated by TANROADS for the District Councils and Local NGOs to promote soil conservation, tree-planting activities to control soil erosion and sedimentation of road pavement.
k) TANROADS should involve the local communities in the implementation of mitigation measures and road maintenance (E.g. control of road side vegetation and cleaning of road side drains).

l) TANROAD should involve the local communities and local NGOs in the monitoring of the Contractor to ensure compliance with the proposed mitigation measures.
m) TANROADS should contribute to anti-AIDS campaigns during road construction phase by allocating some funds to the local NGOs that are active in the area.
n) One copy of ESIA Report should be sent to Korogwe and Same District Councils so that they are well informed at the design stage.

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APPENDICES

APPENDIX 1: JUXTAPOSITION OF THE 1:50000 TOPOGRAPHIC MAPS

88/1 Lossogoni	89/1 Same	89/2 Kisiwani				
88/4 Martin	89/3 Jiungeni	89/4 Makanya				
107/2 Olmotilosing	108/1 Remiti	108/2 Hedaru	109/1 Mkomazi	109/2 Mlalo		
	108/3	108/4 Samsangeni	109/3 Mazinde	109/4 Lushoto		
	128/1	128/2 Semita	129/1 Pangani River	129/2 Korogwe	130/1 Mnyuzi	130/2 Muheza
	128/3	128/4	129/3 Handeni	129/4 Kwamkono	130/3 Hale	130/4 Pangani
				148/2 Kwedikwazu	149/1 Gendagenda	149/2 Sakura

APPENDIX 2: BIOPHYSICAL AND SOCIO-ECONOMIC CHARACTERISTICS OF THE ROUTE CORRIDOR

Block No.	Block Name	Chainage (CH)	Location (Lat. & Long.)	Topography	Soils	Flora and Fauna	Land Use	Service utilities / linear infrastructure	Remarks / Other significant features
1.	Segera	0+ 000	5° 15′ S 38° 30′ E						
				hilly /	red loam	forest	Forest reserve		
				undulating	(fertile)				
						scrubland	cultivation (L)		
							cultivation (L&R)		
2.	Mandera	1 + 900					cultivation (L&R)		
				hilly / undulating	red loam		cultivation (L&R)		
					(fertile)	scrubland			
							settlement (L&R)		
							cultivation (L&R)		
						scrubland	sisal plantation		sisal starts at CH. 4 + 200)
						scrubland	cultivation (R)		
							mango tree farms		
							mango tree farms		
3.	Kwakombo	5 + 100	5° 12′ S 38° 29′ E						
				hilly /	reddish brown loam		cultivation (R)	crossing electricity	
				undulating	(fertile)		sisal plantation	lines	
							settlement (R)		
							cultivation (L)		
						scrubland	cultivation (L)		pasture land
							cotton tree farms		
							sisal plantation		sisal starts at CH. 9 + 000
4.	Kwamdulu	8 + 300	5° 10′ S 38° 27′ E						

Block No.	Block Name	Chainage (CH)	Location (Lat. & Long.)	Topography	Soils	Flora and Fauna	Land Use	Service utilities / linear infrastructure	Remarks / Other significant features
				hilly /	red loam	scrubland (R)	sisal plantation		few isolated trees
				undulating	(fertile)		sisal plantation		
							cultivation (R)		
						scrubland (R)	settlement (L)		
						scrubland			pasture / grazing land
						scrubland			
						scrubland	Cashew nut plant.		conspicuous at CH. 11 + 400
						scrubland	cultivation (R)		
						scrubland	coconut farms		conspicuous at CH 12 + 500)
						scrubland	cultivation (R)		
							settlement (L&R)		
						scrubland	coconut trees (R)		
5.	Korogwe	13 + 000	5° 08′ S 38° 26′ E						
				hilly /	red loam (fertile)		central business district	railway crossing	
				undulating			cultivation (L&R)	(CH. 13 + 400)	
							settlement	electricity lines (overhead)	
							exotic trees	telephone lines (overhead)	
							coconut trees	Pangani River bridge	
							cultivation (L&R)	crossing (CH. 13+000)	
							cultivation (L&R)		
						scrubland	cultivation (L)		
							cultivation (L&R)		
							coconut trees		
6.	Kitonga	16 + 800	5° 07′ S 38° 22′ E						

Block No.	Block Name	Chainage (CH)	Location (Lat. & Long.)	Topography	Soils	Flora and Fauna	Land Use	Service utilities / linear infrastructure	Remarks / Other significant features
				hilly	red loam (fertile)		settlement		
							cultivation		
							settlement		
							cultivation		rock outcrops
							cultivation		rounded hilltops
							coconut trees		
							cultivation		
7.	Msambiazi	20 + 600	5o 06/ S 38o 21/ E						
				hilly			cultivation		
							settlement		Quarry site 500 m from
							mango trees		the road
							coconut trees		
							settlement		
							cultivation		abandoned borrow pit at
							settlement		CH. 22 + 400
						scrubland			Mtibi stream at CH. 23 + 800
						scrubland			Bridge
							cultivation		
							cultivation (R)		Pangani River close to the road
							mango trees		at CH. 24 + 600
							rice farms (L)		Wetland
							cultivation (R)	railway line close	
							mango tree	(5 m) at CH. 26 + 000)	
							coconut trees		
8.	Gobe	26 + 100	5o 04/ S 38o 20/ E						
				hilly / undulating			settlement (L&R)		
							cultivation (L&R)		

Block No.	Block Name	Chainage (CH)	Location (Lat. & Long.)	Topography	Soils	Flora and Fauna	Land Use	Service utilities / linear infrastructure	Remarks / Other significant features
							mango trees (L)		
							cotton tree farms		
							coconut trees (L)		livestock route crossing
							mango trees (L&R)		
							coconut trees (L &R)		
							cultivation (L&R)		
							cultivation (L)		
							cotton tree farms	railway line close	
							cultivation (L&R)	(□10 m)	
							mango tree farms		
							mango tree farms		
							settlement		local bus stop (unofficial)
							coconut tree farms		
							settlement		
9.	Kiloza	29 + 000	5^{o} 02/ S 38^{o} 19/ E						
				undulating			settlement		
							cultivation		
							coconut trees		livestock route crossing
							cultivation		local bus stop (unofficial)
							cultivation		local market-selling clothes
							mango trees		
							cashew nut farms		
				flat land			coconut trees		
							coconut trees		
10.	Kwasunga	31 + 400	5^{o} 01/ S 38^{o} 19/ E						
				undulating			settlement		
							cultivation		

Block No.	Block Name	Chainage (CH)	Location (Lat. & Long.)	Topography	Soils	Flora and Fauna	Land Use	Service utilities / linear infrastructure	Remarks / Other significant features
							settlement		
							cultivation		
							mango trees		
							coconut trees		
							coconut trees		
							settlement	railway crossing	seasonal stream
							settlement	(CH. 35 + 000)	
							settlement	bus stand	
							cultivation	(CH. 35 + 700)	
11.	Mpirani	36 + 000	4° 59/ E 38 18/ E						
							cultivation		
							cultivation (R)		
							settlement		livestock route crossing
						scrubland			
						scrubland (R)	cultivation (L)		
						scrubland	cultivation (R)		
12.	Makuyuni	38 + 700	4° 57/ E 38° 17/ S						
						scrubland			abandoned borrow pit
							cultivation		(CH. 38 +700)
							cultivation		cultivation within road reserve
							cultivation	railway line crossing	
							cultivation	(CH. 39 + 600)	wetland (R)
				flat land			settlement		
									local bus stop (CH. 40 + 800)
13.	Madumu	41 + 300	4° 56/ S 38° 17/ E						
				flat / undulating			settlement	houses and some	

Block No.	Block Name	Chainage (CH)	Location (Lat. & Long.)	Topography	Soils	Flora and Fauna	Land Use	Service utilities / linear infrastructure	Remarks / Other significant features
						baobab woodland		kiosks in road reserve	
							settlement		
							cultivation	railway crossing	
							sisal plantation	(CH. 42 + 000	
							cultivation (R)		
							rice farms (R)		
14.	Chekelei	44 + 100	4^{o} 54/ S 38^{o} 17′ E						
				extensively flat			settlement		irrigation in Chekelei valley
				valley			cultivation (L&R)		wetland (CH. 44 + 900)
							settlement		
							cultivation (L)	railway crossing	
							cultivation (L)	(CH. 44 + 900)	
							settlement (R)		
							cultivation (R)		
							cultivation (L)		
							settlement (R)		livestock route crossing
							cultivation (L)	railway line close	
15.	Mombo	51 + 500	4^{o} 51′ E						
			38^{o} 15′ S	undulating			central business	railway crossing	Mombo river -
							district	(CH. 56 + 800)	river banks with
							riverine forest		tall tress and climbers (liana)
							settlement		livestock route crossing the road
				flat land			sisal plantation	overhead transmission	
							cultivation (R)	line crossing	
							sisal plantation		
						scrubland			

Block No.	Block Name	Chainage (CH)	Location (Lat. & Long.)	Topography	Soils	Flora and Fauna	Land Use	Service utilities / linear infrastructure	Remarks / Other significant features
16.	Kasiga	63 + 400	4° 46′ S 38° 10′ E						
							settlement	leaking water	small business in the road
							cultivation	pipeline crossing	reserve selling vegetables
							cultivation	(CH. 66 + 350)	
							sisal plantation		primary school near the road
						scrubland with isolated			
						baobab trees			
17.	Mazinde	68 + 600	4° 44′ S 38° 08′ E						
				flat land			sisal plantation	railway station /	livestock route crossing
							cultivation (R)	servant quarters	local bus stop
						scrubland		(CH. 65 + 400)	
							settlement	railway line close (R)	school children crossings
						thicket			
							sisal plantation	water pipelines	
							banana farms (L)	(underground)	
							cultivation (L)	(CH. 66 + 600)	
							sisal plantation		
							mango trees		
							cultivation		wetland - Mkomazi
							cultivation (L&R)		(CH. 69 + 100)
							settlement		
							cultivation		
						scrubland			
						scrubland	cultivation (R)		
						thicket (R)	settlement		
						thicket		railway close (□15 m)	

Block No.	Block Name	Chainage (CH)	Location (Lat. & Long.)	Topography	Soils	Flora and Fauna	Land Use	Service utilities / linear infrastructure	Remarks / Other significant features
18.	Mkumbara	72 + 000	4° 42′ E 38° 07′ S						
							settlement	electricity lines	
							cultivation		
						scrubland			pasture / grazing land
						scrubland			bus stand (CH. 78 + 000
						Acacia bush.	sisal plantation		
						Acacia bush.(L)	sisal plantation		
						scrubland	sisal plantation		
							cultivation (L)		
							settlement (R)		
						scrubland	sisal plantation		
						scrubland	sisal plantation		(Start at CH. 80 + 100)
						scrubland	coconut trees (L)		
				flat land	grey mbuga	scrubland			
					soil	Acacia bush.			
						Acacia bush.			
						scrubland			
							settlement		
						scrubland			
19.	Goha	81 + 300	4° 39′ S 38° 03′ E						
							settlement (R)		
							coconut trees (L)		
						scrubland			
						Acacia bush.(L)			
						scrubland			
							settlement		
20.	Manga	83 + 300	4° 38′ E						

Block No.	Block Name	Chainage	Location	Topography	Soils	Flora and	Land Use	Service utilities /	Remarks /
		(CH)	(Lat. & Long.)			Fauna		linear infrastructure	Other significant features
			38° 02′ S	flat land	red loam	scrubland			abandoned borrow pit
						thicket / bushland	settlement		spotted hyena *(Crocuta*
							cultivation		*crocuta)* knocked
							rice farms		down by a speeding vehicle
					brownish / grey stony soils	thicket / bushland			
					(non-fertile)				
21.	Bwiko	93 + 400	4° 26′ S 38° 00′ E						
				undulating	brownish / grey stony		settlement	railway overpass	bush fires are common
					soils	thicket / bushland		bridge (CH. 92 + 800)	charcoal burning and selling
						thicket / bushland		high tension overhead	Mkomazi river crossing
								transmission lines	(CH. 93 + 700)
					red soil	thicket / bushland			Kilimanjaro / Tanga Border
							cultivation		(CH. 103 + 800)
							cultivation		charcoal burning and selling
					brownish /	scrubland			
					grey stony	Acacia bush.			
					soils		settlement		
22.	Chekereni	109 +800	4° 28′ S 37° 52′ E						
							settlement		
							cultivation		
					red sandy		cultivation		severe soil erosion
					loam		cultivation		soil erosion downstream
									embankment upstream to control sedimentation of pavement

Block No.	Block Name	Chainage (CH)	Location (Lat. & Long.)	Topography	Soils	Flora and Fauna	Land Use	Service utilities / linear infrastructure	Remarks / Other significant features
									trees planted along the road
									sedimentation of pavement
					red sand loam		cultivation (R)		
					(loose)				
23.	Hedaru	117 + 200	4° 24′ S 37° 51′ E						
				flat			settlement		severe soil erosion with gully
							cultivation		formation downstream
							cultivation		(CH. 121 + 600)
							cultivation		trees planted along the road
							settlement		severe sheet erosion upstream
24.	Saweni	123 + 300	4° 21′ S 37° 50′ E						
				flat			settlement		
						scrubland			livestock route crossing
									severe land degradation
25.	Mkwini	129 + 600	4° 16′ S 37° 51′ E						
				flat			settlement		livestock route crossing
							settlement		monkeys noted crossing
						scrubland			
							sisal plantation		
26.	Makanya	135 + 500	4° 12′ S 37° 50′ E						
				flat			sisal plantation		
							sisal plantation		borrow pit
									borrow pit
							sisal plantation		livestock route
							sisal plantation		sisal ends at CH. 138 + 400)
						scrubland			charcoal making and selling
									(160 + 400)

Block No.	Block Name	Chainage (CH)	Location (Lat. & Long.)	Topography	Soils	Flora and Fauna	Land Use	Service utilities / linear infrastructure	Remarks / Other significant features
						scrubland / thicket			firewood cutting and selling
					red sandy soils	scrubland			
						scrubland			charcoal making and selling
									(164 + 400)
					reddish brown soils	scrubland			trees planted along the road
						scrubland			bus stop (CH. 169 + 200)
						/ bushland			
						thicket			
							cultivation		
							settlement		
27.	Same	171 + 100	3° 00′ S 37° 40′ E						
				flat land	red sandy soil		central business		
							district		

APPENDIX 3: NAMES OF PEOPLE CONSULTED DURING THE STUDY

A. NAMES OF PEOPLE INTERVIEWED DURING THE STUDY

1.	**NAME**	**DESIGNATION**	**ADDRESS**
2.	MS. Esther Mbiligili	District Executive Director	Korogwe District Council
3.	Hamisi Singano	Acting District Executive Director	Same District Council
4.	Eng. Materu	Project Manager	TANROADS
5.	Eng. Ako	Regional Manager	TANROADS - TANGA
6.	Yohana Mhando	Assistant Planning Officer	Korogwe District
7.	Ado Stephano Mapunda	Assistant Planning Officer	Korogwe District
8.	Ramadhani Kingo	Land Officer, Korogwe	Korogwe District
9.	Patrice Mangawe	Community Development Officer	Korogwe District
10.	M. Mapato	District Hospital Health Secretary	Korogwe District
11.	Mr. Mpazi	District HIV / AIDS Coordinator	Korogwe District
12.	Mr. Tenson Joseph	Technician	Ubungo Water Central Laboratory
13.	Mr. Lusajo	Environmental Standards Officer	Tanzania Bureau of Standards
14.	Mr. Greyson Kigondi	Village member	Hedaru Wards
15.	Mr. Kahabi	Coordinator	SAIPRO
16.	Mr. Alphonce N. Sambura	Assistant Coordinator	SMECAO
17.	Saimon Mmakasa	Coordinator	SMECAO
18.	Anthony J. Makoye	Chairman	Tanzania Vetiver Network
19.	Eng. Mgeta	Environmental Engineer	TANROADS HEADQUARTERS
20.	Mr. Kombe	Acting Director	EIA Directorate NEMC

B. NAMES OF PEOPLE WHO ATTENDED CONSULTATIVE MEETING

MANUNDU WARD	
1.	Mbise – Ward Executive Officer
2.	Shedafa Sheludehe – Ward Education Officer
3.	Athuman Magogo
4.	Ali Maonga
5.	Anna Lema
6.	Oscar Yagasa
7.	Mashaka Issa
8.	Mohamed Msabaha
9.	William Sempoli
10.	Hamis Issa
11.	Boniface Assey
12.	Sadick Shekimweri
13.	Safari Ayub
14.	Mohamed Wayayu
15.	Ally A. Msomea
16.	Hauma Mkilisi
17.	Said Buge
18.	Juma Issa Kihamia

19.	Selemani Juma
20.	Mwajuma Musa
21.	Muyanda
22.	Bashiri Shebila
23.	Asha Makao
24.	Antony Sanga
25.	Athman Magogo
26.	Jammila Msabaha
27.	All M. Karata
28.	Sadiki Mshengwatu
29.	Ali Maonga
30.	Mohamed Shosi
KILOLE WARD	
1.	Mwajuma Jackson – Ward Executive Officer
2.	George Mkinga
3.	Abdu Ayubu
4.	Jeni Mhina
5.	Hamisi Katomali Hosen Luchele
6.	Anthon Mhaiki
7.	Mariam Akija
8.	Asha Ramadhan
9.	Bakari Ramadhan
10.	John Haule
11.	Abdalah
12.	Mary Joseph
KWAMSISI	
Mwisadi - Ward Executive Officer	
CHEKELEI WARD	
1.	Moses Mkanyage - Ward Executive Officer
2.	Dr Mapunda
3.	Ayubu Mwinyijuma
4.	Mr Mbega
MOMBO WARD	
1.	Anthony Fuad Rashid - Township Executive Officer, Mombo
2.	Aziza Saida
3.	Hasani Sabuni
4.	Mikidadi Mwandege
5.	Bebi Badru
6.	Peter Masita
7.	Leornad Masonu
8.	Selemani Singano
9.	Ally A. Saguti
10.	Martin Shegwando
11.	Hamdani Hozza
12.	Halima Ally
13.	Amina Athman
14.	Juma Mrindoko
15.	Juma William Magogo
16.	Waziri Sheshe

17.	Habibu Said
18.	Seff Mwindadi
MAKUYUNI WARD	
1.	Boniface Siruri
2.	Muhsini S. Kashereje
3.	Ernest Misesi
4.	Hassan Njama
5.	Michael Ngoda
6.	Michael Wangole
7.	Said Shaban
8.	Mohamed Mashaka
9.	Rukia Rajabu
10.	Mwaisha Hemed
11.	Mbuguni Hemed
MAZINDE WARD	
1.	Abdallah Hamis
2.	Francis Mbwana
3.	Mama Hashim
4.	Matata Ali
5.	Ole Ndeiskoyi
6.	Maimuna Karata - Ward Executive Officer
7.	Bakari Mwinyikombo – Village Chairman
8.	Jumanne Sige
9.	Mamejaha Kikoti
10.	Zaina Mwamed
11.	Athman Mshimbila
12.	Zubeda Mahundi
13.	Asha mahundi
14.	Musa Mahundi
15.	Sadiki Rashid
16.	Sadiki Zuberi
17.	Omar Mwamin
18.	Omari Addallah
SAME WARD	
David Mkunundu - Ward Executive Officer	
HEDARU WARD	
1.	Andrew Mbwambo - Ward Executive Officer
2.	Fadhiri Herisante
3.	Naomba Janoowala
4.	Daud Mweta
MKOMAZI WARD	
1.	Joseph Mng'ano
2.	Peter Mhina
3.	Henry Mbaga

APPENDIX 4: LIST OF PHOTOGRAPHS

Plate 1: The road alignment passing through the forest reserve at Maili Kumi (CH. 0+000)

Plate 2: Sisal plantation on the left hand side near Mandera Village (CH. 2+100)

Plate 3: The Pangani River Bridge the river bed underneath is rocky (CH.13+500)

Plate 4: This is one of the important non-motorized transports. The cyclist is passing through the Pangani river bridge posing a risk to his life due to speeding vehicles.

Plate 5: One of the abandoned borrow pits close to the road. The borrow pit is creating a visual impact to road users.

Plate 6: One of the local bus stops used by people (CH. 28+800). Lack of parking space or waiting area creates a potential risk of accidents to the pedestrians.

Plate 7: One of the Charcoal selling areas along the road alignment near Mandera Village.

APPENDIX 5: RAPID IMPACT ASSESSMENT MATRIX (RIAM) TECHNIQUES

STEP 1: CATEGORIZATION OF IMPACTS

ENVIRONMENTAL COMPONENTS	Magnitude	Significance	Permanence	Reversibility	Cumulative	$\alpha 1$ X $\alpha 2$	$\beta 1 + \beta 2 + \beta 3$	$\alpha\tau$ x $\beta\tau$	Range Value	Description of impacts
	(A1)	(A2)	(B1)	(B2)	(B3)	$\alpha\tau$	$\beta\tau$	ES		
Biophysical Components (BC)										
. Air pollution	1	-2	2	2	1	-2	5	-10	-2	significant negative impact
. Noise / vibration	1	-2	2	2	1	-2	5	-10	-2	significant negative impact
. Soil and Water pollution	1	-2	2	2	3	-4	7	-28	-3	moderate negative impact
. Soil erosion and sedimentation of road pavement	1	-4	2	2	1	-4	5	-20	-3	moderate negative impact
Soil erosion and sedimentation of stream / river beds	1	-4	3	3	3	-4	9	-36	-4	high negative impact
. Destruction of natural vegetation	1	-2	3	3	1	-4	7	-28	-3	moderate negative impact
. Creation of breeding sites for water borne vectors	2	-3	3	2	3	-6	8	-48	-4	high negative impact
Socio-economic Components (SC) .	.									
Disruption of traffic flow during construction	1	-2	2	2	1	-2	5	-10	-2	significant negative impact
Risk of accidents in borrow pit / quarries	1	-2	3	3	1	-2	7	-14	-2	significant negative impact
. Increased incidence of HIV/AIDS	2	-2	3	3	3	-4	9	-36	-4	high negative impact

. Increased traffic related road accidents	1	-2	3	3	3	-2	9	-18	-2	significant negative impact
. Construction related accidents	1	-2	2	3	3	-2	8	-16	-2	significant negative impact
. Destruction of infrastructure & utilities	1	-2	2	2	1	-2	5	-10	-2	significant negative impact
. Disruption of Pedestrian and Non-motorized transport	2	-2	3	2	1	-4	6	-24	-2	significant negative impact
. Destruction of adjacent land use	1	-2	3	3	1	-2	7	-14	-2	significant negative impact
. Temporary employment opportunity	1	+2	2	2	1	2	5	10	2	significant positive impact
. Increased income to local people	1	+2	2	2	1	2	5	10	2	significant positive impact
. Reduced vehicle maintenance and operational costs	3	+2	3	3	3	6	9	54	4	high positive impact
. Increased tourism activities	3	+2	3	1	3	6	7	42	4	high positive impact

STEP 2: DETERMINATION OF ASSESSMENT CRITERIA

Assessment of impacts is done according to the following Group A and B Criteria:

Group A Criteria

. Magnitude (A1)

4 = national / international
3 = regional / national
2 = local
1 = site specific

. Significance (A2)

+4 = very highly significant positive impact (Very High)
+3 = highly significant negative impact (High)
+2 = moderately significant (Intermediate)
+1 = low significance (Low)
0 = no change / not applicable
-1 = low negative impact (Low)
-2 = moderately significant negative impact (Intermediate)
-3 = highly significant negative impact (High)
-4 = very highly significant negative impact (Very High)

Group B Criteria

. Permanence (B1)

1 = no change / not applicable
2 = temporary
3= permanent

. Cumulative (B3)

1 - no change / not applicable
2 - non-cumulative
3 = cumulative

. Reversibility (B2)

1 = no change / not applicable
2 = reversible
3 = irreversible

STEP 3: DETERMINATION OF VALUE RANGES

ES	Range Value (Alphabetical) (RV)	Range Value (Numerical) (RV)	Description of Range
144 to 72	+E	5	very high positive impact
71 to 36	+D	4	high positive impact
35 to 19	+C	3	moderate positive impact
10 to 18	+B	2	significant positive impact
1 to 9	+A	1	very low positive
0	N	0	no change / not applicable
-1to-9	-A	-1	very low negative impact
-10 to -18	-B	-2	significant negative impact
-19 to -35	-C	-3	moderate negative impact
-36 to -72	-D	-4	high negative impact
-72 to -144	-E	-5	very high negative impact

The ranges are derived from the following formula:

$\alpha 1 \times \alpha 2 = \alpha\tau$

$\beta 1 + \beta 2 + \beta 3 = \beta\tau$

$\alpha\tau \times \beta\tau = ES$

Where by:

$\alpha 1$ and $\alpha 2$ are individual criteria scores for Group (A)

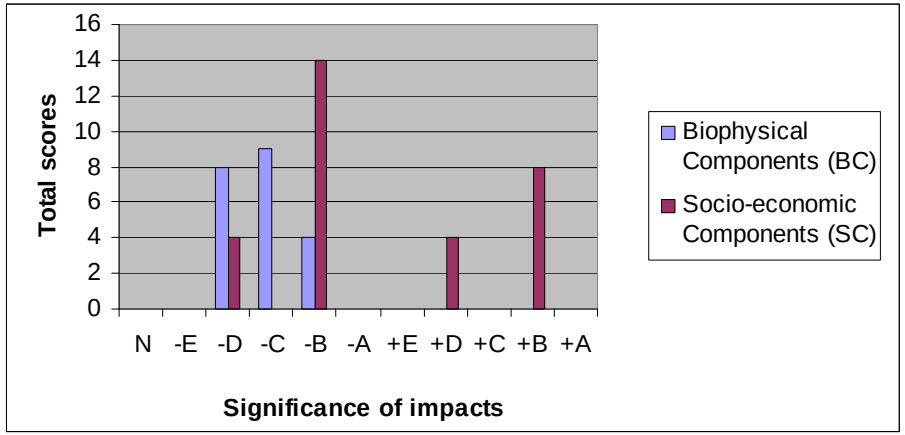
$\beta 1$, $\beta 2$ and $\beta 3$ are individual criteria scores for Group (B)

$\alpha\tau$ is the result of multiplication of all (A) scores

$\beta\tau$ is the result of summation of all (B) scores

STEP 3: RESULTS

Range Value (Alphabetical)	Biophysical components (BC)	Socio-economic component (SC)
N	0	0
-E	0	0
-D	8	4
-C	9	0
-B	4	14
-A	0	0
+E	0	0
+D	0	4
+C	0	0
+B	0	8
+A	0	0



STEP 4: CONCLUSIONS

The total score values for Socio-economic components are + 12 (positive impacts) and -18 (negative impacts). For Biophysical components the total score values are -21 (negative impacts). That means the project will have both negative and positive impacts on Socio-economic components and only negative impacts on Biophysical components.

However, the net values indicate that the project will have less significant negative impacts on Socio-economic environment (-6) and more significant negative impacts on Biophysical environment (-21). It can therefore be concluded that although the project is going to have some negative impacts to the Socio-economic environment it is expected to be socio-economically beneficial.

It is therefore recommended that the identified negative impacts should be minimized and positive impacts should be enhanced to make the project become environmentally sustainable and socio-economically beneficial.

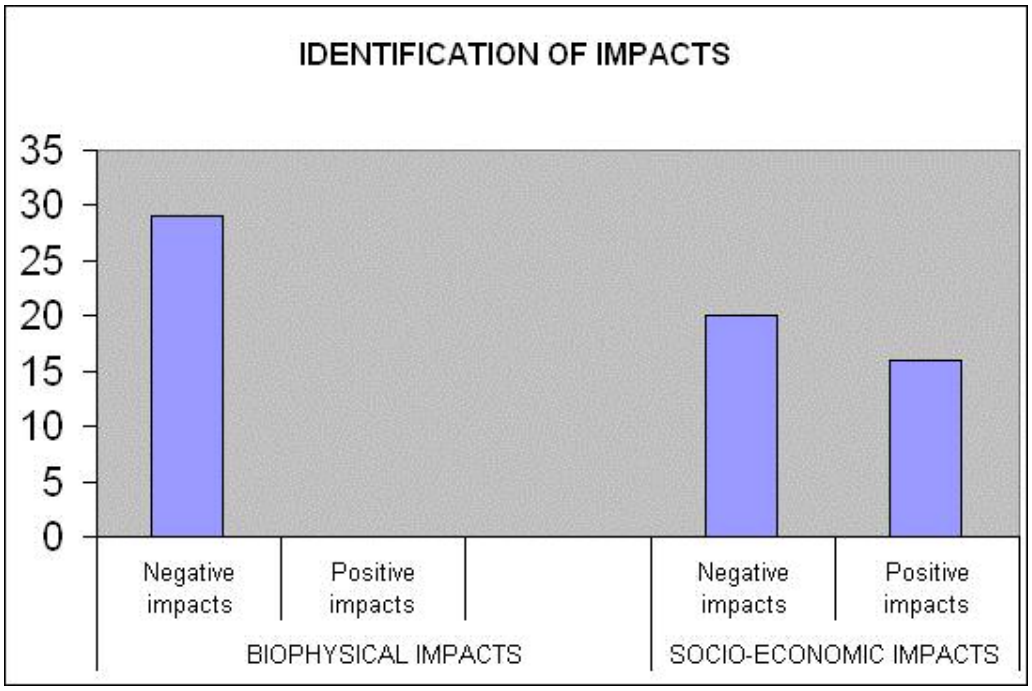
APPENDIX 6: IMPACT IDENTIFCATION MATRIX

POTENTIAL IMPACTS / PROJECT ACTIVITIES	BIOPHYSICAL IMPACTS							SOCIO-ECONOMIC IMPACTS												
	Dust / Air Pollution	Noise / Vibration	Surface Water Pollution	Sedimentation of stream / river beds	Sedimentation of road pavement	Soil and Water Pollution	Destruction of stream/river bank vegetation	Increased traffic related accidents	Destruction of infrastructure / Service utilities	Disruption of traffic flow	Destruction of adjacent land use / properties	Disruption of non-motorized transport	Construction related accidents	Risk of accidents in borrow pits and quarry sites	Creation of breeding site for mosquitoes	Improved tourism activities	Creation of temporary employment	Increased income to local communities	Transmission of HIV/AIDS and STIs	Reduced vehicle maintenance costs
Construction Phase																				
. Operation of mobile equipment / machinery	-☐	-☐											-☐	-☐			+☐			
. Operation of workers campsite																	+☐		-☐	
. Operation of borrow pit / quarry site	-☐	-☐											-☐	-☐	-☐		+☐			
. Use of explosives	-☐	-☐												-☐						
. Solid and liquid waste disposal from campsite			-☐			-☐														
. Storage / handling of fuels / oils / grease			-☐			-☐														
. Transportation and storage of construction materials	-☐																+☐			
. Construction of access roads / detours	-☐	-☐	-☐							-☐	-☐						+☐	+☐		
. Hauling of construction waters from streams/rivers			-☐	-☐			-☐										+☐			
. Construction of bridges / culverts			-☐	-☐			-☐	-☐	-☐	-☐	-☐	-☐					+☐	+☐		
. Construction of road pavement / roadside drainages				-☐				-☐	-☐	-☐	-☐	-☐					+☐	+☐		
. Operation of bitumen / asphalt plant	-☐	-☐															+☐	+☐		
. Operation of concrete mixing plant	-☐	-☐															+☐			
. Stockpiling of Spoils and construction wastes			-☐	-☐			-☐			-☐	-☐	-☐								
. Solid and liquid waste disposal from campsite																				
Operation Phase																				
. Presence of improved road infrastructure								-☐								+☐		+☐		+☐
. Upstream cultivation by local communities					-☐															
. Abandonment of borrow pit and quarry sites														-☐						
	-7	-6	-6	-4	-1	-2	-3	-3	-2	-4	-4	-3	-2	-1	-1	1	10	5		1

NOTE: +☐ = Positive Impacts; -☐ = Negative Impacts

BIOPHYSICAL IMPACTS	
Negative impacts	Positive impacts
7	
6	
6	
4	
1	
2	
3	
29	
BIOPHYSICAL IMPACTS	
Negative impacts	Positive impacts
29	-

SOCIO-ECONOMIC IMPACTS	
Negative impacts	Positive impacts
3	1
2	10
4	5
4	
3	
2	
1	
1	
20	16
SOCIO-ECONOMIC IMPACTS	
Negative impacts	Positive impacts
20	16



CONCLUSIONS

The findings indicate that the project will have both negative and positive impacts on socio-economic Components. The project will also have negative impacts on Biophysical components but no positive and negative impacts should be minimized or mitigated.

APPENDIX 7: IMPACT EVALUATION MATRIX

POTENTIAL IMPACTS	Type		Effect		Intensity				Magnitude				Duration			Riversib.		Significance			
	Positive	Negative	Direct	Indirect	Cumulative	Low	Medium	High	Site specific	Local	Regional	National	Temporary (S-t)	Temporary (l-t)	Permanent (L-t)	Reversible	Irreversible	Low	Medium	High	Very High
. Dust / Air Pollution		☐	☐				☐		☐				☐			☐		☐			
. Noise / Vibration		☐	☐					☐	☐				☐			☐			☐		
. Soil pollution		☐	☐			☐			☐				☐				☐	☐			
. Surface Water Pollution		☐	☐		☐	☐			☐				☐			☐		☐			
. Sedimentation of stream/rivers		☐	☐		☐	☐			☐				☐			☐		☐			
. Soil erosion and Sedimentation of road pavement		☐		☐	☐			☐		☐				☐		☐				☐	
. Ground Water Pollution		☐	☐			☐			☐				☐			☐		☐			
. Destruction of roadside trees in Forest Reserve (F.R)		☐	☐			☐			☐						☐		☐	☐			
. Destruction of Streams/River Bank vegetation		☐	☐			☐			☐				☐			☐		☐			
. Destruction of roadside Sisal Plants / Crops		☐	☐			☐			☐						☐		☐		☐		
. Creation of barrier effect - communities and livestock		☐		☐		☐			☐					☐		☐		☐			
. Increased traffic related accidents		☐		☐		☐				☐					☐		☐	☐			
. Destruction of infrastructure / Service tilities		☐	☐			☐			☐				☐			☐		☐			
. Disruption of traffic flow		☐		☐		☐			☐				☐					☐			
. Destruction of adjacent land use / properties		☐		☐		☐			☐						☐			☐			
. Disruption of non-motorized transportation		☐		☐		☐			☐					☐				☐			
. Displacement of business in urban / village centres		☐		☐		☐			☐					☐		☐		☐			
. Creation of breeding site for mosquitoes		☐		☐		☐			☐					☐		☐		☐			
. Creation of water reservoirs for livestock	☐			☐		☐			☐					☐				☐			
. Improved tourism activities	☐			☐	☐			☐			☐				☐						☐
. Creation of temporary employment	☐			☐			☐			☐			☐					☐			
. Increased income to local communities	☐			☐		☐				☐			☐					☐			
. Increased transmission of HIV/AIDS and STIs		☐		☐	☐	☐				☐					☐		☐	☐			
. Reduced vehicle operation and maintenance costs	☐			☐				☐				☐			☐						☐
. Construction related accidents		☐		☐		☐			☐				☐			☐		☐			
. Visual intrusion		☐		☐		☐			☐						☐	☐		☐			
Total Score:	5	21	10	16	5	20	2	4	19	5	1	1	12	6	8	13	5	21	2	1	2

Grid Method to determine the significance of negative impacts

INTENSITY	MAGNITUDE	DURATION	SIGNIFICANCE OF THE IMPACT
Very High	Regional	Pt	Very High
		I-t	Very High
		S-t	Very High
	Local	Pt	Very High
		I-t	Very High
		S-t	High
	Site Specific	Pt	Very High
		I-t	High
		S-t	High
High	Regional	Pt	Very High
		I-t	High
		S-t	High
	Local	Pt	High
		I-t	High
		S-t	Intermediate
	Site Specific	Pt	High
		I-t	Intermediate
		S-t	Intermediate
Intermediate	Regional	Pt	High
		I-t	Intermediate
		S-t	Intermediate
	Local	Pt	Intermediate
		I-t	Intermediate
		S-t	Low
	Site Specific	Pt	Intermediate
		I-t	Low
		S-t	Low
Low	Regional	Pt	Intermediate
		I-t	Low
		S-t	Low
	Local	Pt	Low
		I-t	Low
		S-t	Low
	Site Specific	Pt	Low
		I-t	Low
		S-t	Low

Note:

Pt. = Permanent Pt
I-t = Temporary, but over an intermediate time frame I-t
S-t = Temporary and short term S-t
Source: Ministry of Works (2004)[20]

[20] Ministry of Works (2004).*Environmental Assessment and Management Guidelines for Road Sector Stakeholders* Ministry of Works. United Republic of Tanzania. July 2004.

APPENDIX 9: ENVIRONMENTAL COMPLIANCE MONITORING CHECKLIST

1.	GENERAL ASSESSMENT					
	Issues	**Parameter Monitored**	**YES**	**NO**	**SCORE**	**REMARKS / COMMENTS**
1.1	Order of Works	Are sites immediately reinstated? (e.g. spoil areas)				
		Are temporary structures immediately removed?				
1.2	Method of Construction	Are contractor's arrangements and methods for the execution of works in conflict with community needs?				
		Is the local water supply adequate?				
		Has the Contractor considered the local water use, when obtaining water?				
		Does the Contractor's water use conflict with community use (leading into water shortage or siltation of water supply)?				
		Are there any other water issues?				
1.3	Site acquisition	Does the Contractor have the legal right to use the land?				
		Did the Contractor consult relevant land owners?	☐			
		Are there any outstanding compensation issues? If so what is being done?				
		Did the Government adequately evaluate compensation? Were funds released in a timely manner? If not what can be done?				
1.4	Construction works in general	Were trees removed unnecessarily? If so, will the Contractor replace the trees?				
		Is the Contractor maintaining the Temporary Worksite in a safety-conscious manner and maintaining access to adjacent properties?				
		Is there any evidence of surface or ground water pollution?				
		Is dust being suppressed adequately?				
1.5	Protection from water	Is on-site water management adequate?				
		Is there any evidence of ponding, flooding, erosion?				
		What can be done to improve on-site water management?				
1.6	Pollution	Are the Camps and Sites in a neat and tidy condition?				
		Are the sanitary and solid waste facilities adequate?				
		Is water treatment adequate?				
		Are spills in the working areas controlled?				
		Is the Contractor using a proper heating system for bitumen?				
		Are measures taken to decrease dust, air and noise pollution?				

1.7	Protection of existing works, services and Diversion of services	Has the Contractor's activity damaged existing works and services?				
		Has the Contractor arranged for the moving and alteration of services?				
1.8	Storage of materials and manufactured articles	Are materials, in particular dangerous materials properly stored?				
1.9	Health and Safety	Is an industrial-type First Aid Kit available on each site at all times?				
		Are trained First Aid personnel available on each site at all times?				
		Is transport for sick or inured workers available on each site at all times?				
		Do workers regularly receive information on spread of contagious diseases, and control of sexually transmitted infections, including HIV/AIDS?				
		Do workers have access to free condoms, general medical treatment and treatment for STIs?				
1.10	Facilities for Engineer and his/her Staff	Are the Engineer's facilities also equipped with adequate sanitary and solid waste facilities and water treatment?				
		Is refuse being collected from the Engineer's houses, offices and laboratories?				
1.11	Clearance and reinstatement of site	Is the Site being reinstated? Is there evidence that this will be done?				
		What is the work programme for reinstatement?				
1.12	Removal of Camps	Is the Camp located away from settlements and drinking water intake?				
		Has the camp been completely removed (i.e. temporary facilities)?				
		Have all unwanted structures, wastes, polluting substances been removed and disposed of in an approved disposal site?				
		Is there anything else that should be done before handing over?				
1.13	Engagement of Staff and labour	Did the Contractor hire some local labour? If no, why not? What can be done to encourage local hiring and the hiring of women?				
		Is the Contractor paying fair wages on time?				
		Is the Contractor restricting the number of working hours per day?				
		Is the Contractor allowing a number of rest days?				
		Is the Contractor prohibiting disorderly conduct (including poaching)?				
		Is the Contractor keeping good records, including accident records?				
		Are all the workers 16 years of age or above?				
1.14	Relations with local communities	Have communities been informed about the project?				
		Have there been any problems with or complaints by the local communities regarding the Works or the location and				

		operation of plant and facilities? If so, what was done and was it satisfactory? What needs to be done to resolve any other outstanding issues?				
1.16	Protection of existing natural and cultural resources	Is there any evidence of needless damage to natural resources (sensitive areas, cultural resources)? If so, what will be done to repair the damage? Was the national environmental agencies (NEMC or VPO) involved or should they be involved?				
		Is fuel wood being used on Site for the construction works?				
		Is there (functional) fire prevention equipment on Site?				
1.17	Road Safety	Was the road design subjected to a road safety audit?				
		Was the road project Drawing amended, based on the road safety audit results?				
		Does the new road design include adequate safety considerations? If not, can the road be referred back to the Road safety Unit? Can anything be done to improve road safety in a cost-effective manner?				
1.18	Payment of compensation	Were people satisfied with the compensation? If not, what can be recommended for the future?				
		Was there a significant delay between "evaluation of compensation" and "payment of compensation"? If so, have individuals received interest on their compensation package?				
2.	**SETTING OUT, GEOMETRIC TOLERANCE AND RECTIFICATION**					
	Issues	**Parameter Monitored**	**YES**	**NO**	**SCORE**	**REMARKS / COMMENTS**
	Geometric Tolerance	Do embankments, depth of drains, and cleared areas appear to be within geometric tolerance? If not, what is being done?				
		Is there any evidence of erosion and sedimentation in those areas?				
3.	**SITE CLEARANCE**					
	Issues	**Parameter Monitored**	**YES**	**NO**	**SCORE**	**REMARKS / COMMENTS**
3.1	Site clearance	Did Site clearance commence after compensation was agreed on?				
		Is there any evidence of excessive clearance (i.e. clearing beyond what was stipulated in the Drawing)?				
		Has there been unnecessary removal of trees or other vegetation? If so, why? What can be done to reinstate the area?				
		Did the Contractor protect designated trees from damage, including protecting trees' rooting system? Were some trees damaged? Will the Contractor replace the damaged trees?				
		Has debris been carted to the approved disposal areas?				
3.2	Topsoil stripping	Has all topsoil been stripped and stockpiled?				
3.3	Removal of structures,	Were items not specified to remain completely removed (e.g. buildings,				

	fences, and obstructions	foundations, pits, structures, drainage facilities, culverts)?				
		Was the material that cannot be reused sent to designated disposal areas?				
3.4	Protection of fences, trees, hedges, etc.	Were existing paths, fences, walls, hedges and trees, which were not removed, protected from damage?				
3.5	Disposal of materials	Were materials that were not to be reused disposed of appropriately?				
		Were spoils disposed in borrow pits for eventual use in borrow pit reinstatement?				
		Is the Contractor haphazardly burning materials on Site?				
4.	**EARTHWORKS**					
	Issues	**Parameter Monitored**	**YES**	**NO**	**SCORE**	**REMARKS / COMMENTS**
4.1	Explosives and blasting	Were explosives used correctly, by qualified, experienced personnel?				
4.2	Preparation prior to forming embankments	Is there evidence of drainage problems at large embankments? If so, what is being done? What can be recommended to resolve the issue?				
		Has excess excavated material been disposed of appropriately?				
4.3	Construction of embankments and cuttings	Does the Contractor ensure that the day's worth of materials for building embankments has been spread and compacted at the end of each day?				
		Does the Contractor stockpile material on the embankment?				
		Did the Contractor obtain the Engineer's permission to do so?				
		Is this resulting in heavy erosion or sedimentation? If so, what can be done?				
4.4	Sensitive areas	Has relevant authorities been advised of road project passing through the Forest Reserve or establishment of borrow pits in the Forest Reserve?				
4.5	Spoil materials	Is spoil materials being deposited in appropriate locations?				
		Is there evidence of spoil dumping?				
4.6	Top soiling and grassing	Is the Contractor top soiling and grassing embankment slopes, cut faces, side drains, shoulders, guiding dams and spoil or borrow areas? If so, are the plants healthy? Is re-vegetation successful? If not, what can be done?				
5.	**QUARRIES, BORROW PITS, STOCK PILE, AND SPOIL AREAS**					
	Issues	**Parameter Monitored**	**YES**	**NO**	**SCORE**	**REMARKS / COMMENTS**
5.1	General	Does the Contractor know where all the materials are coming from?				
		Did the Contractor consult with the community before opening an area?				
		Was the area and working method approved by the Engineer?				
		Did the Contractor only open such areas as are absolutely necessary for the Works?				
		Did the Contractor organize and plan his/her work in such a manner as to ensure the minimum wastage of valuable quarry and borrow pit resources, including removing overburden, excavating, and stockpiling only to the extent required for				

		the Works?				
		Does the Contractor have a reinstatement / restoration plan?				
		Is there an adequate supply of materials?				
		Are there any issues with respect to location of materials?				
		Has the Contractor located appropriate stockpile and spoil areas?				
5.2	Access roads	Are access road to borrow pits and quarry sites developed according to existing technical specifications?				
6.	**EXCAVATIONS AND FILLING FOR STRUCTURES**					
	Issues	**Parameter Monitored**	**YES**	**NO**	**SCORE**	**REMARKS / COMMENTS**
	Excavation for foundations or structures	Has surplus excavated material been taken to spoil areas?				
		Are the protection works adequate?				
		Were the temporary structures removed after completion?				
7.	**CULVERT AND DRAINAGE WORKS**					
	Issues	**Parameter Monitored**	**YES**	**NO**	**SCORE**	**REMARKS / COMMENTS**
	Excavation of culverts	Is the Contractor properly disposing excavation materials that are not suitable for reuse?				
		Are excavations timbered and supported, where required?				
	Protection of Work and Minor drainage structures	Do the drainage structures seem adequate in terms of number of structures or placement of structures? If not, what can be done?				
	Stone pitching, gabions, and riprap.	Are there adequate plans fro stone pitching, gabions, and riprap?				
	Mitre drains, Side drains, etc.	Are there adequate drainage structures?				
	Scour checks	Are there adequate scour checks?				
	Cleaning and maintenance	Are the drainage structures well maintained?				
		Are the waste materials from the drainage maintenance activities deposited in an identified and approved spoil deposit area?				
8.	**PASSAGE OF TRAFFIC**					
	Issues	**Parameter Monitored**	**YES**	**NO**	**SCORE**	**REMARKS / COMMENTS**
8.1	Summary of provisions	Does the Contractor provide safe passage through the Site at all times?				
		Are temporary road signs adequate (of the same as specified in the Standard Specifications), correctly placed, and visible at night?				
		Has the Contractor coordinated with other agencies, including the Police, on traffic management issues?				
8.2	Construction of Deviation	Is the deviation at least 6 m wide?				
		Was the site for the deviation cleared and the earthworks conducted in conformity with the Standard Specifications?				
		Was the land or watercourse associated with the deviation reinstated?				

		with the deviation reinstated?				
		Were all materials forming the diversion removed?				
		Was soil that was compacted because of the deviation ripped?				
8.3	Maintenance of Deviation	Is the Contractor maintaining the deviation during the course of the Works?				
8.4	Passage of Traffic	Is the passage of traffic during construction properly managed?				
8.5	Signs, barriers, and lights	Has the Contractor provided an adequate number of temporary signs, barriers, and lights along the worksite and the deviations, in correct locations?				
		Are barriers, hazards and signs illuminated / visible at night?				
8.6	Access roads	Have communities been consulted about the extra traffic on the public highways caused by the Contractor's activities?				
		Has the use of the public roads as an access caused undue disturbances in the form of noise, safety hazard, dust, or other disturbances to local communities				
9.	**CEMENT AND LIME TREATED MATERILAS**					
	Issues	**Parameter Monitored**	**YES**	**NO**	**SCORE**	**REMARKS / COMMENTS**
	Storage and handling	Have workers been supplied with boots, gloves, as well as masks and goggles?				
		Are there washing facilities nearby?				
		Are there "eye baths" in the First Aid Kit?				
10.	**BITUMINOUS SURFACE TREATMENTS AND SURFACE DRESSINGS**					
	Issues	**Parameter Monitored**	**YES**	**NO**	**SCORE**	**REMARKS / COMMENTS**
10.1	Bituminous Binder and Handling	Are bitumen storage and heating areas neat, tidy and clean?				
		Are spills handled immediately, placed in an appropriate spoil area and kept away from drinking water intakes, streams and rivers?				
		Does the work conform to the practice outlined in the Standard Specifications?				
10.2	Heating of Bituminous Binder	Is overheated? (Spoilt) bitumen disposed of in an appropriate manner?				
		Is the Contractor heating bitumen with the correct fuel (i.e. the Contractor should *not* be using firewood and rubber tires)?				
10.3	Safety precautions	Have safety measures been implemented to avoid fire and health hazards, when using bitumen (e.g. are workers provided with personal protective equipment)?				
		Has the bitumen worksite been properly controlled with barriers, cones, signs, and traffic controllers?				
10.4	Plant and equipment for surface dressing	Is the plant and equipment in good working condition?				
10.5	Weather Limitations	Does the Contractor suspend bituminous construction work or the pre-coating of chippings in adverse weather conditions (e.g. rain, wind, etc.)?				
10.6	Spraying of Prime Coat	During spraying, are kerbs, road furniture, culvert, headwalls, trees, poles, and other				

	and Tack Coat	structures protected from being splashed by bitumen?				
10.7	Pre-coating of chippings	Is pre-coating conducted during rainy periods?				
		Are stockpiles kept clean and dry?				
11.	**ROAD FURNITURE**					
	Issues	**Parameter Monitored**	**YES**	**NO**	**SCORE**	**REMARKS / COMMENTS**
11.1	Permanent road signs	Have trees and vegetation been cut back to permit good visibility of the permanent road signs?				
		Does dumped material obscure the signs?				
11.2	Road marking paints	Has the Contractor installed an adequate number of warning signs during the painting of road markings?				
11.3	Rumble strips	Has the Contractor provided rumble strips, as specified or instructed?				
11.4	Trees	Has the Contractor followed the instructions for the planting, care, and protection of tree seedlings?				
		Has the Contractor sub-contracted the work to a local NGO or women's group?				
		Are trees healthy?				
		Are the plants well established?				
		Was payment staged and subject to 2/3 of the plants surviving to the next payment period, with a payment schedule such as: 40% on planting; 30% 3 months after planting; and the final 30 % at the end of the Defects Liability Period?				

TOTAL SCORE RESULTS	**+ % Score values means Compliance**		
	- % Score values means Non-Compliance		
Ratings: 81-100 = Excellent 71-80 = Very Good 61-70 = Good 41-60 = Fair 0-40 = Poor			

APPENDIX 9: TERMS OF REFERENCE

1. INTRODUCTION

The Government of the United Republic of Tanzania through the Tanzania National Roads Agency (TANROADS) has received a credit from the International Development Association (IDA) towards the cost of the Central Transport Corridor Project (CTCP) and intends to apply part of the proceeds of this credit to eligible payments under the contract for the Detailed Engineering Design and preparation of bidding documents for the rehabilitation of Korogwe-Mkumbara - Same road (165 km).

The Korogwe- Mkumbara - Same road forms part of the North East Corridor (T2), which is a major link between the East Coast (including Dar Es Salaam-the capital city of Tanzania and Tanga Port) and the popular tourist destinations in the North including Mount Kilimanjaro, Mount Meru, Lake Manyara, the Ngorongoro Conservation Area, Tarangire National Park and the famous Serengeti National Park. It is also the main road link between the Dar Es Salaam and Nairobi – the capital cities (and major trade centres) of Tanzania and Kenya respectively.

The Korogwe Mkumbara Same road can be divided into two distinct sections namely Korogwe- Mkumbara (65km), and Mkumbara-Same (100km). Both sections have a bituminous double surface dressed carriageway with varying degrees of deterioration.

The Korogwe – Mkumbara section which starts at Maili Kumi village located at about 10 km west of Segera junction and ends at Mkumbara village was rehabilitated in 1991-1994 to double surfaced bituminous standard. The carriageway is 6.5m wide with 1.5m wide shoulders. The condition of the road section varies from fair to poor. The pavement is characterized by extensive surface cracking, stripping of aggregates from the surface dressing, rutting, occasional base failures and potholes. The road requires urgent strengthening of the pavement to preserve the investment. The ADT recorded in 2002 on this section was 741 vehicles per day.

The Mkumbara – Same section was constructed in the early 1960's and has received regular routine and periodic maintenance. The last resealing of the section was done in 1990. Apart from spot improvement to the drainage structures, no major rehabilitation or pavement strengthening has been provided since its construction. The road condition has therefore deteriorated due to increased traffic and requires rehabilitation. The condition of the surface varies from corrugations caused by stripping of aggregates from the surface dressings to localized potholes and rutting. The ADT on this road is 706 vehicles per day (October 2002 Traffic Count Report).

The economic analysis done during the "Ten Year Road Sector Development Study" showed an economic return of 28% for this road section, thus confirming its strategic importance and the need for rehabilitation.

The proposed rehabilitation works are to be implemented in two packages. Package 1: Same - Mkumbara (65km) will involve improvement of the vertical and to some extent horizontal alignment, reconstruction and widening of the carriageway, surfacing of shoulders, and improvement of the drainage system. Package 2: Mkumbara - Korogwe (100km) will involve mainly pavement strengthening, surfacing of shoulders, and improvement of the drainage system.

2. OBJECTIVES

The objective of the assignment is to carry out a detailed engineering design including preparation of pre-qualification and tender documents, for the rehabilitation of the Korogwe-Mkumbara- Same road to double surfaced bitumen standards without adverse effect on the society and the environment.

3. SCOPE OF CONSULTANCY SERVICES

The Consultants shall carry out all tasks deemed necessary to achieve the objectives defined review in Section 2 hereof. Such tasks shall include inter alias, review of available documentation related to the project and performs all field investigations and engineering works related the assignment. As part of the study the consultant shall carry out an Environmental and Social Impact Assessment (EIA & SIA) and prepare Environmental Management Plan (EMP), Social Impact Mitigation Plan and the Resettlement Action Plan (RAP) including related cost estimates in accordance with the guidelines issued by GOT and World Bank.

In particular the consultant shall perform the following tasks:

3.1 Environmental and Social Impact Assessment

The Consultant shall carry out an Environmental Impact Assessment (EIA) and a Social Impact Assessment (SIA). The consultant shall be guided by Tanzania's legislation and regulations governing environmental management and suggest means of promoting public / NGO participation during project implementation.

The consultant shall also prepare the following:

- A description of the proposed works,
- Baseline data and information on the environmental characteristics of the entire road project and include information on any changes anticipated before and after the project commences.
- An identification of potential impacts (negative and positive),
- A preliminary Environmental Management Plan, including its cost estimate,
- A preliminary Social Impact Mitigation Plan including RAP and associated costs,
- Identification of the Institutional Needs to implement Environmental Management Plan and
- Plan to monitor the implementation of proposed mitigation measures of the project.

The consultant shall produce an environment & social impact assessment report following the guidelines in Attachments I and II. Scoping exercise shall be conducted with key environmental stakeholders (i.e. Vice-President's Office, NEMC, Ministry of Natural Resources and Tourism etc) before the report is submitted to TANROADS.

The Consultant shall also carry out a Social Impact Assessment (SIA) and prepare a Social Impact Mitigation Plan. Although no major resettlement works are envisaged, the consultant shall prepare the Resettlement Action Plan (RAP) following the guidelines in Attachment III. Since the road works will affect the life of the community staying within the area of influence of the road, the consultant shall prepare a social mitigation plan, and design HIV/AIDS awareness and prevention program. The campaign shall be targeted at the road construction workers and the communities within the area of influence of the road project.

3.2 Detailed Engineering Design

The consultants shall undertake the detailed engineering design of the road as outlined below. Once the basic rehabilitation options and related costs are known, the consultant shall carry out an economic analysis to establish the economic justification of each option. The total cost shall also include costs of Environmental Mitigation Plan, the RAP, HIV/AIDS alleviation provisions and construction supervision costs.

The overall responsibility for administration and coordination of the assignment rests with TANROADS. In the conduct of his work, the Consultant shall regularly communicate with TANROADS and other Government departments and Agencies responsible for Transport and Development planning. The Consultant shall be responsible, however, for the analysis and interpretation of all data received and the conclusions and recommendations in the report.

3.2.1 Design Standards

The following approved standards by the Ministry of Works shall be adopted and adhered to:-

Geometric design: Draft Road Manual of 1989
Code of Practice for Geometric Design (Draft) published by SATTC -TU, 1998

Pavement and Materials: MINISTRY OF INFRASTRUCTURE DEVELOPMENT Pavement and Materials Design Manual, 1999

Specifications: MINISTRY OF INFRASTRUCTURE DEVELOPMENT Standard Specifications for Road Works, 2000

Testing Procedure: -Central Materials Laboratory Testing Manual, 2000

Structures: -British Standards BS 5400

The Consultant shall be responsible for the design details within this framework. The methodologies used in the design of pavement, earthworks, drainage and structures, shall conform to the latest techniques while ensuring the optimal use of available local construction materials. At all times a balance must be kept between capital and maintenance costs.

3.2.2 Topographical Surveys

Topographic surveys shall be carried out to locate the centreline and establish permanent markers. The horizontal and vertical alignment as well as drainage structures shall only be improved where necessary to comply with MINISTRY OF INFRASTRUCTURE DEVELOPMENT Design Standards appropriate to the traffic and engineering characteristics

of the road. The consultant shall preferably follow the existing alignment, except where realignment is necessary to improve safety.

The topographical surveys shall include:

- Establishing a primary network of trigonometric points (control points) at a maximum interval of 600 m along the road thereafter to be distributed to 300m as secondary points,
- Survey of the existing roads, junctions, kerbs, drains, culverts, road furniture, buildings etc within the road reserve for preparation of mapping to a scale of 1:2000 and as necessary to complete the detailed engineering design,
- Detailed surveys shall be carried out at all areas for proposed new structures locations extending for at least 100m downstream and upstream.
- Levelling along centre line at 25m intervals for longitudinal profile, and
- Cross-section levelling at 25m intervals and at any local abnormality. Cross sections are to cover at least 25m each side of the future centreline.

The co-ordinates of all intersection points shall be tied to the National Survey Grid, and levels related to the National Benchmarks. The Consultant shall carry out all the surveys necessary for the detailed design of the proposed works and for the estimation of quantities to be incorporated in the final bidding documents. The following surveys.

- Concrete beacons shall be firmly sited,
- The geometric characteristics of the centreline shall be computed and defined,
- Staking data will also be given for points along regular intervals along the curves and the longer tangent alignments, and
- The Vertical and Horizontal alignment will be defined and computed accordingly.

All topographical surveys undertaken by the Consultant shall be to generally acceptable international standards for such works, and must conform to survey procedures of the Ministry of Lands and Human Settlement. The topographical data shall be available and presented on maps with a scale of 1:2000 for the road showing the following:

- Existing road, other roads, footpaths, rivers, creeks, watercourses, drains;
- Buildings:-public building and houses of all types
- Public land usage: sports fields, cemeteries, cultivation, forests, etc.;
- Trees with diameter in excess of 0.5m and 1.50m height;
- Main fences/bench marks and grid lines; and
- National trigonometric points, National Bench Marks, Consultant's primary and secondary trigonometric points and benchmarks complete with co ordinates and elevations (levels).

3.2.3 Detailed Soils and Materials Investigations

i) A review shall be made of all existing relevant data followed by a detailed soils investigation study of the soils and materials along the route to identify the varying soil types, sub – grade strength properties with samples taken at about 250 m intervals and also at such other places necessary to determine changes in soil type. The soil and materials testing program shall be presented by the consultant and agreed to by TANROADS.

ii) Investigations for sources of construction materials for pavement and structures shall also be carried out, and sites of suitable materials surveyed and shown in the engineering plans. To ascertain the quantity and quality of material at potential borrow pits and quarry sited test pits of adequate depth and drilling shall be carried out (at least 4 tests/hectare). Analysis and

testing shall be carried out and provided as required on the construction materials, in accordance with standard practice provided in the CML's Testing Manual, 2000. Tests are to include: soil/moisture/density relationships and CBR values and any test on special methods of soil stabilization. The consultant shall make adequate tests to prepare alternative designs for sub-base, base course and wearing courses with different materials, such as naturally occurring gravel, gravel stabilized with cement and/or crushed stone.

iii) Construction materials samples shall be tested where necessary for mechanical characteristics. Potential gravel sources shall be tested for the following material properties:

- Grading,
- Atterberg Limits, and
- Moisture/density relationship (AASHTO T180)
- California Bearing Ratio (CBR)

Special attention shall be given to identification of possible causes for existing pavement failure and suggest measures to prevent similar failures in future. This should include sections with plastic soils that should be determined and appropriate corrective measures recommended.

Potential sources of hard stone shall be tested for:

- Los Angeles Abrasion,
- Aggregate Crushing Value,
- Sodium Sulphate Soundness,
- Flakiness,
- Bitumen Affinity,
- Specific Gravity and Water Absorption, and
- Chloride and Sulphate Content.

iv) Soil and material plans (scale 1:500) shall be prepared showing sample/drilling locations and exact locations of all construction materials available and investigated with an indication of their quantities.

v) The consultant shall review existing sources, and shall identify additional supplies of construction water, shall provide information on the quantities and quality of water-required and available for construction. Please take note that all water to be used for the implementation of the project shall not be provided from a public source or on the expense of either the farming population in the area or the villagers, etc. Where construction water is not readily available from sources other than public sources the Consultant shall propose sources of construction water such as bore holes or shallow ponds ahead of the rainy season and identify associated costs.

3.2.4 Drainage Structures

The Consultant shall assess the structural condition and hydraulic properties of all existing bridges, pipe and box culverts including inlet and outlet structures, and carry out the design of their remedial works or replacement. For all new drainage structures, or existing structures which are need of major repairs, expansion or replacement, the consultant shall carry out relevant hydrological and geo-technical analysis as follows:

i) Hydrological studies shall be carried out on the proposed drainage structures with careful analyses of stereoscopic maps of aerial photographs and other available data such as rainfall data, temperature and other dichotic features of importance.

ii) The catchments area, run-off coefficient, hydraulic gradient and design flood discharge for the appropriate return period shall be determined for each drainage structure, and the corresponding water level established.

iii) Cross-sections and gradients of watercourses shall be surveyed to determine the design of proper drainage and erosion control and the scour and slope protections.

iv) Sub surface investigations will include trenching, hand – auguring, and/or drilling up to foundation level including the taking of undisturbed samples. Seismic investigation shall also be carried out if considered necessary by the consultants. Allowable bearing pressures of sub-surface stratum shall be determined at proposed foundation levels of structures.

3.1.5 Pavement Evaluation

The consultant shall conduct visual road condition survey to gather data related to pavement distresses such as cracks, ravels, potholes, patches, deformation, edge step, edge break, shoulder conditions, ditches conditions, etc. Particular attention shall be given to compliance with HDM IV input data requirements.

Pavement deflection measurements, to assess the residual life of the existing pavement shall be carried out using non-destructive tests such as the Standard Falling Weight Deflectometer (SFWD) also the consultant will be allowed to use other alternatives. However, consultant will be required to quote for SFWD. The interval of the tests will depend on pavement condition and will vary from 100m intervals where damage is not severe to 50 m spacing in areas of severe damage.

3.2.6 Traffic Studies, Surveys and Analysis

Surveys and Studies of Present Traffic

The consultant shall undertake all traffic surveys and studies necessary in order:

- to determine the Average Annual Daily Traffic (AADT) of the present traffic on the project road, and
- to forecast the AADT to the horizon of the economic analysis period, i.e. 20 years.

These outputs will be used as input data to economic analysis as well as engineering design.

Surveys of present traffic will include:

- Classified one-week 12-hrs manual traffic directional count at stations appropriately located on the project road;
- Classified three-day 24-hrs manual traffic directional count at significant stations located along the project in order to derive night/day ratio of traffic;
- Origin/Destination (O/D) road site surveys (RIS) at stations appropriately located on the project road to capture information on vehicles movements in order to prepare O/D matrices of passenger and commodities flows from these origins and destinations;
- Axle loading surveys at stations appropriately located along the road to capture information on directional traffic loading in order to determine the Coefficient

Equivalent Factors (CEF) for various categories of vehicles passing through survey stations in view of the estimation of E80s traffic loading on the project road.

Forecasts of Future Traffic

The consultant shall undertake all traffic studies necessary for forecasting the AADT and associated E80 loading on the project roads year by year to the horizon of the economic analysis, i.e. 20 years.

Studies for traffic forecasts shall include:

1. Macro-economic studies related to GDP and growth rates for all economic sectors, in particular the transport sector, GDP per capita and growth rates, transport demand elasticity in order to derive traffic growth rates for normal traffic based on these input data;
2. Studies on present and future development projects affecting the economy of the project areas during the economic analysis period, i.e. 20 years to forecast generated traffic based on O/D matrices;
3. Studies on the effects of improvement of the project road condition to forecast diverted traffic based on O/D matrices.

3.2.7 Detailed Engineering Design Requirements

(a) Horizontal and vertical alignment

The horizontal alignment for reconstruction sections shall be determined by points at even increment of length of 25m along the centreline, tangent points and such other critical points as may be required. Cross – section shall be taken along the length of the road centreline and levelled at each 25 metre and at any local abnormalities in topography. All major points shall be tied to the National Grid System to which the roads shall be referenced. Scale should be 1:2000/200 and details at scale 1:50.

The vertical alignment shall take into account the design standards adopted and, at the same time, due consideration shall be taken to the hydraulic conditions and the needs, for raising the embankments appropriately to avoid flooding.

(b) Earthworks and Pavement Design

Engineering analysis shall be undertaken using the results of the soils and materials tests, to determine the gradients of slopes, compaction requirements, pavement design and other engineering treatment dictated by available natural materials. The pavement will be designed to carry traffic over a 20-year life of the proposed project following the procedure given in the Pavement and Materials Design Manual. The consultant shall consider various alternatives for the pavement design based on traffic forecast and cumulative standard axles. Pavement strengthening alternatives for the Korogwe - Mkumbara section should take into consideration the existing pavement structure and the need for providing uniform pavement to match with the adjoining sections.

(c) Drainage Design

All existing data and the results of the field investigations for drainage structures, soils, etc, shall be assessed and used as a basis for the design of drainage structures. Detailed hydraulic computation and structural designs shall be carried out and fully documented in the Reports. Detailed designs shall be prepared for all drainage structures to a width and loading capacity in accordance with BS 5400.

(d) Traffic Safety

The Consultant shall identify and incorporate remedial measures within their design, existing and potential accident black spots. Particular attention should be addressed to those black spots identified by SWEROADS during the safety master plan study. Improved layout and visibility at junctions, proper separation of pedestrians and cyclists from the vehicular traffic and the provision of pedestrian crossings, bus bays and parking areas shall be reviewed and appropriate safety measures included in the design, where the road passes through town and major markets. Other measures to be considered include provision of wide shoulders with protective barriers such as bollards in town/villages and inclusion of climbing lanes on steep grades.

A detailed traffic engineering analysis shall be prepared to specify the design of necessary traffic control features. The consultant shall conduct traffic studies to determine the location of signs, signal as necessary, pavement markings, facilities for pedestrians and non-motorized traffic around populated areas and other control features.

(e) Engineering Drawings

The Consultant shall prepare the following drawings for the project using format and title sheets as shall be required with by TANROADS, with the originals becoming the property of the Client.

(i) Topographical Plans, scale 1:2000

(ii) Plans and Profile, scale 1:2000/1:200

Showing natural ground levels, horizontal and vertical curve details, running chainage, cross-section chainages, side drains location, description and references to all drainage works, location of bench marks, location of road furniture, any other relevant information in the format approved by TANROADS.

(iii) Typical Cross-Sections, scale 1:50

Showing all details of road cross section in cuts and fills, side drains, Pavement thickness, camber and super-elevation and pavement widening. Also showing natural ground level and super - imposed road prism and structural drawings details as required

(v) Bridge and Culvert details, scale 1:50

Showing details of all types of culverts and other drainage structures, their inlets and outlets and any necessary protection work.

(vii)Auxiliary Work

Drawings for all other ancillary works shall be prepared using the appropriate scales.

(viii)Maintenance of Traffic Plans

A detailed scheme for the maintenance of the traffic flow shall be developed to ensure that vehicle and pedestrian movement is properly handled during the rehabilitation period. This plan shall include details of the location of by-pass lanes, temporary structures, barriers, signs, signals and other physical features necessary to accommodate traffic flow during construction. In addition to the design plan, the Consultant shall prepare a traffic operations plan detailing the construction sequencing, public information announcements, use of traffic control devices and other activities designed to minimize traffic disruption.

(f) Cost Estimates.

The Consultant shall estimate likely unit rates applicable to the proposed construction works. In order to make a fair and reasonable estimate of the cost of project, the Consultant shall prepare a unit price analysis of each item using basic cost elements (labour, materials, equipment, tools, overheads, on - site costs, profit, etc.), and showing separately the cost of all taxes (direct or indirect, duties, levies, and fees). The estimated financial cost resulting from this analysis shall be accurate to within +/-10% and shall be compared with costs of previous projects or similar works executed in the area and adjusted accordingly. The estimates shall also include RAP and EMP related costs.

The Consultant shall give cost estimates broken down by main work items into foreign and local currency components as follows:-

(i) For foreign currency:
- imported equipment, materials and supplies;
- Identifiable foreign components of domestic manufactured equipment, materials and supplies;
- Salaries of expatriate personnel, and
- Profit and overheads of foreign firms where appropriate.

(ii) For local currency:
- Right of way acquisition;
- Local materials, supplies, and services;
- Salaries and wages of local employees both skilled and unskilled.
- RAP & EMP

In addition, the Consultant shall present separately the taxes and duties element of the cost estimates.

(g) Construction Schedule

In order to assist in evaluating the required construction period and forward budget needs, the consultant shall carry out a network analysis of the project using suitable deterministic or probabilistic theory or a combination of both showing, inter alia: -

- Major activities and their duration
- A "network" showing the proposed ordering or sequencing of the major activities.
- Duration of the entire project in the form of a bar chart
- Monthly cost of each activity
- Anticipated monthly expenditure presented in form of an S-curve.

In carrying out this analysis, due account shall be taken of the climatic conditions in the project area.

3.3 Tender Documents

Based on the approved detailed designs, the Consultant shall prepare complete Tender Documents for each package: Same – Mkumbara and Mkumbara – Korogwe. The tender documents shall be prepared in accordance with the World Bank's Standard Bidding Documents for the Procurement of Works or the Procurement of Works - Smaller Contracts, the appropriateness of which shall depend on the estimated cost of the project. The former is applicable to the project estimated to cost US $10 million and above.

3.3.1 Pre-qualification Documents

Pre-qualification is required for contracts of US $ 10m or more. It is expected that each of the two packages may be above USD 10 million. In the event pre-qualification is required the Consultant shall:

Prepare all necessary documents for the pre-qualification of contractors, including abbreviated specifications of the work to be performed, forms for Invitations for pre-qualification, draft advertisements, etc.; and

Review and evaluate applications for pre-qualification and prepare a list of pre-qualified firms which should be permitted to bid.

The consultant shall price separately for the related cost to facilitate adjustments in the event that the pre-qualification documents are not required.

Bidding Documents

The Consultant shall prepare complete Tender Documents to allow for the call of tenders for works. The Tender Documents shall be designed as follows:

i) Volume I

- Invitation to Tender
- Instructions to Bidders - Bidding Data
- Forms of Bid and Qualification Information
- Form of Agreement and Appendix
- Form of Performance Guarantee
- Tender Surety
- Special and General Conditions of Contract
- Bill of Quantities

N. B This document shall be clearly marked on the cover as “TENDER DOCUMENT”

ii) Volume II

- Technical Specifications (General and Special Specification)

ii) Volume III

- Drawings (photo-reduced to “A 3” size)

iv) Volume IV

- IV (A) Materials Report
- IV (B) Hydrological/Hydraulic Report

Volume IV (A) & IV (B) shall be factual reports clearly marked on the cover “FOR INFORMATION ONLY AND NOT PART OF TENDER DOCUMENTS” with a preamble in the text stating, that “This report is only representing the investigations and findings of the Consultant and shall be the Bidder’s responsibility for any source and quality of materials, etc. without binding the Client”.

4. REPORTS

The Consultant shall prepare, and submit the reports listed below in English and presented on A4 sized paper. All reports shall be submitted as initial draft versions which shall be finalized to accommodate clients' comments. Survey data for both draft and final shall be submitted in a format compatible to Windows XP™.

Consultant shall arrange for presentations (preferably in Power Point™) of their findings and recommendations to a panel of TANROAD experts for the preliminary and draft final reports. The presentations shall take place at least one week after submission of the respective report.

a) Inception report: (10 copies)

This report shall briefly describe the mobilization and establishment status of the Consultant, the specific staffing plan, the updated work plan the Consultant proposes to follow in carrying out the assignment based on the consultants initial findings, details of any constraints or inputs required from the employer and such remarks as are deemed appropriate including the works done so far. This report shall be submitted not later than 30 calendar days from the date of commencement of services.

b) Preliminary Design Report.

The consultant shall within 4 months from commencement prepare and submit a preliminary report (10 copies) summarizing the findings of the field investigations and preliminary design proposals including detailed economic analysis of the various rehabilitation options proposed by the consultant. The report shall comprise of an executive summary and interim technical reports from each of the disciplines (i.e. pavement evaluation, Drainage analysis and structures, materials, economic analysis, environmental and social impact assessment, etc.) describing the work carried out in the investigation/study, detailed summary of findings and preliminary design proposals.

c) Draft Final Report (5 copies) and Draft Tender Documents (5 copies).

This report shall cover all aspects of the Final Design Report and shall be submitted in five (5) copies to TANROADS not later than seven (7) months after the commencement of services. The objective of this report is to provide the client with the opportunity for a final crosscheck of all documents before preparation of the final version.

The report shall summarize the findings, analysis, results and recommendations of the detailed engineering design, and shall consist of the following volumes:

(i) Design Report –Main Report

The design report shall include all the assumptions and criteria used in the analysis and design of the works, together with all details and standards used. All design calculations for pavements and structures shall be enclosed in form of annexes.

ii) Materials Report.

The reports summarizing all geotechnical findings and adoption of those findings to design, quantities and qualities of materials to be available with the corresponding excavation depths, test results and any other related information in respect of materials quarries.

iii) Hydrological - Hydraulic Report

The report summarizing all Hydrological and hydraulic analysis/calculations together with the assumptions and criteria used for the design of drainage structures, water way opening,

major water courses, etc. shall be submitted together with the Draft Final and Final Design Reports.

iii) Engineering Drawings

The Consultant shall prepare A1 size contract Engineering Drawings, which shall be photo reduced to A3 size and submitted as bound sets. The drawings shall include locations of the proposed pavement treatment of various details, typical Sections, typical treatment details. The consultant shall forward to TANROADS one (1) complete set of originals of all drawings in A1 size and four bound sets in A 3. In additional the electronic copy of the drawings should be submitted to TANROADS.

iv) Economic Justification (5 copies)

The consultant shall submit an updated report on the economic analysis presented in the preliminary report showing economic justification for the proposed rehabilitation option. This report shall include summaries of relevant data used in the analysis and shall include traffic data, summary of project costs and benefits and calibration factors used in the HDM IV model. Summaries of HDM IV printouts shall also be annexed to this report.

v) RAP and EMP (5 copies)

Together with the Final Engineering Design Report and Bidding Documents, the Full Resettlement Action Plan (RAP) shall be submitted. The full RAP shall be submitted initially as a Draft which shall then be finalized to accommodate clients' comments.

vi) Confidential cost estimate (4 copies)

The confidential cost estimate for works and services shall be in the form of completed Bills of quantities. The estimate shall be submitted together with other reports

vii) Draft Tender Document and PQ Document (5 copies)

The consultant shall prepare and submit draft tender document for the two packages:

Package 1: Rehabilitation of Same - Mkumbara section

Package 2: Rehabilitation of Mkumbara - Korogwe section

(d) Final Report (10 copies)

The reports shall be submitted not later than 30 calendar days from the date of approval by client of Draft Final Report including related Tender Documents. This report shall incorporate all comments received from the Client in respect of the Draft Final report.

4.1 Record of Documents

After delivery of all final documentation, the originals of the documents are to be deposited with TANROADS head quarters in hard and soft version (Compact Disc) in Microsoft Office compatible format or such other software agreed with the client during the pre-contract negotiation.

5. PROFESSIONAL STAFF

The total professional input is estimated at 42 man-months comprised of the following key position: Resident Engineer/Senior Highway Engineer; Highway Engineer, Transport Economist; Materials Engineer, Hydrologist, Bridge/Structural Engineer, Environmentalist and a Sociologist.

1. Team Leader /Senior Highway Engineer

The Team Leader shall be responsible for the proper conduct of the entire study and shall be the principal contact person between the Design team and the Client.

The Team Leader should be a Registered or Chartered Civil Engineer preferably with a relevant post graduate training. He must have not less than 12 years of cumulative experience related to road/bridges design and construction. The Team Leader must have in the last ten (10) years specific experience of working in similar capacity in managing consultancy teams working on feasibility studies and detailed roads design in at least three (3) projects of similar magnitude and complexity. At least one project should be in sub Saharan Africa. Fluency in written and spoken English is mandatory and ability to communicate ideas freely and easily is essential.

2. Transport Economist

The transport economist shall carry out the economic analysis of the project. He shall be responsible for compilation of the relevant data for economic analysis and shall ensure proper calibration of the HDM-4 Model. The analysis shall also include sensitivity tests to check the robustness of the project outcomes as indicated.

He /she should be a qualified, graduate Transport Economist/Transport Engineer with at least 8 years of cumulative experience in the design and analysis of public investment projects. He/She must have in the last ten (10) years served in a similar position in the design of at least 2 road projects of similar magnitude and complexity. One of these projects must have been in a developing country. Proven experience in the use of HDM-4 model and fluency in both written and spoken English are essential.

3. Highway Engineer

The Highway Engineer shall be responsible for, among others, the topographic survey and the geometrical aspects of the road design; and shall assist the materials engineer in the design of pavement strengthening measures.

The Highway Engineer should be a Registered or Chartered Civil Engineer. He must have not less than 8 years of cumulative experience related to road/bridges design and construction. He /She must have in the last ten (10) years specific experience of working as highway engineer on at least two (2) projects of similar magnitude and complexity. Post graduate qualifications in highway engineering and experience in working in tropical countries is an added advantage. He/She must be fluent in both written and spoken English.

4. Materials/ Pavement Engineer

The Materials/Pavement Engineer shall be responsible for the materials investigation and pavement evaluation activities with a view to achieving optimal design and construction strategy. In addition to preparing the material report the material engineer shall be responsible for the design of the pavement structure.

The Materials Engineer should be a Registered or Chartered graduate Civil Engineer with not less than 8 years of cumulative experience related to pavement evaluation, materials investigation and pavement design. He /She must have specific experience of working as Materials/Pavement Engineer on at least two (2) projects of similar magnitude and

complexity in the last ten (10) years. At least one of the projects must be in a tropical country. He/She must be fluent in both written and spoken English.

5. Environmentalist

The Environmentalist shall be responsible for carrying out an environmental impact assessment of the project and shall prepare the corresponding, environmental management plan (EMP).

The environmentalist shall have a degree in environmental management or related discipline. He /She shall have at least 5 years of cumulative working experience related to environmental management in infrastructure development projects. He /She must have served on similar position on at least two (2) road projects of similar nature in the last ten (10) years experience in environment management issues in tropical countries. He/She must be fluent in both written and spoken English.

6. Sociologist

The Sociologist shall be responsible for the Social Impact Assessment (SIA) in the corridor of impact and shall prepare a social impact mitigating plan including Resettlement Action Plan (RAP) in accordance with the Terms of Reference.

The sociologist shall be a holder of a degree in social sciences or related discipline. He/She must have at least 5 years of cumulative working experience related to social impact management. He/She must have served in similar position for at least two (2) road projects related to road development in the last ten (10) years previous experience in tropical countries. He/She must be fluent in both written and spoken English and knowledge in Swahili language is desirable.

7. Bridge/ Structural Engineer

The Bridge/Structural Engineer shall be responsible for the assessment of existing bridges, design of new bridges and other structure along the project road.

The Bridge/Structural Engineer should be Registered or Chartered Engineer with a degree in civil engineering or equivalent qualification. He /She must have not less than 8 years of cumulative experience related to design construction and maintenance of roads/bridges. He /She must have served as a bridge engineer on at least two (2) projects of similar magnitude and complexity in the last ten (10) years. Experience in the design of bridges in tropical countries will be an added advantage. He/She must be fluent in both written and spoken English.

8. Hydrologist

The Hydrologist shall be responsible for the assessment of the hydrological characteristics of all catchments area along the project area and advice the bridge engineer accordingly. The Hydrologist should be a holder of a degree in hydrology or civil engineering or equivalent with not less than 8 years of cumulative working experience related to water sources/flood management. He /She must have served as a hydrologist on at least two (2) projects involving the design of drainage structures of similar magnitude and complexity and those encountered along the project road in the last ten (10) years. Experience in tropical countries is essential. He/She must be fluent in both written and spoken English.

6. TIMING

The services are expected take 10 calendar months and shall commence 15 days from the date of signing the contract (effective date)

The following time frame/schedule (in months) is proposed for the study. Deliverables shall be submitted not later than the dates shown below:-

Signing/Effective Date of Contract	M
Commencement of services	M + 0.5
Inception Report	M + 2
Comments on the Inception report (Client)	M + 3
Preliminary Design Report including economic justification	M+4
Client's comments on the Preliminary Design Report	M+5
Draft Final Engineering Design Report including Bidding Documents, Full EMP& RAP &SMP	M +7
Comments by Client	M +8
Final Report and Tender Documents	M +9
Approval of Final Report and Bidding Documents	M+10

7. SPECIFIC RESPONSIBILITIES OF THE CONSULTANT

All information, data and reports obtained from TANROADS in the execution of Consultancy services shall be properly reviewed and analysed by the Consultant.

The Consultant shall be responsible for arranging for all necessary office and living accommodation, transport, equipment, supplies, secretarial services, and such other services, except that a Provisional Sum amount of US $ 75,000 shall be included in the Consultant's Financial Proposal for the direct costs for the purchase of three new diesel powered 4X4 vehicles. The Consultant shall also include in his Financial Proposal for the cost of fully-comprehensive insurance, maintenance and all other running costs for these vehicles, which he will use for carrying out the consultancy services. These two vehicles shall revert to the Employer in good condition upon completion of the services

8. OBLIGATIONS OF THE GOVERNMENT

8.1 Documents and Reports

The client shall provide the Consultant with all available data and reports that is considered relevant to the services of the consultant. The consultant shall be responsible for the correctness, analysis and interpretation of the data and recommendations thereof. All such

information, data and reports shall be treated as confidential and shall not be used for any purpose not related to the assignment.

8.2 Liaison

The client shall facilitate liaison with Government Departments and other agencies whom the consultant needs to contact in the course of the study. The Consultant shall be fully responsible for subsequent follow-up and collection of data and information from the agencies, and shall be responsible for any costs thereof.

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